Inductive displacement measuring system
Interface: **IO-Link**
Model **IEIO25**

SUPREME SENSORING
TWK

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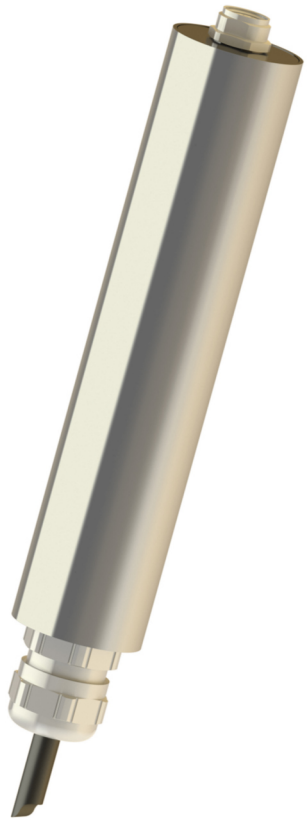

- **Contact-less, wear-free sensor system**
- **Digital IO-Link interface**
- **12 bit resolution**
- **Up to 200 mm measuring range**
- **Return spring up to 100 mm**
- **Detection of broken wires**
- **Stainless steel version**
- **Protection class IP66**

IO-Link

General functional principle

The model IEIO25 is a measuring system, which comprises an inductive linear displacement transducer and a cylindrical electronic module. Both items are supplied and calibrated as one unit. They carry identical serial numbers and should not be combined with other items of the same series.

Operating principle of electronic module

The cylindrical housing in stainless steel has an outside diameter of 25 mm. It contains the excitation circuit for the inductive transducer (oscillator and demodulator) as well as the conditioning electronics and the IO-Link interface

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Linear transducer IW10/IW101 and IW120/X

The linear transducer is available for measuring ranges between 2 mm and 200 mm. The smaller IW10 is available for 2 mm to 15 mm measuring range, the larger IW120 for measuring ranges up to 200mm.

A return spring can be fitted to the item for measuring ranges ≤100 mm for use as a gauge. A cable with suitable connectors is required to connect the transducer to the electronic module IEIO25. This cable must be supplied by the user.

Please refer to the data sheets of the respective transducer for more details (IW10: data sheet 10278, IW120: data sheet 10214).

Technical data

Electrical data

- Sensor system: Inductive transducer
- Operating voltage range: 18 ... 30 VDC
- Power consumption: < 2.3 W
- Switch-on current: < 500 mA
- Resolution position output: 4096 steps / measuring range (12 bit)
- Measuring range: up to 200 mm (depending on transducer)
- Dynamic range: 100 Hz (plunger movement)
- Absolute accuracy: ± 0.1 % .. 0.5 % of measuring range, depending on transducer
- Repeatability: ± 0.05 % tbc.
- Refresh time: 1 ms
- Electrical connection: M12 connectors (4-pole male - IO-Link)
  M 8 connector (8-pole female - to transducer)

Input data (to control)

- 2 bytes position data (format: unsigned)
- 2 bytes temperature data of main controller (unit: °C, resolution: 0.1 °C / digit)
- 2 bytes status word

Output data (from control)

- 2 control bytes

IO-Link data

- IO-Link Interface: IEC 61131-9
- Port class: A (option: class B), class A can be connected to class B master port
- Specification: Version 1.1.3
- Communication: COM3 (230.4 kBaud)
- Cycle time: < 5 ms
- Parameters: See below (page 5)
- Profile: IO-Link Common Profile – Specification V1.0, Order No. 10.072
- General guidelines: IO-Link Design Guideline, Order No. 10.912

System data

- On-time (rise time) of supply voltage: 500 ms (10 % to 90 %) required
- Storage cycle time: 3 s per storage cycle
- Set-up time: ~ 2 s in the operating temperature range

Environmental data

- Operating (ambient) temperature range: -10 °C to +70 °C
- Storage temperature range: -30 °C to +80 °C
- Resistance:
  - ☐ To shock: 300 m/s², 6 ms, (DIN EN 60068-2-27) per 100 x in 3 axes
  - ☐ To vibration: 100 m/s², 5 Hz ... 2000 Hz, (DIN EN 60068-2-6) per 1 h in 3 axes
- Protection type: IP66 (DIN EN 60529)
- Humidity: 10 % to 95 % condensing
- Altitude: ≤ 2000 m

Technical data

EMC standards

EN 61000-6-4:2006 + A1:2011	EMC Part 6-4: Generic standards-Emission standard for industrial environments
EN 61000-6-2:2005	EMC Part 6-2: Generic standards-Immunity for industrial environments
EN 61000-4-2:2009	EMC Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
EN 61000-4-3:2006 A1:2008 + A2:2010	EMC Part 4-3: Testing and measurement techniques - Radiated, radio frequency. electromagnetic field immunity test
EN 61000-4-4:2004	EMC Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
EN 61000-4-6:2009	EMC Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8:2010	EMC Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test Power frequency magnetic field immunity test: 30 A/m, test criterion A 100 A/m, test criterion B
EN 61000-4-29:2000	EMC Part 4-8: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests
IEC 61326-3-2:2018	Electrical equipment for measurement, control and laboratory use - EMC requirements Part 3-2: Immunity for safety-related systems and for equipment intended to perform safety related functions (functional safety) - industrial applications with specified electromagnetic environment

Devices must be connected using shielded cables and properly connected to PE to comply with these norms.

Surge protection is not provided by the device and needs to be ensured by the user.

IO Link communication data

IO-Link input / output data

Input data: Encoder → Master

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Position		Temperature		Status	

Output data: Master → Encoder

Byte 0	Byte 1
16 bit control command	

Status bytes

Byte 4								Byte 5							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
16 bit status															

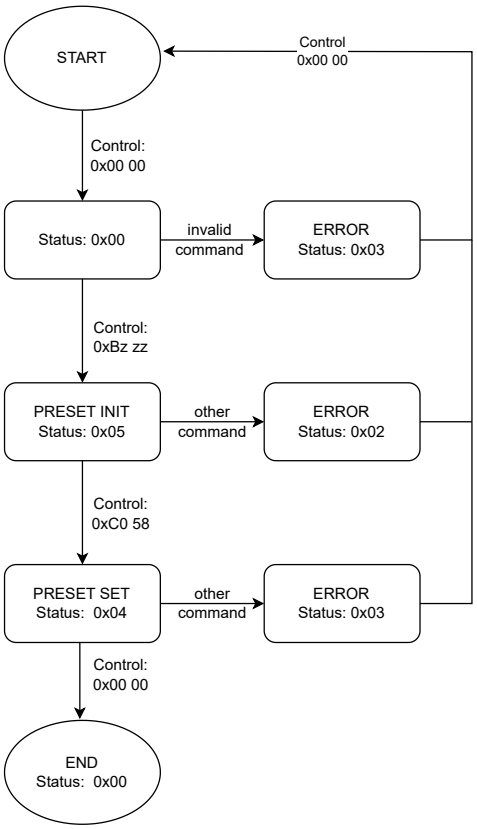
	Bit	Description
Byte 4	0	Operational (no fault)
	1	Fault (wire broken, temperature exceeded)
	2	Warning (measurement range exceeded)
	3	Wire broken
	4	Maximum temperature exceeded
	5	Upper measurement limit reached or exceeded
	6	Lower measurement limit reached or exceeded
	7	reserved
Byte 5	8	Command trigger (toggles on every command change, set to 0 when command is 0x0000)
	9	Command error (set, when error in command is invalid)
	10	Command status (set, when command is valid)
	11-15	reserved

Control bytes

Byte 0								Byte 1							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Ctrl. cmd High Nibble				Control command Low Nibble											

Command	Description
0xA0 80	Device Reset (Restart device)
0xA0 81	Application Reset (all parameters except I&M values will be set to factory default)
0xBZ ZZ	Initialise preset command. On execution, output value will be set to 0xZZZ, where 0x000 ≤ 0xZZZ ≤ 0xFFF
0xC0 58	Execute preset command. Output will be set to value defined in previous command. Output range will be changed!
0xD0 43	Change code direction to default (pushing the plunger increases measurement value)
0xD0 57	Change code direction to inverted (pushing the plunger decreases measurement value)

The flow chart for a control command is shown below. Only valid commands and sequences (e.g. for preset) are accepted (Command status is set). When command is invalid, the command error bit is set. The command trigger bit is toggled on every change in the control bytes and reset to False when the control bit is set to 0x00 00. The command error state can only be left by setting the control bytes to 0x00 00.



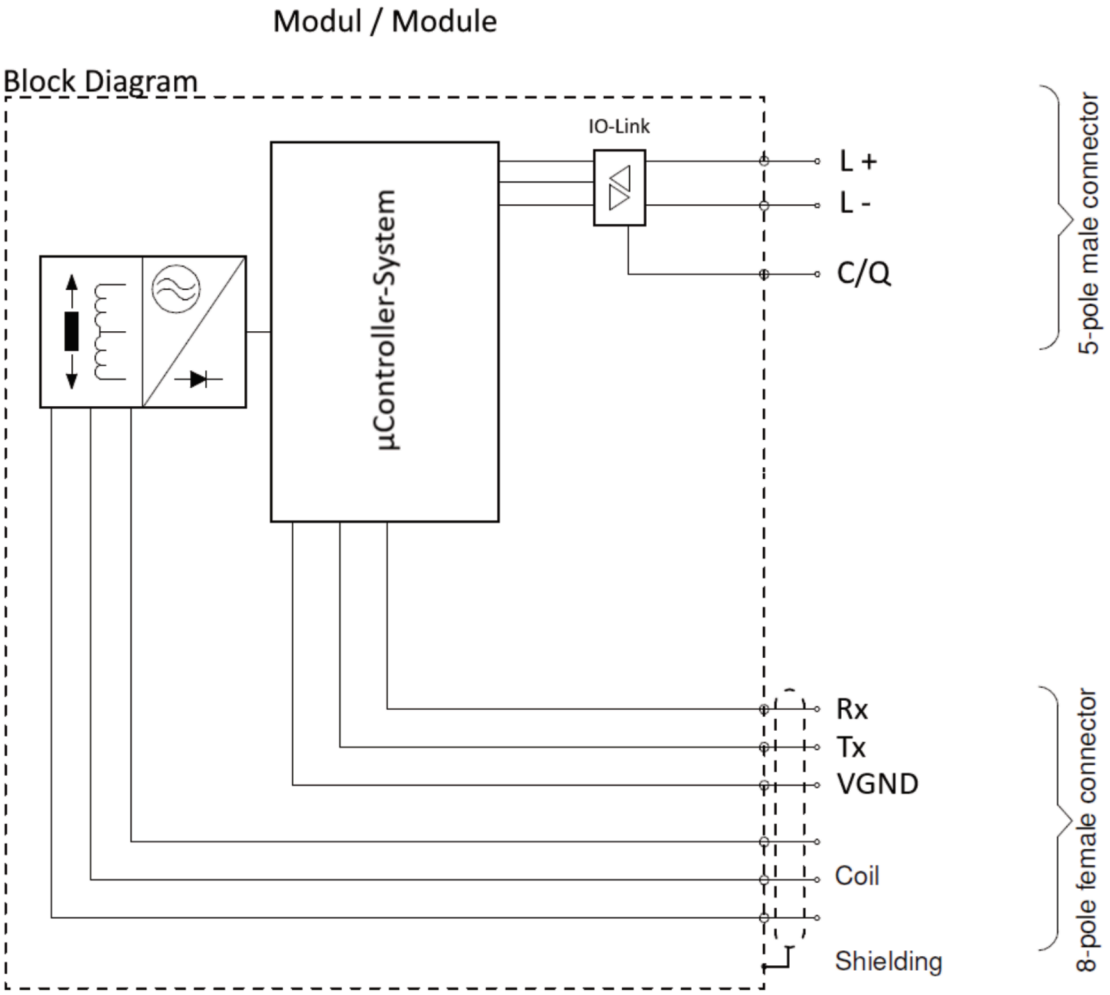
Flow chart for setting a preset value

Firmware updates via the IO-Link Control tool require a firmware password. The password is **0x54574b10**. After a firmware update an application or factory reset must be carried out.

IO-Link parameter list

Parameter *(object/sub) - access*	**Value range** *(data length: octet / default)*	**Parameter description**
Vendor ID *(0x00)* - read only	*2 octets*	0x0159
Device ID *(0x00)* - read only	*3 octets*	0xXXYYYY (X: 01: prototype, 00 serial product, YYYY: Number of connection assignment document)
Vendor Name *(0x10)* - read only	*max. 64 octets*	TWK-ELEKTRONIK GmbH
Vendor Text *(0x11)* - read only	*max. 64 octets*	www.twk.de/produkte
Product Name *(0x12)* - read only	*max. 64 octets*	IEIO25/x-Lxx
Product ID *(0x13)* - read only	*max. 64 octets*	IEIO
Product Text *(0x14)* - read only	*max. 64 octets*	Inductive linear displacement transducer
Serial Number *(0x15)* - read only	*max. 64 octets*	device specific
Hardware Version *(0x16)* - read only	*max. 64 octets*	device specific
Firmware Version *(0x17)* - read only	*max. 64 octets*	device specific
ApplicationSpecific Tag (0x18) - read / write	*max. 32 octets*	device specific (not affected by application reset)
Function- Tag (0x19) - read / write	*max. 32 octets*	device specific (not affected by application reset)
Location- Tag (0x1A) - read / write	*max. 32 octets*	device specific (not affected by application reset)
Order Number *(0x40)* - read only	*max. 32 octets*	IEIO25/x-Lxx
Customer Part Number *(0x41)* - read only	*max. 32 octets*	device specific
Manufacturing Date *(0x42)* - read only	*max. 32 octets*	yyyy/mm/dd (device specific)
Installation Date *(0x43)* - read / write	*max. 32 octets*	device specific (not affected by application reset)
Resolution [steps/ measuring range] *(0x64)* - read only	1 … 4096 steps *(4 / 4096)*	4096
Total number of steps [steps] *(0x65)* - read only	1 … 4096 steps *(4 / 4096)*	4096
Device error history *(0x1003/01)* - read / write	Per error: 0x00 .. 0xFFFF FFFF (4 / 0)	History of up to 20 device errors. Manual reset required when full.
Reference value (0x1100/02) - rw	0 ... total number of steps -1 (2 / 2048)	For calibration in application, the position value can be set to any value within the measuring range.
Operating hours *(0xE1)* - read only	*4 octets*	*On request*
Temperature indicator *(0xE2)* - read only	*2 octets*	*On request*

Principle circuit diagram (simplified)



Electrical connection

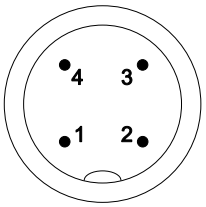
Pin configuration and numbering

Viewed looking at the contact side of connectors / sockets installed in the IEIO.
Depending on customer specifications, the use of different connectors with individual assignment is possible.
Please always note the connection assignment TY which is enclosed with each device.

Connector IO-Link Class A - S1

M12 male

PIN	Connector S1 (pins - male)
1	L+ / Operating voltage **+ V_s**
2	I/Q (DI/DO (digital I/O)) / **Not used**
3	L- / Operating voltage **- V_s**
4	C/Q / **IO-Link Interface**

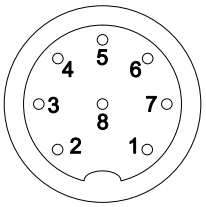


This connector can be connected to Class B port at master as well.

Connector for transducer - S2

M8 female

PIN	Connector S2 (socket - female)
1	coil end
2	coil start
3	coil centre
4	shield
5	not connected
6	UART RX*
7	UART TX*
8	GND*



* Pins 6 to 8 are used for internal programming only and may not be connected by the customer.

Cable

Cable for IO-Link interface: 3 or 5-wire (class A or B)

IO-Link specifications allow the use of untwisted and unshielded cables. To fully comply with the EMC norms stated in this data sheet, shielded cables and a proper connection to PE must be used!

Order number

IEIO	25 /	X -	L	01	→ standard version

IEIO	Inductive displacement measuring system with IO-Link interface
25	**Design form:** 25: Design form Ø 25 mm
X	**Calibrated measuring range in mm (2 mm - 200 mm)**
L	**Output:** IO-Link interface
01	**Electrical and mechanical variants:** 01: According to this data sheet xx: Further versions on customer request

Mating connectors

STK4GS60	M12, 4-pin, female, A-coded, straight - data sheet STK14572
STK4WS61	M12, 4-pin, female, A-coded, angled - data sheet STK14675

Cable

KABEL-X-232	M12 Connector Pin (M12-A coded) to M12 Connector Socket (M12-A coded) X: length of cable (1m / 2m / other lengths on request) - data sheet KBL16122

Documentation

- Data sheet IEIO (electronics) 16632
- Data sheet linear transducer IW10/IW101 10278
- Data sheet linear transducer IW120 10214
- IODD and FW update files on request
- For more information visit www.twk.de

Installation drawing

Model IEIO25/x-Lxx

Dimensions in mm