Inductive Displacement Transducers with CANopen interface

IWN 250 series

Measuring strokes : 20 mm, 40 mm, 100 mm, 200 mm

IWN 11253 IE

07 / 2015

- **Contactless, robust sensor system**
- **Integral electronics**
- **Resolution 12 bit / binary**
- **Definite repeatability**
- **To CANopen Application Layer and Communication Profile, CiA Draft Standard 301, Version 4.1 and to Device Profile for Encoders CiA Draft Standard Proposal 406 Version 3.0**
- **CANopen Layer Setting Services (LSS) for address and Baud rate**
- **Protection class IP 66**
- **Gauge type with spring return up to 100 mm measuring stroke**

Construction and operating principle

The displacement transducer operates according to the principle of the differential choke, i.e. an inductive half bridge. It consists of two coils which are encapsulated in a stainless steel cylinder. A mu-metal plunger core causes opposing changes of inductance when it is displaced through the centre of the coils. These changes are converted by the integral electronic circuit into a signal proportional to the displacement. The circuit contains an oscillator, demodulator, a 12 bits A/D converter and a micro-processor with integral CAN interface.

The transducers are completely sealed to ensure positive protection against vibration, shock, humidity, oil and corrosive matter.

Standard measuring strokes:

20 mm, 40 mm, 100 mm, 200 mm

General features

The IWN transducers conform to the CANopen interface for Encoders to the CIA specification DSP 406 / Class 1 and Class 2.

Besides administrative and pre-defined messages such as Energency-Messages and Synchronization, support is given to Service Data Objects (SDOs) and Process Data Objects (PDOs).

PDOs are used for data exchange between master and slave, SDOs are used for direct reading and writing access to Object Registers between master and slave. The main application of SDOs is the device configuration, e.g. modification of the transmission type Tx-PDO-Object 1800 H.

CANopen

CANopen Features

NMT Master:	no
NMT-Slave:	yes
Maximum Boot up:	no
Minimum Boot up:	yes
COB ID Distribution:	Default, SDO
Node ID Distribution:	via Index 2000 oder LSS
No of PDOs:	2 Tx
PDO-Modes:	sync, async, cyclic, acyclic
Variables PDO-Mapping:	no
Emergency Message:	yes
Heartbeat:	yes
No. of SDOs:	1 Rx / 1 Tx
Device Profile:	CiA DSP 406 Version 3.0

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General parameters

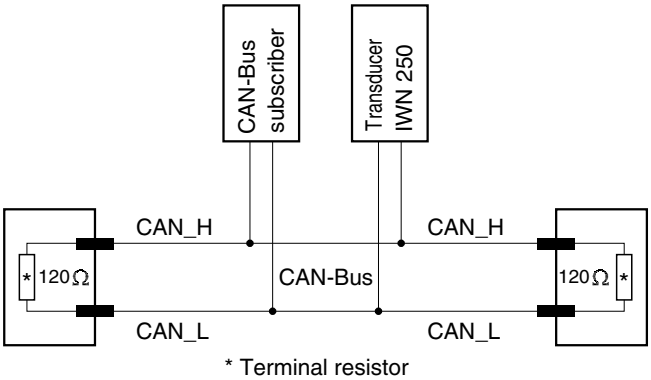
- Datarate (Object 2001): 20, 50, 125 , 250, 500, 800 kBaud or 1 MBaud (adjustable via LSS) Default: 20 kBaud
- Node address (Object 2000): 1-127 (adjustable via LSS) Default: 1
- Cycle time: 0 to 65536 ms
- Alarms: Device specific Error (e. g. EEPROM-error, CRC-error, internally-error, sensor-error, ...)

Operating modes (can be programmed via SDO)

- **Polling mode** (asynchronous-RTR*):
  The transducer sends its actual position value when the master has called the actual position value through a Remote Frame telegram.
- **Cycle mode** (asynchronous-cyclic / acyclic*):
  The transducer sends the actual position value without request, either after change of value (cycle timer = 0) or after expiration of a pre-defined cycle time (cycle timer > 0). The cycle time can be programmed between 1 ms to 65536 ms.
- **Synch mode** (synchronous-cyclic*):
  After having received a SYNC telegram from the master the transducer sends its position value. The SYNC counter can be programed in such a way that the position value will not be send but after a predefined number of SYNC telegrams.
- **Acyclic mode** (synchronous-acyclic*):
  The transducer send its actual position value after receipt of a SYNC telegram provided the position value has changed after the previous transmission.

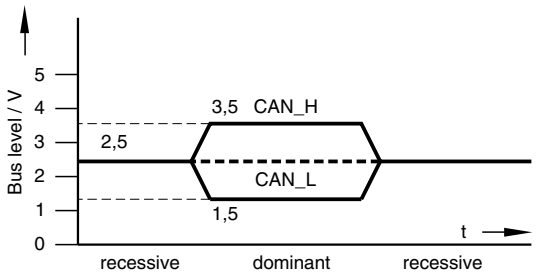
* PDO-transmission type

Connection to ISO / DIS 11898

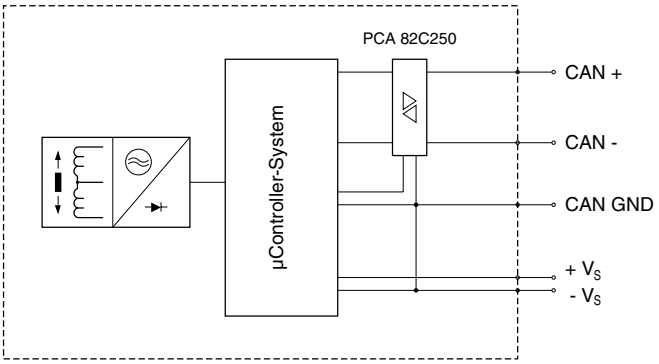


* Terminal resistor

Output signls to ISO / DIS 11898



Block diagram



Data format

Byte 1								Byte 0							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
0	0	0	0	12 Bits position value											

Electrical data

- Resolution: 12 bits at full scale
- Independant linearity: 0.5 % or 0.25 %
- Mesasuring frequency: 100 Hz max.
- Temperature drift: < 0.01 % / °C
- Dependence from V_S: < 0.05 % at ΔV_S = 1 V
- Stability: < 0.1 % witin 24 h
- Output code: Nat. binary
- CAN-interface: ISO/DIS 11898 (physical)
- Supply voltage range: + 21.5 to + 30 VDC
- Output current: 60 mA typ. / 90 mA max.
- Terminating resistances: to install externally
- Max. transfer length: 200 m *

* No electrical separation between supply voltage and bus lines. (ref. CiA DS301)

If not otherwise shown all values refer to 20 °C ambient temperatue, 24 VDC supply and after 30 min switch on time.

Environmental data

- Operating temperature range: -10 °C bis +80 °C
- Storage temperature range: -30 °C bis +80 °C
- Resistance to shock: 250 g SRS 20-2000 Hz
- Resistance to vibration: 20 g rms (50 g p-p) 20-2000 Hz
- Protection class: IP 66

Materials

- External and internal tube : Chrome-nickel steel
- Plunger : Chrome-nickel steel
- Core : Mu-metal
- Spring and gauge head : Stainless steel ("T")
- Sealing plug: Delrin

Calibration

Both the sensor system and the plunger core are calibrated as one unit. They carry the same serial number.

Lengths and masses (refer to drawings page 4)

Type	L1 * [mm]	L2 [mm]	without plunger [g]	plunger only [g]
IW 250/20	40	110	210	15
IW 250/40	50	140	240	19
IW 250/100	80	250	380	31
IW 250/200	130	500	720	56
KV or KFN:			22 g	
KHN			55 g	

* L1 = Plunger in central position: 2048 steps

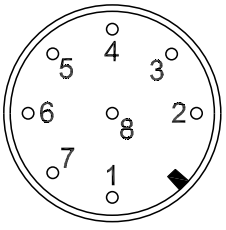
Counter plug STK8GS53 (see page 4) *

- Typ: M12x1, 8 pins, staight
- Chassis: plastic (PBT)
- Contacts: sockets, CuSnZn
- Cable entry: 6 - 8 mm (PG 9)
- Lead section: 0.75 mm^2 max.
- Fixing: screws
- Protection class: IP66

* To be orderd separatly

Electrical connections of counter plug

(A view of the terminal strip of counter plug)



Pin	Signal
1	+V_S (24 VDC)
2	-V_S (0 VDC)
3	CAN +
4	CAN -
5	CAN GND (bridged with -V_S)
6	Reserved
7	Reserved
8	screen

Order code format

IWN 250 / 40 - 0.5 - KFN - KHN - C2 - N01 *

- N01 * : Only for mechanical or electrical deviations from data sheet.
- C2 : CANopen - profil C2 CIA DSP 406 revision 3.0
- KHN : Ball joint on case
- KV = ball joint on plunger, without guide.
- KFN = ball joint on plunger, with guide.
- T = gauge (only for 20, 40 and 100 mm strokes).
- 0.5 : Accuracy 0.5% or 0.25%.
- 40 : Measuring stroke: 20, 40, 100, 200 mm.
- 250 : Diameter 25 mm
- IWN : Inductive linear displacement transducer.

* The applicable N-No. is allocated after the definition of the deviation when ordering. No N-No. is given for standard versions as specified in the data sheet.

Special versions with cable exit will be marked „Kx“ (x = length of lead).

Accessories

Discette: IWN-01 including EDS-file and PDF-manual will be supplied with each order.

SR: Protective tube in stainless steel, to protect plunger (rod) against lateral stress * (ref. to data sheet 11537).

STK8GS53: Counter connector straight, plastic *

STK8GS54: Counter connector straight, metal *

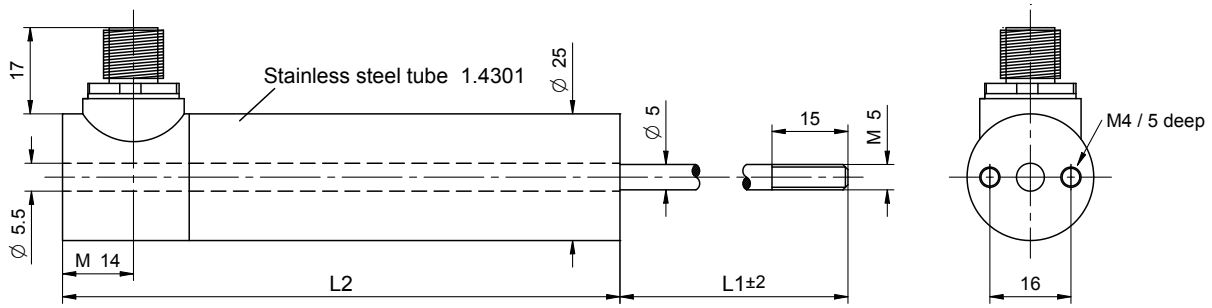
* To be ordered separately

Documentation and supply

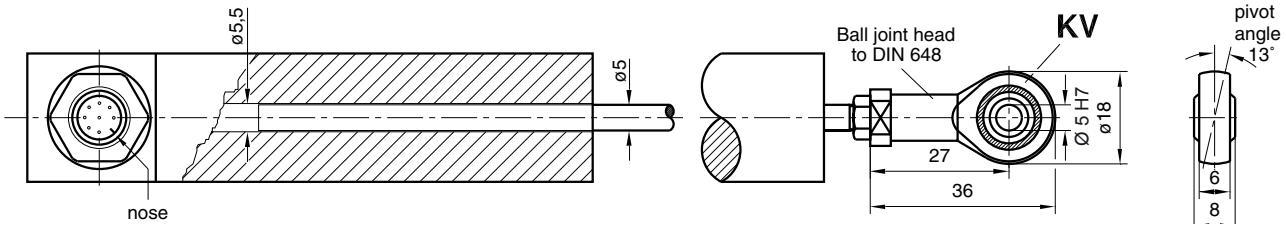
- CANopen-Spezifikationen:
  CiA -CAN, Am Weichselgarten 26,
  D-91058 Erlangen.
  www.can-cia.org
- TWK-manual IWN 11307 and EDS-file via www.twk.de

Dimensions in mm

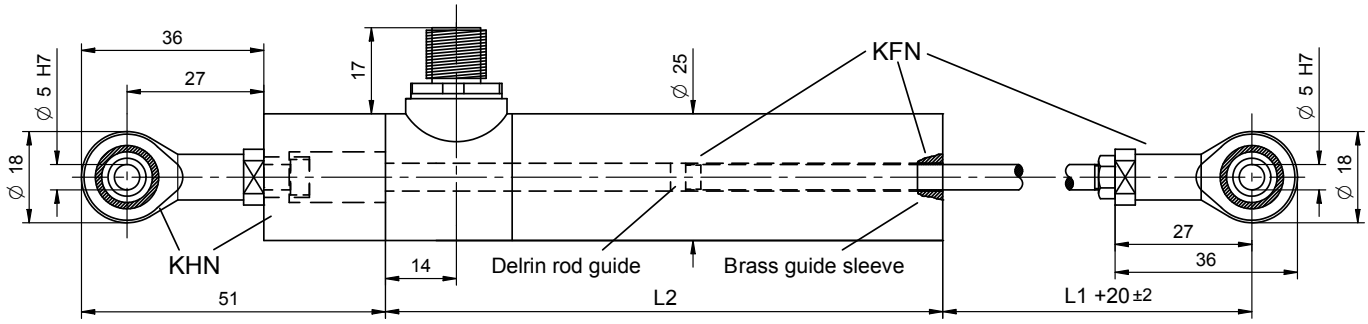
Standard version (without rod guide)



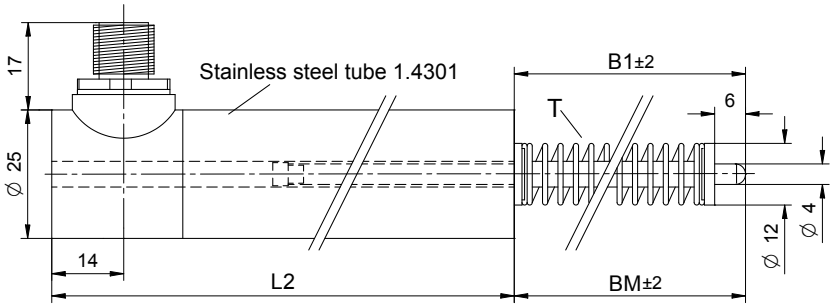
Version with ball joint on plunger (KV) (without rod guide)



Version with ball joints on plunger (KFN) and on end of case (KFH) (with rod guide, captivated)



Gauge version (T) with return spring (only up to 100 mm stroke)

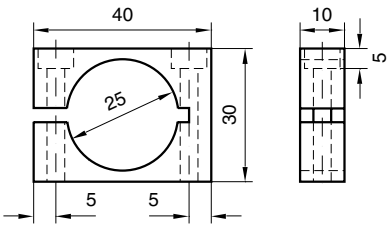


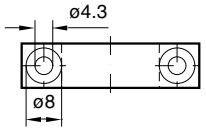
Measuring stroke [mm]	BM [mm]	B1 [mm]	FM [N]	FC [N/m]
20	70	85	~ 4	0.14
40	70	98	~ 4	0.07
100	140	198	~ 4	0.03

BM = Plunger in central position
B1 = Plunger full out

FM = Spring prestress
Fc = Spring rate

MB 25 Mounting block, brass Nickel plated (to be ordered separately)





2 hexagon socket screws M4/35 mm long are supplied with each item.

Mass : 60 g

Mating Plugs (to be ordered separately)

STK8GS53: Counter connector straight, plastic

STK8GS54: Counter connector straight, metal