



## PLC Integration RK46C\_2111

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

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# 1 Legal information

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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\_RK46C\_2111" 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_RK46C_2111	Sensor data

See structure description of Leuze\_type\_RK46C\_2111 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\_RK46C\_2111". 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\_RK46C\_2111" 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\_RK46C\_2111" 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\_RK46C\_2111 simplifies the interpretation of composed IO-Link process data. This data is provided as a data structure on the PLC side. Some sensors supports different process data output. User must select mode of PD according to the sensors settings. Each sensor connected to Leuze IO-Link master has its own hardware ID. See Fig. 5.2.

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

### 5.1 Calling and designation



Fig. 5.1: Example of process data parsing function call

### 5.2 Configuration

Tab. 5.1: Parameters

Parameter name	Declaration	Data type	Description
HwID	INPUT	HW_IO	Hardware IO-Address of the IO-Link master (see HW-Configuration). For masters that do not use the Siemens PCT-Tool please use the HW IOAddress of the configured Master port.
RelByteOffset	INPUT	UINT	Relative start address of the IO-Link device on the IO-Link master port (see PCT-Tool -> Addresses -> Inputs Start). If the process data is mapped into a specified logical IO-Address, the relative byte offset = 0.
PDMode	INPUT	INT	Mode of the PD. User must select mode of PD according to the sensors settings. The PD Mode parameter only appears for some sensors.
Error	OUTPUT	BOOL	Error flag FALSE: No error TRUE: Error detected
ErrorCode	OUTPUT	WORD	Error code details see in the Siemens help system ("DPRD_DAT").
RET_VAL	OUTPUT	Leuze_type_PD_RK46C_2111	Reference to the instance of the data structure Leuze_type_PD_RK46C_2111. The structure includes the disaggregated values of the process data.

See structure description of Leuze\_type\_PD\_RK46C\_2111 in chapter 7.



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

## 6 Error description

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

Tab. 6.1: Leuze\_type\_IolError description

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

Tab. 6.2: Error description for status

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

Tab. 6.3: Error description for ioLError

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

For additional information see the technical specification "IO-Link Integration Part 1" ([www.profibus.com](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\_RK46C\_2111

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.CmdBackToBox	Bool	[WRITE_ONLY] Back-to-box
DeviceData.Selection.Commands.CmdErrorConfirmation	Bool	[WRITE_ONLY] Error Confirmation
DeviceData.Selection.Commands.CmdTeach11StandardSensitivity	Bool	[WRITE_ONLY] Teach 11% (Standard Sensitivity)
DeviceData.Selection.Commands.CmdTeach30DecreasedSensitivity	Bool	[WRITE_ONLY] Teach 30% (Decreased Sensitivity)
DeviceData.Selection.Commands.CmdDarkSwitching	Bool	[WRITE_ONLY] dark switching
DeviceData.Selection.Commands.CmdLightSwitching	Bool	[WRITE_ONLY] light switching
DeviceData.Selection.Commands.CmdEnableConfigurationMode	Bool	[WRITE_ONLY] Enable Configuration Mode
DeviceData.Selection.Commands.CmdReloadLastTeachWorking	Bool	[WRITE_ONLY] Reload last Teach (WORKING)
DeviceData.Selection.Commands.CmdRestoreFactoryDefaults	Bool	[WRITE_ONLY] Restore factory defaults
DeviceData.Selection.Commands.CmdSaveCurrentParametersToDevice	Bool	[WRITE_ONLY] Save current parameters to device
DeviceData.Selection.Commands.CmdEnableSensorMode	Bool	[WRITE_ONLY] Enable Sensor Mode
DeviceData.Selection.Commands.CmdEnableAdcSignalProcessDataOutput	Bool	[WRITE_ONLY] Enable ADC Signal Process Data Output
DeviceData.Selection.DirectParametersPage1.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.DirectParametersPage1.Reserved_1	Bool	[READ_ONLY] ; Suffix "_1" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Selection.DirectParametersPage1.MasterCycleTime	Bool	[READ_ONLY] Communication: Current communication cycle duration used by the master. This value defines the process data cycle.
DeviceData.Selection.DirectParametersPage1.MinCycleTime	Bool	[READ_ONLY] Communication: Minimum communication cycle duration supported by the device. This value defines the lowest possible process data cycle.

Parameter name	Data type	Description
DeviceData.Selection.DirectParametersPage1.MSequenceCapability	Bool	[READ_ONLY] Communication: Information on the structure and the supported features of the communication messages.
DeviceData.Selection.DirectParametersPage1.IoLinkRevisionId	Bool	[READ_ONLY] Communication: Identifier for the currently used communication protocol revision.
DeviceData.Selection.DirectParametersPage1.ProcessDataInputLength	Bool	[READ_ONLY] Communication: Information on width and features of the process input data (Process Data from Device to Master).
DeviceData.Selection.DirectParametersPage1.ProcessDataOutputLength	Bool	[READ_ONLY] Communication: Information on width of the process output data (Process Data from Master to Device).
DeviceData.Selection.DirectParametersPage1.VendorId1	Bool	[READ_ONLY] Identification: Highest octet of the Vendor ID. Combined with the parameter Vendor ID 2, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
DeviceData.Selection.DirectParametersPage1.VendorId2	Bool	[READ_ONLY] Identification: Lowest octet of the Vendor ID. Combined with the parameter Vendor ID 1, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
DeviceData.Selection.DirectParametersPage1.DeviceId1	Bool	[READ_ONLY] Identification: Highest octet of the Device ID. Combined with the parameters Device ID 2 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
DeviceData.Selection.DirectParametersPage1.DeviceId2	Bool	[READ_ONLY] Identification: Middle octet of the Device ID. Combined with the parameters Device ID 1 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.

Parameter name	Data type	Description
DeviceData.Selection.DirectParametersPage1.DeviceId3	Bool	[READ_ONLY] Identification: Lowest octet of the Device ID. Combined with the parameters Device ID 1 and 2, this parameter defines the 24-bit value of the vendor-specific Device ID.
DeviceData.Selection.DirectParametersPage1.Reserved_13	Bool	[READ_ONLY] ; Suffix "_13" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Selection.DirectParametersPage1.Reserved_14	Bool	[READ_ONLY] ; Suffix "_14" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Selection.DirectParametersPage1.Reserved_15	Bool	[READ_ONLY] ; Suffix "_15" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Selection.DirectParametersPage1.SystemCommand	Bool	[WRITE_ONLY] Application: Command interface for devices without ISDU support. Validity and execution of commands are not confirmed.
DeviceData.Selection.Dp.All	Bool	[READ_WRITE] all parameters of complex data type
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.CmdBackToBox	UInt	[WRITE_ONLY] Back-to-box
DeviceData.Data.Commands.CmdErrorConfirmation	UInt	[WRITE_ONLY] Error Confirmation
DeviceData.Data.Commands.CmdTeach11StandardSensitivity	UInt	[WRITE_ONLY] Teach 11% (Standard Sensitivity)
DeviceData.Data.Commands.CmdTeach30DecreasedSensitivity	UInt	[WRITE_ONLY] Teach 30% (Decreased Sensitivity)
DeviceData.Data.Commands.CmdDarkSwitching	UInt	[WRITE_ONLY] dark switching
DeviceData.Data.Commands.CmdLightSwitching	UInt	[WRITE_ONLY] light switching
DeviceData.Data.Commands.CmdEnableConfigurationMode	UInt	[WRITE_ONLY] Enable Configuration Mode
DeviceData.Data.Commands.CmdReloadLastTeachWorking	UInt	[WRITE_ONLY] Reload last Teach (WORKING)
DeviceData.Data.Commands.CmdRestoreFactoryDefaults	UInt	[WRITE_ONLY] Restore factory defaults



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

Parameter name	Data type	Description
DeviceData.Data.DirectParametersPage1.VendorId2	UInt	[READ_ONLY] Identification: Lowest octet of the Vendor ID. Combined with the parameter Vendor ID 1, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
DeviceData.Data.DirectParametersPage1.DeviceId1	UInt	[READ_ONLY] Identification: Highest octet of the Device ID. Combined with the parameters Device ID 2 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
DeviceData.Data.DirectParametersPage1.DeviceId2	UInt	[READ_ONLY] Identification: Middle octet of the Device ID. Combined with the parameters Device ID 1 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
DeviceData.Data.DirectParametersPage1.DeviceId3	UInt	[READ_ONLY] Identification: Lowest octet of the Device ID. Combined with the parameters Device ID 1 and 2, this parameter defines the 24-bit value of the vendor-specific Device ID.
DeviceData.Data.DirectParametersPage1.Reserved_13	UInt	[READ_ONLY] ; Suffix "_13" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Data.DirectParametersPage1.Reserved_14	UInt	[READ_ONLY] ; Suffix "_14" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Data.DirectParametersPage1.Reserved_15	UInt	[READ_ONLY] ; Suffix "_15" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Data.DirectParametersPage1.SystemCommand	UInt	[WRITE_ONLY] Application: Command interface for devices without ISDU support. Validity and execution of commands are not confirmed.
DeviceData.Data.Dp.OffLimit	UInt	[READ_WRITE] Off Limit
DeviceData.Data.Dp.OnLimit	UInt	[READ_WRITE] On Limit

Parameter name	Data type	Description
DeviceData.Data.Dp.KeyLock	Bool	[READ_WRITE] Key Lock; IO-Link Parameter overrides IN2 Input/PD
DeviceData.Data.Dp.Q2LogicFunction	UInt	[READ_WRITE]
DeviceData.Data.Dp.DelayFunctionInternalDelayUnit	UInt	[READ_WRITE] Operating mode of the internal delay unit
DeviceData.Data.Dp.TimeBaseInternalDelayUnit	UInt	[READ_WRITE] 1ms, 10ms, 100ms, 1000ms
DeviceData.Data.Dp.MultiplicationFactorForTimeBaseInternalDelayUnit	UInt	[READ_WRITE] 1-15
DeviceData.Data.Dp.LightDarkSwitching	Bool	[READ_WRITE] Light/Dark Switching: adjusting the switching behavior of the switching output
DeviceData.Data.Dp.InternalDelayUnitBasedOnObject	Bool	[READ_WRITE] Enable Internal Delay Unit
DeviceData.Data.Dp.PdiContent	UInt	[READ_ONLY]
DeviceData.Data.Dp.StatusTeachCommand	Bool	[READ_ONLY] Value is re-read after new command. All status bits are valid after finished command.
DeviceData.Data.Dp.CommandAccepted	Bool	[READ_ONLY]
DeviceData.Data.Dp.TeachError	Bool	[READ_ONLY]
DeviceData.Data.Dp.LastValuesRestored	Bool	[READ_ONLY]
DeviceData.Data.Dp.ReceptionLevelTooHigh	Bool	[READ_ONLY]
DeviceData.Data.Dp.ReceptionLevelTooLow	Bool	[READ_ONLY]

Tab. 7.2: Leuze\_type\_PD\_RK46C\_2111

Parameter name	Data type	Description
FC_Leuze_PD_RK46C_2111.Mode_0.Q	Bool	
FC_Leuze_PD_RK46C_2111.Mode_0.Warning	Bool	
FC_Leuze_PD_RK46C_2111.Mode_0.Status	Bool	
FC_Leuze_PD_RK46C_2111.Mode_1.Q	Bool	
FC_Leuze_PD_RK46C_2111.Mode_1.ReceivedSignal	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	Application: Command interface for devices without ISDU support. Validity and execution of commands are not confirmed.
Device Reset			UIntegerT	128	W	Device Reset
Application Reset			UIntegerT	129	W	Application Reset
Restore Factory Settings			UIntegerT	130	W	Restore Factory Settings
Back-to-box			UIntegerT	131	W	Back-to-box
Error Confirmation			UIntegerT	160	W	Error Confirmation
Teach 11% (Standard Sensitivity)			UIntegerT	161	W	Teach 11% (Standard Sensitivity)
Teach 30% (Decreased Sensitivity)			UIntegerT	162	W	Teach 30% (Decreased Sensitivity)
dark switching			UIntegerT	163	W	dark switching
light switching			UIntegerT	164	W	light switching
Enable Configuration Mode			UIntegerT	170	W	Enable Configuration Mode
Reload last Teach (WORKING)			UIntegerT	171	W	Reload last Teach (WORKING)
Restore factory defaults			UIntegerT	172	W	Restore factory defaults
Save current parameters to device			UIntegerT	173	W	Save current parameters to device
Enable Sensor Mode			UIntegerT	174	W	Enable Sensor Mode
Enable ADC Signal Process Data Output			UIntegerT	191	W	Enable ADC Signal Process Data Output
Direct Parameters - Page 1	0	0	RecordT		RW	Comprises the required parameters defining the communication characteristics and identifiers for device validation.
Reserved	0	1	UIntegerT		R	
Master Cycle Time	0	2	UIntegerT	0	R	Communication: Current communication cycle duration used by the master. This value defines the process data cycle.
Min Cycle Time	0	3	UIntegerT	23	R	Communication: Minimum communication cycle duration supported by the device. This value defines the lowest possible process data cycle.
M-Sequence Capability	0	4	UIntegerT	0	R	Communication: Information on the structure and the supported features of the communication messages.

Parameter	Index	Subindex	Data type	Default	AR	Description
IO-Link Revision ID	0	5	UIntegerT	17	R	Communication: Identifier for the currently used communication protocol revision.
Process Data Input Length	0	6	UIntegerT	72	R	Communication: Information on width and features of the process input data (Process Data from Device to Master).
Process Data Output Length	0	7	UIntegerT	1	R	Communication: Information on width of the process output data (Process Data from Master to Device).
Vendor ID 1	0	8	UIntegerT	1	R	Identification: Highest octet of the Vendor ID. Combined with the parameter Vendor ID 2, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
Vendor ID 2	0	9	UIntegerT	82	R	Identification: Lowest octet of the Vendor ID. Combined with the parameter Vendor ID 1, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
Device ID 1	0	10	UIntegerT	0	R	Identification: Highest octet of the Device ID. Combined with the parameters Device ID 2 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
Device ID 2	0	11	UIntegerT	8	R	Identification: Middle octet of the Device ID. Combined with the parameters Device ID 1 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
Device ID 3	0	12	UIntegerT	63	R	Identification: Lowest octet of the Device ID. Combined with the parameters Device ID 1 and 2, this parameter defines the 24-bit value of the vendor-specific Device ID.
Reserved	0	13	UIntegerT		R	
Reserved	0	14	UIntegerT		R	
Reserved	0	15	UIntegerT		R	

Parameter	Index	Subindex	Data type	Default	AR	Description
System Command	0	16	UIntegerT		W	<p>Application: Command interface for devices without ISDU support. Validity and execution of commands are not confirmed.</p> <p>(0 ... 63): Reserved            128: Device Reset            129: Application Reset            130: Restore Factory Settings            131: Back-to-box            (132 ... 159): Reserved            160: Error Confirmation            161: Teach 11% (Standard Sensitivity)            162: Teach 30% (Decreased Sensitivity)            163: dark switching            164: light switching            170: Enable Configuration Mode            171: Reload last Teach (WORKING)            172: Restore factory defaults            173: Save current parameters to device            174: Enable Sensor Mode            191: Enable ADC Signal Process Data Output</p>
DP	1	0	RecordT		RW	
Off Limit	1	2	UIntegerT		RW	Off Limit
On Limit	1	3	UIntegerT		RW	On Limit
Key Lock	1	6	BooleanT	0	RW	<p>Key Lock; IO-Link Parameter overrides IN2 Input/PD</p> <p>False: Disabled            True: Enabled</p>
Q2 logic function	1	8	UIntegerT	0	RW	<p>0: Inverted Switching Output            1: Switching Output            2: Warning Output</p>
Delay Function (internal delay unit)	1	10	UIntegerT	1	RW	<p>Operating mode of the internal delay unit</p> <p>0: On delay            1: Off delay            2: pulse stretching            3: pulse suppression</p>
Time base (internal delay unit)	1	11	UIntegerT	3	RW	<p>1ms, 10ms, 100ms, 1000ms</p> <p>0: 1ms            1: 10ms            2: 100ms            3: 1000ms</p>
Multiplication factor for time base (internal delay unit)	1	12	UIntegerT	5	RW	1-15
Light/Dark Switching	1	18	BooleanT	0	RW	<p>Light/Dark Switching: adjusting the switching behavior of the switching output</p> <p>False: light switching            True: dark switching</p>
Internal Delay Unit (based on object)	1	20	BooleanT	0	RW	<p>Enable Internal Delay Unit</p> <p>False: Disabled            True: Enabled</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
PDI Content	1	26	UIntegerT	0	R	0: Switching Signal and Status 1: Analog ADC value and Switching Signal
Status Teach/Command	1	32	BooleanT	0	R	Value is re-read after new command. All status bits are valid after finished command.  False: finished True: running
Command accepted	1	33	BooleanT	0	R	False: no True: yes
Teach Error	1	36	BooleanT	0	R	False: no True: yes
Last values restored	1	37	BooleanT	0	R	False: no True: yes
Reception level too high	1	38	BooleanT	0	R	False: no True: yes
Reception level too low	1	39	BooleanT	0	R	False: no True: yes

## 9 Technical specifications

### 9.1 General data

Tab. 9.1: Sensor and IODD version

IODD version	V1.0
IODD release date	2023-10-13
Device family	RK46C
Device ID	2111
Device name	RK46C.DL3/LP
Device variants	RK46C_2111 IO-Link (RK46C_2111)