

M20C Torque Transducer



The M20C is a rotating torque transducer of a flange type.

The M20C transducers are used to measure constant and variable torque at the wide measuring range from ± 3 up to $\pm 30\,000$ Nm and at the rotation speed up to 10 000 rpm.

They represent a new generation of digital torque transducers with advanced performance. The M20C torque transducers are equipped with the advanced digital telemetry system for contactless transmission of the measured torque data from the rotor to the stator.

This digital coded signal has high interference immunity, provides high accuracy of measurements and can be transmitted over significant distances without distortion and loss of information.

The rotor is supported on the stator by ball bearings.

The M20C torque transducers are suitable to determine static as well dynamic

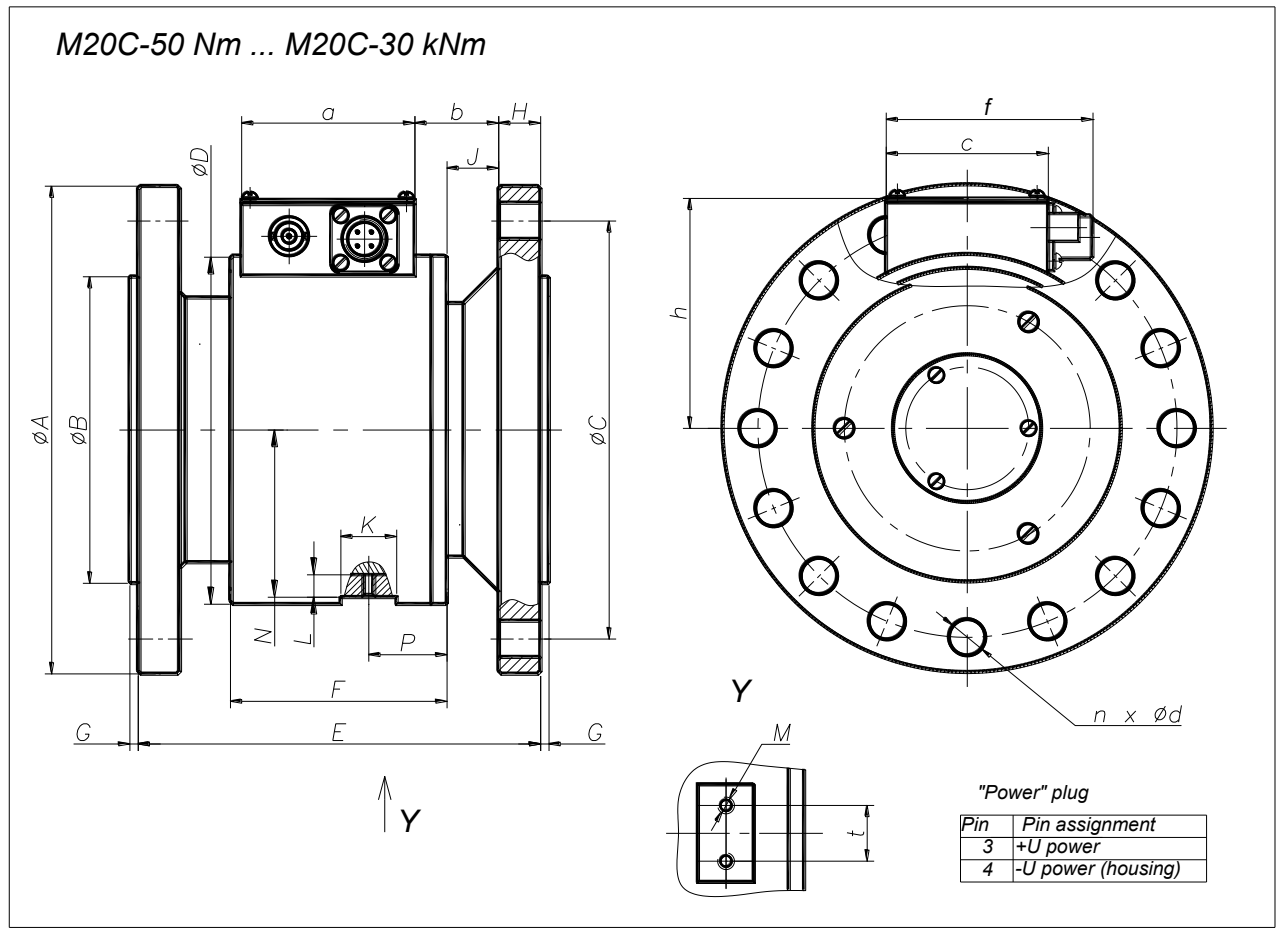
rapidly changing torque in positive and negative polarity. The transducer has a built-in optoelectronic speed sensor.

The torque output signal can be digital (USB 2.0, RS232, RS485 (Modbus) interfaces), analogue (± 5 V, ± 10 V, 4 ... 20 mA) and frequency ($10\text{ kHz} \pm 5\text{ kHz}$, $60\text{ kHz} \pm 30\text{ kHz}$). The M20C can be easily connected to a PC. The Windows-based software for data acquisition and its processing is included in the scope of supply with the M20C torque transducer.

Type-Survey

Type	Unit	Nominal torque M_N	Max. speed, rpm
M20C-3 ... 30	Nm	3 5 6 8 10 15 20 25 30	10 000
M20C-50 ... 150		50 60 80 100 150	9 000
M20C-200 ... 300		200 250 300	9 000
M20C-400 ... 1.2k	kNm	400 500 600 800 1 000 1 200	8 000
M20C-1.5k ... 2.5k		1.5 2 2.5	7 500
M20C-3k ... 6k		3 5 6	5 600
M20C-8k ... 15k		8 10 15	5 300
M20C-20k ... 30k		20 25 30	3 800

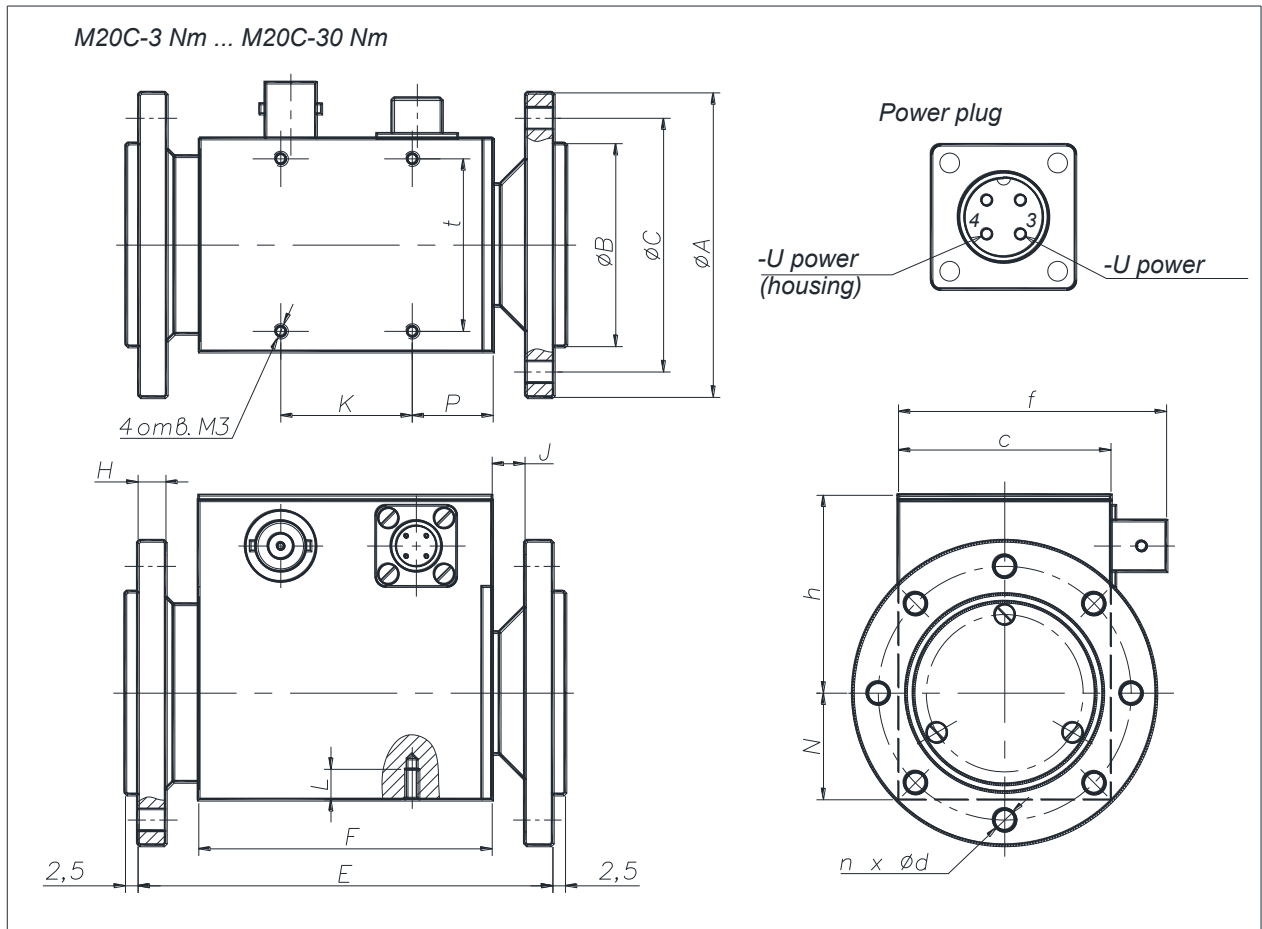
Dimensions (in mm)



Type	ØA	ØB	ØC	ØD	E	F	G	H	J	K	L
M20C-50 ... 150	78	50g6	66±0.10	56	90	57.5	3 ^{+0.14}	7	7.5	15	5.5
M20C-200 ... 300	90	60g6	76±0.10	64	96	62.0	3 ^{+0.14}	8	9.0	15	7.0
M20C-400 ... 1.2k	122	80g6	104±0.10	85	110	65.0	3 ^{+0.14}	11	9.0	18	7.0
M20C-1.5k ... 2.5k	142	90g6	120±0.12	96	124	67.0	3 ^{+0.14}	13	14.0	18	6.0
M20C-3k ... 6k	175	110g6	150±0.25	125	144	76.5	3 ^{+0.14}	15	18.5	20	8.0
M20C-8k ... 15k	200	130g6	170±0.25	138	158	77.5	4 ^{+0.18}	18	22.5	20	10.0
M20C-20k ... 30k	238	160g6	204±0.25	170	176	86.5	4 ^{+0.18}	20	24.5	20	8.0

Type	M	t	N	P	a	b	C	f	h	Ød	n
M20C-50 ... 150	M4	12	26	18	54	11	46	62	45	5.5H12	8
M20C-200 ... 300	M4	14	30	22	58	13	52	62	49	6.5H12	8
M20C-400 ... 1.2k	M5	20	40	24	60	14	50	66	61	8.5H12	12
M20C-1.5k ... 2.5k	M5	20	46	25	60	21	50	66	68	10.5H12	12
M20C-3k ... 6k	M5	22	60	28	62	30	58	74	83	13H12	16
M20C-8k ... 15k	M5	22	66	28	62	31	60	74	90	17H12	16
M20C-20k ... 30k	M5	22	82	28	62	39	60	74	107	19H12	16

Dimensions in mm



Type	ØA	ØB	ØC	E	F	H	J	K	L
M20C-3 ... M20C-30	60	40g6	50±0.1	80	56	5.5	6.5	26±0.1	5

Type	N	P	t	h	c	f	Ød	n
M20C-3 ... M20C-30	20	17	34±0.1	38	40	51	4.5H12	8

Technical data

Nominal torque M_N and max. speed see table «Type-Survey».

Accuracy class		0.2
Deviation of the actual output signal at the nominal torque from the nominal value (including hysteresis and nonlinearity)	%	± 0.2
Temperature effect per 10 °C on the zero signal, related to the nominal output value	%	± 0.1
Nominal supply voltage	V (DC)	12 ... 30
Power consumption	W	< 5
Measurement frequency range	Hz	0 ... 1000 (- 1.5 dB)
Amplitude ripple (0 ... 500 Hz)	dB	≤ 0.1
Frequency output (T23 decoder)		
Frequency output signal with positive nominal torque	kHz	15 (90)
Frequency output signal with negative nominal torque	kHz	5 (30)
Frequency output signal at torque = zero	kHz	10 (60)
Load resistance	k Ω	≥ 2
Output voltage	V	5 ± 1 (symmetrical meander)
Input-output galvanic isolation		+
Analogue output (T24 decoder)		
Nominal output signal with positive (right-hand) nominal torque	V	+ 5 (+ 10)
Nominal output signal with negative (left-hand) nominal torque	V	- 5 (- 10)
Output signal at torque = zero	V	0
Load resistance	k Ω	≥ 10
Analogue output (T24/4 ... 20 mA decoder)		
Output current	mA	4 ... 20
Output current at loading = zero	mA	12
Output current at nominal positive loading	mA	20
Output current at nominal negative loading	mA	4
Load resistance	k Ω	≥ 100
Digital output (T45 decoder)		
Interface		USB 2.0
Data transfer rate (Full-Speed)	Mbit/sec	13
Sample rate	kSample	5.0
Input-output galvanic isolation		+
Digital output (T37 decoder)		
Interface		Ethernet
Data transfer rate	Mbit/sec	10; 100
Sample rate	kSample	5.0
Input-output galvanic isolation		+
Digital output (T46 decoder)		
Interface		RS485
Protocol		MODBUS RTU
Data transfer rate	baud	2 400 - 115 200
Parity check		+
Sample rate	kSample	5.0
Input-output galvanic isolation		+
Digital output (T42 decoder)		
Interface		RS232
Data transfer rate	baud	2 400 - 115 200
Parity check		+
Sample rate	kSample	5.0
Input-output galvanic isolation		+
Rotation speed measuring system		
Accuracy (within 30 ... 20 000 rpm)	%	± 0.1
Pulses per revolution depending on a decoder	T23, T24	1
	T23/3, T24/3	60, 120, 360, 480, 720 (optionally)
Min. detected speed	rpm	30
Amplitude of output pulse voltage with analogue (frequency) output	V	5 ± 1

Parameters of resistance to environment and mechanical exposures

Nominal temperature range	°C	+ 5 ... + 50
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	Hz	10 ... 55
Duration	h	1
Acceleration	m/s ²	40
Impact resistance:		
Number of impacts	n	1 000
Duration	ms	10
Acceleration	m/s ²	400
Degree of protection		IP40

Permissible load limits and mechanical values

Nominal torque M _N	Nm	5	10	20	50	100	200
Axial limit force on the rotor	kN	0.5	0.7	1.0	1.2	1.5	3
Lateral limit force on the rotor	N	10	20	30	40	80	120
Bending limit moment on the rotor	Nm	0.5	1	2	5	10	20
Lateral limit force on the mounting surface of the stator	N	5	10	20	50	50	50
Torsional stiffness	kNm/rad	0.3	0.8	2.2	7.6	17.4	35.2
Weight	kg	0.7	0.7	0.7	1.4	1.4	2.0

Nominal torque M _N	Nm	500	1 000	2 000	5 000	10 000	25 000	30 000
Axial limit force on the rotor	kN	5	8	16	28	32	80	90
Lateral limit force on the rotor	kN	0.3	0.6	1 000	2 000	4 000	8 000	9 000
Bending limit moment on the rotor	Nm	50	80	150	300	600	1 200	1 400
Lateral limit force on the mounting surface of the stator	N	100	100	100	150	200	300	300
Torsional stiffness	kNm/rad	104	240	570	1 820	3 940	8 200	9 800
Weight	kg	4.4	4.4	6.5	12.3	17.2	28.0	29.0

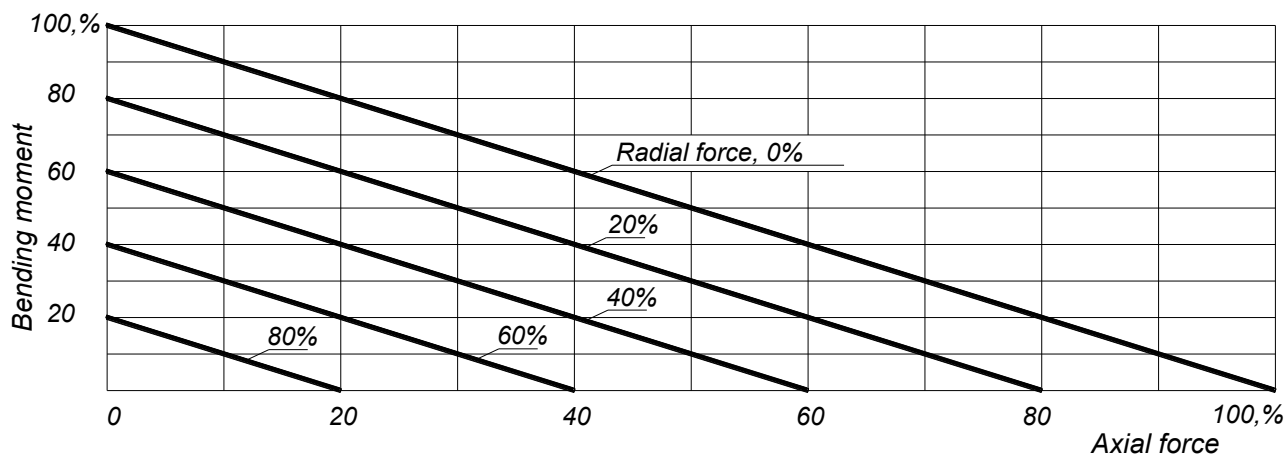
Limit torque, related to M_N

Type	Unit	Nominal torque M _N								Limit torque related to M _N , %	
M20C-3 ... 30	Nm	3	5	6	8	10	15	20	25	30	150
M20C-50 ... 150		50	60	80	100	150					
M20C-200 ... 300		200	250	300							
M20C-400 ... 1.2k		400	500	600	800	1 000	1 200				
M20C-1.5k ... 2.5k	kNm	1.5	2	2.5							120
M20C-3k ... 6k		3	5	6							
M20C-8k ... 15k		8	10								
		15									
M20C-20k ... 30k		20	25								
		30								120	

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

To prevent from excessive stress due to misalignment and thermal influences the transducer should be fitted between flexible couplings. We offer such flexible torsionally rigid couplings MK series. Technical specification see in the data sheet entitled "MK Couplings".

Graph 1



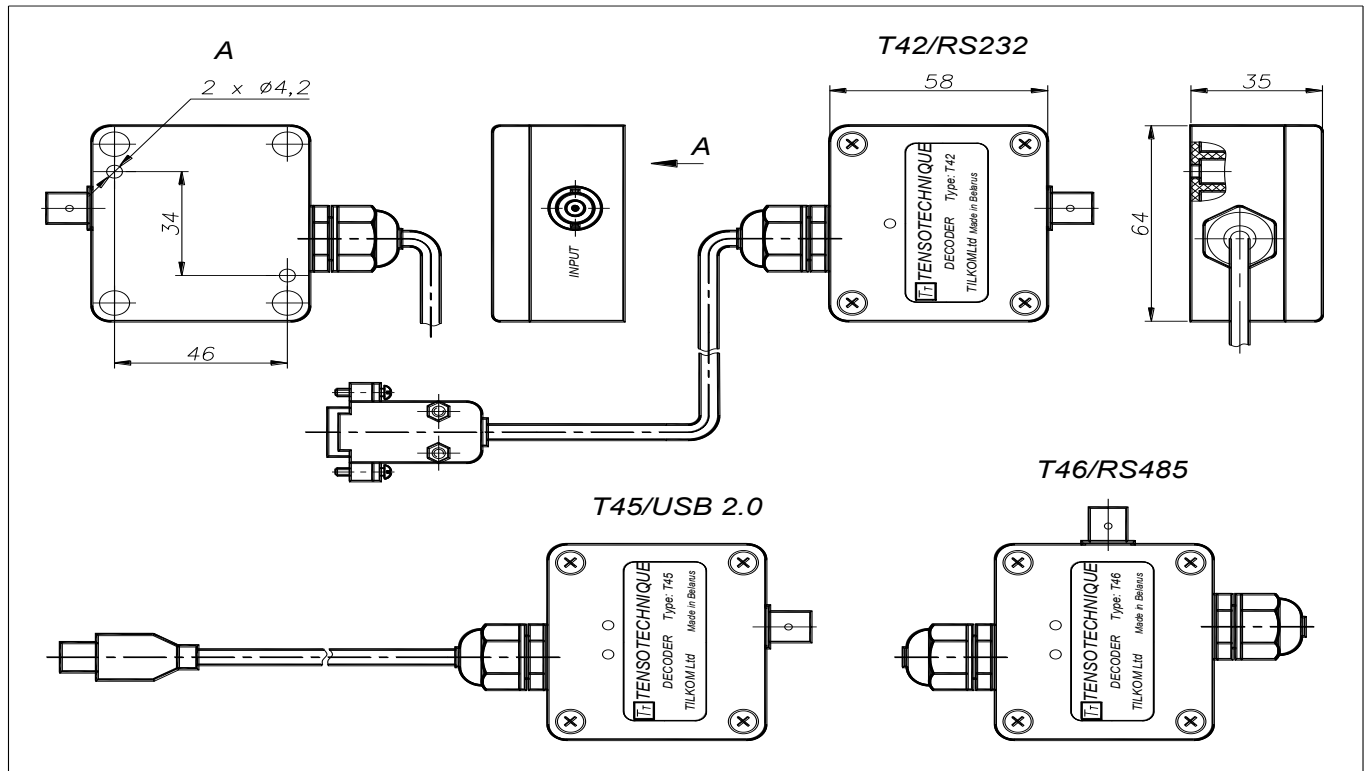
Scope of delivery

M20C torque transducer	1
Txx decoder	1
Output signal cable, 5 m long (optionally can be over in length)	1
Power supply connector (PC4 or 2PM14)	1
"Transducer" software for Windows XP, 7, 8, 10	1
Software user manual	1
Operating manual	1

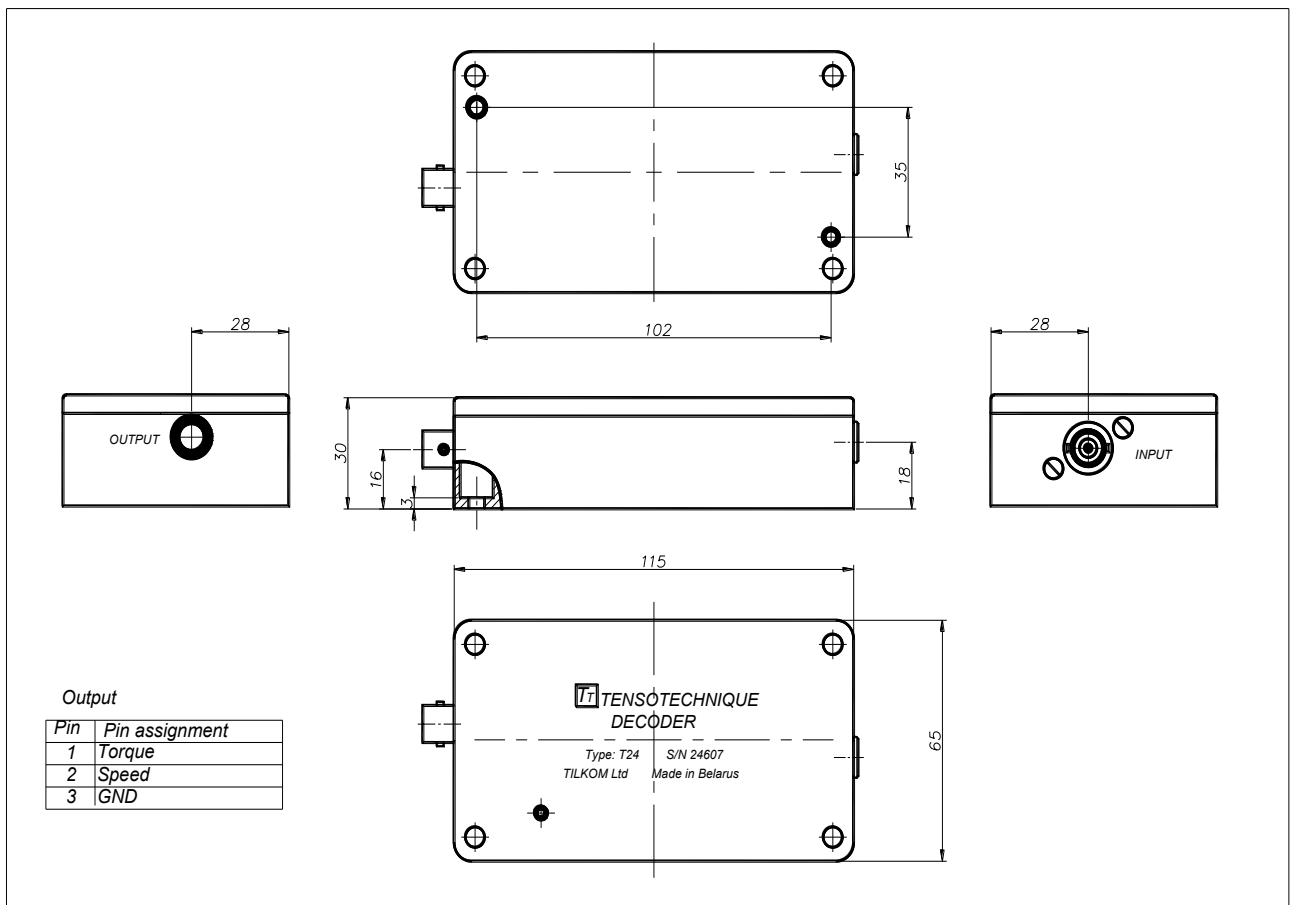
Accessories (to be ordered separately and optionally)

MK Flexible torsionally rigid couplings	2
T40 display unit	1
T41 display unit (plastic case)	1
T50 display unit (for long distances)	1
T24 analogue decoder ($\pm 5\text{ V}$, $\pm 10\text{ V}$ or $4 \dots 20\text{ mA}$)	1
T23 frequency decoder ($10 \pm 5\text{ kHz}$ or $60 \pm 30\text{ kHz}$)	1
T45 digital decoder (USB 2.0)	1
T42 digital decoder (RS232)	1
T46 digital decoder (RS485)	1
T37 digital decoder (Ethernet)	1
AC/DC adapter (12 ... 30 V)	1

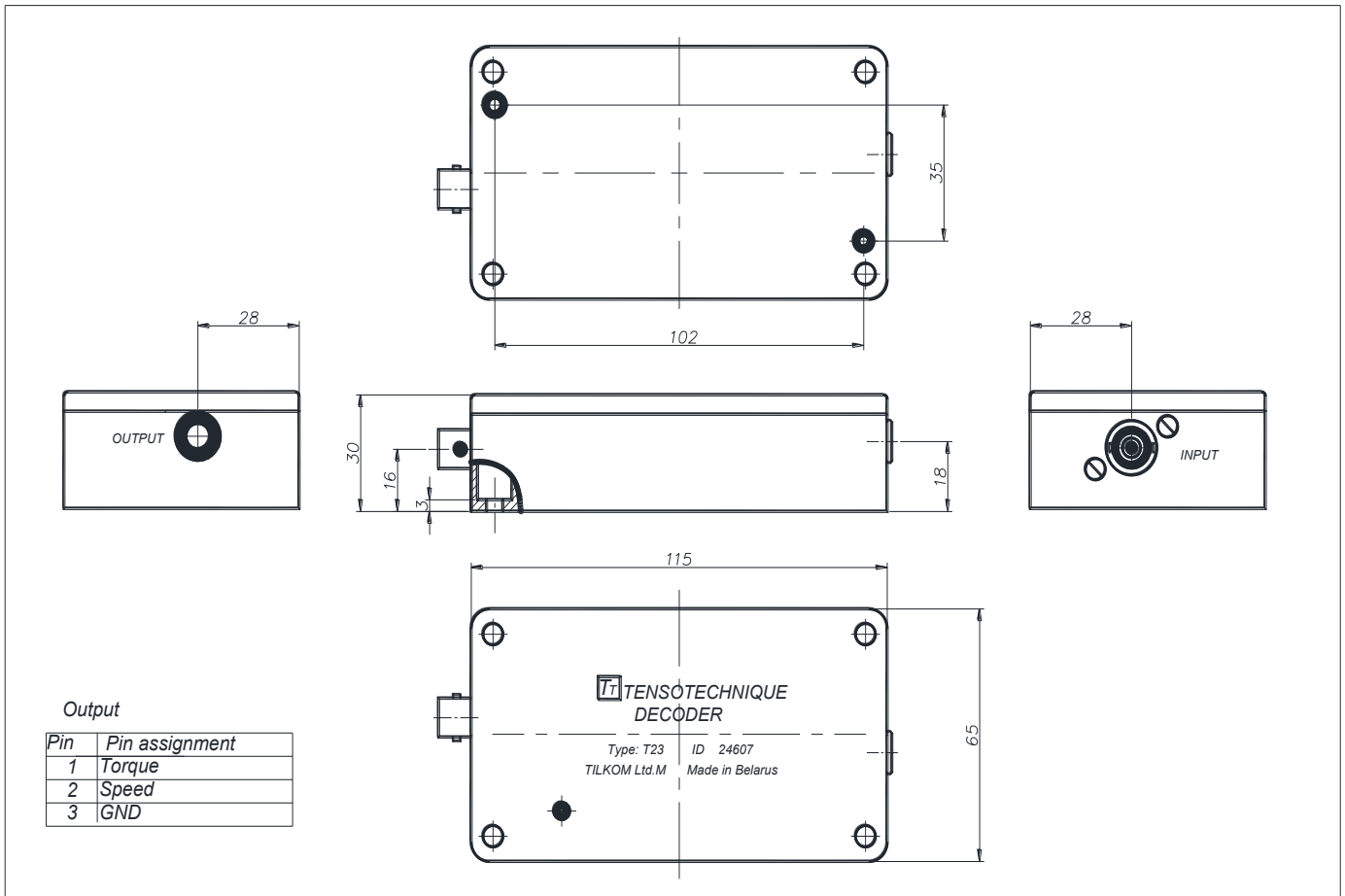
T42, T45, T46 digital decoder. Dimension in mm



T24 analogue decoder. Dimension in mm



T23 frequency decoder. Dimensions in mm.



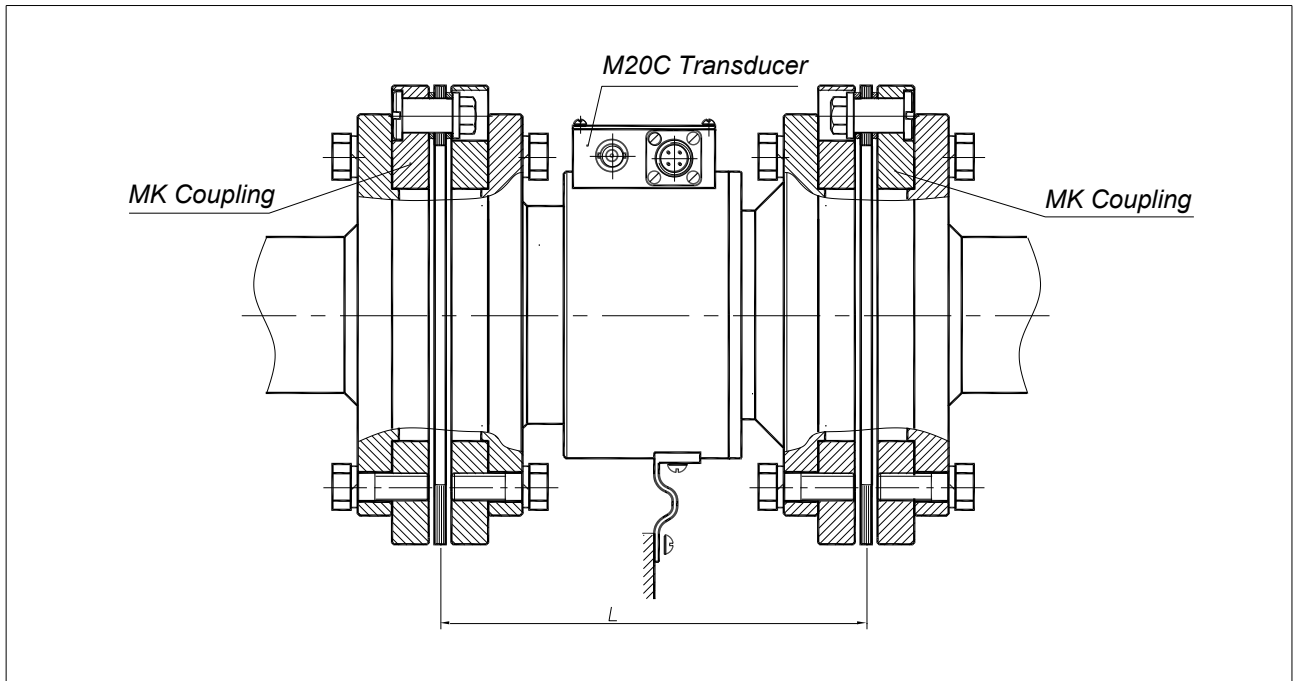
Software

The MS-Windows software for M20C transducer enables the acquisition of measurement data and its storage in a file. The measurements can be visualized on-line with digital indicators and x/y displays. A text file is provided for storage so that the measurement data can be read and processed by other programs.

The software provides auto identification of the type of transducer, serial number, measuring range.

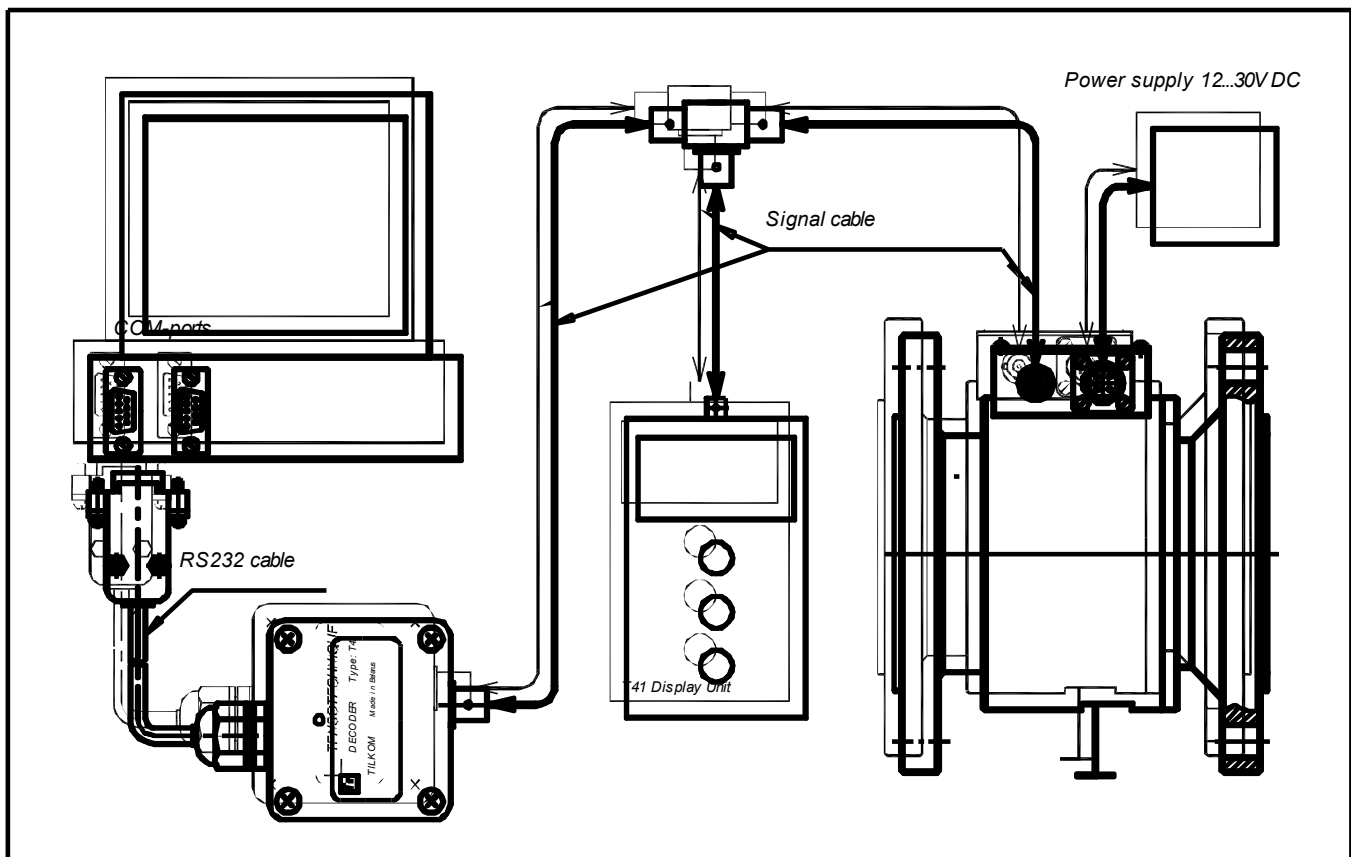
Features: support up to 8 (eight) transducers simultaneously, mathematical computation of mechanical power, rotation speed and torque, measurement signal filter and signal averaging, zero shift adjustment, fast records, slow records, scaling of x-axis and y-axis, digital indicator of high resolution, real-time display of measured values, their storage and playback. The software has a function of recording data without averaging at the maximum speed of receiving data; this enables you to analyze the dynamic processes.

Installation example

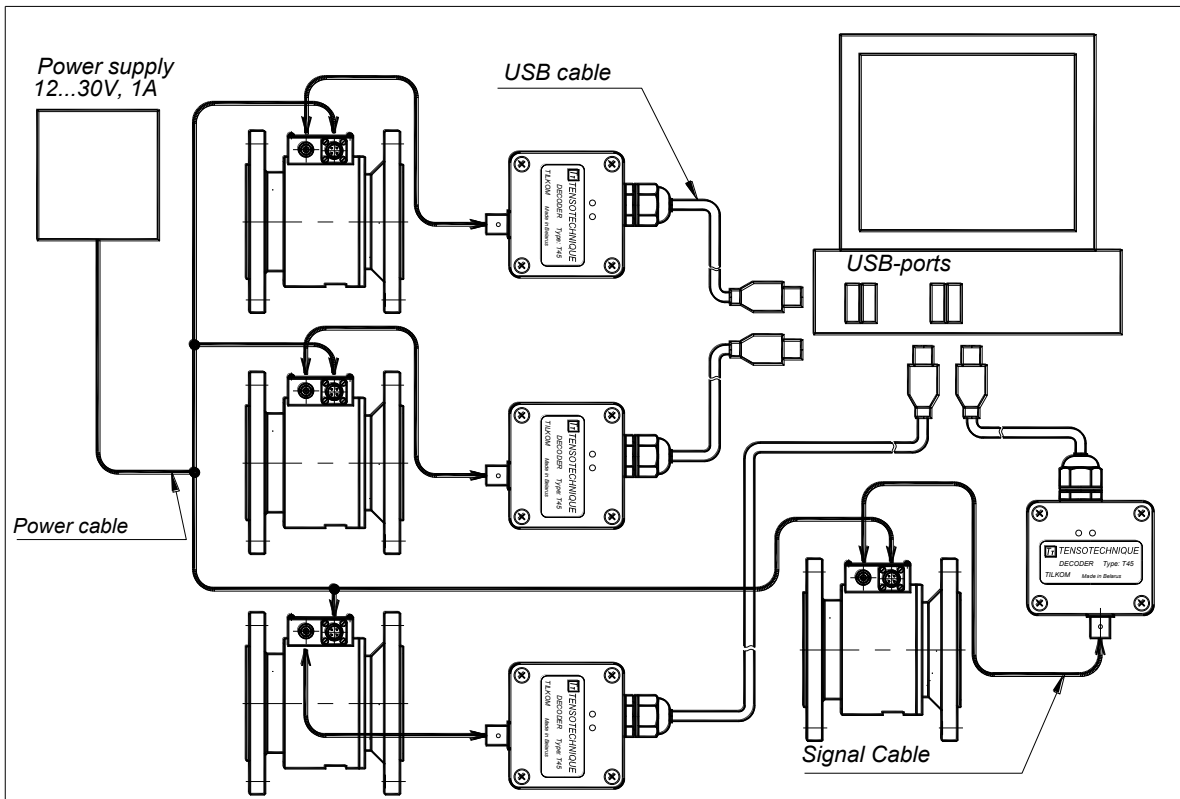


Electrical connections

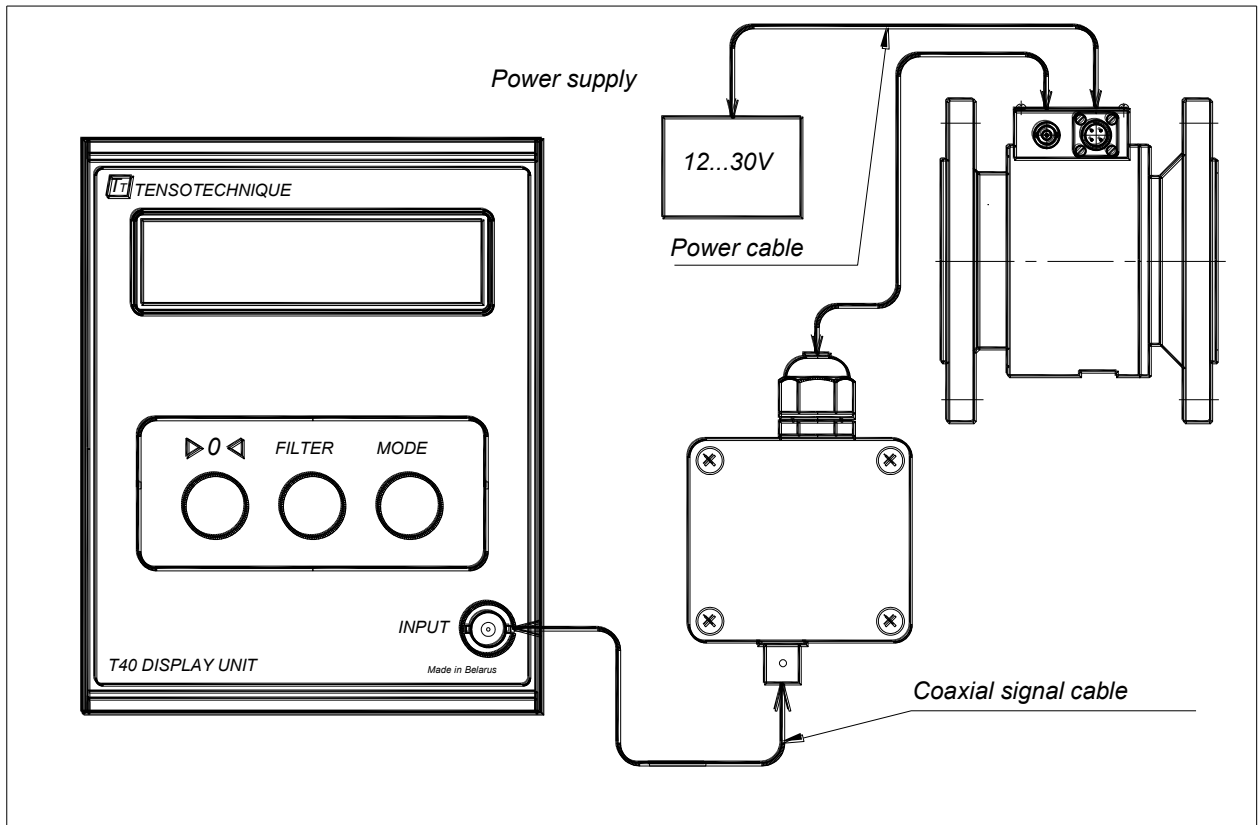
1. Simultaneous use of a PC and the T40 (T41) display unit



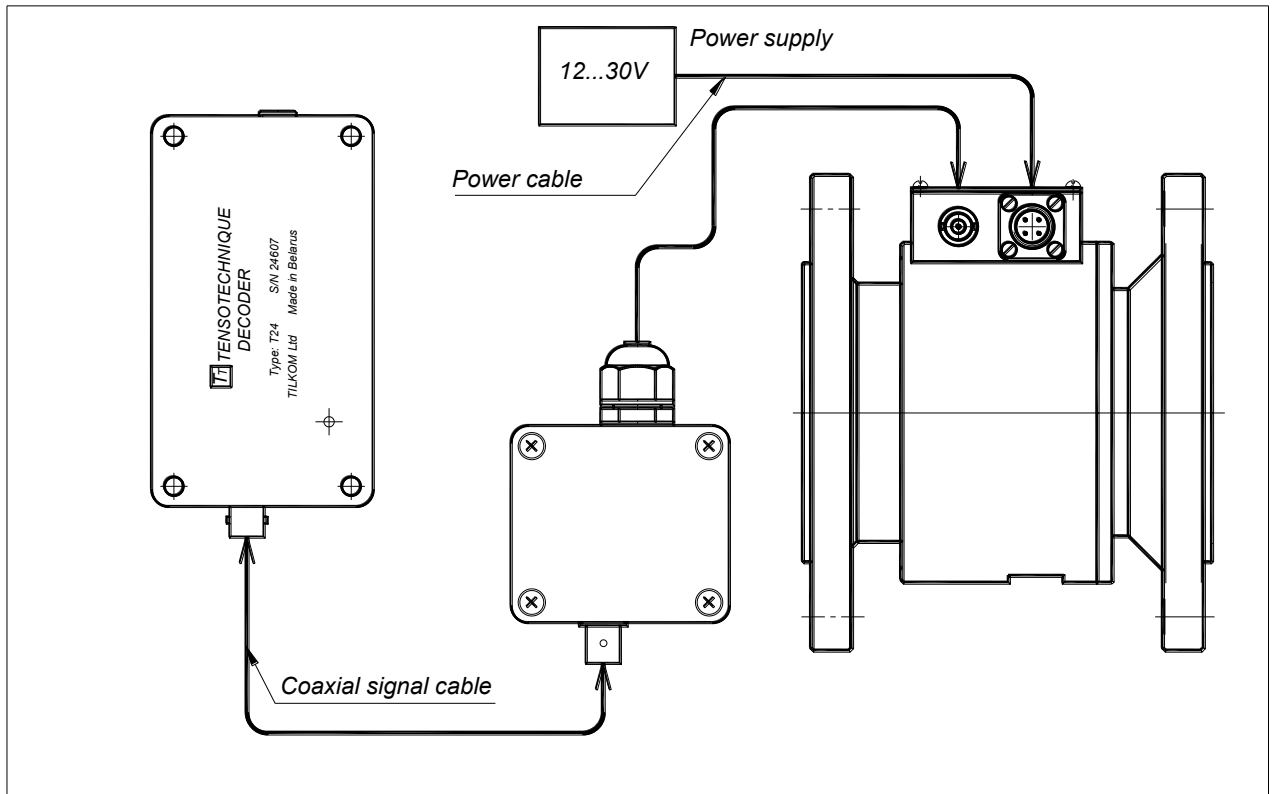
2. Connection to an USB-port (T45 decoder)



3. Connection to the T40 display unit



4. Connection to the T24 analogue decoder ($\pm 5\text{ V}$, $\pm 10\text{ V}$ or $4 \dots 20\text{ mA}$)



5. Connection to the T46 decoder (RS485)

