



THX5 IO-LINK OPERATING INSTRUCTIONS – FIRMWARE V1.2



ELECTRICAL INSTALLATION

BF : Connector M12 5 pins (Device class B)

| Pin number | Description | Illustration |
|------------|-----------------------|--------------|
| 1 | L+ : power supply V+ | |
| 2 | N.C. | |
| 3 | L- : power supply gnd | |
| 4 | IO-Link | |
| 5 | N.C. | |



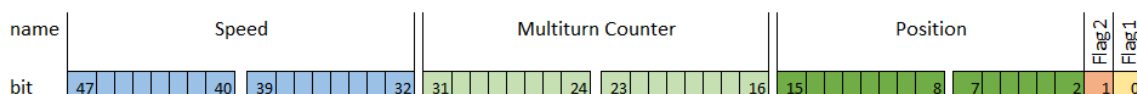
IO-LINK SPECIFICATION INFORMATION

Device specification

| Specification | IO-Link description | Value |
|---|---|-----------------------------------|
| Transfer rate | COM3 | 230.4 kBaud |
| Minimum cycle time of device | Minimum cycle time | 0x0A (1ms) |
| Frame specification Amount of preoperate data required Amount of operate data required Enhanced parameters | M-Sequence Capability: M-Sequence Type Preoperate M-Sequence Type Operate ISDU supported | TYPE_1_2 TYPE_2_V Supported |
| IO-Link protocol version | Revision ID | 0x11 (Version 1.1) |
| Amount of process data from the device to the master to the device | ProcessDataIn | 0x85 (6 bytes) |
| Amount of process data from the master | ProcessDataOut | 0x00 (0 byte) |
| Manufacturer ID | Vendor ID | 0x0468 (1128) |
| Device identification | Device ID | 0x0006 |

Process data

| Name | Description | Datatype | Bitoffset | Bitlength | Value Range | Unit |
|-----------|--|-----------|-----------|-----------|-----------------|-------|
| Speed | Rotating speed | IntegerT | 32 | 16 | -12000 to 12000 | rpm |
| Multiturn | Multiturn counter | UIntegerT | 16 | 16 | 0 to 65535 | turns |
| Position | Absolute position counter | UIntegerT | 2 | 14 | 0 to 16383 | |
| Flag2 | Absolute position error True: The multiturn counter cannot be trusted Cleared after set Zero, Apply Preset or Restore Factory Settings command | BooleanT | 1 | | true false | |
| Flag1 | Magnetic field issue Problem with the sensor | BooleanT | 0 | | true false | |



When the absolute position resolution is configured to a value smaller than 14 bits, the data is aligned to the right on the bit 2.

For example, if the absolute position resolution (index 90) is configured to 12 bits, the bits 2 to 13 will contain the data. Bits 14 and 15 will then be unused and set to zero.

Standard Identification data

| Index (hex) | Sub index | Name | Data type | Access | Contents |
|-------------|-----------|--------------------------|-----------|--------|----------------------------|
| 16 (0x10) | 0 | Vendor Name | StringT | RO | BEI Sensors |
| 17 (0x11) | 0 | Vendor Text | StringT | RO | Sensata Technologies Inc. |
| 18 (0x12) | 0 | Product Name | StringT | RO | THx5-ZIO |
| 19 (0x13) | 0 | Product ID | StringT | RO | Detailed reference |
| 20 (0x14) | 0 | Product Text | StringT | RO | Absolute multiturn encoder |
| 21 (0x15) | 0 | Serial Number | StringT | RO | Unique number |
| 22 (0x16) | 0 | Hardware Version | StringT | RO | 284v3 |
| 23 (0x17) | 0 | Firmware Version | StringT | RO | V1.2 |
| 24 (0x18) | 0 | Application Specific Tag | StringT | RW | *** |

System command

| Index (hex) | Subindex | Name | Data type | Access | Value range |
|-------------|----------|----------------|-------------|--------|---------------------------------------|
| 2 (0x02) | 0 | System-Command | UIntegerT 8 | WO | 130 (0x82) : Restore factory settings |
| | | | | | 131 (0x83) : Back-to-Box command |

Observation parameters

| Index (hex) | Subindex | Name | Data type | Access | Value range | Comment |
|-------------|----------|-------------------------|-------------|--------|-----------------|----------------------------|
| 40 (0x28) | 0 | Process Data Input | Record | RO | | |
| | 1 | Speed | IntegerT16 | NA | -10000 to 10000 | Speed value. |
| | 2 | Multiturn counter | UIntegerT16 | NA | 0 to 65535 | Number of complete turns |
| | 3 | Position | UIntegerT14 | NA | 0 to 16383 | Single-turn position |
| | 4 | Absolute position error | BooleanT | NA | 0 or 1 | Multi turn position status |
| | 5 | Magnetic field issue | BooleanT | NA | 0 or 1 | Magnetic field status |

Diagnosis, Observer and Maintenance access

| Index (hex) | Subindex | Name | Data type | Access | Value range | Comment |
|-------------|----------|-----------------|--------------|--------|-----------------|--|
| 36 (0x24) | 0 | Device Status | UIntegerT 8 | RO | 0 to 4 | Device status : Device is OK [0] Maintenance required [1] Out of specification [2] Functional check [3] Failure [4] |
| 110 (0x6E) | 0 | Operating hours | UIntegerT 32 | RO | 0 to 4294967295 | Number of hours with device on |

Sensata specific parameters, Observer and Maintenance access

| Index | Subindex | Name | Data type | Access | Value range | Comment |
|-----------|----------|--------------------------|-------------|--------|---------------------------------------|---|
| 64 (0x40) | 0 | Set Zero Point | Button | WO | - | Set zero as current position |
| 65 (0x41) | 0 | Apply Preset | Button | WO | - | Apply preset values as the current position |
| 67 (0x43) | 0 | Preset singleturn | UIntegerT14 | RW | 0 to 16383 | Preset value for position inside the turn |
| 68 (0x44) | 0 | Preset multiturn | UIntegerT16 | RW | 0 to 65535 | Preset value for the number of turns |
| 72 (0x48) | 0 | Rotation direction | BooleanT | RW | 0 : CW 1 : CCW | Set the rotation direction |
| 80 (0x50) | 0 | Speed calculation window | UIntegerT8 | RW | 0 : 20 ms 1 : 200 ms 2 : 600 ms | Time between each speed data update |
| 90 (0x5A) | 0 | Singleturn Resolution | UIntegerT8 | RW | 1 to 14 bits | Power of 2, number of bits |
| 91 (0x5B) | 0 | Multiturn Resolution | UIntegerT8 | RW | 1 to 16 bits | Power of 2, number of bits |

Sensata specific parameters, Specialist access

| Index | Subindex | Name | Data format | Access | Value range | Comment |
|------------|----------|--------------------|-------------|--------|--|---|
| 252 (0xFC) | 0 | Test parameter 252 | UIntegerT 8 | RW | 0 : A appears 1 : A disappears 2 : B appears 3 : B disappears | Do not use For IO-link test purpose. |

Factory settings parameters

| Name | Index | Factory Setting | Comment |
|--------------------------|-------|-----------------|---|
| Application Specific Tag | 24 | *** | Customer text tag (string 32 characters) |
| Rotation direction | 72 | 0 : CW | Set the rotation direction |
| Singleturn Resolution | 90 | 12 bits | Resolution of the single-turn counter (in bits) |
| Multiturn Resolution | 91 | 16 bits | Resolution of the multi-turn counter (in bits) |
| Speed calculation window | 80 | 1 : 200ms | Time between each speed data update |
| Preset singleturn | 67 | 0 | Preset value for position inside the turn |
| Preset multiturn | 68 | 0 | Preset value for the number of turns |
| Operating-hours | 110 | 0 | Number of hours with device on |

Events

| Code | Name | Type | Comment |
|----------------|---|---------|---|
| 16912 (0x4210) | Temperature issue | Warning | event appears when temperature exceeds specifications. |
| 6145 (0x1801) | Off-power multi-turn counter desynchronized with running multi-turn counter | Warning | Device off-power MT counter is desynchronized with running MT. Set Zero or set Preset needs to be done |
| 16912 (0x5012) | Battery low | Warning | Device needs to be replaced, the multi-turn position will be lost when power is off |
| 35888 (0x8C30) | Test Event A | Error | Event appears by setting index 252 to value 1, Event disappears by setting index 252 to value 2 |
| 36351 (0x8DFF) | Test Event B | Error | Event appears by setting index 252 to value 3, Event disappears by setting index 252 to value 4 |

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