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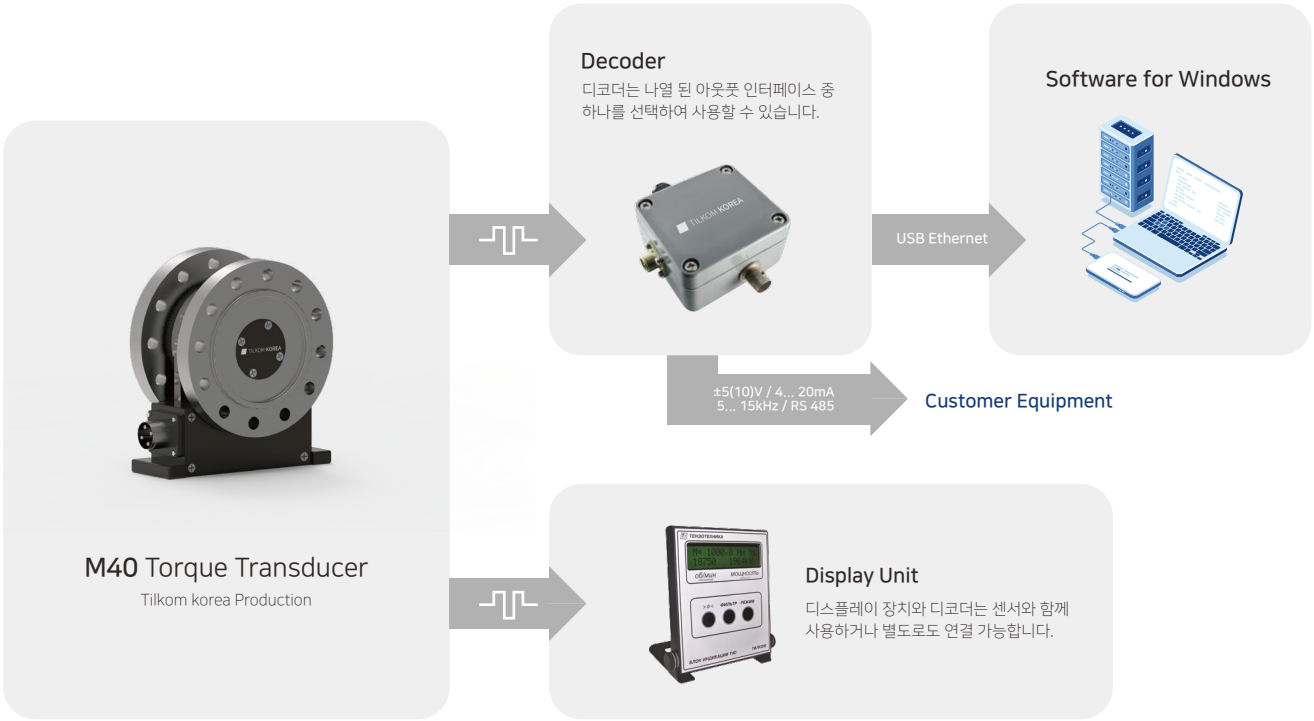
M40 Torque Transducer

- Torque Measurement : ±0.1...300,000Nm
- Rotational speed measurement
- Temperature measurement
- On line determination of mechanical power
- Accuracy class 0.1
- Digital telemetry
- Sample rate 5 kHz
- A/D conversion 16 bit
- "Transducer" software for Windows included



Specifications

Nominal torque and maximum rotational speed

Type	Measuring unit	Nominal (rated) torque, M_N	Max. rotational speed, rpm
M40-0,1… 2	Nm	0,1 0,2 0,5 1,0 1,2 1,5 2,0	20 000
M40-3… 30		3 5 6 8 10 12 15 20 25 30	20 000
M40-50… 150		50 60 80 100 150	16 000
M40-200… 300		200 250 300	16 000
M40-400… 1,2k		400 500 600 800 1000 1200	16 000
M40-1,5k… 2,5k	kNm	1,5k 2,0k 2,5k	12 000
M40-3k… 6k		3k 5k 6k	10 000
M40-8k… 15k		8k 10k 12k 15k	8 000
M40-20k… 30k		20k 25k 30k	6 000
M40-40k… 60k		40k 50k 60k	4 000
M40-80k… 100k		80k 100k	3 000
M40-120k… 150k		120k 150k	3 000
M40-200k… 300k		200k 250k 300k	2 000

Nominal torque measurement range: - M_N to + M_N. The negative sign means counterclockwise torque; the positive sign means the clockwise torque.
Extended torque measurement range (approx.): - 1.07M_N to + 1.07M_N

Accuracy class		**0.1**
Combine error, including nonlinearity and hysteresis, related to the nominal torque	%	<±0.1
Temperature effect per 10°C on the zero signal, related to the nominal output value	%/10°C	<±0.05
A/D conversion	bit	16
Sample rate	kHz	5.0
Supply voltage	V (DC)	12…30
Power consumption	W	<5
Transducer identification		Auto Identification
Frequency output (T23 Decoder)		
Frequency output signal with positive nominal toque	kHz	15 (90)
Frequency output signal with negative nominal toque	kHz	5 (30)
Frequency output signal at toque = zero	kHz	10 (60)
Load resistance	kΩ	≥2
Amplitude of output signal	V	5±1(symmetrical meander)
Input-output galvanic isolation		+
Analogue output (T24 Decoder)		
Nominal output signal with positive nominal toque	V	+5(+10)
Nominal output signal with negative nominal toque	V	-5(-10)
Output signal at toque = zero	V	0
Load resistance	kΩ	≥10
Measurement frequency range	Hz	0…1000 (-1.5 dB)
Analogue output (T24/4 …20 mA Decoder)		
Output current	mA	4…20
Output current with nominal positive torque	mA	20
Output current with nominal negative torque	mA	4
Output current at torque = zero	mA	12
Maximum load resistance	Ω	100
Measurement frequency range	Hz	0…1000 (-1.5 dB)
Digital output (T45 Decoder)		
Interface		USB 2.0
Data transfer rate (Full-Speed)	Mbit/sec	12
Input-output galvanic isolation		+

Digital output (T46 Decoder)		
Interface		RS485
Protocol		MODBUS RTU
Data transfer rate	baud	2400 – 115200
Parity check		+
Input-output galvanic isolation		+
Digital output (T42 Decoder)		
Interface		RS232
Protocol		MODBUS RTU
Data transfer rate	baud	2400 – 115200
Parity check		+
Input-output galvanic isolation		+
Digital output (T42 Ethernet Indicator-Decoder)		
Interface		Ethernet
Protocol		TCP/IP
Data transfer rate	Mbit/sec	10 and 100
Input – output galvanic isolation		+
Rotational speed measuring system		
Type of measurement system		optical
Relative measurement error at the digital output	%	≤±0,1
Minimum measurable rotational speed	rpm	30 (15, 8, 4)
Amplitude of pulses at the frequency and analogue output (T23, T24 decoder)	V	5±10%
Number pulses per revolution at the frequency and analogue output (T23, T24 decoder)		1, 60, 120
Load resistance (T23, T24 decoder)	kΩ	10
Resistance to environmental influences and mechanical stress		
Nominal temperature range	°C	0…+60
Humidity	%	95 (+35°C)
Atmospheric pressure	kPa	84…106.7 (630…800 mm Hg)
Storage temperature range	°C	-10…+70
Storage humidity	%	95 (+ 30°C)
Vibration resistance: Frequency range Duration Acceleration	 Hz h m/s^2	 10…55 1 40
Impact resistance: Number of impacts Duration Acceleration	 n ms m/s^2	 1000 10 400
Degree of protection		IP 40

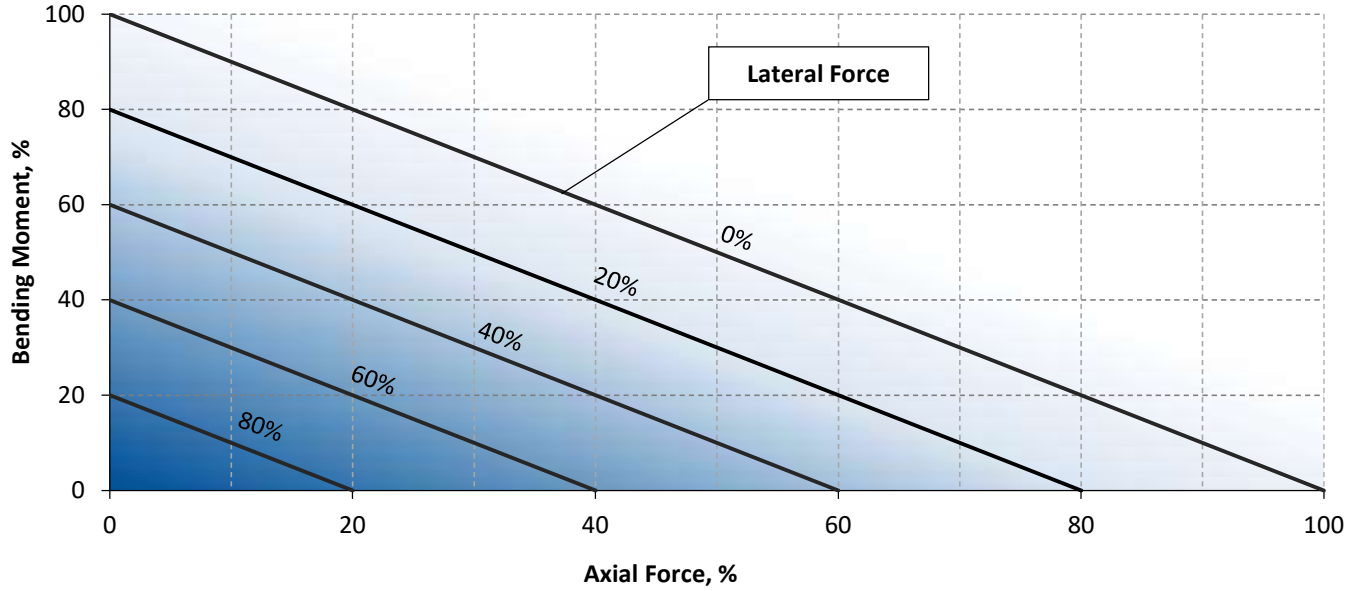
Mechanical parameters and operating limitations

Nominal torque M_N	Nm	**0,1-0,2**	**0,5-1**	**1-2**	**3-5**	**10-30**	**50-100**	**200-300**	**400-1 200**	**1 500-2 500**
Axial limit force on the rotor	kN	0,1	0,2	0,3	0,5	1,0	1,5	3	8	16
Permissible radial force applied to the rotor	N	2	3	5	10	40	120	220	1 000	2 000
Bending limit moment on the rotor	Nm	0,1	0,2	0,3	0,5	2	10	20	80	150
Torsional stiffness	kNm/rad	0,02	0,12	0,20	0,50	3,50	31,0	51,0	480	710
Weight: rotor **stator**	kg	0,1 0,2	0,14 0,2	0,14 0,2	0,4 0,2	0,4 0,2	0,9 0,2	1,2 0,2	2,9 0,4	4,5 0,4

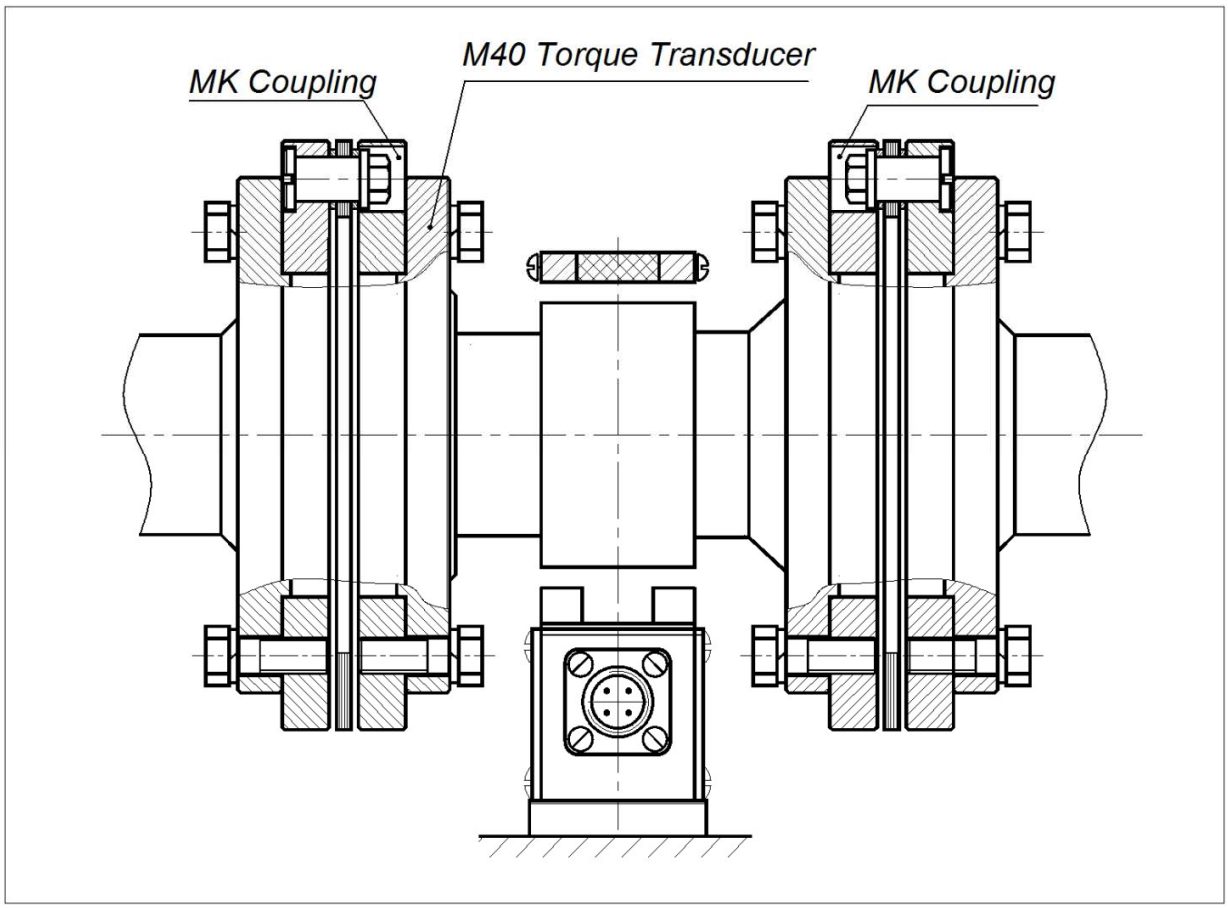
Nominal torque M_N	kH·м	3-6	8-15	20-30	40-60	80-100	120-150	200-300
Axial limit force on the rotor	kN	28	32	80	120	180	180	220
Permissible radial force applied to the rotor	N	5	10	25	50	80	80	120
Bending limit moment on the rotor	Nm	0,6	0,6	1,2	2	4	4	6
Torsional stiffness	kNm/rad	3 150	4 240	13 020	18 000	26 000	29 000	88 000
Weight: rotor stator	kg	7,8 0,5	12,8 1,0	21,0 1,1	37,1 1,2	55,0 1,4	98,5 1,5	184,0 1,6

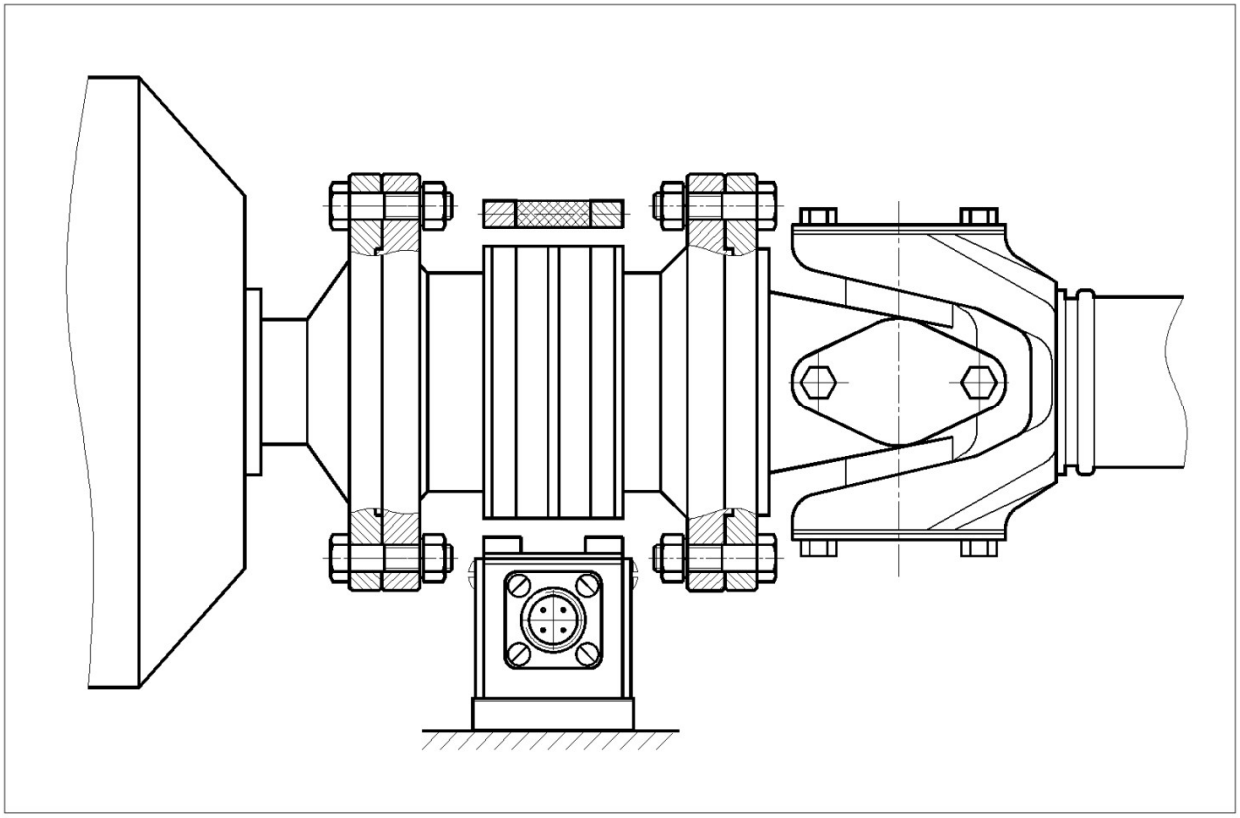
Axial force, radial force and bending moment have to be reduced according to the graph 1, if they act together.

Permissible external forces acting on the rotor

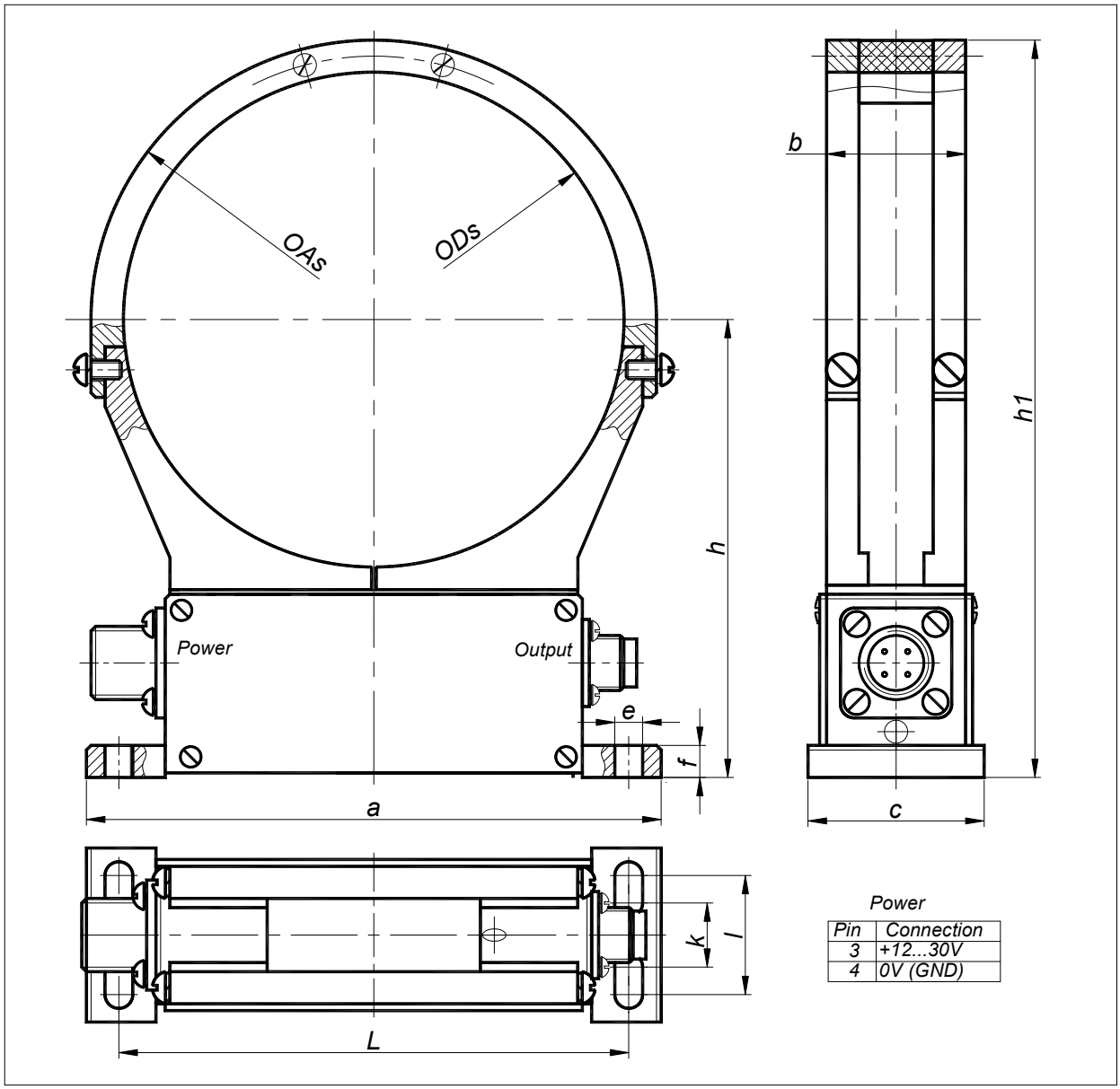


M40 installation examples





Stator M40. Dimensions, mm

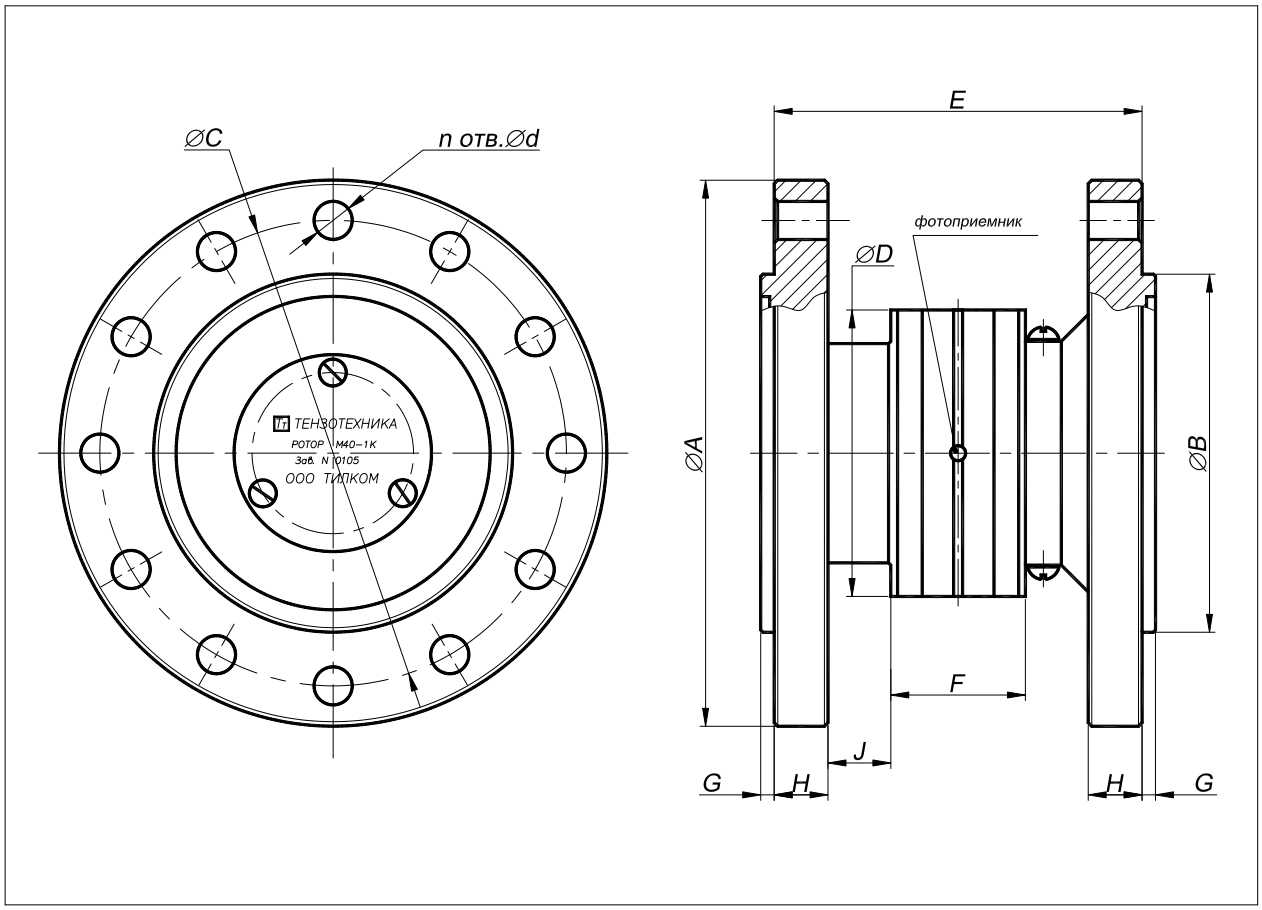


Power

Pin	*Connection*
3	*+12...30V*
4	*0V (GND)*

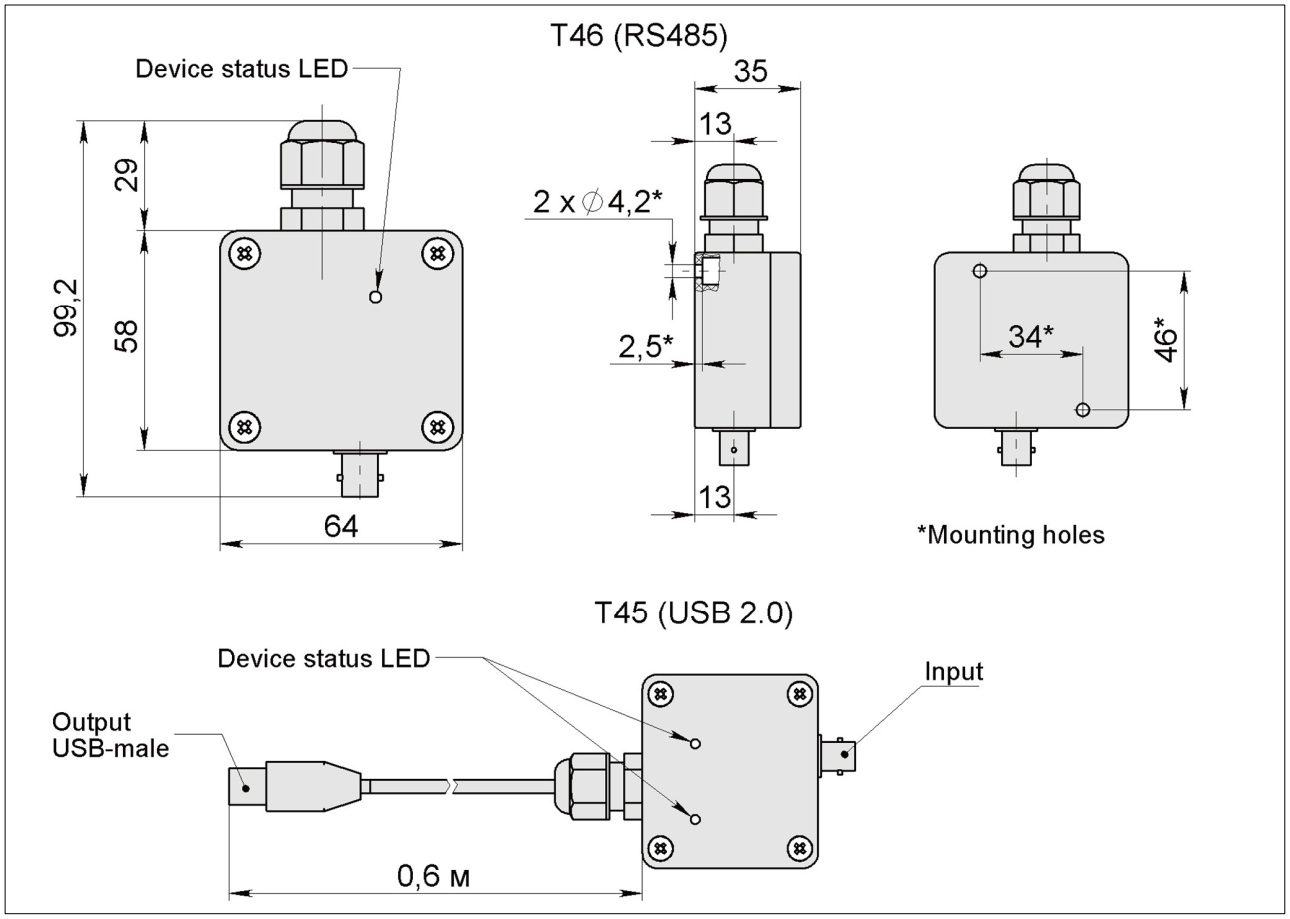
Тип	ØAs	ØDs	L	a	b	c	e	f	h	h1	k	l
M40-0,1… 2	47	37	80±0,1	90	22	30	4,6	6	54,5	78	10	20
M40-5… 30	57	47	80±0,1	90	26	30	4,6	6	62,5	91	10	20
M40-50… 150	57	47	80±0,1	90	26	30	4,6	6	62,5	91	10	20
M40-200… 300	62	52	80±0,1	90	26	30	4,6	6	65	96	10	20
M40-400… 1,2k	82	70	110±0,1	124	28	40	6,0	7	80	121	16	28
M40-1,5k… 2,5k	92	80	110±0,1	124	28	40	6,0	7	85	131	16	28
M40-3k… 6k	120	106	110±0,1	124	30	40	6,0	7	100	160	16	28
M40-8k… 15k	142	128	110±0,2	124	30	40	6,0	7	110	181	16	28
M40-20k… 30k	162	146	138±0,2	154	50	53	7,0	8	123	204	20	38
M40-40k… 60k	196	180	138±0,2	154	50	53	7,0	8	140	238	20	38
M40-80k… 100k	214	198	138±0,2	154	50	53	7,0	8	149	256	20	38
M40-120k… 150k	248	232	138±0,2	154	50	53	7,0	8	166	290	20	38
M40-200k… 300k	258	242	138±0,2	154	50	53	7,0	8	171	300	20	38

Rotor M40. Dimensions, mm

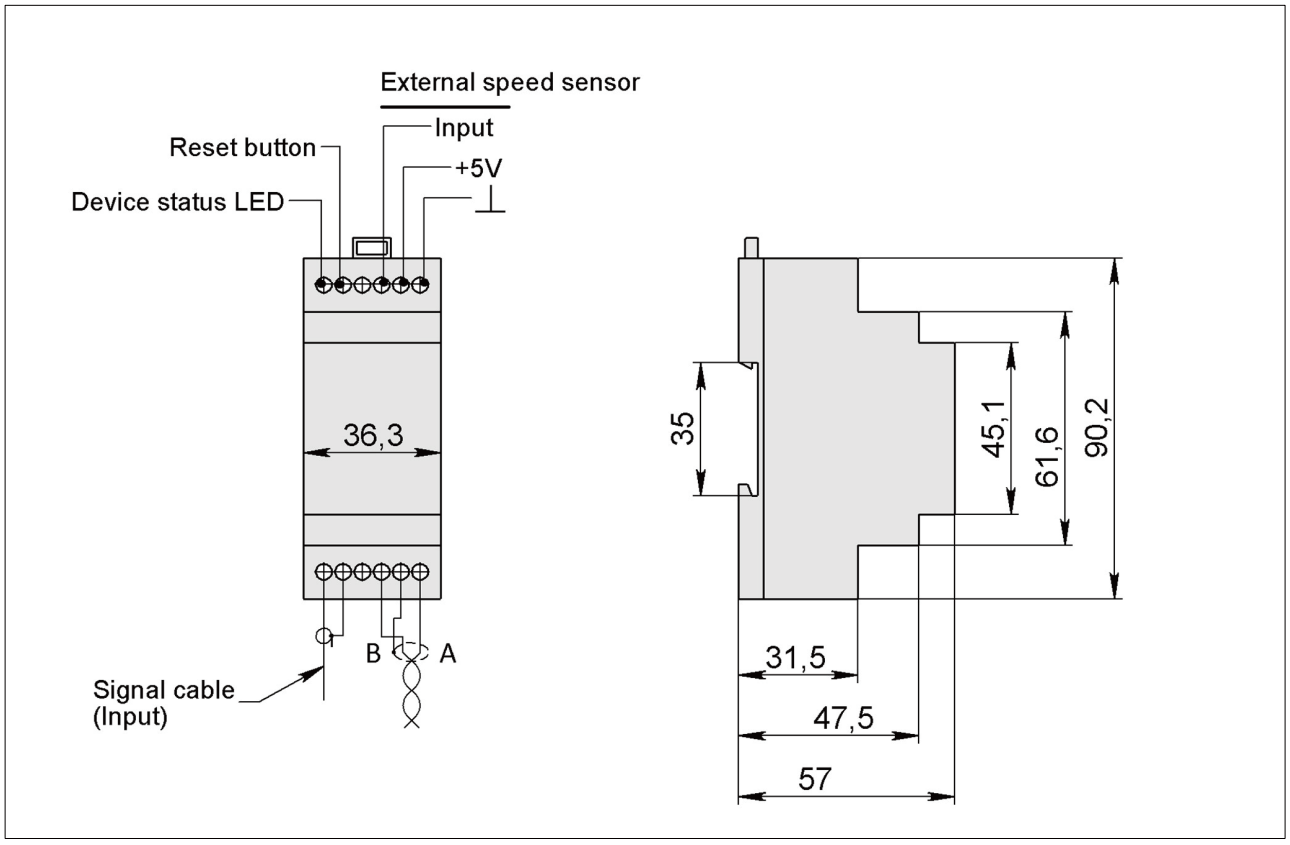


Type	ØA	ØB	ØC	ØD	E	F	G	H	J	n	Ød
M40-0,1… 2	45	30g6	38±0,10	32	54	22	2,5+0,1	4,0	14	8	3,4H12
M40-5… 30	60	40g6	50±0,10	40	60	26	2,5+0,1	5,5	11	8	4,5H12
M40-50… 150	78	50g6	66±0,10	40	64	26	3+0,14	7,0	12	8	5,5H12
M40-200… 300	90	60g6	76±0,10	45	68	26	3+0,14	8,0	13	8	6,5H12
M40-400… 1,2k	122	80g6	104±0,10	62	82	28	3+0,14	12,0	15	12	8,5H12
M40-1,5k… 2,5k	142	90g6	120±0,12	72	90	28	3+0,14	13,0	17	12	10,5H12
M40-3k… 6k	175	110g6	150±0,25	98	100	30	3+0,14	16,0	19	16	13H12
M40-8k… 15k	200	130g6	170±0,25	120	120	30	4+0,18	20,0	25	16	17H12
M40-20k… 30k	238	160g6	204±0,25	138	150	50	4+0,18	22,0	28	16	19H12
M40-40k… 60k	304	210g6	260±0,25	170	170	50	5+0,18	28,0	32	16	25H12
M40-80k… 100k	346	220g6	290±0,25	190	190	50	6+0,22	32,0	38	16	32H12
M40-120k... 150k	450	260g6	395±0,30	224	190	50	8+0,22	32,0	38	16	32H12
M40-200k… 300k	540	370g6	470±0,30	234	280	50	10+0,22	40,0	75	18	38H12

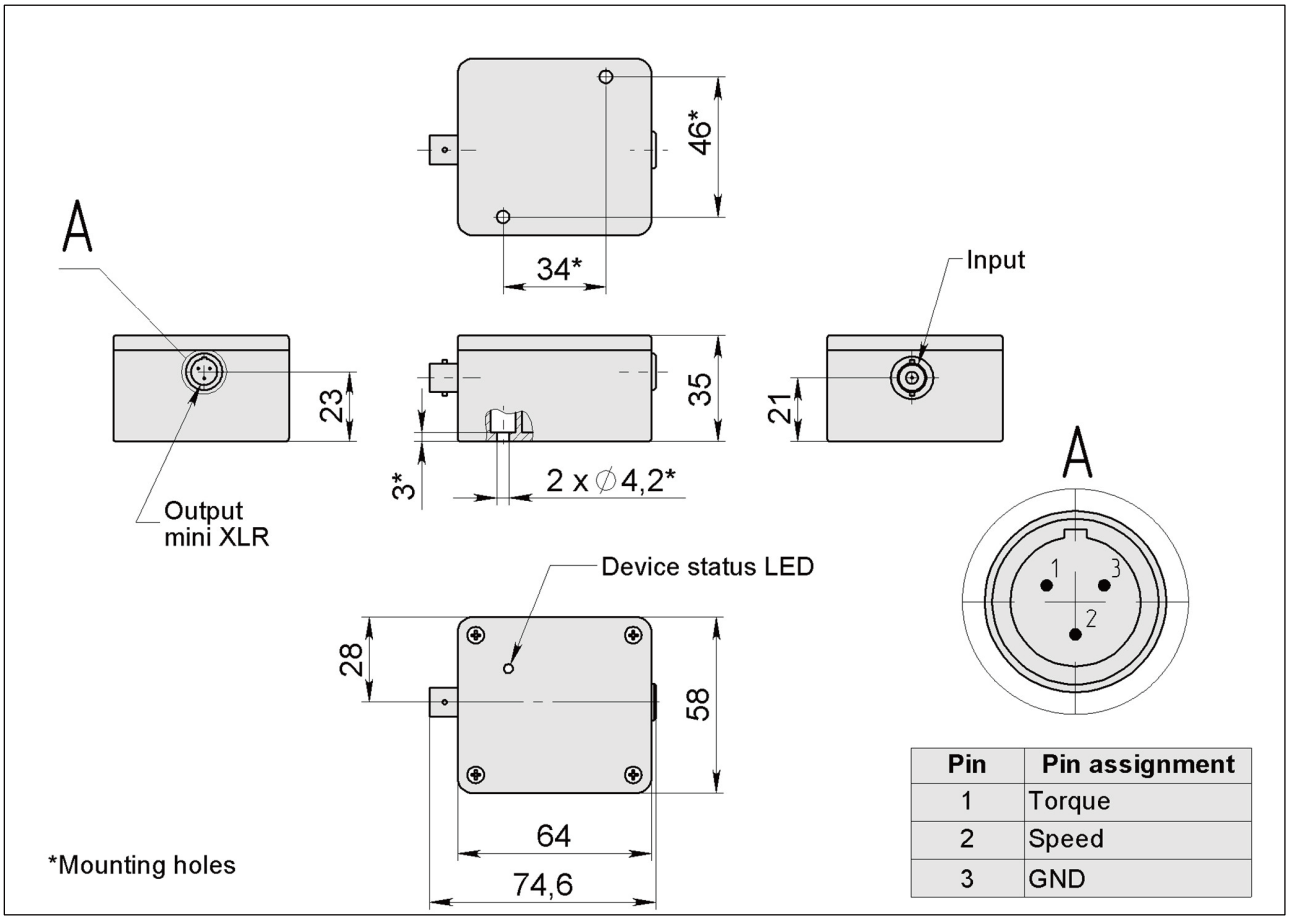
Digital decoder T45, T46 Dimensions (in mm)



Decoder T46 in 35 mm DIN rail housing T46 Dimensions (in mm)

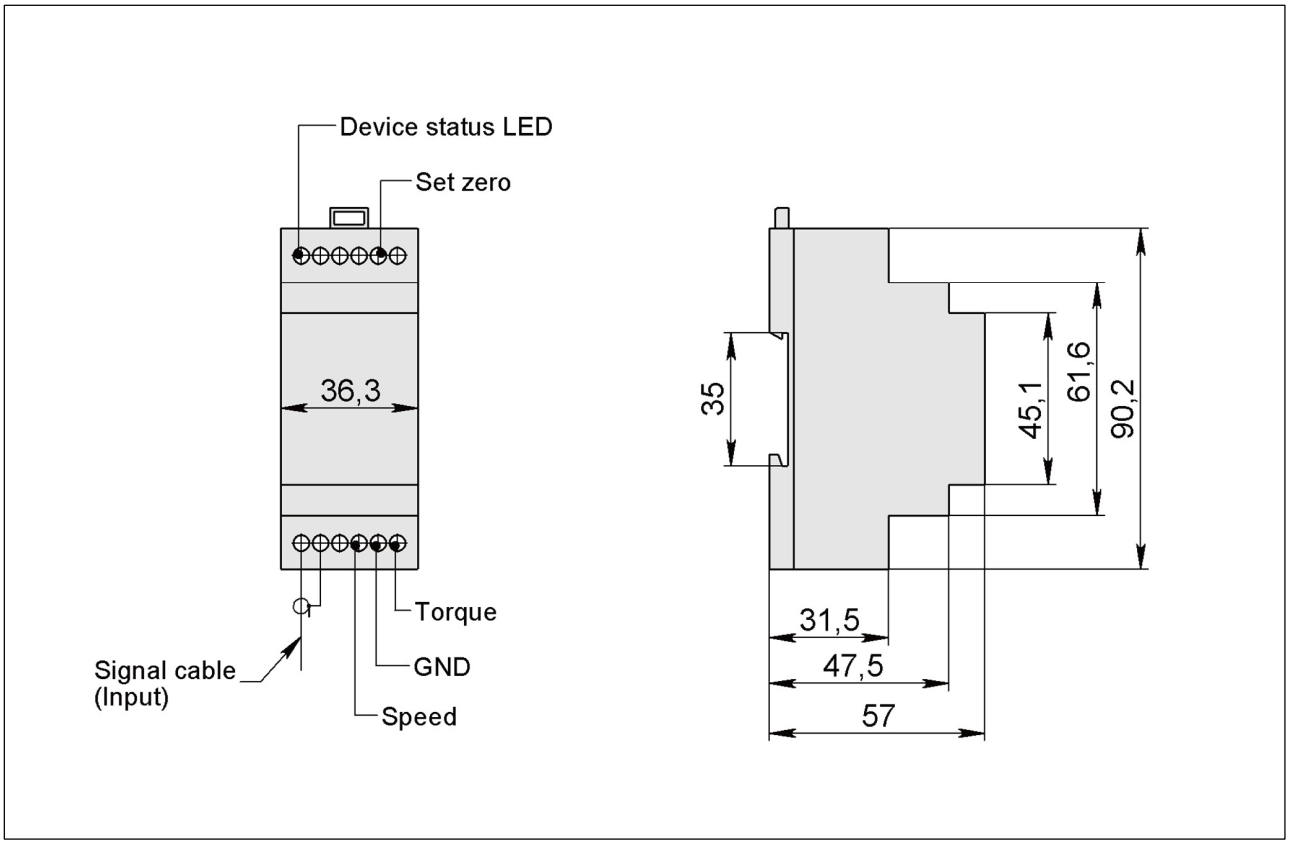


Analogue decoder T24 Dimensions (in mm)

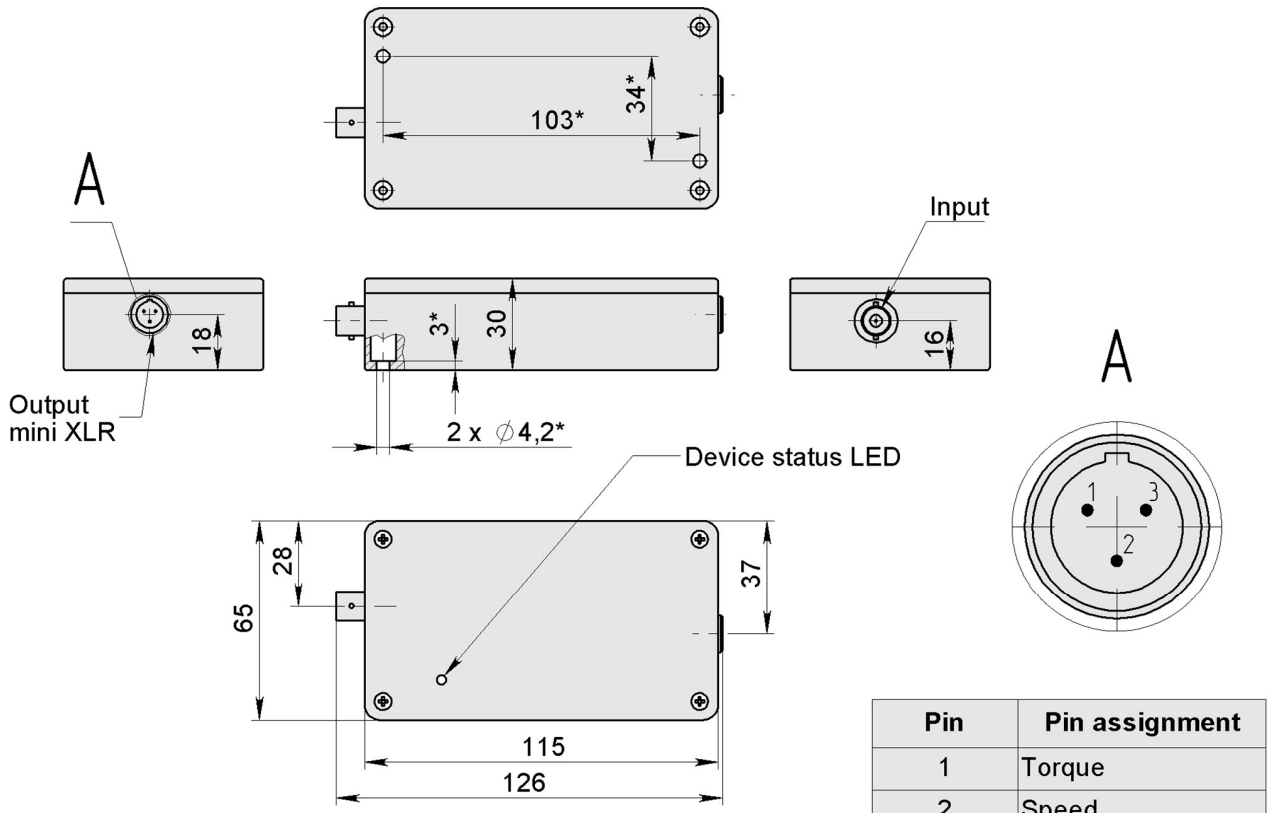


Pin	Pin assignment
1	Torque
2	Speed
3	GND

Analogue decoder T24 in 35 mm DIN rail housing Dimensions, (in mm)



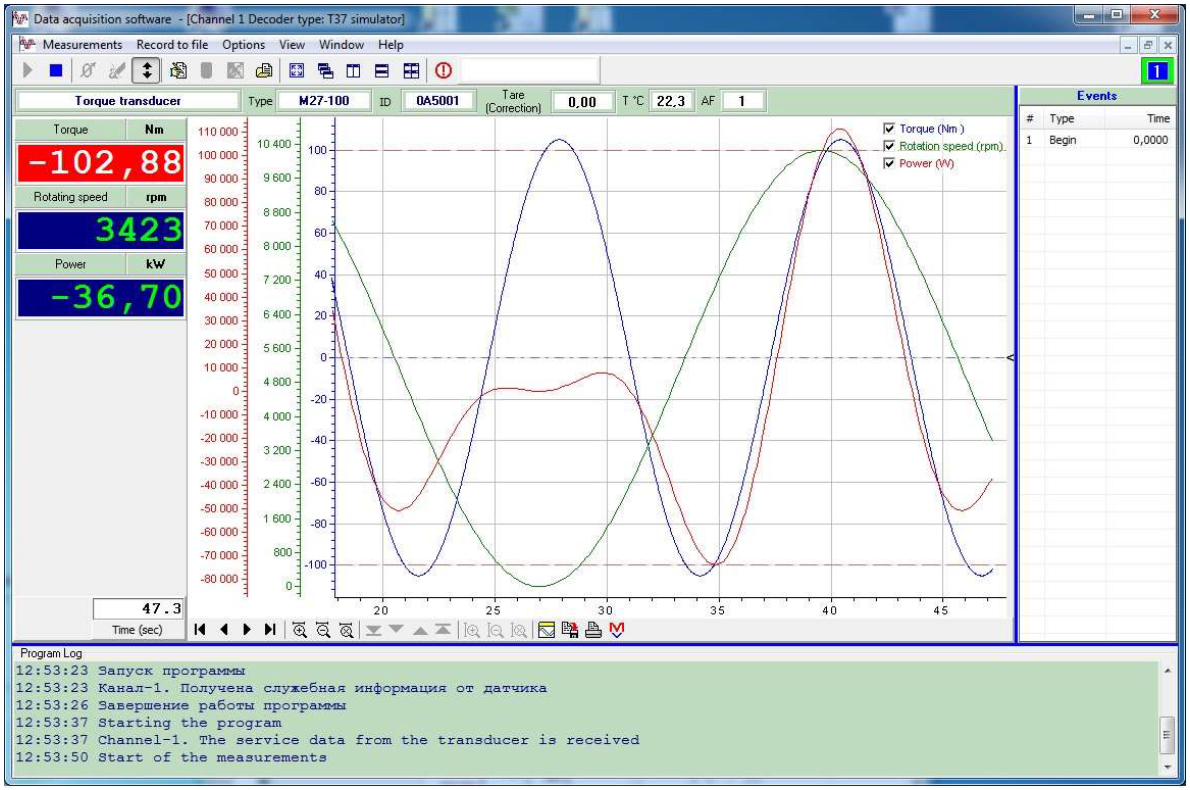
Frequency decoder T23 Dimensions (in mm)



Pin	Pin assignment
1	Torque
2	Speed
3	GND

Software

The “Transducer” software for MS Windows 10, 7, XP ® provides the visualization and data acquisition on a PC via the USB 2.0 interface.



The M40 Torque Transducers are supplied with decoders made as separate modules connected to the Transducer with a signal cable. Decoders are available with digital (USB2.0, RS232, RS485, Ethernet, CAN), analog (±5B, ±10B, 4 ... 20mA) and frequency (10kHz±5kHz, 60kHz±30kHz) outputs. Digital decoders can be connected to a computer for monitoring the measurement process and data acquisition. Software for Windows included.

Standard scope of delivery

Torque Transducer M40-*XX* [1]	1
Decoder TYY [2]	1
Output signal cable 5m length	1
Power supply connector (2PM14 or PC4TB)	1
Software “Transducer” for MS Windows	1
Software user manual	1
Operating manual for M40 Torque Transducer	1

1) *XX* – nominal torque
2) *YY* – type of decoder

Accessories (to be ordered separately)

	Disc couplings of the MK series - to compensate for angular, axial and radial displacement of shafts when installing The Transducer.
	The T40 display unit is used to display the values of torque, force, rotational speed and power measured by the M type torque transducers and CT force transducers.
	The T42 display unit is designed to indicate torque, force, rotational speed and power measurement values made with the M type torque transducers and the CT type force transducers. The T42 display unit can include optionally: USB2.0, RS232, RS485, CAN, Ethernet interfaces; Analogue or Frequency output; Two-level relay to control an external actuator.
	The T50 display unit is used to monitor the torque value from a distance of up to 50-70m.
	Decoders: T23 Frequency output, T24 Analogue output, T42 RS 232, T45 USB 2.0, T46 RS 485
	Power adapter 12 ... 30 V
	Signal cable of any length (up to 200 m).

Transducers may be subject to changes on delivery that are not specified in this data sheet. According to the customer 's technical assignment, non-standard products with the equired parameters can be designed and manufactured.