UTMⅢ

ROTATING TORQUE METER

CE RoHS2

Long-awaited new series capable of dynamic torque measurement even more accurately!

- Compared to UTM Ⅱ ,impact on accuracy by radial loads, thrust loads and during high-speed rotation was dramatically reduced
- Max. rotational speed 40000 rpm *1
- Available in 17 different capacity ranging from 0.05 to 10000 Nm
- Analog bandwidth 5 kHz with high-speed sampling rate of 20 kHz.
- Safe overload of 500%
- Power supply DC 24 V
- Rated torque at ±10 V
- Digital zero function via external signal
- Digital output via RS-485
- Equipped with pulse output for rotation detection (4 pulses per 1 rotation) 60 pulses/revolution is available *1

*1 10 Nm or below available by custom order.

Abundant options available

Centering location

(C)

Easy aligning
Ideal when applying for automatic fitting

Rotary encoder

(R)

Output 3600 pulse per rotation
Ideal for detecting torque fluctuation along with angle change

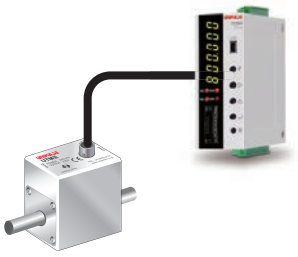
Key Groove

(K)

For a rotation lock for the shaft

* Please check P.9 for details on centering location (C), P.8 for details on rotary encoder (R) and key groove (K).

Frequency bandwidth of 5 kHz, variable filter



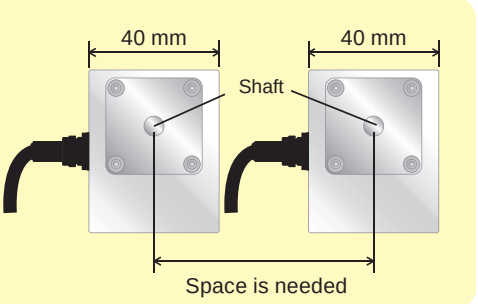
Response time improved
Filter constant can be changed using external input

Cutoff frequency 5 kHz

Cutoff frequency 100 Hz

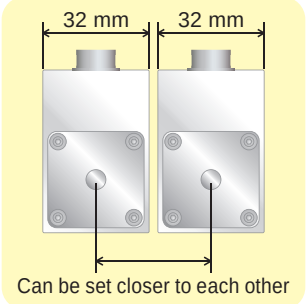
More compact for side-by-side measurement

UTMⅡ



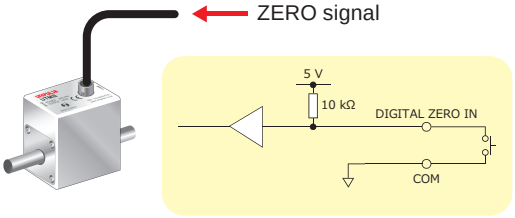
* Dimensions above are for 0.05 to 2 Nm capacity type.

UTMⅢ



Slimmed down body and repositioned connector allow shafts to be setup closer from each other.

Added zero correction function with external signal

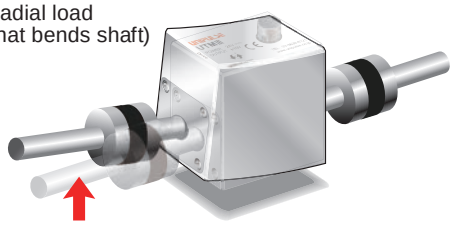


Reading deviation occurred during installation can be corrected with external signal.

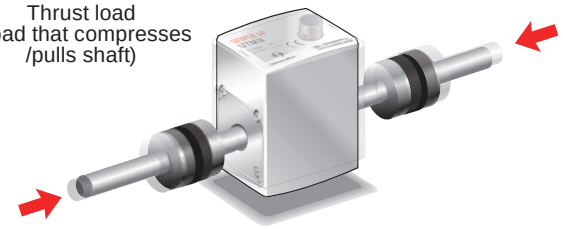
Increased resistance to radial & thrust load

Influences that radial and thrust loads exert on effective accuracy were dramatically reduced.

Radial load
(Load that bends shaft)



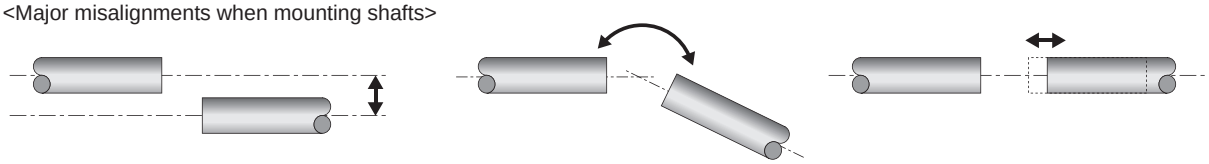
Thrust load
(Load that compresses /pulls shaft)



■ Why is load other than torque applied at torque meter?

For torque measurement, when interlocking shafts, misalignments on shaft center as illustrated below occurs by all means.
The devices that absorb radial and thrust loads caused by such misalignments are couplings. However, even the couplings cannot completely absorb such radial and thrust loads, resulting in an impact on torque measurement.

<Major misalignments when mounting shafts>

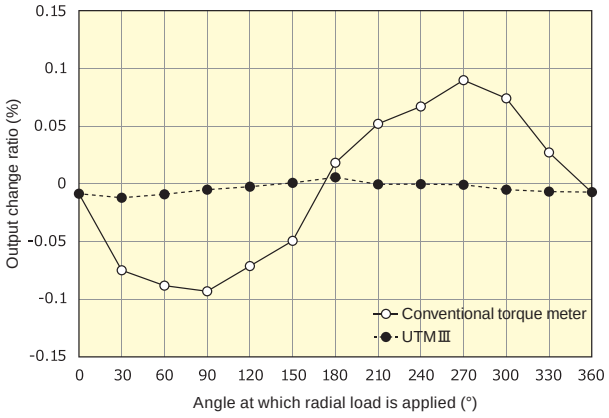


Misalignments of eccentricity | Misalignments of deflection angle | End play

■ Experimental data

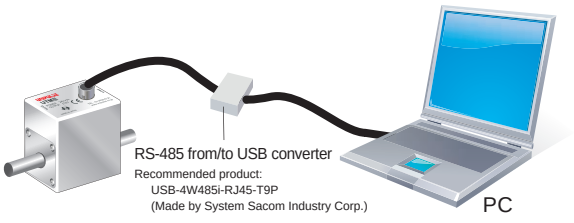
The right figure shows the change in output when one shaft end of a torque meter with a rated torque of 2 Nm is fixed and a 7 N radial load is applied to the other shaft end via a bearing.
Output changes depending on rotation angle.
While output value changes 0.1% at maximum with conventional torque meter, output value changes less than 0.01% with UTMⅢ.

The table on P.7 standardizes the allowable shaft end load.
UTMⅢ can be used more safely than ever before.



Digital output via RS-485

Enable to retrieve the digital signal to PC.



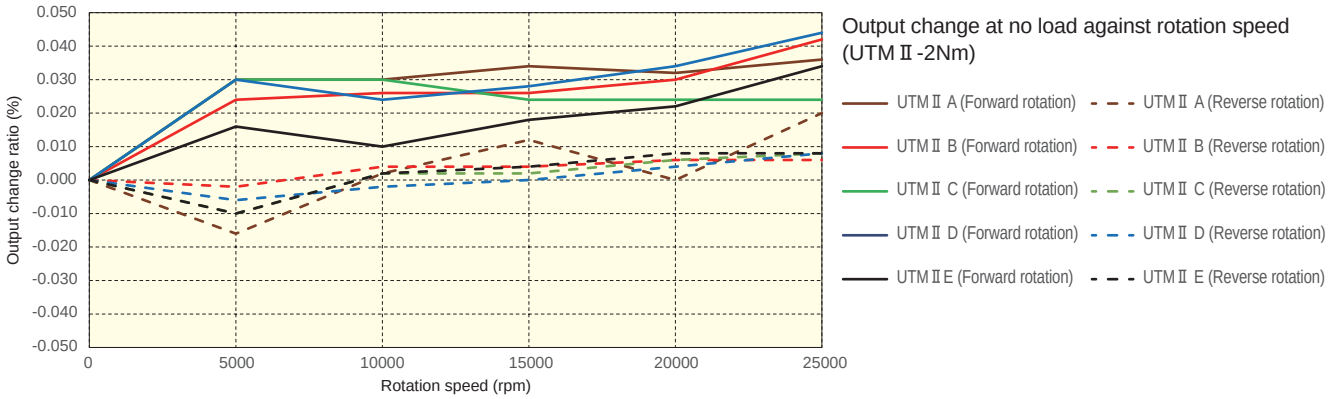
■ Application software for RS-485

Torque displays two types of waveforms before and after the filter, allowing you to check whether the filter settings are appropriate.
- Display waveforms of torque and rotational speed
- Waveform can be saved in CSV format
- Data of time, torque, and rotational speed can be saved.

Application software can be downloaded from our official website.

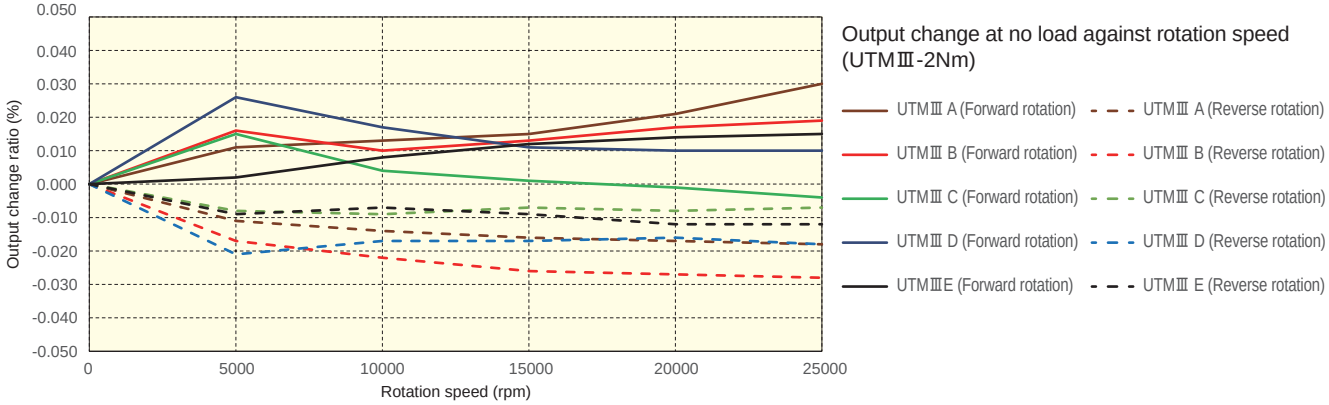
Output change depending on rotation speed

The output of a rotating torque meter changes due to the sliding resistance and centrifugal force of the bearing during rotation.
The figure below shows five units of UTMⅡ-2Nm and UTMⅢ-2Nm, and shows the change in output when each is rotated with no load.



Output change at no load against rotation speed (UTMⅡ-2Nm)

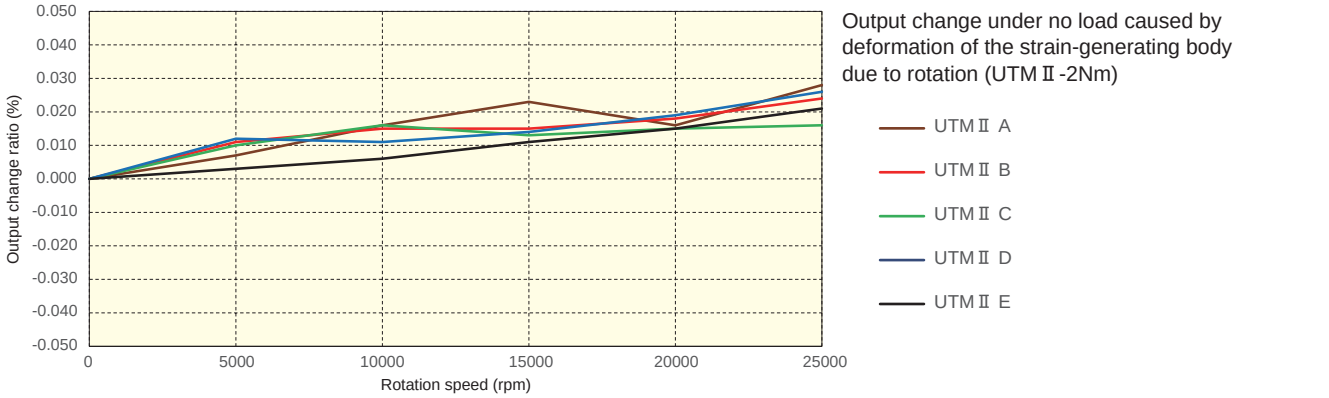
- UTMⅡ A (Forward rotation) / UTMⅡ A (Reverse rotation)
- UTMⅡ B (Forward rotation) / UTMⅡ B (Reverse rotation)
- UTMⅡ C (Forward rotation) / UTMⅡ C (Reverse rotation)
- UTMⅡ D (Forward rotation) / UTMⅡ D (Reverse rotation)
- UTMⅡE (Forward rotation) / UTMⅡ E (Reverse rotation)



Output change at no load against rotation speed (UTMⅢ-2Nm)

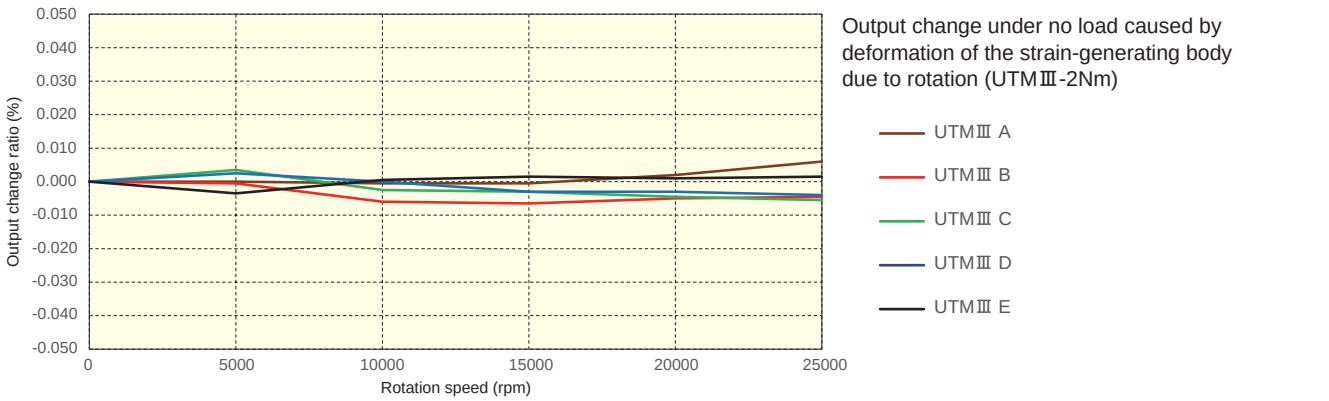
- UTMⅢ A (Forward rotation) / UTMⅢ A (Reverse rotation)
- UTMⅢ B (Forward rotation) / UTMⅢ B (Reverse rotation)
- UTMⅢ C (Forward rotation) / UTMⅢ C (Reverse rotation)
- UTMⅢ D (Forward rotation) / UTMⅢ D (Reverse rotation)
- UTMⅢE (Forward rotation) / UTMⅢ E (Reverse rotation)

The output of the sliding resistance of the bearing changes according to the direction of rotation, but the output of the centrifugal force always changes with the same tendency regardless of the direction of rotation.
The figure below is a graph of the value obtained by subtracting the reverse rotation value from the forward rotation value.
For UTMⅡ, the output changes upward according to the rotation speed, but for UTMⅢ, the output change is very small.
The bearingless specification does not generate bearing sliding resistance and can handle up to 40000 rpm.



Output change under no load caused by deformation of the strain-generating body due to rotation (UTMⅡ-2Nm)

- UTMⅡ A
- UTMⅡ B
- UTMⅡ C
- UTMⅡ D
- UTMⅡ E



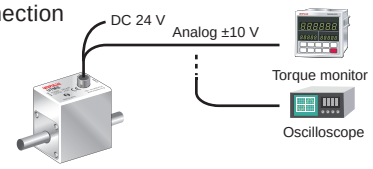
Output change under no load caused by deformation of the strain-generating body due to rotation (UTMⅢ-2Nm)

- UTMⅢ A
- UTMⅢ B
- UTMⅢ C
- UTMⅢ D
- UTMⅢ E

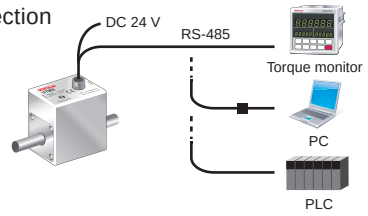
UTMⅢ has a particularly small change in output against centrifugal force, and can perform high-precision torque measurement not only in static tests but also in dynamic tests.

Connection example

Analog connection

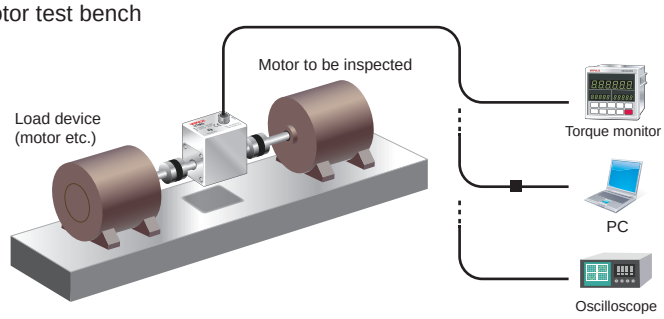


Digital connection



Sample application

Motor test bench



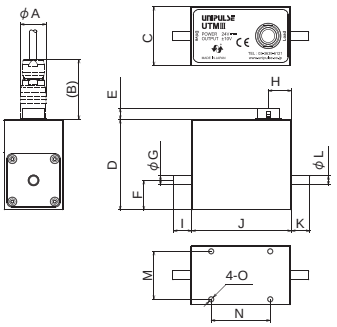
Mechanical power can be calculated from torque and rotation speed of UTMⅢ

Specifications

Measurement range	±0.05 Nm	±0.1 Nm	±0.2 Nm	±0.5 Nm	±1 Nm	±2 Nm	±5 Nm	±10 Nm	±20 Nm	±50 Nm	±100 Nm	±200 Nm	±500 Nm	±1000 Nm	±2000 Nm	±5000 Nm	±10000 Nm
Power supply	DC 24 V±15%																
Consumption current	100 mA or less								150 mA or less					180 mA or less			
Output range	±10 V DC Load resistance must be more than 5 kΩ																
Responsivity	5 kHz																
Rotation signal	4 pulses per 1 rotation *1 Open collector Max. ratings 30 V, 10 mA																
Digital filter	1 Hz to 1 kHz (Depending on settings) PASS 5 kHz																
Safe overload	500% FS																
Non-linearity	0.03% FS or less																
Hysteresis	0.03% FS or less																
Repeatability	0.03% FS or less																
Operation temp. range	-10 to +50℃																
Temp. effect on zero	0.01% FS/℃ or below																
Temp. effect on span	0.01% FS/℃ or below																
Max. rotation speed	25000 rpm *2								20000 rpm		15000 rpm	12000 rpm	10000 rpm	7000 rpm	6000 rpm	5000 rpm	4000 rpm
Torsional spring constant (Nm/rad)	5.67	11.57	26.10	93.1	188	414	691	1851	5386	8428	17.3×10^3	41.7×10^3	117×10^3	377×10^3	717×10^3	1649×10^3	3255×10^3
Maximum torsional angle (rad)	8.81×10^{-3} (0.505°)	8.64×10^{-3} (0.495°)	7.66×10^{-3} (0.439°)	5.37×10^{-3} (0.308°)	5.32×10^{-3} (0.305°)	4.83×10^{-3} (0.277°)	7.24×10^{-3} (0.415°)	5.40×10^{-3} (0.310°)	3.71×10^{-3} (0.213°)	5.93×10^{-3} (0.340°)	5.78×10^{-3} (0.331°)	4.79×10^{-3} (0.275°)	4.28×10^{-3} (0.246°)	2.65×10^{-3} (0.152°)	2.79×10^{-3} (0.160°)	3.03×10^{-3} (0.174°)	3.07×10^{-3} (0.176°)
Inertia moment (kgm²)	8.48×10^{-7}	8.58×10^{-7}	8.70×10^{-7}	1.46×10^{-6}	1.49×10^{-6}	1.39×10^{-6}	3.56×10^{-6}	3.66×10^{-6}	2.59×10^{-5}	2.66×10^{-5}	6.59×10^{-5}	1.40×10^{-4}	4.70×10^{-4}	2.90×10^{-3}	5.89×10^{-3}	2.01×10^{-2}	5.16×10^{-2}
Permissible shaft end load *3 Radial	0.12 N	0.25 N	0.3 N	0.5 N	1 N	8 N	15 N	20 N	23 N	60 N	90 N	160 N	300 N	400 N	500 N	1000 N	1200 N
Permissible shaft end load *3 Thrust	3 N	4 N	5 N	6 N	8 N	30 N	40 N	100 N	360 N	400 N	500 N	800 N	1800 N	3000 N	4500 N	7000 N	11000 N
Permissible shaft end load *3 Radial (R, RC, RK, RCK)	0.07 N	0.14 N	0.17 N	0.3 N	0.6 N	5 N	7 N	13 N	20 N	25 N	60 N	100 N	200 N	-	-	-	-
Permissible shaft end load *3 Thrust (R, RC, RK, RCK)	3 N	4 N	5 N	6 N	8 N	30 N	40 N	100 N	360 N	400 N	500 N	800 N	1800 N	-	-	-	-
Dimension (case size) W×H×D (mm)	54×49×32						57×54×37		70×63×47		67×63.5×56	67×68×61	67×78×71	86×103×98	86×119×111	97×141×137	103×166×162
Total length	74 mm			84 mm			97 mm		150 mm	170 mm	177 mm	187 mm	217 mm	286 mm	306 mm	387 mm	447 mm
Shaft diameter	ϕ5 mm			ϕ8 mm *4			ϕ12 mm *4		ϕ20 mm		ϕ25 mm	ϕ30 mm	ϕ40 mm	ϕ60 mm	ϕ70 mm	ϕ90 mm	ϕ110 mm
Approx. weight	140 g			160 g			250 g		670 g		1.1 kg	1.4 kg	2.6 kg	7.4 kg	10.6 kg	21.7 kg	36.2 kg
Supplied cable	12-conductor flexible cable (2 m) Cable end: 13 wires → Cable length is switchable to 5 m (Option: UTMⅢ-L5)																
Optionally available cable	CATM351: 12-conductor flexible cable (5 m) Cable end: 13 wires CATM312: 12-conductor flexible cable (10 m) Cable end: 13 wires																
Option Key groove							○	○	○	○	○	○	○	○	○	○	○
Option Rotary encoder	○	○	○	○	○	○	○	○	○	○	○	○	○				
Option Key groove & Rotary encoder							○	○	○	○	○	○	○				
Option Centering location	○	○	○	○	○	○	○	○	○	○	○	○	○				
Option Key groove & Centering location									○	○	○	○	○				
Option Rotary encoder & Centering location	○	○	○	○	○	○	○	○	○	○	○	○	○				
Option Key groove & Rotary encoder & Centering location									○	○	○	○	○				
CE marking certification	EMC directives EN61326-1, EN61326-2-3																

*1 0.05 to 10 Nm model can be changed to 60 pulses in 1 rotation specification. Contact us for more details.
*2 0.05 to 10 Nm can be changed to a maximum rotation speed of 40000 rpm.
*3 The allowable shaft end load (N) for radial and thrust is the value that guarantees that the torque output will not be affected by 0.03% FS or less when these loads are applied.
*4 The shaft can be changed to a hollow shaft. Contact us for more details.

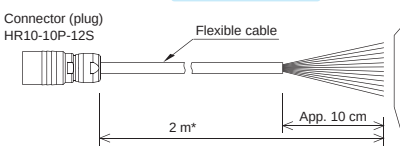
External dimension



Unit: mm

Measurement range	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
0.05 Nm	14	31.5	32	49	6.1	16	5h7	12	10	54	10	5h7	26	32	M3 depth 5
0.1 Nm															
0.2 Nm															
0.5 Nm							8h7		15		15	8h7			
1 Nm															
2 Nm															
5 Nm			37	54		18.5	12h7	13.5	20	57	20	12h7	30		
10 Nm															
20 Nm			47	63		24	20h7	23	40	70	40	20h7	40	40	M3 depth 6
50 Nm									50		50				
100 Nm			56	63.5		28	25h7		55		55	25h7	46	38	
200 Nm			61	68		30	30h7	18.5	60	67	60	30h7	50	30	M4 depth 8
500 Nm			71	78		35	40h7		75		75	40h7	63		
1000 Nm			98	103		49	60h7	28	100	86	100	60h7	86	66	M5 depth 10
2000 Nm			111	119		57.5	70h7		110		110	70h7	100	69	
5000 Nm			137	141		68.5	90h7	33.5	145	97	145	90h7	124	72	M6 depth 12
10000 Nm			162	166		81	110h7	36.5	172	103	172	110h7	144	76	M8 depth 16

■ Supplied cable **Flexible cable**



1	: Red	PWR (+24 V)
2	: Black	PWR (0 V)
3	: Green	SIG OUT (±10 V)
4	: White	SIG GND
5	: Yellow	PULSE OUT +
6	: Brown	PULSE OUT -
7	: Orange	DIGITAL ZERO IN
8	: Purple	RS-485 TX +
9	: Gray	RS-485 TX -
10	: Pink	RS-485 RX +
11	: Light blue	RS-485 RX -
12	: Blue	COM
Shield		

2 PWR (0 V), 4 SIG GND & 6 PULSE OUT - are separate isolated ground.
2 PWR (0 V) & 12 COM are connected internally.

Torque monitor for UTMⅢ

■ TM320

■ TM380

■ TC80

Structure of product code

UTMⅢ-0.05Nm (R) (C) (K)

- Key groove option (5 to 10000 Nm)
- Centering location option (0.05 to 500 Nm)
- Rotary encoder option (0.05 to 500 Nm)
- Measurement range (0.05 to 10000 Nm)

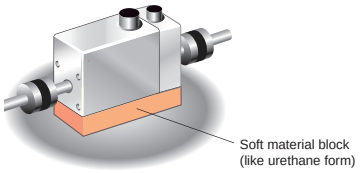
* For 0.05 to 500 Nm, a rotary encoder option and centering location option can be added.
  Model numbers are UTMⅢ- ○Nm(RC) respectively.
* You can add both rotary encoder and key groove options for 5 to 500 Nm capacity type.
  Model numbers are UTMⅢ- ○Nm(RK) respectively.
* You can add both centering location and key groove options for 20 to 500 Nm capacity type.
  Model numbers are UTMⅢ- ○Nm(CK) respectively.
* For 20 to 500 Nm, a rotary encoder option, centering location option and key groove option can be added.
  Model numbers are UTMⅢ- ○Nm(RCK) respectively.

(R) Rotary encoder option: 0.05 to 500 Nm

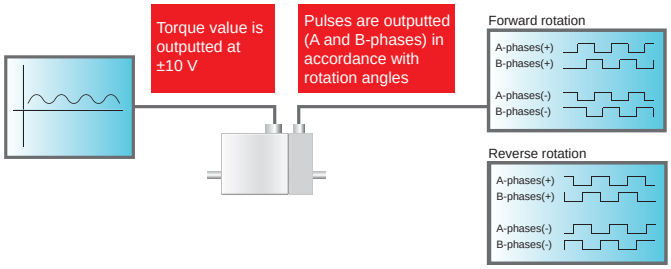
- Optical encoder
- Ideal for detecting torque versus angle

- Mounting instruction

Fix the main unit to prevent it from moving in rotational direction.

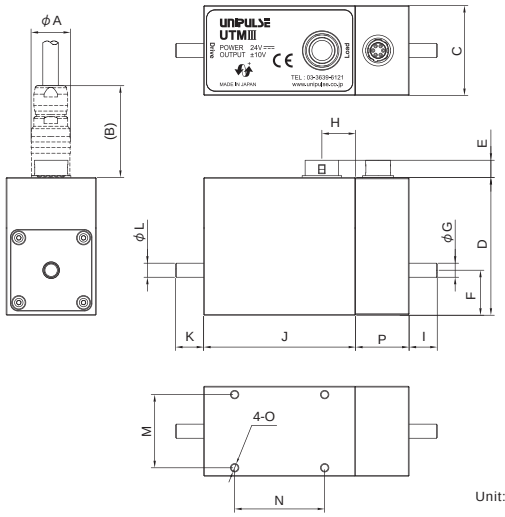


- Torque signal (analog ±10 V) and rotation angle signals (A and B phase line driver outputs) are outputted.



Measurement range	Pulses per rev.	Max. measurable rotation speed	Torsional spring constant (Nm/rad)	Maximum torsional angle (rad)	Inertia moment (kgm^2)	Approx. weight
0.05 Nm	3600	5000 rpm	5.55	9.01×10^{-3} (0.516°)	1.39×10^{-6}	190 g
0.1 Nm			11.08	9.02×10^{-3} (0.517°)	1.40×10^{-6}	
0.2 Nm			23.73	8.43×10^{-3} (0.483°)	1.41×10^{-6}	
0.5 Nm			88.32	5.66×10^{-3} (0.324°)	1.90×10^{-6}	210 g
1 Nm			169.41	5.90×10^{-3} (0.338°)	1.93×10^{-6}	
2 Nm			333.57	6.00×10^{-3} (0.344°)	1.83×10^{-6}	
5 Nm			831	6.02×10^{-3} (0.345°)	4.18×10^{-6}	320 g
10 Nm			1492	6.70×10^{-3} (0.384°)	4.28×10^{-6}	
20 Nm			4390	4.56×10^{-3} (0.261°)	2.85×10^{-5}	780 g
50 Nm			7578	6.60×10^{-3} (0.378°)	2.92×10^{-5}	
100 Nm		2500 rpm	15.9×10^{3}	6.28×10^{-3} (0.360°)	7.49×10^{-5}	1.2 kg
200 Nm			37.6×10^{3}	5.32×10^{-3} (0.305°)	1.55×10^{-5}	1.7 kg
500 Nm			106×10^{3}	4.71×10^{-3} (0.270°)	5.10×10^{-4}	2.9 kg

■ UTMⅢ-0.05Nm(R) to 500Nm(R)

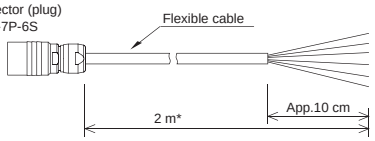


Unit: mm

Measurement range	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
0.05 Nm	14	31.5	32	49	6.1	16	5h7	12	10	54	10	5h7	26	32	M3 depth 5	19
0.1 Nm																
0.2 Nm																
0.5 Nm							8h7		15		15	8h7				
1 Nm																
2 Nm																
5 Nm			37	54		18.5	12h7	13.5	20	57	20	12h7	30			
10 Nm																
20 Nm			47	63		24	20h7	23	40	70	40	20h7	40	40	M3 depth 6	17
50 Nm									50		50					
100 Nm			56	63.5		28	25h7	18.5	55	67	55	25h7	46	38		
200 Nm			61	68		30	30h7		60		60	30h7	50	30	M4 depth 8	
500 Nm			71	78		35	40h7		75		75	40h7	63			

■ Supplied cable **Flexible cable**

Connector (plug)
HR10-7P-6S



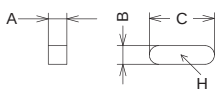
1 : Red PWR (+5 to +24 V)
2 : Black PWR GND
3 : Green Line driver output B-phase (+)
4 : White Line driver output B-phase (-)
5 : Yellow Line driver output A-phase (+)
6 : Brown Line driver output A-phase (-)
7 : Shield

* Cable length is switchable to 5 m
(Option: UTMⅢ-R5)

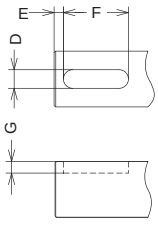
(K) Key groove option: 5 to 10000 Nm

■ UTMⅢ-5Nm(K) to 10000Nm(K)

・Key (Included in (K) option)



・Key groove



Measurement range	A	B	C	D	E	F	G	H
5 Nm	$4^{+0}_{-0.03}$	$4h9^{+0}_{-0.03}$	$14^{+0}_{-0.18}$	$4^{-0.012}_{-0.042}$	2	$14^{+0.3}_{+0.1}$	$2.5^{+0.1}_{-0}$	–
10 Nm								
20 Nm	$6^{+0}_{-0.03}$	$6h9^{+0}_{-0.03}$	$32^{+0}_{-0.25}$	$6^{-0.012}_{-0.042}$	3	$32^{+0.3}_{+0.1}$	$3.5^{+0.1}_{-0}$	M3
50 Nm			$38^{+0}_{-0.25}$			$38^{+0.3}_{+0.1}$		
100 Nm	$7^{+0}_{-0.036}$	$8h9^{+0}_{-0.036}$	$48^{+0}_{-0.25}$	$8^{-0.015}_{-0.051}$		$48^{+0.3}_{+0.1}$	$4^{+0.2}_{-0}$	
200 Nm			$53^{+0}_{-0.25}$			$53^{+0.3}_{+0.1}$		
500 Nm	$8^{+0}_{-0.09}$	$12h9^{+0}_{-0.043}$	$62^{+0}_{-0.3}$	$12^{-0.018}_{-0.061}$	4	$62^{+0.3}_{+0.1}$	$5^{+0.2}_{-0}$	M5
1000 Nm	$11^{+0}_{-0.11}$	$18h9^{+0}_{-0.043}$	$90^{+0}_{-0.35}$	$18^{-0.018}_{-0.061}$	5	$90^{+0.3}_{+0.1}$	$7^{+0.2}_{-0}$	M6
2000 Nm	$12^{+0}_{-0.11}$	$20h9^{+0}_{-0.052}$	$100^{+0}_{-0.35}$	$20^{-0.022}_{-0.074}$		$100^{+0.3}_{+0.1}$	$7.5^{+0.2}_{-0}$	M8
5000 Nm	$14^{+0}_{-0.11}$	$25h9^{+0}_{-0.052}$	$135^{+0}_{-0.4}$	$25^{-0.022}_{-0.074}$		$135^{+0.3}_{+0.1}$	$9^{+0.2}_{-0}$	
10000 Nm	$18^{+0}_{-0.11}$	$32h9^{+0}_{-0.062}$	$162^{+0}_{-0.4}$	$32^{-0.026}_{-0.088}$		$162^{+0.5}_{+0.1}$	$11^{+0.3}_{-0}$	M10

* During high-speed rotation, consider the imbalance caused by the key and adjust the rotation balance of the entire device.

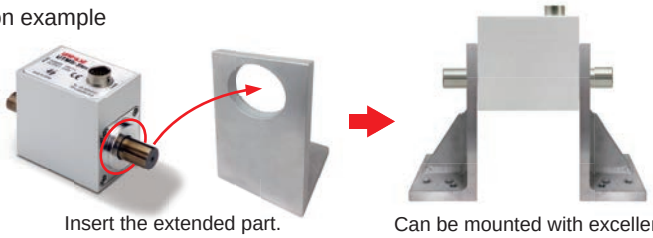
Unit: mm

Centering location type suitable for mounting

In a scene like this…

- Wants center point of axis as reference for installation
- Wants to stop vibration & fix main unit

Installation example



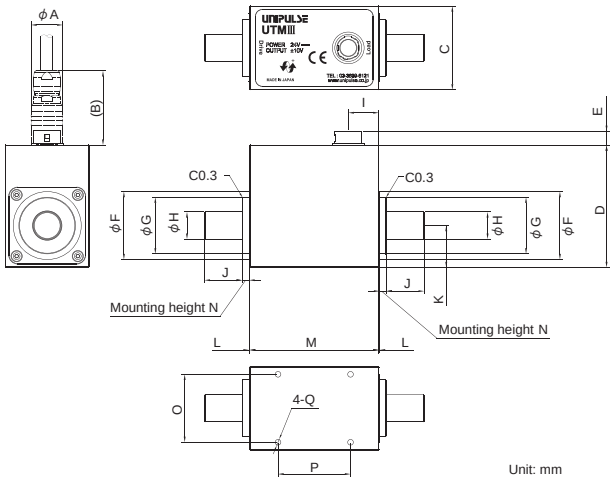
Insert the extended part.

Can be mounted with excellent centering effect.

* For this setup use double disc couplings on both sides.
* If main unit starts to rotate, install stopper while avoiding excessive force on the main unit.
* Jig is not included. Please prepare an installation jig that fits the convex part of UTMⅢ.

■ UTMⅢ-0.05Nm(C) to 500Nm(C)

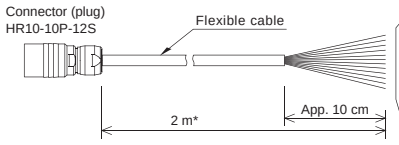
Measurement range	±0.05 Nm	±0.1 Nm	±0.2 Nm	±0.5 Nm	±1 Nm	±2 Nm	±5 Nm	±10 Nm	±20 Nm	±50 Nm	±100 Nm	±200 Nm	±500 Nm
Torsional spring constant (Nm/rad)	5.67	11.57	26.10	93.1	188	414	691	1851	5386	8428	17.3×10^3	41.7×10^3	117×10^3
Maximum torsional angle (rad)	8.81×10^{-3} (0.505°)	8.64×10^{-3} (0.495°)	7.66×10^{-3} (0.439°)	5.37×10^{-3} (0.308°)	5.32×10^{-3} (0.305°)	4.83×10^{-3} (0.277°)	7.24×10^{-3} (0.415°)	5.40×10^{-3} (0.310°)	3.71×10^{-3} (0.213°)	5.93×10^{-3} (0.340°)	5.78×10^{-3} (0.331°)	4.79×10^{-3} (0.275°)	4.28×10^{-3} (0.246°)
Inertia moment (kgm^2)	8.48×10^{-7}	8.58×10^{-7}	8.7×10^{-7}	1.46×10^{-6}	1.49×10^{-6}	1.39×10^{-6}	3.56×10^{-6}	3.66×10^{-6}	2.59×10^{-5}	2.66×10^{-5}	6.59×10^{-5}	1.40×10^{-4}	4.70×10^{-4}
Approx. weight	150 g			170 g			260 g		690 g		1.1 kg	1.5 kg	2.6 kg



Unit: mm

Measurement range	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
0.05 Nm	14	31.5	32	49	6.1	25	20h7	5h7	12	6.8	16	0.2	54	3	26	32	M3 depth 5
0.1 Nm																	
0.2 Nm																	
0.5 Nm								8h7		11.8							
1 Nm																	
2 Nm																	
5 Nm			37	54		30	25h7	12h7	13.5	16.7	18.5	0.3	57		30		
10 Nm																	
20 Nm			47	63		41	36h7	20h7	23	36.5	24		70		40	40	M3 depth 6
50 Nm										46.5							
100 Nm			56	63.5		48	40h7	25h7		51.5	28	0.5	67		46	38	
200 Nm			61	68		51	45h7	30h7	18.5	56.5	30			4	50	30	M4 depth 8
500 Nm			71	78		62	55h7	40h7		70.5	35				63		

■ Supplied cable (C), (RC) common **Flexible cable**



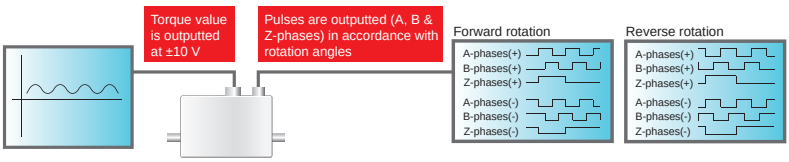
* Cable length is switchable to 5 m (Option: UTMⅢ-L5)

1	: Red	PWR (+24 V)
2	: Black	PWR (0 V)
3	: Green	SIG OUT (±10 V)
4	: White	SIG GND
5	: Yellow	PULSE OUT +
6	: Brown	PULSE OUT -
7	: Orange	DIGITAL ZERO IN
8	: Purple	RS-485 TX +
9	: Gray	RS-485 TX -
10	: Pink	RS-485 RX +
11	: Light blue	RS-485 RX -
12	: Blue	COM
Shield		

* 2:PWR GND, 4:SIG GND & 6:PULSE GND are separate isolated ground.
* 2:PWR GND & 12:COM are connected internally.

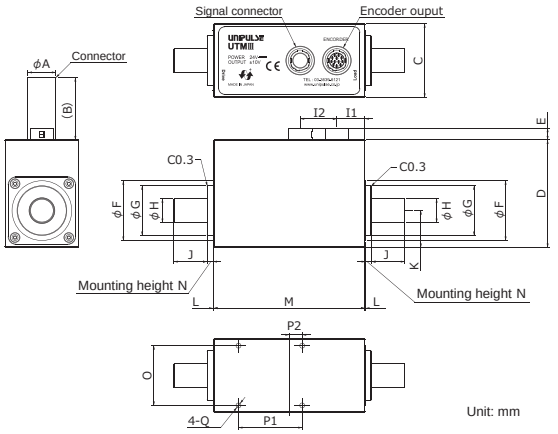
■ UTMⅢ-0.05Nm(RC) to 500Nm(RC)

- Torque signal (analog±10 V) and rotation angle signals (A, B & Z phase line driver outputs) are output.



- Number of divisions: 3600
- Max. measurable rotation speed:
  5000 rpm (0.05 to 50 Nm)
  2500 rpm (100, 200, 500 Nm)

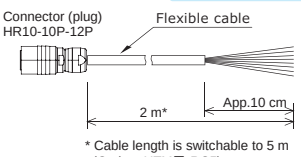
Measurement range	±0.05 Nm	±0.1 Nm	±0.2 Nm	±0.5 Nm	±1 Nm	±2 Nm	±5 Nm	±10 Nm	±20 Nm	±50 Nm	±100 Nm	±200 Nm	±500 Nm
Torsional spring constant (Nm/rad)	5.55	11.08	23.73	88.32	169.41	333.57	831	1492	4390	7578	15.9×10^3	37.6×10^3	106×10^3
Maximum torsional angle (rad)	9.01×10^{-3} (0.516°)	9.02×10^{-3} (0.517°)	8.43×10^{-3} (0.483°)	5.66×10^{-3} (0.324°)	5.90×10^{-3} (0.338°)	6.00×10^{-3} (0.344°)	6.02×10^{-3} (0.345°)	6.70×10^{-3} (0.384°)	4.56×10^{-3} (0.261°)	6.60×10^{-3} (0.378°)	6.28×10^{-3} (0.360°)	5.32×10^{-3} (0.305°)	4.71×10^{-3} (0.270°)
Inertia moment (kgm^2)	1.39×10^{-6}	1.40×10^{-6}	1.41×10^{-6}	1.92×10^{-6}	1.95×10^{-6}	1.85×10^{-6}	4.26×10^{-6}	4.36×10^{-6}	2.86×10^{-5}	2.93×10^{-5}	7.56×10^{-5}	1.56×10^{-4}	5.12×10^{-4}
Approx. weight	190 g			210 g			320 g		770 g		1.2 kg	1.6 kg	2.8 kg



Unit: mm

Measurement range	A	B	C	D	E	F	G	H	I1	I2	J	K	L	M	N	O	P1	P2	Q
0.05	14	31.3	32	49	5.9	25	20h7	5h7	10.1	20.9	6.8	16	0.2	73	3	26	32	6.5	M3 深 5
0.1																			
0.2																			
0.5								8h7			11.8								
1																			
2																			
5			37	54		30	25h7	12h7	14.1	18.4	16.7	18.5	0.3	76		30			
10																			
20			47	63		41	36h7	20h7	20.6	19.4	36.5	24		87		40	40	11.5	M3 深 6
50											46.5								
100			56	63.5		48	40h7	25h7	10.5	25	51.5	28	0.5	84		46	38	11	
200			61	68		51	45h7	30h7	10.4	24.1	56.5	30				50	30	6.5	M4 深 8
500			71	78		62	55h7	40h7	11.6	23.9	70.5	35			4	63			

■ Supplied cable (RC) **Flexible cable**



* Cable length is switchable to 5 m (Option: UTMⅢ-RC5)

1	: Red	PWR (+5 to +24 V)
2	: Black	PWR GND
3	: Green	Line driver output B-phase (+)
4	: White	Line driver output B-phase (-)
5	: Yellow	Line driver output A-phase (+)
6	: Brown	Line driver output A-phase (-)
7	: Orange	Line driver output Z-phase (+)
8	: Blue	Line driver output Z-phase (-)
9	: Shield	