

## IO-Link Interface Description

### ThinkTop V70 IO-Link



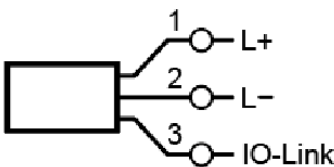


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## 1 Device variant

|                                                              |                                                                                   |                                                                                     |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <p><b>ThinkTop V70 IO-Link</b></p> <p>Valve Control Unit</p> |  |  |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|



## 2 Communication

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|                        |                                                            |
|------------------------|------------------------------------------------------------|
| Vendor ID              | 0x050C 1292 d / Bytes 5d 12d                               |
| Device ID              | 0x0002 2 d / Bytes 0d 2d                                   |
| Bit rate               | COM2                                                       |
| Minimum cycle time     | 5 ms                                                       |
| SIO mode supported     | No                                                         |
| Block parameterization | Yes                                                        |
| Data storage           | Yes                                                        |
| Supported profiles     | BLOB, Binary Large Objects<br>Identification and Diagnosis |



**NOTE:**

If the Vendor ID and Device ID is referenced in your PLC system, then it is ensured that

- the connected Device type is correct
- the IO-Link datastorage is enabled
- your application is still able to work, even your Device has been exchanged with a successor model.



For process value update rate, as well as further information concerning sensor performance, see product leaflet



### 3 Parameter overview

| Parameter                | Index | Subindex | Type              | Factory setting                 | page |
|--------------------------|-------|----------|-------------------|---------------------------------|------|
| Device Access Locks      | 12    |          | RecordT (16 Bit)  | false                           | 13   |
| Vendor name              | 16    |          | StringT (10 Byte) | Alfa Laval                      | 8    |
| Vendor text              | 17    |          | StringT (17 Byte) | www.alfalaval.com               | 8    |
| Product Name             | 18    |          | StringT (20 Byte) | ThinkTop V70 IO-Link            | 8    |
| Product ID               | 19    |          | StringT (20 Byte) | ThinkTop V70 IO-Link            | 8    |
| Product Text             | 20    |          | StringT (31 Byte) | Control board SP no. 9615394801 | 8    |
| Hardware Version         | 22    |          | StringT (2 Byte)  |                                 | 14   |
| Firmware Version         | 23    |          | StringT (16 Byte) |                                 | 14   |
| Application Specific Tag | 24    |          | StringT (32 Byte) | ***                             | 8    |
| Function Tag             | 25    |          | StringT (32 Byte) | ***                             | 8    |
| Location Tag             | 26    |          | StringT (32 Byte) | ***                             | 8    |
| Process data input       | 40    |          | RecordT (32 Bit)  |                                 | 9    |
| Process data output      | 41    |          | RecordT (8 Bit)   |                                 | 10   |
| BLOB ID                  | 49    |          | IntegerT (16 Bit) | 0 (Idle)                        | 17   |
| Production date          | 65    |          | StringT (4 Byte)  |                                 | 14   |
| Valve Type               | 66    |          | UIntegerT (8 Bit) |                                 | 13   |
| Setup Type               | 67    |          | UIntegerT (8 Bit) |                                 | 13   |
| Error Modifier           | 70    |          | IntegerT (8 Bit)  | 10                              | 11   |
| Power Save               | 73    |          | UIntegerT (8 Bit) | 0 (Disabled)                    | 11   |
| RGB-Colour               | 74    |          | RecordT (64 Bit)  |                                 | 12   |
| Button press             | 74    | 1        | UIntegerT (8 Bit) | 5 (Purple)                      |      |
| Error                    | 74    | 2        | UIntegerT (8 Bit) | 4 (Red)                         |      |
| Out                      | 74    | 3        | UIntegerT (8 Bit) | 0 (RGB off)                     |      |
| De-En                    | 74    | 4        | UIntegerT (8 Bit) | 2 (Green)                       |      |
| Main                     | 74    | 5        | UIntegerT (8 Bit) | 7 (White)                       |      |
| Usl                      | 74    | 6        | UIntegerT (8 Bit) | 3 (Cyan)                        |      |
| Lsp                      | 74    | 7        | UIntegerT (8 Bit) | 6 (Yellow)                      |      |
| Wink                     | 74    | 8        | UIntegerT (8 Bit) | 5 (Purple)                      |      |
| USA Bit Mapping          | 75    |          | UIntegerT (8 Bit) | 0 (USA bit mapping disabled)    | 11   |
| Key Lock                 | 76    |          | UIntegerT (8 Bit) | 0 (Unlocked)                    | 13   |
| Burst Clean              | 77    |          | UIntegerT (8 Bit) | 0 (Disabled)                    | 11   |
| Log                      | 80    |          | RecordT (96 Bit)  |                                 | 14   |
| PowerUps                 | 80    | 1        | IntegerT (32 Bit) |                                 |      |
| RunTime                  | 80    | 2        | IntegerT (32 Bit) |                                 |      |
| LastCustomisation        | 80    | 3        | IntegerT (32 Bit) |                                 |      |
| Temperature              | 81    |          | RecordT (48 Bit)  |                                 | 14   |
| Current                  | 81    | 1        | IntegerT (16 Bit) |                                 |      |
| Min                      | 81    | 2        | IntegerT (16 Bit) |                                 |      |
| Max                      | 81    | 3        | IntegerT (16 Bit) |                                 |      |
| Pressure Shock Counter   | 82    |          | IntegerT (32 Bit) | 0                               | 14   |
| SV-activations           | 83    |          | RecordT (96 Bit)  |                                 | 15   |
| SV1                      | 83    | 1        | IntegerT (32 Bit) | 0                               |      |
| SV2                      | 83    | 2        | IntegerT (32 Bit) | 0                               |      |
| SV3                      | 83    | 3        | IntegerT (32 Bit) | 0                               |      |
| SV-ON_time               | 84    |          | RecordT (96 Bit)  |                                 | 15   |



### 3 Parameter overview

| Parameter                   | Index | Subindex | Type               | Factory setting | page |
|-----------------------------|-------|----------|--------------------|-----------------|------|
| SV1                         | 84    | 1        | IntegerT (32 Bit)  | 0               |      |
| SV2                         | 84    | 2        | IntegerT (32 Bit)  | 0               |      |
| SV3                         | 84    | 3        | IntegerT (32 Bit)  | 0               |      |
| Setup En-stroke             | 85    |          | RecordT (96 Bit)   |                 | 16   |
| SV1 (main)                  | 85    | 1        | IntegerT (32 Bit)  | 0               |      |
| SV2 (USL)                   | 85    | 2        | IntegerT (32 Bit)  | 0               |      |
| SV3 (LSP)                   | 85    | 3        | IntegerT (32 Bit)  | 0               |      |
| Setup DeEn-stroke           | 86    |          | RecordT (96 Bit)   |                 | 17   |
| SV1                         | 86    | 1        | IntegerT (32 Bit)  | 0               |      |
| SV2                         | 86    | 2        | IntegerT (32 Bit)  | 0               |      |
| SV3                         | 86    | 3        | IntegerT (32 Bit)  | 0               |      |
| Setup Position Data (De...) | 110   |          | RecordT (32 Bit)   |                 | 15   |
| Pos De-En                   | 110   | 1        | UIntegerT (16 Bit) |                 |      |
| Switchpoint logic           | 110   | 2        | BooleanT           |                 |      |
| Switchpoint hystere...      | 110   | 3        | UIntegerT (8 Bit)  |                 |      |
| Setup Position Data (Ma...) | 111   |          | RecordT (48 Bit)   |                 | 16   |
| Pos Main                    | 111   | 1        | UIntegerT (16 Bit) |                 |      |
| Switchpoint logic           | 111   | 2        | BooleanT           |                 |      |
| Switchpoint hystere...      | 111   | 3        | UIntegerT (8 Bit)  |                 |      |
| Setup Position Data (Lsp)   | 112   |          | RecordT (32 Bit)   |                 | 16   |
| Pos Lsp                     | 112   | 1        | UIntegerT (16 Bit) |                 |      |
| Switchpoint logic           | 112   | 2        | BooleanT           |                 |      |
| Switchpoint hystere...      | 112   | 3        | UIntegerT (8 Bit)  |                 |      |
| Setup Position Data (Usl)   | 113   |          | RecordT (32 Bit)   |                 | 16   |
| Pos Usl                     | 113   | 1        | UIntegerT (16 Bit) |                 |      |
| Switchpoint logic           | 113   | 2        | BooleanT           |                 |      |
| Switchpoint hystere...      | 113   | 3        | UIntegerT (8 Bit)  |                 |      |

## 4 System Commands



System Command information  
 - Address: Index 2, Subindex 0  
 - Datatype: UInteger (8 Bit)  
 - AccessRight: Write Only

| System Commands | Text                                                          | Description                                            |
|-----------------|---------------------------------------------------------------|--------------------------------------------------------|
| 1               | Upload Start                                                  | Start block parameter upload                           |
| 2               | Upload End                                                    | End block parameter upload                             |
| 3               | Download Start                                                | Start block parameter download                         |
| 4               | Download End                                                  | Stop block parameter download                          |
| 5               | Store                                                         | Finalize block parameterization and start Data Storage |
| 6               | Break                                                         | Cancel block parameterization                          |
| 130             | Restore Factory Settings                                      |                                                        |
| 208             | Start Auto Setup                                              |                                                        |
| 209             | Setup Reset                                                   |                                                        |
| 210             | Parameter Reset                                               |                                                        |
| 211             | Diagnostic Reset                                              |                                                        |
| 240             | IO-Link 1.1 system test command<br>240, Event 8DFE appears    |                                                        |
| 241             | IO-Link 1.1 system test command<br>241, Event 8DFE disappears |                                                        |
| 242             | IO-Link 1.1 system test command<br>242, Event 8DFF appears    |                                                        |
| 243             | IO-Link 1.1 system test command<br>243, Event 8DFF disappears |                                                        |

## 5 Identification

### 5.1 Identification

| Function Tag                                | Index 25                        | Subindex 0 | StringT (32 Byte) | ReadWrite |
|---------------------------------------------|---------------------------------|------------|-------------------|-----------|
| Description of the device function          |                                 |            |                   |           |
| Factory setting                             | ***                             |            |                   |           |
| Location Tag                                | Index 26                        | Subindex 0 | StringT (32 Byte) | ReadWrite |
| Description of the physical device location |                                 |            |                   |           |
| Factory setting                             | ***                             |            |                   |           |
| Application Specific Tag                    | Index 24                        | Subindex 0 | StringT (32 Byte) | ReadWrite |
| Factory setting                             | ***                             |            |                   |           |
| Vendor name                                 | Index 16                        | Subindex 0 | StringT (10 Byte) | ReadOnly  |
| Factory setting                             | Alfa Laval                      |            |                   |           |
| Product Name                                | Index 18                        | Subindex 0 | StringT (20 Byte) | ReadOnly  |
| Factory setting                             | ThinkTop V70 IO-Link            |            |                   |           |
| Product ID                                  | Index 19                        | Subindex 0 | StringT (20 Byte) | ReadOnly  |
| Factory setting                             | ThinkTop V70 IO-Link            |            |                   |           |
| Product Text                                | Index 20                        | Subindex 0 | StringT (31 Byte) | ReadOnly  |
| Factory setting                             | Control board SP no. 9615394801 |            |                   |           |
| Vendor text                                 | Index 17                        | Subindex 0 | StringT (17 Byte) | ReadOnly  |
| Factory setting                             | www.alfalaval.com               |            |                   |           |

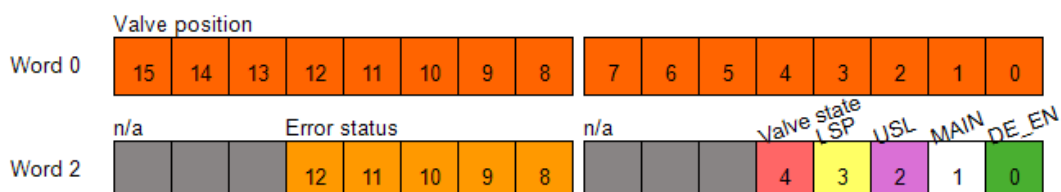




## 6 Observation

### 6.1 Process Data Input/Output

| Process data input                                                                                                          |                   |       | RecordT (32 Bit)                         |
|-----------------------------------------------------------------------------------------------------------------------------|-------------------|-------|------------------------------------------|
| Valve position                                                                                                              |                   |       | IntegerT (16 Bit)                        |
| Current valve position. Represents the actual distance between the top of the valve actuator and the top of the valve stem. |                   |       |                                          |
| Value range [mm]                                                                                                            | (0 To 1060) * 0.1 | 32764 | (NoData)                                 |
| Error status                                                                                                                |                   |       | UIntegerT (5 Bit)                        |
| Short description of the current error (Troubleshooting advice is available in the Instruction manual)                      |                   |       |                                          |
| Value range                                                                                                                 | 0                 | 16    | (Everything is OK)                       |
|                                                                                                                             |                   | 17    | (Sensor target missing (#16))            |
|                                                                                                                             |                   | 18    | (Setup prerequisite issue (#17))         |
|                                                                                                                             |                   | 19    | (Pneumatic part issue (#18))             |
|                                                                                                                             |                   | 20    | (Seat lift sensor issue (#19))           |
|                                                                                                                             |                   | 21    | (Position not reached (#20))             |
|                                                                                                                             |                   | 22    | (Unexpected movement (#21))              |
|                                                                                                                             |                   | 23    | (Seat-lift sensor missing (#22))         |
|                                                                                                                             |                   | 24    | (Pilot valve 1 missing (#23))            |
|                                                                                                                             |                   | 25    | (Pilot valve 2 missing (#24))            |
|                                                                                                                             |                   | 26    | (Pilot valve 3 missing (#25))            |
|                                                                                                                             |                   | 27    | (Interlock active (#26))                 |
|                                                                                                                             |                   | 28    | (Hardware fault (#27))                   |
|                                                                                                                             |                   | 29    | (Setup aborted (#28))                    |
|                                                                                                                             |                   | 30    | (Blocked button (#29))                   |
|                                                                                                                             |                   | 31    | (Communication failure (#30))            |
|                                                                                                                             |                   |       | (Safety stop active (#31))               |
| Valve state                                                                                                                 |                   |       | BooleanT                                 |
| Current Valve state (The valve system is OK when the signal is high)                                                        |                   |       |                                          |
| Value range                                                                                                                 | false             | true  | (Valve state NOT OK)<br>(Valve state OK) |
| LSP                                                                                                                         |                   |       | BooleanT                                 |
| Lower Seat Push energised position                                                                                          |                   |       |                                          |
| Value range                                                                                                                 | false             | true  | (inactive)<br>(active)                   |
| USL                                                                                                                         |                   |       | BooleanT                                 |
| Upper Seat Lift energised position                                                                                          |                   |       |                                          |
| Value range                                                                                                                 | false             | true  | (inactive)<br>(active)                   |
| MAIN                                                                                                                        |                   |       | BooleanT                                 |
| Main energised Position                                                                                                     |                   |       |                                          |
| Value range                                                                                                                 | false             | true  | (inactive)<br>(active)                   |
| DE_EN                                                                                                                       |                   |       | BooleanT                                 |
| De-Energized                                                                                                                |                   |       |                                          |
| Value range                                                                                                                 | false             | true  | (inactive)<br>(active)                   |

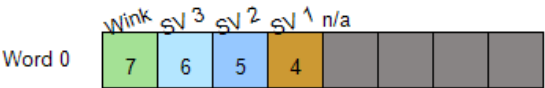


Process data displayed according device sort order.  
Please note: Siemens PLCs swap the high and low byte when using byte addressing.



## 6 Observation

| Process data output                                                  |               |                       | RecordT (8 Bit) |
|----------------------------------------------------------------------|---------------|-----------------------|-----------------|
| SV 1                                                                 |               |                       | BooleanT        |
| Trigger solenoid valve 1 for main valve activation                   |               |                       |                 |
| Value range                                                          | false<br>true | (Disable)<br>(Enable) |                 |
| SV 2                                                                 |               |                       | BooleanT        |
| Trigger solenoid valve 2 for upper seat lift activation              |               |                       |                 |
| Value range                                                          | false<br>true | (Disable)<br>(Enable) |                 |
| SV 3                                                                 |               |                       | BooleanT        |
| Trigger solenoid valve 3 for lower seat push activation              |               |                       |                 |
| Value range                                                          | false<br>true | (Disable)<br>(Enable) |                 |
| Wink                                                                 |               |                       | BooleanT        |
| Visual indication for locating the unit (Purple flashing as default) |               |                       |                 |
| Value range                                                          | false<br>true | (Disable)<br>(Enable) |                 |



-n/a: Not available area. Used to cover structured process data mapping



## 7 Parameter

### 7.1 Parameterization

#### 7.1.1 Customisation

| Burst Clean                                                                   | Index 77 | Subindex 0              | UIntegerT (8 Bit) | ReadWrite |
|-------------------------------------------------------------------------------|----------|-------------------------|-------------------|-----------|
| Burst clean mode. Independent fast seat-lift operation for effective cleaning |          |                         |                   |           |
| <b>Factory setting</b>                                                        | <b>0</b> | <b>(Disabled)</b>       |                   |           |
| Value range                                                                   | 0<br>1   | (Disabled)<br>(Enabled) |                   |           |

| USA Bit Mapping                                                             | Index 75 | Subindex 0                                              | UIntegerT (8 Bit) | ReadWrite |
|-----------------------------------------------------------------------------|----------|---------------------------------------------------------|-------------------|-----------|
| With this setting the seat-lift signals will represent seat closed position |          |                                                         |                   |           |
| <b>Factory setting</b>                                                      | <b>0</b> | <b>(USA bit mapping disabled)</b>                       |                   |           |
| Value range                                                                 | 0<br>1   | (USA bit mapping disabled)<br>(USA bit mapping enabled) |                   |           |

| Power Save                                                                | Index 73 | Subindex 0              | UIntegerT (8 Bit) | ReadWrite |
|---------------------------------------------------------------------------|----------|-------------------------|-------------------|-----------|
| Power save mode will turn off the visual indication when the unit is idle |          |                         |                   |           |
| <b>Factory setting</b>                                                    | <b>0</b> | <b>(Disabled)</b>       |                   |           |
| Value range                                                               | 0<br>1   | (Disabled)<br>(Enabled) |                   |           |

| Error Modifier                                                                                                                                              | Index 70      | Subindex 0 | IntegerT (8 Bit) | ReadWrite |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|------------------|-----------|
| The 'position not reached' timeout of the surveillance mode feature is calculated by [stroke duration + error modifier], the error modifier can be modified |               |            |                  |           |
| <b>Factory setting</b>                                                                                                                                      | <b>10</b>     |            |                  |           |
| Value range                                                                                                                                                 | (1 To 60) [s] |            |                  |           |

| RGB-Colour                                                      | Index 74                             | Subindex 0                                                                           | RecordT (64 Bit)  | ReadWrite |
|-----------------------------------------------------------------|--------------------------------------|--------------------------------------------------------------------------------------|-------------------|-----------|
| Option for customisation of the colours for the visual feedback |                                      |                                                                                      |                   |           |
| Button press                                                    |                                      | Subindex 1                                                                           | UIntegerT (8 Bit) |           |
| RGB colour for button press feedback                            |                                      |                                                                                      |                   |           |
| <b>Factory setting</b>                                          | <b>5</b>                             | <b>(Purple)</b>                                                                      |                   |           |
| Value range                                                     | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7 | (RGB off)<br>(Blue)<br>(Green)<br>(Cyan)<br>(Red)<br>(Purple)<br>(Yellow)<br>(White) |                   |           |

| Error                         |                                      | Subindex 2                                                                           | UIntegerT (8 Bit) |  |
|-------------------------------|--------------------------------------|--------------------------------------------------------------------------------------|-------------------|--|
| RGB colour for error feedback |                                      |                                                                                      |                   |  |
| <b>Factory setting</b>        | <b>4</b>                             | <b>(Red)</b>                                                                         |                   |  |
| Value range                   | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7 | (RGB off)<br>(Blue)<br>(Green)<br>(Cyan)<br>(Red)<br>(Purple)<br>(Yellow)<br>(White) |                   |  |



## 7 Parameter

| RGB-Colour                                  | Index 74 | Subindex 0       | RecordT (64 Bit)  | ReadWrite |
|---------------------------------------------|----------|------------------|-------------------|-----------|
| Out                                         |          | Subindex 3       | UIntegerT (8 Bit) |           |
| RGB colour for Moving (out of any position) |          |                  |                   |           |
| <b>Factory setting</b>                      | <b>0</b> | <b>(RGB off)</b> |                   |           |
| Value range                                 | 0        | (RGB off)        |                   |           |
|                                             | 1        | (Blue)           |                   |           |
|                                             | 2        | (Green)          |                   |           |
|                                             | 3        | (Cyan)           |                   |           |
|                                             | 4        | (Red)            |                   |           |
|                                             | 5        | (Purple)         |                   |           |
|                                             | 6        | (Yellow)         |                   |           |
|                                             | 7        | (White)          |                   |           |
| De-En                                       |          | Subindex 4       | UIntegerT (8 Bit) |           |
| RGB colour for De-Energized position        |          |                  |                   |           |
| <b>Factory setting</b>                      | <b>2</b> | <b>(Green)</b>   |                   |           |
| Value range                                 | 0        | (RGB off)        |                   |           |
|                                             | 1        | (Blue)           |                   |           |
|                                             | 2        | (Green)          |                   |           |
|                                             | 3        | (Cyan)           |                   |           |
|                                             | 4        | (Red)            |                   |           |
|                                             | 5        | (Purple)         |                   |           |
|                                             | 6        | (Yellow)         |                   |           |
|                                             | 7        | (White)          |                   |           |
| Main                                        |          | Subindex 5       | UIntegerT (8 Bit) |           |
| RGB colour for Main position                |          |                  |                   |           |
| <b>Factory setting</b>                      | <b>7</b> | <b>(White)</b>   |                   |           |
| Value range                                 | 0        | (RGB off)        |                   |           |
|                                             | 1        | (Blue)           |                   |           |
|                                             | 2        | (Green)          |                   |           |
|                                             | 3        | (Cyan)           |                   |           |
|                                             | 4        | (Red)            |                   |           |
|                                             | 5        | (Purple)         |                   |           |
|                                             | 6        | (Yellow)         |                   |           |
|                                             | 7        | (White)          |                   |           |
| Usl                                         |          | Subindex 6       | UIntegerT (8 Bit) |           |
| RGB colour for Upper Seat Lift position     |          |                  |                   |           |
| <b>Factory setting</b>                      | <b>3</b> | <b>(Cyan)</b>    |                   |           |
| Value range                                 | 0        | (RGB off)        |                   |           |
|                                             | 1        | (Blue)           |                   |           |
|                                             | 2        | (Green)          |                   |           |
|                                             | 3        | (Cyan)           |                   |           |
|                                             | 4        | (Red)            |                   |           |
|                                             | 5        | (Purple)         |                   |           |
|                                             | 6        | (Yellow)         |                   |           |
|                                             | 7        | (White)          |                   |           |
| Lsp                                         |          | Subindex 7       | UIntegerT (8 Bit) |           |
| RGB colour for Lower Seat Push position     |          |                  |                   |           |
| <b>Factory setting</b>                      | <b>6</b> | <b>(Yellow)</b>  |                   |           |
| Value range                                 | 0        | (RGB off)        |                   |           |
|                                             | 1        | (Blue)           |                   |           |
|                                             | 2        | (Green)          |                   |           |
|                                             | 3        | (Cyan)           |                   |           |
|                                             | 4        | (Red)            |                   |           |
|                                             | 5        | (Purple)         |                   |           |
|                                             | 6        | (Yellow)         |                   |           |
|                                             | 7        | (White)          |                   |           |
| Wink                                        |          | Subindex 8       | UIntegerT (8 Bit) |           |
| RGB colour for Wink signal                  |          |                  |                   |           |
| <b>Factory setting</b>                      | <b>5</b> | <b>(Purple)</b>  |                   |           |
| Value range                                 | 0        | (RGB off)        |                   |           |
|                                             | 1        | (Blue)           |                   |           |
|                                             | 2        | (Green)          |                   |           |
|                                             | 3        | (Cyan)           |                   |           |
|                                             | 4        | (Red)            |                   |           |
|                                             | 5        | (Purple)         |                   |           |
|                                             | 6        | (Yellow)         |                   |           |
|                                             | 7        | (White)          |                   |           |



## 7 Parameter

### 7.2 Setup

| Key Lock                                                                                                                    | Index 76 | Subindex 0        | UIntegerT (8 Bit) | ReadWrite |
|-----------------------------------------------------------------------------------------------------------------------------|----------|-------------------|-------------------|-----------|
| Locks the SELECT key on the local user interface to prevent unintentional changes, [Key Lock] is reset-table at the device. |          |                   |                   |           |
| <b>Factory setting</b>                                                                                                      | <b>0</b> | <b>(Unlocked)</b> |                   |           |
| Value range                                                                                                                 | 0        | (Unlocked)        |                   |           |
|                                                                                                                             | 1        | (Locked)          |                   |           |

| Setup Type            | Index 67 | Subindex 0   | UIntegerT (8 Bit) | ReadOnly |
|-----------------------|----------|--------------|-------------------|----------|
| Type of current setup |          |              |                   |          |
| Value range           | 0        | (No Setup)   |                   |          |
|                       | 1        | (Auto Setup) |                   |          |
|                       | 2        | (Live Setup) |                   |          |
|                       | 3        | (Flex Setup) |                   |          |

| Valve Type                        | Index 66 | Subindex 0     | UIntegerT (8 Bit) | ReadOnly |
|-----------------------------------|----------|----------------|-------------------|----------|
| Detected or configured valve type |          |                |                   |          |
| Value range                       | 0        | (Rotary valve) |                   |          |
|                                   | 1        | (Seat valve)   |                   |          |

### 7.3 Extended Command

| Device Access Locks         | Index 12     | Subindex 0  | RecordT (16 Bit) | ReadWrite |
|-----------------------------|--------------|-------------|------------------|-----------|
| Data Storage Lock           |              | bitOffset 1 | BooleanT         |           |
| Local Parameterization Lock |              | bitOffset 2 | BooleanT         |           |
| <b>Factory setting</b>      | <b>false</b> |             |                  |           |



## 8 Diagnosis

### 8.1 Diagnostics

|                                                                                |                    |                   |                          |                 |
|--------------------------------------------------------------------------------|--------------------|-------------------|--------------------------|-----------------|
| <b>Production date</b>                                                         | <b>Index 65</b>    | <b>Subindex 0</b> | <b>StringT (4 Byte)</b>  | <b>ReadOnly</b> |
| Device production date (YYWW)                                                  |                    |                   |                          |                 |
| <b>Hardware Version</b>                                                        | <b>Index 22</b>    | <b>Subindex 0</b> | <b>StringT (2 Byte)</b>  | <b>ReadOnly</b> |
| <b>Firmware Version</b>                                                        | <b>Index 23</b>    | <b>Subindex 0</b> | <b>StringT (16 Byte)</b> | <b>ReadOnly</b> |
| <b>Log</b>                                                                     | <b>Index 80</b>    | <b>Subindex 0</b> | <b>RecordT (96 Bit)</b>  | <b>ReadOnly</b> |
| Logging information                                                            |                    |                   |                          |                 |
| PowerUps                                                                       |                    | Subindex 1        | IntegerT (32 Bit)        |                 |
| Number of power-cycles                                                         |                    |                   |                          |                 |
| Value range                                                                    | (0 To 2000000) * 1 |                   |                          |                 |
| RunTime                                                                        |                    | Subindex 2        | IntegerT (32 Bit)        |                 |
| Number of operating hours                                                      |                    |                   |                          |                 |
| Value range [h]                                                                | (0 To 2000000) * 1 |                   |                          |                 |
| LastCustomisation                                                              |                    | Subindex 3        | IntegerT (32 Bit)        |                 |
| Time since last tool parametrisation                                           |                    |                   |                          |                 |
| Value range [h]                                                                | (0 To 2000000) * 1 |                   |                          |                 |
| <b>Temperature</b>                                                             | <b>Index 81</b>    | <b>Subindex 0</b> | <b>RecordT (48 Bit)</b>  | <b>ReadOnly</b> |
| Temperature monitoring                                                         |                    |                   |                          |                 |
| Current                                                                        |                    | Subindex 1        | IntegerT (16 Bit)        |                 |
| Current core temperature                                                       |                    |                   |                          |                 |
| Value range [°C]                                                               | (-20 To 100) * 1   |                   |                          |                 |
| Min                                                                            |                    | Subindex 2        | IntegerT (16 Bit)        |                 |
| Minimum core temperature to date                                               |                    |                   |                          |                 |
| Value range [°C]                                                               | (-20 To 100) * 1   |                   |                          |                 |
| Max                                                                            |                    | Subindex 3        | IntegerT (16 Bit)        |                 |
| Maximum core temperature to date                                               |                    |                   |                          |                 |
| Value range [°C]                                                               | (-20 To 100) * 1   |                   |                          |                 |
| <b>Pressure Shock Counter</b>                                                  | <b>Index 82</b>    | <b>Subindex 0</b> | <b>IntegerT (32 Bit)</b> | <b>ReadOnly</b> |
| Small unexpected valve movements (0,2 - 0,4mm movement within 0,5s, Event #32) |                    |                   |                          |                 |
| <b>Factory setting</b>                                                         | <b>0</b>           |                   |                          |                 |
| Value range                                                                    | (0 To 2000000)     |                   |                          |                 |
| <b>SV-activations</b>                                                          | <b>Index 83</b>    | <b>Subindex 0</b> | <b>RecordT (96 Bit)</b>  | <b>ReadOnly</b> |
| Number of solenoid valve activations                                           |                    |                   |                          |                 |
| SV1                                                                            |                    | Subindex 1        | IntegerT (32 Bit)        |                 |
| Number of SV 1 activations                                                     |                    |                   |                          |                 |
| <b>Factory setting</b>                                                         | <b>0</b>           |                   |                          |                 |
| Value range                                                                    | (0 To 2000000) * 1 |                   |                          |                 |
| SV2                                                                            |                    | Subindex 2        | IntegerT (32 Bit)        |                 |
| Number of SV 2 activations                                                     |                    |                   |                          |                 |
| <b>Factory setting</b>                                                         | <b>0</b>           |                   |                          |                 |
| Value range                                                                    | (0 To 2000000) * 1 |                   |                          |                 |



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| SV-activations             | Index 83           | Subindex 0 | RecordT (96 Bit)  | ReadOnly |
|----------------------------|--------------------|------------|-------------------|----------|
| SV3                        |                    | Subindex 3 | IntegerT (32 Bit) |          |
| Number of SV 3 activations |                    |            |                   |          |
| Factory setting            | 0                  |            |                   |          |
| Value range                | (0 To 2000000) * 1 |            |                   |          |

| SV-ON_time                       | Index 84           | Subindex 0 | RecordT (96 Bit)  | ReadOnly |
|----------------------------------|--------------------|------------|-------------------|----------|
| Total ON time of solenoid valves |                    |            |                   |          |
| SV1                              |                    | Subindex 1 | IntegerT (32 Bit) |          |
| Total ON time of SV 1            |                    |            |                   |          |
| Factory setting                  | 0                  |            |                   |          |
| Value range [min]                | (0 To 2000000) * 1 |            |                   |          |
| SV2                              |                    | Subindex 2 | IntegerT (32 Bit) |          |
| Total ON time of SV 2            |                    |            |                   |          |
| Factory setting                  | 0                  |            |                   |          |
| Value range [min]                | (0 To 2000000) * 1 |            |                   |          |
| SV3                              |                    | Subindex 3 | IntegerT (32 Bit) |          |
| Total ON time of SV 3            |                    |            |                   |          |
| Factory setting                  | 0                  |            |                   |          |
| Value range [min]                | (0 To 2000000) * 1 |            |                   |          |

| Setup Type            | Index 67         | Subindex 0                                                 | UIntegerT (8 Bit) | ReadOnly |
|-----------------------|------------------|------------------------------------------------------------|-------------------|----------|
| Type of current setup |                  |                                                            |                   |          |
| Value range           | 0<br>1<br>2<br>3 | (No Setup)<br>(Auto Setup)<br>(Live Setup)<br>(Flex Setup) |                   |          |

| Valve Type                        | Index 66 | Subindex 0                     | UIntegerT (8 Bit) | ReadOnly |
|-----------------------------------|----------|--------------------------------|-------------------|----------|
| Detected or configured valve type |          |                                |                   |          |
| Value range                       | 0<br>1   | (Rotary valve)<br>(Seat valve) |                   |          |

| Setup Position Data (DeEn)         | Index 110                  | Subindex 0                    | RecordT (32 Bit)   | ReadOnly |
|------------------------------------|----------------------------|-------------------------------|--------------------|----------|
| Data for position in current setup |                            |                               |                    |          |
| Pos De-En                          |                            | Subindex 1                    | UIntegerT (16 Bit) |          |
| Target switchpoint (De-Energize)   |                            |                               |                    |          |
| Value range [mm]                   | (0 To 1060) * 0.1<br>32764 | (NoData)                      |                    |          |
| Switchpoint logic                  |                            | Subindex 2                    | BooleanT           |          |
| Value range                        | 0<br>1                     | (High active)<br>(Low active) |                    |          |
| Switchpoint hysteresis             |                            | Subindex 3                    | UIntegerT (8 Bit)  |          |
| Value range                        | 3                          |                               |                    |          |

| Setup Position Data (Main)         | Index 111                  | Subindex 0 | RecordT (48 Bit)   | ReadOnly |
|------------------------------------|----------------------------|------------|--------------------|----------|
| Data for position in current setup |                            |            |                    |          |
| Pos Main                           |                            | Subindex 1 | UIntegerT (16 Bit) |          |
| Target switchpoint (Main)          |                            |            |                    |          |
| Value range [mm]                   | (0 To 1060) * 0.1<br>32764 | (NoData)   |                    |          |



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| Setup Position Data (Main)                                             | Index 111                  | Subindex 0                    | RecordT (48 Bit)   | ReadOnly |
|------------------------------------------------------------------------|----------------------------|-------------------------------|--------------------|----------|
| Switchpoint logic                                                      |                            | Subindex 2                    | BooleanT           |          |
| Value range                                                            | 0<br>1                     | (High active)<br>(Low active) |                    |          |
| Switchpoint hysteresis                                                 |                            | Subindex 3                    | UIntegerT (8 Bit)  |          |
| Value range                                                            | 3                          |                               |                    |          |
| Setup Position Data (Usl)                                              | Index 113                  | Subindex 0                    | RecordT (32 Bit)   | ReadOnly |
| Data for position in current setup                                     |                            |                               |                    |          |
| Pos Usl                                                                |                            | Subindex 1                    | UIntegerT (16 Bit) |          |
| Target switchpoint (Usl)                                               |                            |                               |                    |          |
| Value range [mm]                                                       | (0 To 1060) * 0.1<br>32764 | (NoData)                      |                    |          |
| Switchpoint logic                                                      |                            | Subindex 2                    | BooleanT           |          |
| Value range                                                            | 0<br>1                     | (High active)<br>(Low active) |                    |          |
| Switchpoint hysteresis                                                 |                            | Subindex 3                    | UIntegerT (8 Bit)  |          |
| Value range                                                            | 3                          |                               |                    |          |
| Setup Position Data (Lsp)                                              | Index 112                  | Subindex 0                    | RecordT (32 Bit)   | ReadOnly |
| Data for position in current setup                                     |                            |                               |                    |          |
| Pos Lsp                                                                |                            | Subindex 1                    | UIntegerT (16 Bit) |          |
| Target switchpoint (Lsp)                                               |                            |                               |                    |          |
| Value range [mm]                                                       | (0 To 1060) * 0.1<br>32764 | (NoData)                      |                    |          |
| Switchpoint logic                                                      |                            | Subindex 2                    | BooleanT           |          |
| Value range                                                            | 0<br>1                     | (High active)<br>(Low active) |                    |          |
| Switchpoint hysteresis                                                 |                            | Subindex 3                    | UIntegerT (8 Bit)  |          |
| Value range                                                            | 3                          |                               |                    |          |
| Setup En-stroke                                                        | Index 85                   | Subindex 0                    | RecordT (96 Bit)   | ReadOnly |
| The stroke durations pr solenoid valve (energizing direction)          |                            |                               |                    |          |
| SV1 (main)                                                             |                            | Subindex 1                    | IntegerT (32 Bit)  |          |
| Stroke duration, SV 1 (energizing)                                     |                            |                               |                    |          |
| Factory setting                                                        | 0                          |                               |                    |          |
| Value range [ms]                                                       | (0 To 100000) * 1          |                               |                    |          |
| SV2 (USL)                                                              |                            | Subindex 2                    | IntegerT (32 Bit)  |          |
| Stroke duration, SV 2 (energizing)                                     |                            |                               |                    |          |
| Factory setting                                                        | 0                          |                               |                    |          |
| Value range [ms]                                                       | (0 To 100000) * 1          |                               |                    |          |
| SV3 (LSP)                                                              |                            | Subindex 3                    | IntegerT (32 Bit)  |          |
| Stroke duration, SV 3 (energizing)                                     |                            |                               |                    |          |
| Factory setting                                                        | 0                          |                               |                    |          |
| Value range [ms]                                                       | (0 To 100000) * 1          |                               |                    |          |
| Setup DeEn-stroke                                                      | Index 86                   | Subindex 0                    | RecordT (96 Bit)   | ReadOnly |
| The setup stroke durations pr solenoid valve (de-energizing direction) |                            |                               |                    |          |





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| Setup DeEn-stroke                   | Index 86          | Subindex 0 | RecordT (96 Bit)  | ReadOnly |
|-------------------------------------|-------------------|------------|-------------------|----------|
| SV1                                 |                   | Subindex 1 | IntegerT (32 Bit) |          |
| Stroke duration, SV 1 (de-energize) |                   |            |                   |          |
| Factory setting                     | 0                 |            |                   |          |
| Value range [ms]                    | (0 To 100000) * 1 |            |                   |          |
| SV2                                 |                   | Subindex 2 | IntegerT (32 Bit) |          |
| Stroke duration, SV 2 (de-energize) |                   |            |                   |          |
| Factory setting                     | 0                 |            |                   |          |
| Value range [ms]                    | (0 To 100000) * 1 |            |                   |          |
| SV3                                 |                   | Subindex 3 | IntegerT (32 Bit) |          |
| Stroke duration, SV 3 (de-energize) |                   |            |                   |          |
| Factory setting                     | 0                 |            |                   |          |
| Value range [ms]                    | (0 To 100000) * 1 |            |                   |          |

| BLOB ID                                                                                 | Index 49 | Subindex 0         | IntegerT (16 Bit) | ReadOnly |
|-----------------------------------------------------------------------------------------|----------|--------------------|-------------------|----------|
| The durations of the latest strokes and the latest events can be exported as data files |          |                    |                   |          |
| Factory setting                                                                         | 0        | (Idle)             |                   |          |
| Value range                                                                             | 0        | (Idle)             |                   |          |
|                                                                                         | -4096    | (Diagnostic log)   |                   |          |
|                                                                                         | -4099    | (Stroke durations) |                   |          |



## 9 Events

| Code             | Device status            | PQ*   | Class   | Name                             | Description                                                                                     |
|------------------|--------------------------|-------|---------|----------------------------------|-------------------------------------------------------------------------------------------------|
| 0x4210<br>16912d | 2 (Out of specification) | valid | Warning | Device temperature over-run      | Clear source of heat                                                                            |
| 0x4220<br>16928d | 2 (Out of specification) | valid | Warning | Device temperature under-run     | Insulate device                                                                                 |
| 0x5010<br>20496d | 3 (Functional check)     | valid | Error   | Component malfunction            | Repair or exchange                                                                              |
| 0x5111<br>20753d | 2 (Out of specification) | valid | Warning | Primary supply voltage under-run | Check tolerance                                                                                 |
| 0x8DFE<br>36350d | 1 (Maintenance required) | valid | Warning | Test Event 1                     | Event appears by setting index 2 to value 240, Event disappears by setting index 2 to value 241 |
| 0x8DFF<br>36351d | 1 (Maintenance required) | valid | Warning | Test Event 2                     | Event appears by setting index 2 to value 242, Event disappears by setting index 2 to value 243 |



Events are raised by the device itself to notify irregular device states  
PQ\* = Process data quality



## 10 Error types

| Code             | Name                                  | Description                                                                                                   |
|------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 0x8000<br>32768d | Device application error - no details | Service has been refused by the device application and no detailed information of the incident is available   |
| 0x8011<br>32785d | Index not available                   | Access occurs to a not existing index                                                                         |
| 0x8012<br>32786d | Subindex not available                | Access occurs to a not existing subindex                                                                      |
| 0x8020<br>32800d | Service temporarily not available     | Parameter is not accessible due to the current state of the device application                                |
| 0x8023<br>32803d | Access denied                         | Write access on a read-only parameter                                                                         |
| 0x8030<br>32816d | Parameter value out of range          | Written parameter value is outside its permitted value range                                                  |
| 0x8033<br>32819d | Parameter length overrun              | Written parameter length is above its predefined length                                                       |
| 0x8034<br>32820d | Parameter length underrun             | Written parameter length is below its predefined length                                                       |
| 0x8035<br>32821d | Function not available                | Written command is not supported by the device application                                                    |
| 0x8036<br>32822d | Function temporarily unavailable      | Written command is not available due to the current state of the device application                           |
| 0x8040<br>32832d | Invalid parameter set                 | Written single parameter collides with other actual parameter settings                                        |
| 0x8041<br>32833d | Inconsistent parameter set            | Parameter inconsistencies were found at the end of block parameter transfer, device plausibility check failed |
| 0x8082<br>32898d | Application not ready                 | Read or write service is refused due to a temporarily unavailable application                                 |



Error types are used for the ISDU response. Values unequal '0' indicate the cause of a failed ISDU read or write service.