

IO-Link KRT18 PLC Integration

IO-Link service data function block + process data parser
function for Beckhoff (TwinCAT V2.x) PLC systems in
combination with a EtherCAT IO-Link Master

Table of content

1. About this document	3
1.1. Function of this document	3
1.2. Target group	3
1.3. Scope	3
2. Service data function block	5
2.1. Block specifications	5
2.2. Method of function	6
2.3. Behavior when error occurs	6
2.4. Communication parameter	6
2.5. Parameter	8
2.6. Error description	24
2.6.1. Error code (ERROR_CODE)	24
2.7. Including into the PLC project	25
3. Process data parser function	26
3.1. Block specifications	26
3.2. Parameter	26
3.3. Including into the PLC project	26

1. About this document

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

1.1. Function of this document

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

These instructions do not provide instructions for operating the machine, the system or the vehicle on which IO-Link devices are, or will be, integrated. Information on this is to be found in the appropriate operating instructions of the machine, the system or the vehicle.

1.2. 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.

1.3. Scope

These function blocks are device type-specific and only suitable for the following Leuze IO-Link devices.

Device family: Contrast Scanner

Device ID: 2128



- KRT18BM.V5/L6T-M12
(50130950)
- KRT18BM.H5/L6T-M12
(50131241)
- KRT18BM.VT5/L6T-M12
(50131242)
- KRT18BM.HT5/L6T-M12
(50131243)
- KRT18BM.VS5/L6T-M12
(50131244)
- KRT18BM.HS5/L6T-M12
(50131245)

The function block "FB_Leuze_KRT18_EC" interprets the call-up of the acyclic service data.

The function "F_Leuze_PDInParser_KRT18" interprets the process data telegram sent from the IO-Link device.

The functionality of these PLC blocks depends on the IO-Link parameter set described by the IODD. This means, that these blocks also may be used for other Leuze devices (e.g. new device variants)

with identical IO-Link parameter sets.

2. Service data function block

The function block "FB_Leuze_KRT18_EC" simplifies the usage of Leuze IO-Link devices on Beckhoff (TwinCAT V2.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.

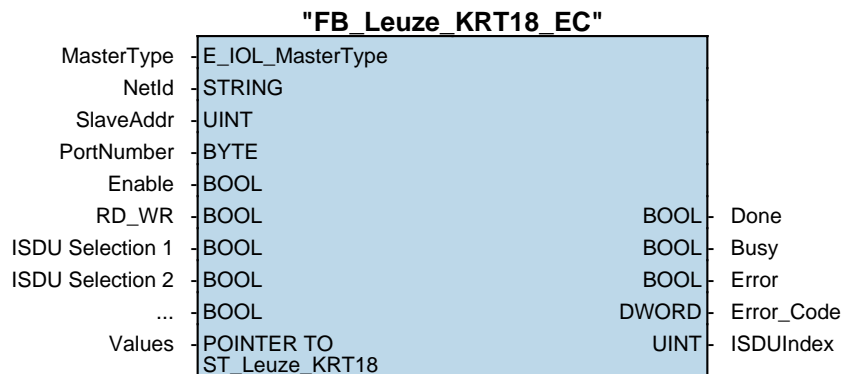
2.1. Block specifications

Block name:	FB_Leuze_KRT18_EC
Version:	1.2.0.0
Used blocks:	SIOL_C_EC R_TRIG TON LEN ADSREADEX ADSWRITE FB_EcCoESdoRead FB_EcCoESdoWrite
Used libraries:	IO-Link Base V3_1_0_0.lib STANDARD.lib TCBase.lib TcSystem.lib TcEtherCAT.lib TCUtilities.lib
Used structures:	ST_Leuze_KRT18
Call up:	Cyclic
Programming language:	Structured text (ST)
IODD:	Leuze_electronic-KRT18_2128-20180604-IODD1.1.xml (V3.0)



Attention!

The function block uses the library "IO-Link Base (IOLBase)" in the version V3.1.0.0 or higher. Please ensure, that you have installed the added it to your PLC project. The IO-Link base library is backward compatible and can also be used with older IO-Link function blocks.



2.2. Method of function

The function block uses the data structure "ST_Leuze_KRT18". The data structure contains the values of all IO-Link variables. Before you can use it, the structure must be instantiated in the PLC program. 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 "RD_WR" = FALSE to read parameters. The value that should be written can be defined in the data structure, as soon as the input parameter "RD_WR" = TRUE. You start each transfer by calling up the "FB_Leuze_KRT18_EC" with a positive trigger at the "Enable" input. As long as there is no valid answer the output "Busy" is TRUE. In the case, the timeout period of 10 sec. 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 "Enable" 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.

2.3. Behavior when error occurs

An error bit (ERROR) is set and an error code (ERROR_CODE) 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.

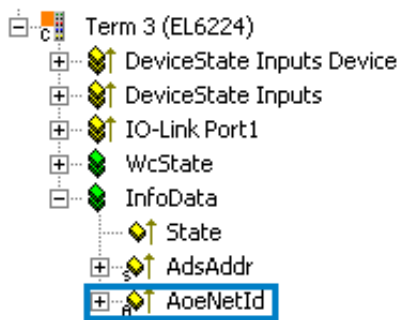
2.4. Communication parameter

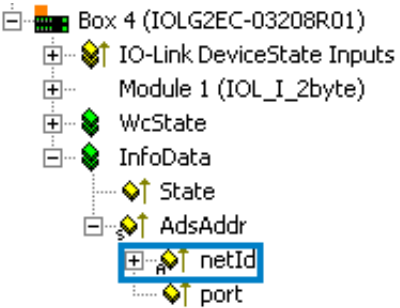
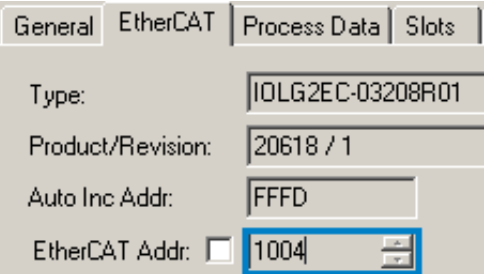
Because of dependencies in the communication between the PLC and the IO-Link Master only the following EtherCAT IO-Link Masters are supported:

- Beckhoff EL6224/EP6224 (MasterType = 0 [eBECKHOFF_6224])
- SICK IOLG2EC (MasterType = 1 [eSICK_IOLG2EC])
- Phoenix Axioline (MasterType = 2 [ePHOENIX_AXIOLINE])

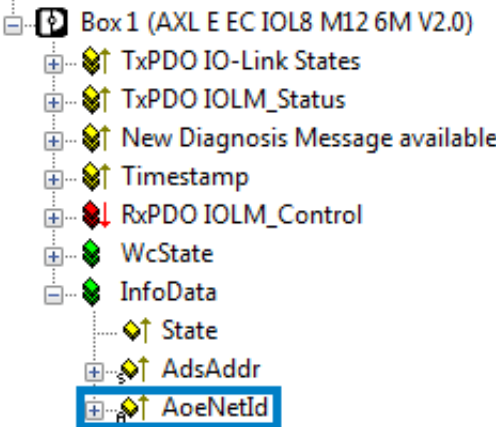
Depending on the selected "MasterType" the communication parameters must be configured as

follows.

Input option	MasterType = 0 (Beckhoff EL6224/EP6224)
MasterType:	0 (Enum: eBECKHOFF_6224)
NetId:	
SlaveAddr:	0
PortNumber:	Port number beginning with 1

Input option	MasterType = 1 (SICK IOLG2EC)
MasterType:	1 (Enum: eSICK_IOLG2EC)
NetId:	
SlaveAddr:	
PortNumber:	Port number beginning with 1

Input option	MasterType = 2 (Phoenix Axioline)
MasterType:	2 (Enum: ePHOENIX_AXIOLINE)

NetId:	
SlaveAddr:	0
PortNumber:	Port number beginning with 1

2.5. Parameter

Parameter name	Declaration	Data type	Description
MasterType	INPUT	E_IOL_M asterType	Selection of the IO-Link Master 0= Beckhoff EL6224/EP6224 1= SICK IOLG2EC 2= Phoenix Axioline
NetId	INPUT	STRING	Beckhoff EL6224/EP6224: AoENetId of the IO-Link Master SICK IOLG2EC: AmsNetId of the EtherCAT Master
SlaveAddr	INPUT	UINT	EtherCAT slave address of the IO-Link Masters (only used for the SICK IOLG2EC, otherwise 0)
PortNumber	INPUT	BYTE	Number of the port where the IO-Link device is connected to the IO-Link Master 1..255: Port number
Enable	INPUT	BOOL	Positive trigger: Start data transfer
RD_WR	INPUT	BOOL	Read or write the selected IO-Link parameter. FALSE: Read parameter TRUE: Write Parameter

Parameter name	Declaration	Data type	Description
SysCommand	INPUT	BOOL	<p>Selection of the IO-Link parameter "Standard Command"</p> <p>===== IO-Link parameter information ===== IO-Link Index: 2 Access: Write only</p> <p>Valid parameter values of the data structure (dec.): 128: Device Reset 130: Restore Factory Settings 160: Clear Configuration Reservation (Clear DsUploadFlag) 161: Reserve Configuration for DS (Set DsUploadFlag) 192: Sensitivity increase by one step 193: Sensitivity decrease by one step 194: Static 2-point teach start with mark 195: Static 2-point teach start with background 196: Dynamic 2-point teach start with mark 197: Dynamic 2-point teach start with background 207: Teach Ack 208: Teach Fail Confirm 255: Do nothing</p>
DeviceAccessLocks	INPUT	BOOL	<p>Selection of the IO-Link parameter "Device Access Locks"</p> <p>===== IO-Link parameter information ===== IO-Link Index: 12 Access: Read/Write</p>
VendorName	INPUT	BOOL	<p>Selection of the IO-Link parameter "Vendor Name"</p> <p>===== IO-Link parameter information ===== IO-Link Index: 16 Access: Read only</p>
VendorText	INPUT	BOOL	<p>Selection of the IO-Link parameter "Vendor Text"</p> <p>===== IO-Link parameter information ===== IO-Link Index: 17 Access: Read only</p>
ProductName	INPUT	BOOL	<p>Selection of the IO-Link parameter "Product Name"</p> <p>===== IO-Link parameter information ===== IO-Link Index: 18 Access: Read only</p>
ProductID	INPUT	BOOL	<p>Selection of the IO-Link parameter "Product ID"</p> <p>===== IO-Link parameter information ===== IO-Link Index: 19 Access: Read only</p>
ProductText	INPUT	BOOL	<p>Selection of the IO-Link parameter "Product Text"</p> <p>===== IO-Link parameter information ===== IO-Link Index: 20 Access: Read only</p>

Parameter name	Declaration	Data type	Description
SerialNumber	INPUT	BOOL	Selection of the IO-Link parameter "Serial Number" ===== IO-Link parameter information ===== IO-Link Index: 21 Access: Read only
HWVersion	INPUT	BOOL	Selection of the IO-Link parameter "Hardware Version" ===== IO-Link parameter information ===== IO-Link Index: 22 Access: Read only
FWVersion	INPUT	BOOL	Selection of the IO-Link parameter "Firmware Version" ===== IO-Link parameter information ===== IO-Link Index: 23 Access: Read only
AppliName	INPUT	BOOL	Selection of the IO-Link parameter "Application Specific Tag" ===== IO-Link parameter information ===== IO-Link Index: 24 Access: Read/Write
DeviceStatus	INPUT	BOOL	Selection of the IO-Link parameter "Device Status" ===== IO-Link parameter information ===== IO-Link Index: 36 Access: Read only Valid parameter values of the data structure (dec.): 0: Device is OK 1: Maintenance required 2: Out of specification 3: Functional check 4: Failure 5-255: Reserved

Parameter name	Declaration	Data type	Description
IdxOfTeachResMemLoc	INPUT	BOOL	<p>Selection of the IO-Link parameter "index of teach result memory location to show"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 100 Access: Read/Write</p> <p>Valid parameter values of the data structure (dec.):</p> <p>0: 0 1: 1 2: 2 3: 3 4: 4 5: 5 6: 6 7: 7 8: 8 9: 9 10: 10 11: 11 12: 12 13: 13 14: 14 15: 15 16: 16 17: 17 18: 18 19: 19 20: 20 21: 21 22: 22 23: 23 24: 24 25: 25 26: 26 27: 27 28: 28 29: 29</p>

Parameter name	Declaration	Data type	Description
IdxToRecallTeachRes	INPUT	BOOL	<p>Selection of the IO-Link parameter "index to recall teach result from memory location "</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 101</p> <p>Access: Write only</p> <p>Valid parameter values of the data structure (dec.):</p> <p>0: 0 1: 1 2: 2 3: 3 4: 4 5: 5 6: 6 7: 7 8: 8 9: 9 10: 10 11: 11 12: 12 13: 13 14: 14 15: 15 16: 16 17: 17 18: 18 19: 19 20: 20 21: 21 22: 22 23: 23 24: 24 25: 25 26: 26 27: 27 28: 28 29: 29</p>

Parameter name	Declaration	Data type	Description
IdxToSaveTeachRes	INPUT	BOOL	<p>Selection of the IO-Link parameter "index to save teach result to memory location "</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 102</p> <p>Access: Write only</p> <p>Valid parameter values of the data structure (dec.):</p> <p>0: 0</p> <p>1: 1</p> <p>2: 2</p> <p>3: 3</p> <p>4: 4</p> <p>5: 5</p> <p>6: 6</p> <p>7: 7</p> <p>8: 8</p> <p>9: 9</p> <p>10: 10</p> <p>11: 11</p> <p>12: 12</p> <p>13: 13</p> <p>14: 14</p> <p>15: 15</p> <p>16: 16</p> <p>17: 17</p> <p>18: 18</p> <p>19: 19</p> <p>20: 20</p> <p>21: 21</p> <p>22: 22</p> <p>23: 23</p> <p>24: 24</p> <p>25: 25</p> <p>26: 26</p> <p>27: 27</p> <p>28: 28</p> <p>29: 29</p>
TimerModuleOnOff	INPUT	BOOL	<p>Selection of the IO-Link parameter "timer module on / off"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 141</p> <p>Access: Read/Write</p> <p>Valid parameter values of the data structure (dec.):</p> <p>1: on</p> <p>0: off</p>
TimeBase	INPUT	BOOL	<p>Selection of the IO-Link parameter "time base"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 142</p> <p>Access: Read/Write</p> <p>Valid parameter values of the data structure (dec.):</p> <p>0: 100µs</p> <p>1: 1ms</p> <p>2: 10ms</p>

Parameter name	Declaration	Data type	Description
TimeFactor	INPUT	BOOL	<p>Selection of the IO-Link parameter "time factor"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 143</p> <p>Access: Read/Write</p> <p>Valid parameter values of the data structure (dec.):</p> <p>1-1000</p>
TimerModuleFunction	INPUT	BOOL	<p>Selection of the IO-Link parameter "timer module function"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 144</p> <p>Access: Read/Write</p> <p>Valid parameter values of the data structure (dec.):</p> <p>1: ON delay</p> <p>2: OFF delay</p> <p>3: pulse stretching</p> <p>4: pulse suppression</p>
FuncSwitchingOut1	INPUT	BOOL	<p>Selection of the IO-Link parameter "function switching output1"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 145</p> <p>Access: Read/Write</p> <p>Valid parameter values of the data structure (dec.):</p> <p>0: high signal on mark</p> <p>1: low signal on mark</p>
TrackingFunction	INPUT	BOOL	<p>Selection of the IO-Link parameter "tracking-function"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 146</p> <p>Access: Read/Write</p> <p>Valid parameter values of the data structure (dec.):</p> <p>1: on</p> <p>0: off</p>
WireInputType	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire input type"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 147</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <p>1: NPN-logic</p> <p>0: PNP-logic</p>

Parameter name	Declaration	Data type	Description
ColorAtTeach	INPUT	BOOL	<p>Selection of the IO-Link parameter "color at teach"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 148</p> <p>Access: Read/Write</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: all 1: red 2: green 3: blue 4: red, green 5: red, blue 6: green, blue
FuncButton1Level0	INPUT	BOOL	<p>Selection of the IO-Link parameter "function for button 1 at button level0"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 150</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
FuncButton1Level1	INPUT	BOOL	<p>Selection of the IO-Link parameter "function for button 1 at button level1"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 151</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error

Parameter name	Declaration	Data type	Description
FuncButton1Level2	INPUT	BOOL	<p>Selection of the IO-Link parameter "function for button 1 at button level2"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 152</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 4: Static 2 point teach 5: Dynamic 2 point teach
FuncButton1Level3	INPUT	BOOL	<p>Selection of the IO-Link parameter "function for button 1 at button level3"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 153</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 4: Static 2 point teach 5: Dynamic 2 point teach
FuncButton1Level4	INPUT	BOOL	<p>Selection of the IO-Link parameter "function for button 1 at button level4"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 154</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
FuncButton2Level0	INPUT	BOOL	<p>Selection of the IO-Link parameter "function for button 2 at button level0"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 155</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error

Parameter name	Declaration	Data type	Description
FuncButton2Level1	INPUT	BOOL	<p>Selection of the IO-Link parameter "function for button 2 at button level1"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 156</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
FuncButton2Level2	INPUT	BOOL	<p>Selection of the IO-Link parameter "function for button 2 at button level2"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 157</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 4: Static 2 point teach 5: Dynamic 2 point teach
FuncButton2Level3	INPUT	BOOL	<p>Selection of the IO-Link parameter "function for button 2 at button level3"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 158</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 4: Static 2 point teach 5: Dynamic 2 point teach
FuncButton2Level4	INPUT	BOOL	<p>Selection of the IO-Link parameter "function for button 2 at button level4"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 159</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error

Parameter name	Declaration	Data type	Description
WireFunctionLevel1	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level1"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 160</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
WireFunctionLevel2	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level2"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 161</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
WireFunctionLevel3	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level3"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 162</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error

Parameter name	Declaration	Data type	Description
WireFunctionLevel4	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level4"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 163</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
WireFunctionLevel5	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level5"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 164</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
WireFunctionLevel6	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level6"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 165</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error

Parameter name	Declaration	Data type	Description
WireFunctionLevel7	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level7"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 166</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
WireFunctionLevel8	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level8"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 167</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
WireFunctionLevel9	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level9"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 168</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error

Parameter name	Declaration	Data type	Description
WireFunctionLevel10	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level10"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 169</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
WireFunctionLevel11	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level11"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 170</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
WireFunctionLevel12	INPUT	BOOL	<p>Selection of the IO-Link parameter "wire function level12"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 171</p> <p>Access: Read only</p> <p>Valid parameter values of the data structure (dec.):</p> <ul style="list-style-type: none"> 0: No function 1: Reserve function1 2: Sensivity + 3: Sensivity - 4: Static 2 point teach 5: Dynamic 2 point teach 6: Special function near mark 7: Special function activ on background 8: tracking enable 9: No function with error
TeachResult	INPUT	BOOL	<p>Selection of the IO-Link parameter "teach result"</p> <p>===== IO-Link parameter information =====</p> <p>IO-Link Index: 180</p> <p>Access: Read/Write</p>

Parameter name	Declaration	Data type	Description
AnalysisDepth	INPUT	BOOL	Selection of the IO-Link parameter "analysis depth" ===== IO-Link parameter information ===== IO-Link Index: 181 Access: Read only Valid parameter values of the data structure (dec.): 2-1000
CounterForMarks	INPUT	BOOL	Selection of the IO-Link parameter "counter for marks" ===== IO-Link parameter information ===== IO-Link Index: 182 Access: Read/Write
SensorVariant	INPUT	BOOL	Selection of the IO-Link parameter "sensor variant" ===== IO-Link parameter information ===== IO-Link Index: 183 Access: Read only
ButtonLockState	INPUT	BOOL	Selection of the IO-Link parameter "button lock state" ===== IO-Link parameter information ===== IO-Link Index: 184 Access: Read/Write Valid parameter values of the data structure (dec.): 1: on 0: off
EasytuneLockState	INPUT	BOOL	Selection of the IO-Link parameter "easytune lock state" ===== IO-Link parameter information ===== IO-Link Index: 185 Access: Read/Write Valid parameter values of the data structure (dec.): 1: on 0: off
FuncSwitchingOut2	INPUT	BOOL	Selection of the IO-Link parameter "function switching output OUT2" ===== IO-Link parameter information ===== IO-Link Index: 186 Access: Read/Write Valid parameter values of the data structure (dec.): 0: inverted OUT1 1: equal OUT1 2: warning output

Parameter name	Declaration	Data type	Description
OutToggleWhileTeach	INPUT	BOOL	Selection of the IO-Link parameter "out toggle while teach" ===== IO-Link parameter information ===== IO-Link Index: 187 Access: Read/Write Valid parameter values of the data structure (dec.): 1: on 0: off
TeachState	INPUT	BOOL	Selection of the IO-Link parameter "teach state" ===== IO-Link parameter information ===== IO-Link Index: 188 Access: Read only Valid parameter values of the data structure (dec.): 0: no teach occurred 1: busy 2: last teach successful 3: last teach failed 4: last valid is used
ProcessReliability	INPUT	BOOL	Selection of the IO-Link parameter "process reliability" ===== IO-Link parameter information ===== IO-Link Index: 189 Access: Read only
ChoicePosOfSwPoint	INPUT	BOOL	Selection of the IO-Link parameter "choice of position of switching point" ===== IO-Link parameter information ===== IO-Link Index: 190 Access: Read/Write Valid parameter values of the data structure (dec.): 0: very close to the mark = 6% 1: close to the mark = 12% 2: toward mark = 25% 3: in the middle between the mark and background = 50% 4: in direction of the background = 70% 5: close to the background = 82% 6: very close to the background = 90%
Values	INPUT	POINTER TO ST_Leuze_KRT18	Pointer to the instance of the data structure ST_Leuze_KRT18. Example: VAR stIOLData: ST_Leuze_KRT18; END_VAR Values:= ADR(stIOLData);
Done	OUTPUT	BOOL	Indicates whether data is valid.
Busy	OUTPUT	BOOL	Request in process. FALSE: Request is terminated TRUE: Request is being processed

Parameter name	Declaration	Data type	Description
Error	OUTPUT	BOOL	Error flag FALSE: No error TRUE: Error detected
Error_Code	OUTPUT	DWORD	Error code
ISDUIndex	OUTPUT	UINT	If an error occurs, this output shows the corresponding ISDU index

2.6. Error description

2.6.1. Error code (ERROR_CODE)

The parameter ERROR_CODE contains detailed information of the occurred error:

WORD 1	WORD 0
Block error	ADS communication error

Device errors are errors send from the connected device. Communication errors are errors generated by the used standard function blocks "ADSWRITE" and "ADSREADEX". Further information is given in the documentation of these function blocks.

Error code (WORD 0)	Error code
0x0001 ... 0x001C	Global error codes (see Beckhoff ADS return codes)
0x0500 ... 0x050A	Router error codes (see Beckhoff ADS return codes)
0x0700 ... 0x0755	Generals ADS error codes (see Beckhoff ADS return codes)
0x1000 ... 0x1010	RTime error codes (see Beckhoff ADS return codes)
0x274C ... 0x2751	Socket error codes (see Beckhoff ADS return codes)

For further information see ADS Return Codes (Beckhoff).

Error code (WORD 1)	Error code
0x0000	No error
0x0001	Reserved
0x0002	No parameter selected
0x0003	Selected parameter(s) not readable. There was at least one parameter selected with a write-only access (see ISDUIndex).
0x0004	Selected parameter(s) not writable. There was at least one parameter selected with read-only access (see ISDUIndex).
0x0005	At least one selected parameter, the input value is greater then the data type allows (see iISDUIndex).
0x0006	At least one selected parameter, the input value is lower than the data type allows (see iISDUIndex).
0x0007 ... 0x0009	Reserved
0x00FF	Master specific error: Action could not perform (only for SICK IOLG2)
0x0100	(FB_IOL_Call_EC): IO-Link Index > 32767
0x0200	(FB_IOL_Call_EC): Invalid parameter (Length > 232)
0x0300	(FB_IOL_Call_EC): Invalid IO-Link port number (1 > PortNumber > 8)
0x0400	(FB_IOL_Call_EC): Timeout
0x0500	(FB_IOL_Call_EC): Invalid IO-Link MasterTyp
0x1000	Master communication error
0x1100	ISDU time out / Device event error

Error code (WORD 1)	Error code
0x5200	Device checksum error
0x5600	Device buffer overflow
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 product description or the IO-Link specification (www.IO-Link.com).

2.7. Including into the PLC project

The function block "FB_Leuze_KRT18_EC" is a part of the TwinCAT V2.x "" library. The library can be included by using the library manager of TwinCAT PLC Control.

The function block uses the "IO-Link Base" communication library. Please make sure that the library has been added to your project. The "IO-Link Base" library is available on www.leuze-electronic.de.

Depending on the IO-Link Master, the communication parameters of the function block must be accordingly defined (see chapter 2.4).

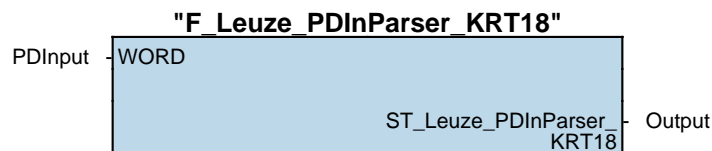
3. Process data parser function

The function F_Leuze_PDInParser_KRT18 simplifies the interpretation of composed IO-Link process data. This data is provided as a data structure on the PLC side.

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

3.1. Block specifications

Block name: F_Leuze_PDInParser_KRT18
Version: 1.2
Used structures: ST_Leuze_PDInParser_KRT18
Programming language: Structured text (ST)
IODD: Leuze_electronic-KRT18_2128-20180604-IODD1.1.xml (V3.0)



3.2. Parameter

Parameter name	Declaration	Data type	Description
PDInput	INPUT	WORD	Raw process data of the IO-Link device. Please make sure that the byte order is not swapped.
Output	OUTPUT	ST_Leuze_PDInParser_KRT18	Reference to the instance of the data structure ST_Leuze_PDInParser_KRT18. The structure includes the disaggregated values of the process data.

3.3. Including into the PLC project

The function "F_Leuze_PDInParser_KRT18" is a part of the IO-Link library. The library can be included by using the TwinCAT library manager. The function needs the process data of the IO-Link device as an input value. The process data is obtained by linking a PLC variable via AT-declaration with the process value of the IO-Link device in the TwinCAT System Manager. Please make sure that the byte order is not swapped (see picture). The output value of the function is a data structure which includes the disaggregated values of the process data.

