



## PLC Integration DMU\_3104

**IO - Link service data function block + process data parser function for Siemens S7-1200 / S7 - 1500 (TIA - Portal V15.1 or higher) PLC systems in combination with a PROFIBUS / PROFINET IO - Link Master**

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# Table of Contents

<b>1</b>	<b>Legal information.....</b>	<b>4</b>
1.1	Disclaimer.....	4
<b>2</b>	<b>About this document.....</b>	<b>5</b>
2.1	Purpose of use.....	5
2.2	Target group.....	5
<b>3</b>	<b>General use of function block.....</b>	<b>6</b>
3.1	Short description.....	6
3.2	Calling and designation.....	6
3.3	Configuration.....	6
3.4	Method of function.....	7
3.5	Behavior when error occurs.....	7
<b>4</b>	<b>Integration into the PLC project.....</b>	<b>8</b>
<b>5</b>	<b>Process data parser function.....</b>	<b>9</b>
5.1	Calling and designation.....	9
5.2	Configuration.....	9
<b>6</b>	<b>Error description.....</b>	<b>11</b>
<b>7</b>	<b>Data structures.....</b>	<b>14</b>
<b>8</b>	<b>Parameter descriptions.....</b>	<b>23</b>
<b>9</b>	<b>Technical specifications.....</b>	<b>29</b>
9.1	General data.....	29

# 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\_DMU\_3104" simplifies the usage of Leuze IO-Link devices on Siemens S7-1200/S7-1500 (TIA-Portal V15.1 or higher) PLC controls. This FB supports IO-Link Masters which can be connected via PROFIBUS / PROFINET to the PLC system.

The function block is device type-specific and thus only suitable for the appropriate Leuze IO-Link devices. The FB interprets the call-up of the acyclic service data between the PLC and the IO-Link device.

The IO-Link function block can only be used in combination with the listed helper functions / libraries.

### 3.2 Calling and designation

The module can be called as a single-instance.

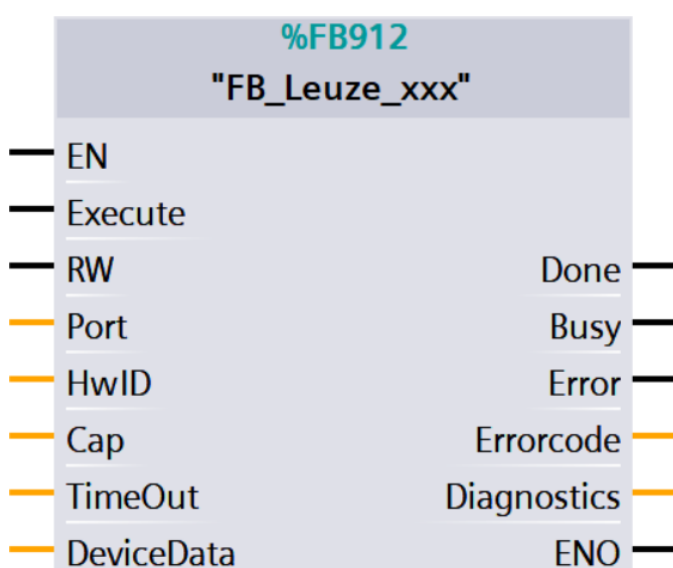


Fig. 3.1: Example of module call with single instance

### 3.3 Configuration

Tab. 3.1: Parameter IN

Parameter	Data type	Description
Execute	Bool	Positive trigger: Start data transfer
RW	Bool	Read or write the selected IO-Link parameter. FALSE: Read parameter TRUE: Write Parameter
Port	Int	Number of the master port the IO-Link device is connected, starting with 1.
HwID	HW_IO	Hardware IO-Address of the IO-Link master
Cap	DInt	Client access point of the IO-Link function (IO-LinkMaster specific). Siemens: 227 Weidmüller: 227 Other manufacturers: 255
TimeOut	Time	Time, after a Timeout-Error is triggered.

Tab. 3.2: Parameter INOUT

Parameter	Data type	Description
DeviceData	Leuze_type_DMU_3104	Sensor data

See structure description of Leuze\_type\_DMU\_3104 in chapter 7.

Tab. 3.3: Parameter OUT

Parameter	Data type	Description
Done	Bool	Indicates whether data is valid.
Busy	Bool	Request in process. FALSE: Request is terminated TRUE: Request is being processed
Error	Bool	Error flag FALSE: No error TRUE: Error detected
ErrorCode	Leuze_type_lolError	Status of the function block
Diagnostics	LIOLink_typeDiagnostics	Detailed diagnostic information of the FB. See description of Siemens Library for IO-Link (LIOLink).

See structure description of Leuze\_type\_lolError in chapter 6.

## 3.4 Method of function

The function block uses the data structure "FB\_Leuze\_DMU\_3104". The PLC data structure contains the values of all IO-Link variables. Before you can use it, the structure must be instantiated by a data block. Each IO-Link FB parameter has a data point representing it in this data structure. This data point will be actualized every time a read request was executed successfully.

The desired parameters can be selected via the input variables. Depending on the device definition, IO-Link parameters are read or writable. The input variable must be "RW" = FALSE to read parameter. The value that should be written can be defined in the data structure, as soon as the input parameter "RW" = TRUE. You start each transfer by calling up the "FB\_Leuze\_DMU\_3104" with a positive trigger at the "Execute" input. As long as there is no valid answer the output "Busy" is TRUE. In the case that the chosen timeout period has elapsed a timeout error will be generated and the thread will be terminated. The "Done" = TRUE output shows that the transmission was successful. The outputs retain there states as long as there is no new positive trigger at the "Execute" input again.

The function block allows you to read or write multiple IO-Link parameters sequentially (multiselection). Please note that it may happen, that a single parameter can not be written. The function block aborts at this point and it is possible, that the IO-Link device contains an inconsistent set of parameters.

## 3.5 Behavior when error occurs


An error bit (Error) is set and an error code (Leuze\_type\_lolError) generated, if there is a spurious input value or an incorrect input connection of the FB. In this case, no further processing is carried out, until the input has been corrected.

## 4 Integration into the PLC project

The function block "FB\_Leuze\_DMU\_3104" is a part of the TIA-Portal library. To get all relevant blocks into your PLC project, please open the library as a "global" library. Afterwards, the library elements can be copied into the currently opened project.

### Integration step by step:

- Downloading the library
- Open the library in the "global" library tab
- Including the blocks of the Leuze library into your project (code-blocks and data type)
- Compiling the PLC project

NOTICE	
	If several devices connect to the IO-Link Master, you can only exchange acyclic data (service data) with one device at the same time. Due this restriction, the service data communication blocks must to be blocked against each other.

## 5 Process data parser function

The function FC\_Leuze\_PD\_DMU\_3104 simplifies the interpretation of composed IO-Link process data. This data is provided as a data structure on the PLC side. Some sensors supports different process data output. User must select mode of PD according to the sensors settings. Each sensor connected to Leuze IO-Link master has its own hardware ID. See Fig. 5.2.

The function is device type-specific and thus only suitable for the appropriated Leuze IO-Link devices.

### 5.1 Calling and designation

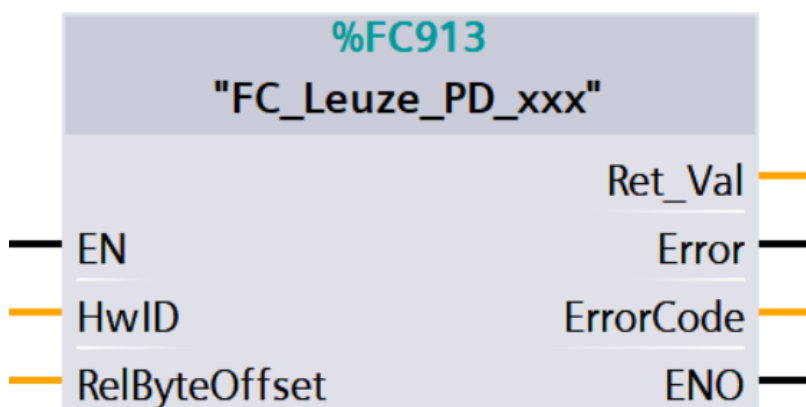


Fig. 5.1: Example of process data parsing function call

### 5.2 Configuration

Tab. 5.1: Parameters

Parameter name	Declaration	Data type	Description
HwID	INPUT	HW_IO	Hardware IO-Address of the IO-Link master (see HW-Configuration). For masters that do not use the Siemens PCT-Tool please use the HW IOAddress of the configured Master port.
RelByteOffset	INPUT	UINT	Relative start address of the IO-Link device on the IO-Link master port (see PCT-Tool -> Addresses -> Inputs Start). If the process date is mapped into a specified logical IO-Address, the relative byte offset = 0.
PDMode	INPUT	INT	Mode of the PD. User must select mode of PD according to the sensors settings.
ErrorCode	OUTPUT	WORD	Error code details see in the Siemens help system ("DPRD_DAT").
RET_VAL	OUTPUT	Leuze_type_PD_DMU_3104	Reference to the instance of the data structure Leuze_type_PD_DMU_3104. The structure includes the disaggregated values of the process data.

See structure description of Leuze\_type\_PD\_DMU\_3104 in chapter 7.

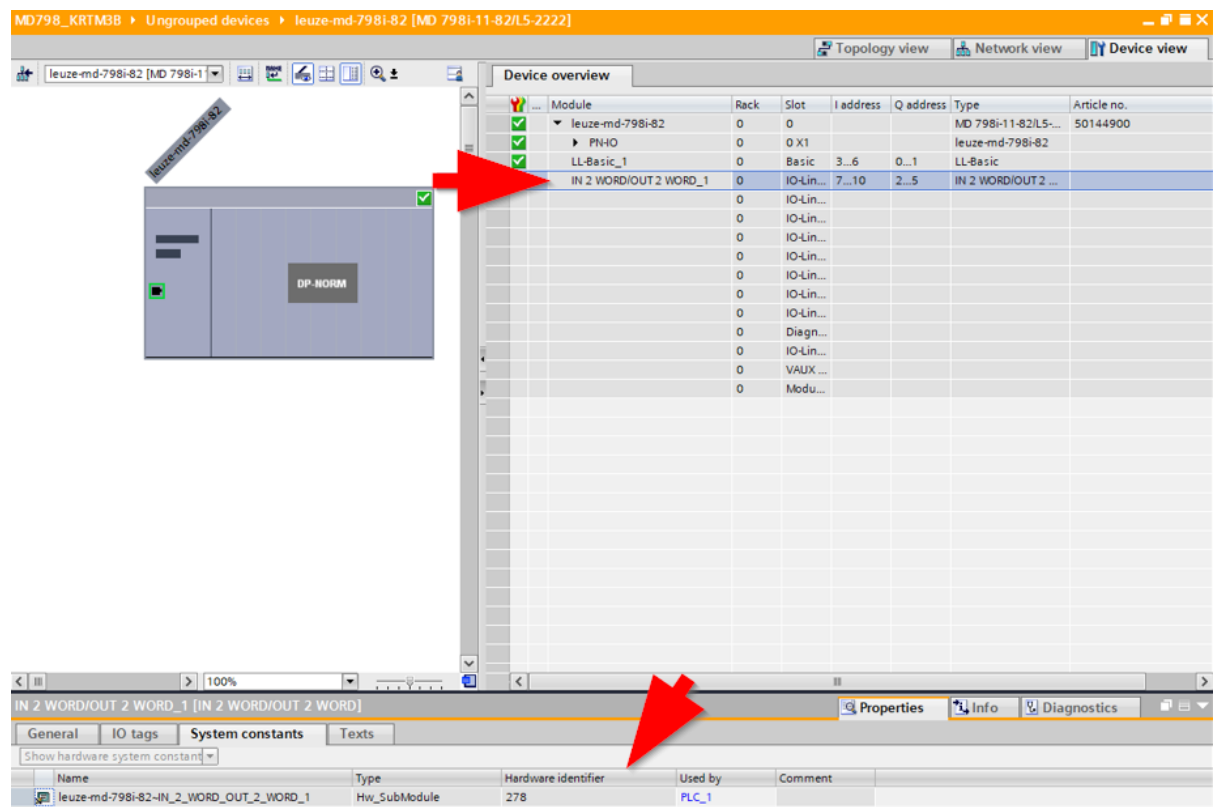


Fig. 5.2: Hardware ID for sensors connected to Leuze MD798 IO-Link master

## 6 Error description

The parameter "ErrorCode" can be interpreted using the PLC data type Leuze\_type\_IolError. This data type contains the following error information:

Tab. 6.1: Leuze\_type\_IolError description

Parameter name	Data type	Description
ErrorCode.status	Word	16#0000–16#7FFF: Status of the FB, 16#8000–16#FFFF: Error codes
ErrorCode.iolMError	Word	IO-Link Master error (see IO-Link specification)
ErrorCode.iolError	Word	IO-Link error. Contains the IOL_Error_Code the IOL_Add_Error_Code (see IO-Link specification) and the device specific error codes
ErrorCode.isduIndex	Int	IO-Link Index (ISDU) to which the error code refers

Tab. 6.2: Error description for status

Error code (status)	Error description
0x0000	Operation completed, no warning and no further details
0x7000	No operation in progress (initial value)
0x7001	First call after input of a new command (rising edge on "execute")
0x7002	Subsequent cal
0x8001	Time out error occurred
0x8002	No parameter selected
0x8201	Unsupported port
0x8202	Unsupported index
0x8203	Unsupported subindex
0x8205	The length at the "writeLen" parameter does not match the data record that will be written
0x8401	The IO-Link master has reported an error code, see "diagnostics"
0x8402	Received data record does not match operation
0x8403	Operation could not be completed in the specified time
0x8600	Internal state machine has reached an undefined state
0x8601	System function WRREC reports an error, see "diagnostics"
0x8602	System function RDREC reports an error, see "diagnostics"

Tab. 6.3: Error description for ioIMError

Error code (ioIMError)	Error description
0x0000	No error
0x0001 ... 0x06FF	Reserved / Master specific
0x7000	Unexpected Write request instead of read request / Invalid response PDU
0x7001	Decode error
0x7002	Port occupied by another task
0x7003 ... 0x7FFF	Reserved / Master specific
0x8000	Timeout when IOL-Devices or IOL-Master port are busy
0x8001	IO-Link index > 32767
0x8002	Port address beyond defined maximum
0x8003	Port function not supported
0x8004	Reserved / Master specific
0x8005	Invalid length of the data that should be written (>232 / <1)
0x8006	Reserved / Master specific
0x8007	IO-Link subindex > 255
0x8008 ... 0x8051	Reserved / Master specific
0x8052	Error during acyclic data access (FB RDREC error)
0x8053	Error during acyclic data access (FB WRREC error)
0x8054 ... 0x8FFFF	Reserved / Master specific

For additional information see the technical specification "IO-Link Integration Part 1" ([www.profibus.com](http://www.profibus.com)).

Tab. 6.4: Error description for ioLError

Error code (ioLError)	Error description
0x0000	No error
0x1000	Master communication error
0x1100	ISDU time out / Device event error
0x5200	Device checksum error
0x5600	Device checksum error

Error code (IoError)	Error description
0x5700	Master ISDU illegal service
0x5800	Device error: Byte length does not fit to the chosen parameter
0x8000	The requested service has been refused by the device application
0x8011	Read write access to a not existing Index
0x8012	Read write access to a not existing sub index
0x8020	Parameter is not accessible for a read or write service due to the current state in the device
0x8021	Parameter is not accessible for a read or write service due to an ongoing local operation at the device
0x8022	Parameter is not accessible for a read or write service due to an remote triggered state of the device application
0x8023	Write service tries to access a read-only parameter
0x8030	Write service to a parameter outside its permitted range of values
0x8031	Write service to a parameter above its specified value range
0x8032	Write service to a parameter below its specified value range
0x8033	Write service to a parameter above its specified length
0x8034	Write service to a parameter below its predefined length
0x8035	Write service with a command value not supported by the device application
0x8036	Write service with a command value calling a device function not available due to the current state
0x8040	The value via single parameter transfer collide with other actual parameter settings
0x8041	Inconsistent parameter set (at least an ISDU cannot be written)
0x8082	The read or write service is refused due to a temporarily unavailable application
0x8100	Unspecified
0x8101 ... 0x81FF	Device specific (see device description)

For additional information see the specification "IO-Link Communication" ([www.IO-Link.com](http://www.IO-Link.com)).

## 7 Data structures

Tab. 7.1: Leuze\_type\_DMU\_3104

Parameter name	Data type	Description
DeviceData.Selection.Commands.CmdDeviceReset	Bool	[WRITE_ONLY] Device Reset
DeviceData.Selection.Commands.CmdApplicationReset	Bool	[WRITE_ONLY] Application Reset
DeviceData.Selection.Commands.CmdRestoreFactorySettings	Bool	[WRITE_ONLY] Restore Factory Settings
DeviceData.Selection.Commands.CmdSp1Teach	Bool	[WRITE_ONLY] SP1 Teach
DeviceData.Selection.Commands.CmdSp2Teach	Bool	[WRITE_ONLY] SP2 Teach
DeviceData.Selection.Commands.CmdCancelTeach	Bool	[WRITE_ONLY] Cancel Teach
DeviceData.Selection.Commands.CmdMuteSensor	Bool	[WRITE_ONLY] mute sensor
DeviceData.Selection.Commands.CmdUnmuteSensor	Bool	[WRITE_ONLY] unmute sensor
DeviceData.Selection.DirectParameters1.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.DirectParameters1.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.DirectParameters1.Reserved_1	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.MasterCycleTime	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.MinCycleTime	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.MSequenceCapability	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.IoLinkVersionId	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.ProcessDataInputLength	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.ProcessDataOutputLength	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.VendorId1	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.VendorId2	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.DeviceId1	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.DeviceId2	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.DeviceId3	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.Reserved_13	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.Reserved_14	Bool	[READ_ONLY]

Parameter name	Data type	Description
DeviceData.Selection.DirectParameters1.Reserved_15	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters2.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter1	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter2	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter3	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter4	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter5	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter6	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter7	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter8	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter9	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter10	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter11	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter12	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter13	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter14	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter15	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter16	Bool	[READ_WRITE]
DeviceData.Selection.StandardCommand	Bool	[WRITE_ONLY]
DeviceData.Selection.DeviceAccessLocks.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.VendorName	Bool	[READ_ONLY]
DeviceData.Selection.VendorText	Bool	[READ_ONLY]
DeviceData.Selection.ProductName	Bool	[READ_ONLY]
DeviceData.Selection.ProductId	Bool	[READ_ONLY]
DeviceData.Selection.ProductText	Bool	[READ_ONLY]
DeviceData.Selection.SerialNumber	Bool	[READ_ONLY]
DeviceData.Selection.FirmwareVersion	Bool	[READ_ONLY]

Parameter name	Data type	Description
DeviceData.Selection.ApplicationSpecificTag	Bool	[READ_WRITE]
DeviceData.Selection.DeviceStatus	Bool	[READ_ONLY]
DeviceData.Selection.DetailedDeviceStatus.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.TeachInStatus.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.TeachInStatus. SetpointValueSp2TeachFlag	Bool	[READ_ONLY]
DeviceData.Selection.TeachInStatus. SetpointValueSp1TeachFlag	Bool	[READ_ONLY]
DeviceData.Selection.TeachInStatus.TeachState	Bool	[READ_ONLY]
DeviceData.Selection.Setpoints.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.Setpoints.SetpointValueSp1Out1	Bool	[READ_WRITE] Value of far setpoint
DeviceData.Selection.Setpoints.SetpointValueSp2Out1	Bool	[READ_WRITE] Value of near setpoint
DeviceData.Selection.Configuration.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.Configuration.Logic	Bool	[READ_WRITE] The behaviour of the switching output can be inverted
DeviceData.Selection.Configuration.Mode	Bool	[READ_WRITE] Window Mode: The sensor changes the output state between the switching points SP1 and SP2   Two Point Mode: The switching points SP1 and SP2 define the hysteresis range
DeviceData.Selection.Configuration.SwitchingOutput1OnDelay	Bool	[READ_WRITE] defines the delay in number of update cycles until a consecutive logic on signal is propagated to the output (Update Cycle Time can be found in the General Settings)
DeviceData.Selection.Configuration.SwithcingOutput1OffDelay	Bool	[READ_WRITE] defines the delay in number of update cycles until a consecutive logic off signal is propagated to the output (Update Cycle Time can be found in the General Settings)

Parameter name	Data type	Description
DeviceData.Selection.OperatingMode	Bool	[READ_WRITE] Standard mode: The sensor operates as diffuse   Multiplex mode: Allocation of an address to run with additional sensors   Synchronization mode: Synchronized sensor network   Enable mode: Sensor remote enabling   Opposed mode: Sensor is emitter or receiver
DeviceData.Selection.PnpNpnSwitchSelection	Bool	[READ_WRITE] Selection of switching behaviour in p or n type
DeviceData.Selection.ErrorBehavior	Bool	[READ_WRITE] In case of failure the switching output can be set to open or closed
DeviceData.Selection.AnalogStartingPoint	Bool	[READ_WRITE] Analog window near limit
DeviceData.Selection.AnalogEndPoint	Bool	[READ_WRITE] Analog window far limit
DeviceData.Selection.Logic	Bool	[READ_WRITE] Selection of positiv or negativ analog slope
DeviceData.Selection.Mode	Bool	[READ_WRITE] Adjustment of voltage output 0...10 V, 0...5 V or 1...6 V
DeviceData.Selection.AnalogInterferenceSuppression.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.AnalogInterferenceSuppression.InterferenceExtensionTime	Bool	[READ_WRITE]
DeviceData.Selection.AnalogInterferenceSuppression.InterferenceSuppressionTime	Bool	[READ_WRITE]
DeviceData.Selection.IolinkIndication	Bool	[READ_WRITE]
DeviceData.Selection.TemperatureCompensation	Bool	[READ_WRITE] Temperature compensation via internally measured temperature or externally defined temperature
DeviceData.Selection.TemperatureValueForExternalTemperatureCompensation	Bool	[READ_WRITE] Value of externally defined temperature that is used for compensation if external temperature compensation is selected
DeviceData.Selection.UnitForTemperatureValue	Bool	[READ_WRITE] The unit of temperature can be changed between °C and °F
DeviceData.Selection.MultiplexModeAddress	Bool	[READ_WRITE] In Multiplex Mode every connected sensor is assigned to an own adress to activate it in a time slice

Parameter name	Data type	Description
DeviceData.Selection.InternalTemperatureValue	Bool	[READ_ONLY] Internally measured value of ambient temperature that is used for compensation if internal temperature compensation is selected
DeviceData.Selection.SignalStrengthIndicationViaLed	Bool	[READ_WRITE] The LED shows the received signal strength
DeviceData.Selection.SignalStrenthIndicationValue	Bool	[READ_ONLY] Value of signal strength
DeviceData.Selection.UpdateCycleTime	Bool	[READ_ONLY] Time between output updates in milliseconds.
DeviceData.Selection.TeachOffset	Bool	[READ_WRITE] This distance offset is added to the measured distance during single point teach sequences.
DeviceData.Selection.AnalogErrorOutputOverride	Bool	[READ_WRITE] Overrides the default Analog Output Error Behaviour when no Target is in Range.
DeviceData.Selection.PdinvalidBehaviour	Bool	[READ_WRITE] When enabled, the sensor emits a PDInvalid Flag on the cyclic Processdata when there is no target in Range.
DeviceData.Data.Commands.CmdDeviceReset	UInt	[WRITE_ONLY] Device Reset
DeviceData.Data.Commands.CmdApplicationReset	UInt	[WRITE_ONLY] Application Reset
DeviceData.Data.Commands.CmdRestoreFactorySettings	UInt	[WRITE_ONLY] Restore Factory Settings
DeviceData.Data.Commands.CmdSp1Teach	UInt	[WRITE_ONLY] SP1 Teach
DeviceData.Data.Commands.CmdSp2Teach	UInt	[WRITE_ONLY] SP2 Teach
DeviceData.Data.Commands.CmdCancelTeach	UInt	[WRITE_ONLY] Cancel Teach
DeviceData.Data.Commands.CmdMuteSensor	UInt	[WRITE_ONLY] mute sensor
DeviceData.Data.Commands.CmdUnmuteSensor	UInt	[WRITE_ONLY] unmute sensor
DeviceData.Data.DirectParameters1.Reserved_1	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.MasterCycleTime	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.MinCycleTime	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.MSequenceCapability	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.IoLinkVersionId	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.ProcessDataInputLength	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.ProcessDataOutputLength	UInt	[READ_ONLY]

Parameter name	Data type	Description
DeviceData.Data.DirectParameters1.VendorId1	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.VendorId2	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.DeviceId1	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.DeviceId2	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.DeviceId3	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.Reserved_13	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.Reserved_14	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.Reserved_15	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter1	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter2	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter3	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter4	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter5	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter6	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter7	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter8	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter9	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter10	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter11	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter12	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter13	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter14	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter15	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter16	UInt	[READ_WRITE]
DeviceData.Data.StandardCommand	UInt	[WRITE_ONLY]
DeviceData.Data.DeviceAccessLocks.ParameterWriteAccessLock	Bool	[READ_WRITE]
DeviceData.Data.DeviceAccessLocks.DataStorageLock	Bool	[READ_WRITE]

Parameter name	Data type	Description
DeviceData.Data.DeviceAccessLocks.LocalParameterizationLock	Bool	[READ_WRITE]
DeviceData.Data.DeviceAccessLocks.LocalUserInterfaceLock	Bool	[READ_WRITE]
DeviceData.Data.VendorName	String	[READ_ONLY]
DeviceData.Data.VendorText	String	[READ_ONLY]
DeviceData.Data.ProductName	String	[READ_ONLY]
DeviceData.Data.ProductId	String	[READ_ONLY]
DeviceData.Data.ProductText	String	[READ_ONLY]
DeviceData.Data.SerialNumber	String	[READ_ONLY]
DeviceData.Data.FirmwareVersion	String	[READ_ONLY]
DeviceData.Data.ApplicationSpecificTag	String	[READ_WRITE]
DeviceData.Data.DeviceStatus	UInt	[READ_ONLY]
DeviceData.Data.DetailedDeviceStatus.Item_1	String	[READ_ONLY]
DeviceData.Data.DetailedDeviceStatus.Item_2	String	[READ_ONLY]
DeviceData.Data.DetailedDeviceStatus.Item_3	String	[READ_ONLY]
DeviceData.Data.DetailedDeviceStatus.Item_4	String	[READ_ONLY]
DeviceData.Data.DetailedDeviceStatus.Item_5	String	[READ_ONLY]
DeviceData.Data.TeachInStatus.SetpointValueSp2TeachFlag	Bool	[READ_ONLY]
DeviceData.Data.TeachInStatus.SetpointValueSp1TeachFlag	Bool	[READ_ONLY]
DeviceData.Data.TeachInStatus.TeachState	UInt	[READ_ONLY]
DeviceData.Data.Setpoints.SetpointValueSp1Out1	UInt	[READ_WRITE] Value of far setpoint
DeviceData.Data.Setpoints.SetpointValueSp2Out1	UInt	[READ_WRITE] Value of near setpoint
DeviceData.Data.Configuration.Logic	UInt	[READ_WRITE] The behaviour of the switching output can be inverted
DeviceData.Data.Configuration.Mode	UInt	[READ_WRITE] Window Mode: The sensor changes the output state between the switching points SP1 and SP2   Two Point Mode: The switching points SP1 and SP2 define the hysteresis range

Parameter name	Data type	Description
DeviceData.Data.Configuration.SwitchingOutput1OnDelay	UInt	[READ_WRITE] defines the delay in number of update cycles until a consecutive logic on signal is propagated to the output (Update Cycle Time can be found in the General Settings)
DeviceData.Data.Configuration.SwitchingOutput1OffDelay	UInt	[READ_WRITE] defines the delay in number of update cycles until a consecutive logic off signal is propagated to the output (Update Cycle Time can be found in the General Settings)
DeviceData.Data.OperatingMode	UInt	[READ_WRITE] Standard mode: The sensor operates as diffuse   Multiplex mode: Allocation of an address to run with additional sensors   Synchronization mode: Synchronized sensor network   Enable mode: Sensor remote enabling   Opposed mode: Sensor is emitter or receiver
DeviceData.Data.PnpNpnSwitchSelection	UInt	[READ_WRITE] Selection of switching behaviour in p or n type
DeviceData.Data.ErrorBehavior	UInt	[READ_WRITE] In case of failure the switching output can be set to open or closed
DeviceData.Data.AnalogStartingPoint	UInt	[READ_WRITE] Analog window near limit
DeviceData.Data.AnalogEndPoint	UInt	[READ_WRITE] Analog window far limit
DeviceData.Data.Logic	UInt	[READ_WRITE] Selection of positiv or negativ analog slope
DeviceData.Data.Mode	UInt	[READ_WRITE] Adjustment of voltage output 0...10 V, 0...5 V or 1...6 V
DeviceData.Data.AnalogInterferenceSuppression.InterferenceExtensionTime	UInt	[READ_WRITE]
DeviceData.Data.AnalogInterferenceSuppression.InterferenceSuppressionTime	UInt	[READ_WRITE]
DeviceData.Data.IolinkIndication	UInt	[READ_WRITE]
DeviceData.Data.TemperatureCompensation	UInt	[READ_WRITE] Temperature compensation via internally measured temperature or externally defined temperature

Parameter name	Data type	Description
DeviceData.Data.TemperatureValueForExternalTemperatureCompensation	Int	[READ_WRITE] Value of externally defined temperature that is used for compensation if external temperature compensation is selected
DeviceData.Data.UnitForTemperatureValue	UInt	[READ_WRITE] The unit of temperature can be changed between °C and °F
DeviceData.Data.MultiplexModeAddress	UInt	[READ_WRITE] In Multiplex Mode every connected sensor is assigned to an own adress to activate it in a time slice
DeviceData.Data.InternalTemperatureValue	Int	[READ_ONLY] Internally measured value of ambient temperature that is used for compensation if internal temperature compensation is selected
DeviceData.Data.SignalStrengthIndicationViaLed	UInt	[READ_WRITE] The LED shows the received signal strength
DeviceData.Data.SignalStrenthIndicationValue	UInt	[READ_ONLY] Value of signal strength
DeviceData.Data.UpdateCycleTime	UInt	[READ_ONLY] Time between output updates in milliseconds.
DeviceData.Data.TeachOffset	Int	[READ_WRITE] This distance offset is added to the measured distance during single point teach sequences.
DeviceData.Data.AnalogErrorOutputOverride	UInt	[READ_WRITE] Overrides the default Analog Output Error Behaviour when no Target is in Range.
DeviceData.Data.PdinvalidBehaviour	UInt	[READ_WRITE] When enabled, the sensor emits a PDInvalid Flag on the cyclic Processdata when there is no target in Range.

Tab. 7.2: Leuze\_type\_PD\_DMU\_3104

Parameter name	Data type	Description
FC_Leuze_PD_DMU_3104.ProcessValue	UInt	
FC_Leuze_PD_DMU_3104.SwitchStateOutput1	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
SP1 Teach			UIntegerT	75	W	SP1 Teach
SP2 Teach			UIntegerT	76	W	SP2 Teach
Cancel Teach			UIntegerT	79	W	Cancel Teach
-			UIntegerT	160	W	-
-			UIntegerT	161	W	-
mute sensor			UIntegerT	176	W	mute sensor
unmute sensor			UIntegerT	177	W	unmute sensor
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	
Device ID 1	0	10	UIntegerT		R	
Device ID 2	0	11	UIntegerT		R	
Device ID 3	0	12	UIntegerT		R	

Parameter	Index	Subindex	Data type	Default	AR	Description
Reserved	0	13	UIntegerT		R	
Reserved	0	14	UIntegerT		R	
Reserved	0	15	UIntegerT		R	
Standard Command	0	16	UIntegerT		W	(0 ... 63): Reserved 128: Device Reset 129: Application Reset 130: Restore Factory Settings (131 ... 159): Reserved
Direct Parameters 2	1	0	RecordT		RW	
Device Specific Parameter 1	1	1	UIntegerT		RW	
Device Specific Parameter 2	1	2	UIntegerT		RW	
Device Specific Parameter 3	1	3	UIntegerT		RW	
Device Specific Parameter 4	1	4	UIntegerT		RW	
Device Specific Parameter 5	1	5	UIntegerT		RW	
Device Specific Parameter 6	1	6	UIntegerT		RW	
Device Specific Parameter 7	1	7	UIntegerT		RW	
Device Specific Parameter 8	1	8	UIntegerT		RW	
Device Specific Parameter 9	1	9	UIntegerT		RW	
Device Specific Parameter 10	1	10	UIntegerT		RW	
Device Specific Parameter 11	1	11	UIntegerT		RW	
Device Specific Parameter 12	1	12	UIntegerT		RW	
Device Specific Parameter 13	1	13	UIntegerT		RW	
Device Specific Parameter 14	1	14	UIntegerT		RW	
Device Specific Parameter 15	1	15	UIntegerT		RW	
Device Specific Parameter 16	1	16	UIntegerT		RW	
Standard Command	2	0	UIntegerT		W	(0 ... 63): Reserved 128: Device Reset 129: Application Reset 130: Restore Factory Settings (131 ... 159): Reserved 75: SP1 Teach 76: SP2 Teach 79: Cancel Teach 160: - 161: - 176: mute sensor 177: unmute sensor

Parameter	Index	Subindex	Data type	Default	AR	Description
Device Access Locks	12	0	RecordT		RW	
Parameter (write) Access Lock	12	1	BooleanT		RW	
Data Storage Lock	12	2	BooleanT		RW	
Local Parameterization Lock	12	3	BooleanT		RW	
Local User Interface Lock	12	4	BooleanT		RW	
Vendor Name	16	0	StringT		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-In Status	59	0	RecordT		R	
Setpoint Value SP2 Teach Flag	59	1	BooleanT		R	False: Not taught or not successful True: Successfully taught
Setpoint Value SP1 Teach Flag	59	2	BooleanT		R	False: Not taught or not successful True: Successfully taught
Teach State	59	3	UIntegerT		R	0: Idle 1: SP1 successfully taught 2: SP2 successfully taught 7: Error
Setpoints	60	0	RecordT		RW	
Setpoint Value SP1 (OUT1)	60	1	UIntegerT		RW	Value of far setpoint
Setpoint Value SP2 (OUT1)	60	2	UIntegerT		RW	Value of near setpoint
Configuration	61	0	RecordT		RW	

Parameter	Index	Subindex	Data type	Default	AR	Description
Logic	61	1	UIntegerT		RW	The behaviour of the switching output can be inverted  0: Not Inverted Switching 1: Inverted Switching
Mode	61	2	UIntegerT	128	RW	Window Mode: The sensor changes the output state between the switching points SP1 and SP2 Two Point Mode: The switching points SP1 and SP2 define the hysteresis range  128: Window Mode 3: Two Point Mode
Switching Output 1 On Delay	61	3	UIntegerT	0	RW	defines the delay in number of update cycles until a consecutive logic on signal is propagated to the output (Update Cycle Time can be found in the General Settings)  (0 ... 255)
Switching Output 1 Off Delay	61	4	UIntegerT	0	RW	defines the delay in number of update cycles until a consecutive logic off signal is propagated to the output (Update Cycle Time can be found in the General Settings)  (0 ... 255)
Operating Mode	80	0	UIntegerT	0	RW	Standard mode: The sensor operates as diffuse Multiplex mode: Allocation of an address to run with additional sensors Synchronization mode: Synchronized sensor network Enable mode: Sensor remote enabling Opposed mode: Sensor is emitter or receiver  0: Standard Mode 1: Multiplex Mode 2: Synchronization Mode 3: Enable Mode 4: Opposed Mode
PNP/NPN Switch Selection	83	0	UIntegerT	0	RW	Selection of switching behaviour in p or n type  0: PNP 1: NPN
Error Behavior	86	0	UIntegerT	0	RW	In case of failure the switching output can be set to open or closed  0: Open 1: Closed
Analog Starting Point	96	0	UIntegerT	0	RW	Analog window near limit
Analog End Point	97	0	UIntegerT	0	RW	Analog window far limit
Logic	98	0	UIntegerT	0	RW	Selection of positiv or negativ analog slope  0: Rising Straight Line 1: Falling Straight Line

Parameter	Index	Subindex	Data type	Default	AR	Description
Mode	101	0	UIntegerT	0	RW	Adjustment of voltage output 0...10 V, 0...5 V or 1...6 V 0: 0...10V 1: 0...5V 2: 1...6V
Analog Interference Suppression	102	0	RecordT		RW	
Interference Extension Time	102	1	UIntegerT	0	RW	(0 ... 255)
Interference Suppression Time	102	2	UIntegerT	0	RW	(0 ... 255)
IOLink Indication	108	0	UIntegerT	0	RW	0: On 1: Off
Temperature Compensation	112	0	UIntegerT	0	RW	Temperature compensation via internally measured temperature or externally defined temperature 0: Internal 1: External
Temperature Value For External Temperature Compensation	113	0	IntegerT	250	RW	Value of externally defined temperature that is used for compensation if external temperature compensation is selected (-300 ... 850)
Unit For Temperature Value	114	0	UIntegerT	0	RW	The unit of temperature can be changed between °C and °F 0: °C 1: °F
Multiplex Mode Address	116	0	UIntegerT	0	RW	In Multiplex Mode every connected sensor is assigned to an own adress to activate it in a time slice (0 ... 9)
Internal Temperature Value	120	0	IntegerT		R	Internally measured value of ambient temperature that is used for compensation if internal temperature compensation is selected (-300 ... 850)
Signal Strength Indication via LED	121	0	UIntegerT	0	RW	The LED shows the received signal strength 0: Off 1: On
Signal Strenth Indication Value	122	0	UIntegerT		R	Value of signal strength
Update cycle time	124	0	UIntegerT	0	R	Time between output updates in milliseconds. (0 ... 65535)
Teach offset	125	0	IntegerT	0	RW	This distance offset is added to the measured distance during single point teach sequences. (-32767 ... 32767)

Parameter	Index	Subindex	Data type	Default	AR	Description
Analog Error Output override	126	0	UIntegerT	0	RW	Overrides the default Analog Output Error Behaviour when no Target is in Range.  0: no override(default) 1: override with low 2: override with high
PDInvalid behaviour	127	0	UIntegerT	0	RW	When enabled, the sensor emits a PDInvalid Flag on the cyclic Processdata when there is no target in Range.  0: inactive 1: active

## 9 Technical specifications

### 9.1 General data

Tab. 9.1: Sensor and IODD version

IODD version	V01.0116
IODD release date	2018-1-25
Device family	DMU... series
Device ID	3104
Device name	DMU-LTV-XP
Device variants	DMU418B-400.X3/LTV-M12 (50124261), DMU418B-1300.X3/LTV-M12 (50124264), DMU430B-3000.X3/LTV-M12 (50124266)