UTMⅢ ROTATING TORQUE METER

UNIPULSE NEW! **Supported dual-range now!**

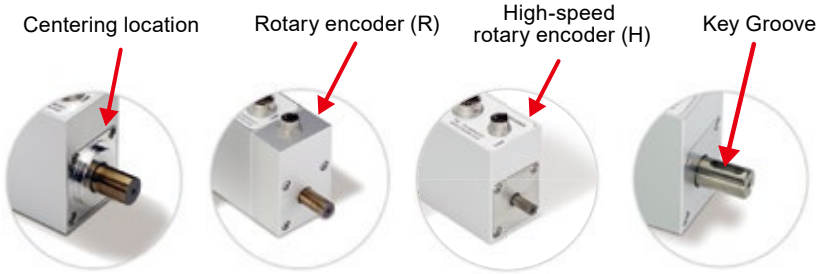
CE RoHS2

New series with 5 kHz high-speed response & noise-insensitive digital output!

- Compared to UTM Ⅱ, disturbances on accuracy by radial and thrust loads and during high-speed rotation were dramatically reduced
- Maximum rotational speed 40000 rpm *1
- Available in 17 different capacities ranging from 0.05 to 10000 N m
- Analog bandwidth 5 kHz with high-speed sampling rate of 20 kHz
- Safe overload of 500%
- ±10 V of analog output Full Scale
- Digital output via RS-485
- No need to exchange torque meter! Range-switching method capable of measuring two capacities (option)
  ・2 N m ⟷ 0.1 N m ・10 N m ⟷ 0.5 N m
  ・5 N m ⟷ 0.25 N m
- Digital zero function via external signal
- Equipped with pulse output for rotation detection (4 pulses per 1 rotation)
  60 pulses/revolution is available *1

*1: 10 N m or below available by custom order.

Abundant options available



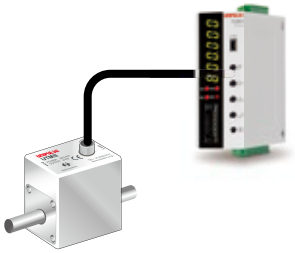
(C) Easy aligning Ideal when applying for automatic fitting

(R) (H) Ideal for detecting torque fluctuation along with angle change

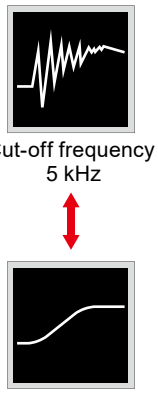
(K) For rotational-slip prevention

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

Frequency bandwidth of 5 kHz, variable filter

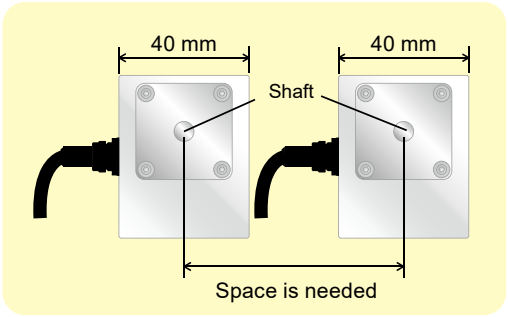


Response time improved
Cut-off frequency can be changed using external input



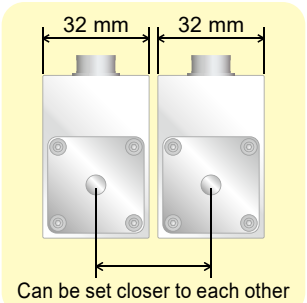
More compact for side-by-side measurement

UTMⅡ



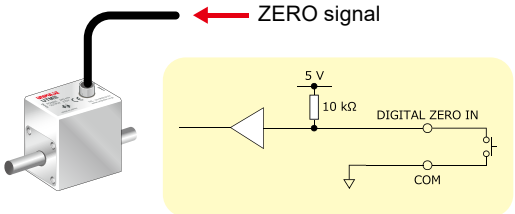
* Dimensions above are for 0.05 to 2 N m capacity type.

UTMⅢ



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

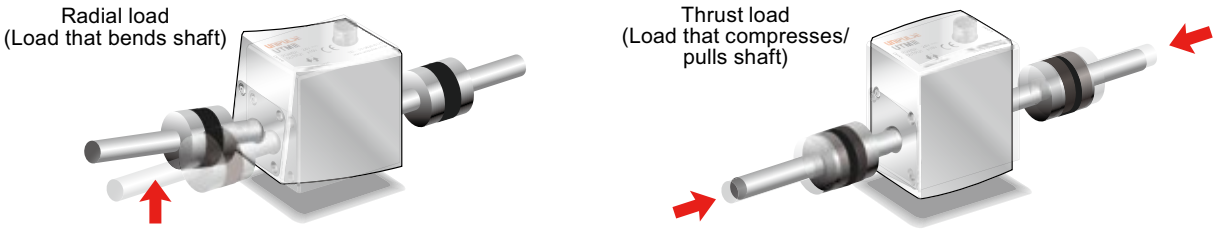
Added zero correction function with external signal



Shifted output due to setup conditions can be set to zero with external signal.

Increased resistance to radial & thrust load

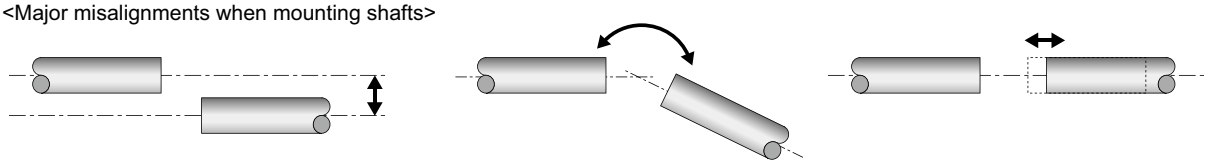
Influences that radial and thrust loads exert on effective accuracy were dramatically reduced.



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

For torque measurement, when interlocking shafts, misalignments on shaft center as illustrated below occur 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>

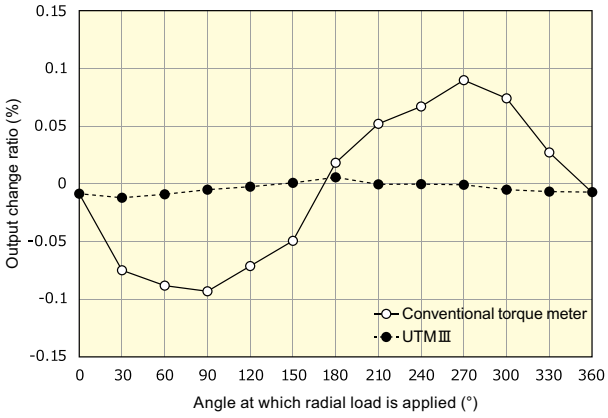


Misalignments of eccentricity　　Misalignments of deflection angle　　Endplay

■ Experimental data

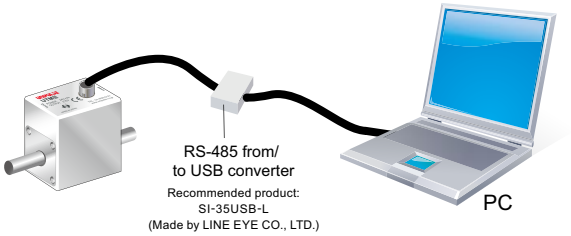
The right figure shows the change in output when one shaft end of a torque meter with a rated torque of 2 N m is fixed and a 7 N radial load is applied to the other shaft end via a bearing.
Output changes depending on rotation angle.
While output value changes 0.1% at maximum with conventional torque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

The table on P.7 standardizes the allowable shaft end load.
UTMⅢ releases your concern about accuracy due to misalignment.



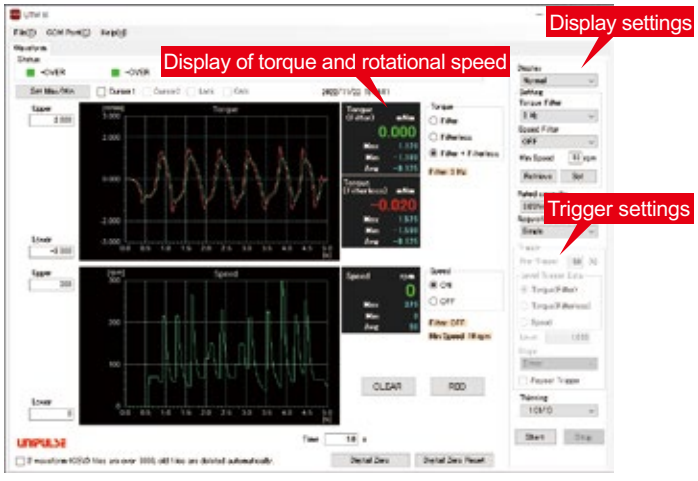
Digital output via RS-485

Enable to retrieve the digital signal to PC.



■ Application software for RS-485

Two type torque waveforms, before and after the filter are displayed, 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.

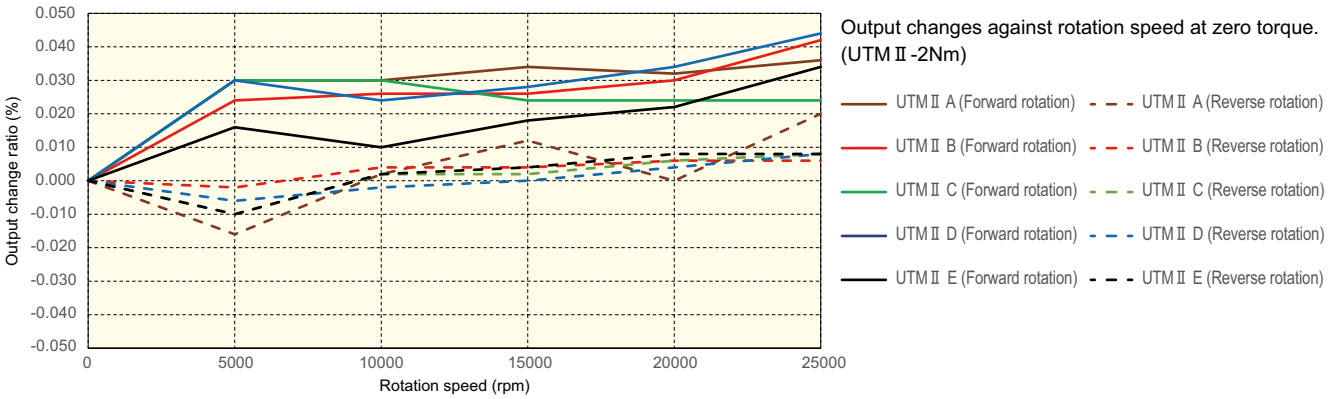


Application software can be downloaded from our official website.
The dedicated software can be run multiply, and it is possible to connect multiple UTMⅢs with one PC.

Output change depending on rotation speed

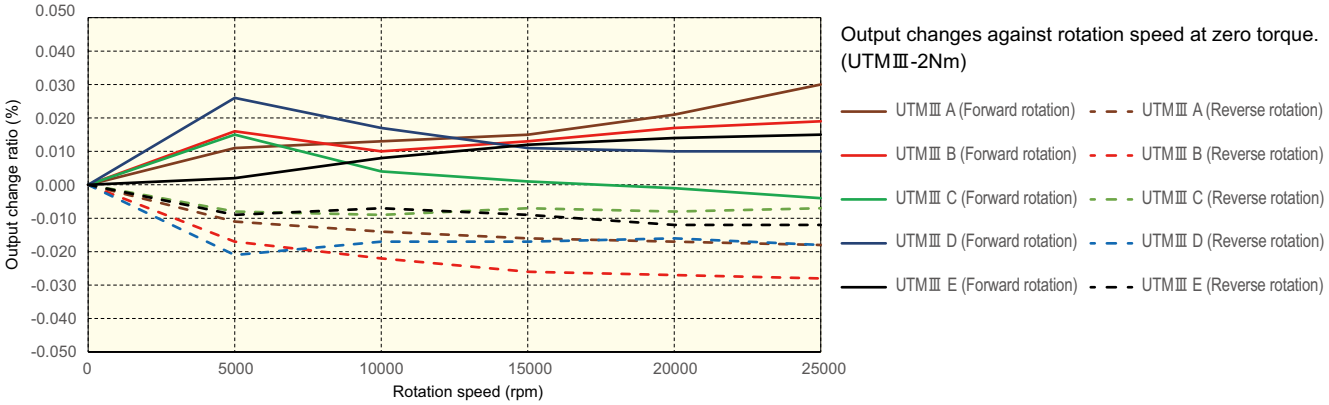
At high rotation speeds, the output of a rotating torque meter changes due to the rolling friction of the load-side bearing and the centrifugal force.

The figures below show the output changes against the rotation speed for the five sets of UTMⅡ-2Nm (Upper) and UTMⅢ-2Nm (Lower).



Output changes against rotation speed at zero torque. (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)
- UTMⅡ E (Forward rotation) / UTMⅡ E (Reverse rotation)



Output changes against rotation speed at zero torque. (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)
- UTMⅢ E (Forward rotation) / UTMⅢ E (Reverse rotation)

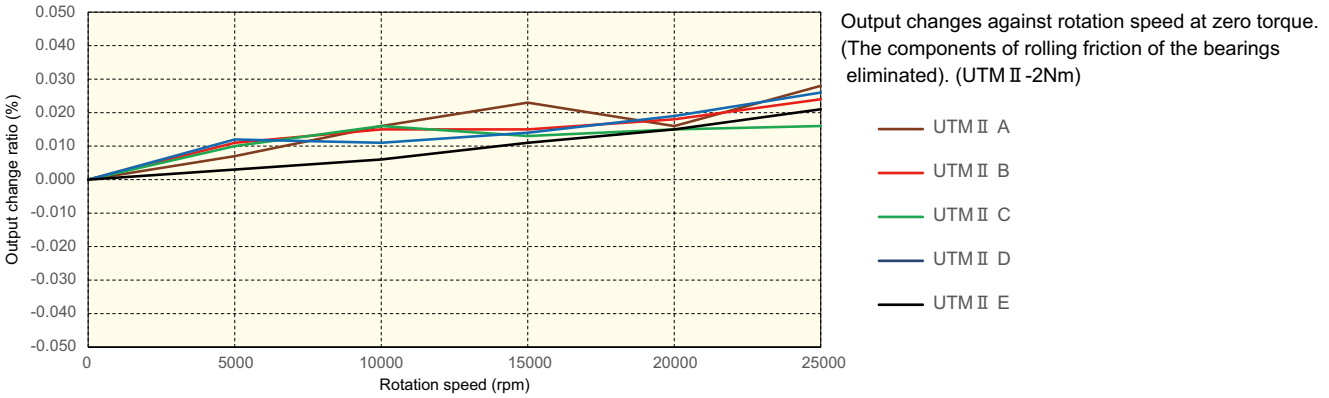
The sign of the output changes due to the rolling friction changes if the rotational direction changes, but the sign of the output due to the centrifugal force does not change.

The figures below (Upper for UTMⅡ-2Nm and Lower for UTMⅢ-2Nm) are plots of the values obtained by subtracting the reverse rotation values from the forward rotation values.

For UTMⅡ, the output changes upward according to the rotation speed, whereas for UTMⅢ, the output changes are very small.

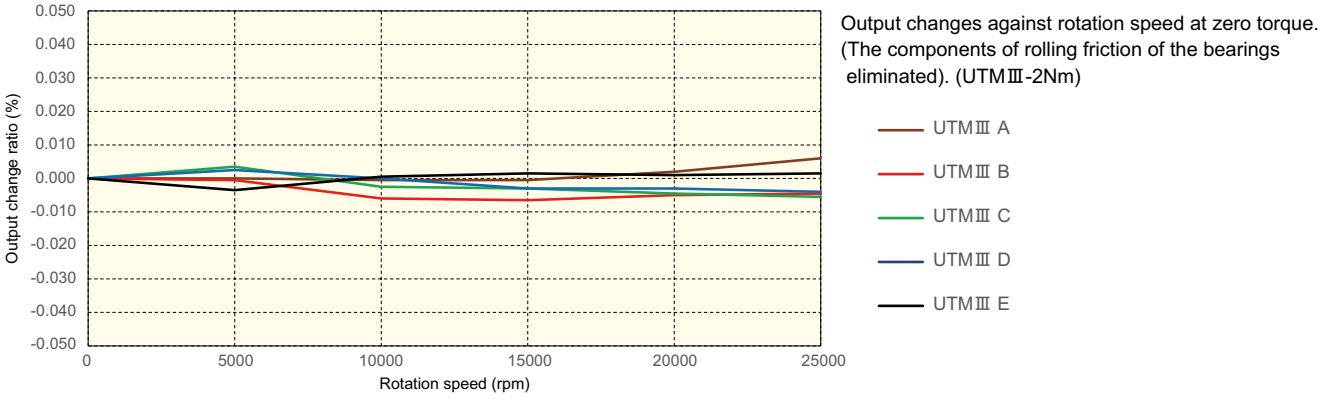
In bearingless UTMⅢ, in principle, any rolling friction does not occur.

In UTMⅢ, the output changes due to the centrifugal force are tiny, so it can accurately measure rotating torque at high rotation speed.



Output changes against rotation speed at zero torque. (The components of rolling friction of the bearings eliminated). (UTMⅡ-2Nm)

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

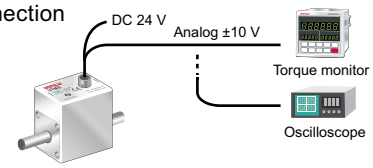


Output changes against rotation speed at zero torque. (The components of rolling friction of the bearings eliminated). (UTMⅢ-2Nm)

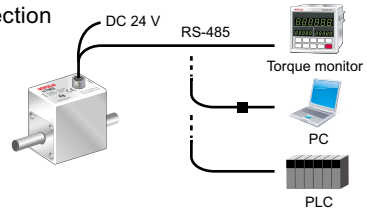
- UTMⅢ A
- UTMⅢ B
- UTMⅢ C
- UTMⅢ D
- UTMⅢ E

Connection example

Analog connection

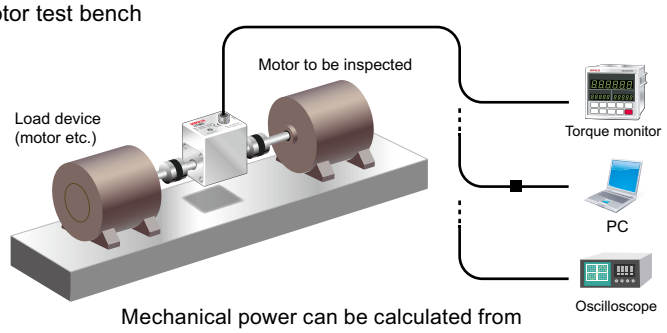


Digital connection



Sample application

Motor test bench



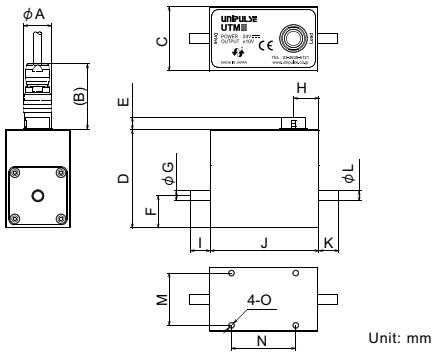
Mechanical power can be calculated from torque and rotation speed of UTMⅢ

Specifications

Measurement range	±0.05 N m	±0.1 N m	±0.2 N m	±0.5 N m	±1 N m	±2 N m*1	±5 N m*1	±10 N m*1	±20 N m	±50 N m	±100 N m	±200 N m	±500 N m	±1000 N m	±2000 N m	±5000 N m	±10000 N m
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 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 temperature	-10 to +50℃																
Temperature effect on zero	0.01% FS/℃ or below																
Temperature effect on span	0.01% FS/℃ or below																
Maximum rotation speed	25000 rpm *2								20000 rpm		15000 rpm	12000 rpm	10000 rpm	7000 rpm	6000 rpm	5000 rpm	4000 rpm
Torsional spring constant (N m/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 (kg m²)	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	2011/65/EU+(EU)2015/863, 2014/30/EU(EN61326-1, EN61326-2-3)																

*1 The measurement range can be changed to the dual-range specification of 20% FS. Please consult with us for capacities other than 2, 5 and 10 N m.
*2 0.05 to 10 N m 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.

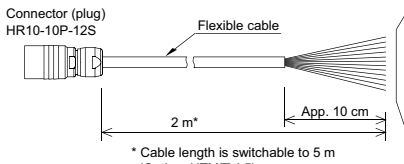
External dimension



Unit: mm

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

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

Full of measuring instruments dedicated for UTMⅢ

TM320

High-speed sampling Torque, rotation speed, and power are displayed simultaneously.

More details: P.27

TM380

High-speed sampling Torque, rotation speed, and angle are displayed simultaneously.

More details: P.28

TC80

High-speed sampling Torque, rotation speed, and torque-angle curve can be monitored.

More details: P.29

Structure of product code

UTMⅢ-0.05Nm (R) (H) (C) (K)

- (K) Key groove option (5 to 10000 N m)
- (C) Centering location option (0.05 to 500 N m)
- (H) High-speed rotary encoder option (0.05 to 500 N m)
- (R) Rotary encoder option (0.05 to 500 N m)
- 0.05Nm Measurement range (0.05 to 10000 N m)

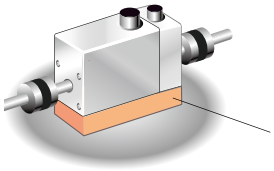
Measurable rotation speed is significantly improved!
High-speed rotary encoder option is now available
The lineup is planned to expand to 10000 N m

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

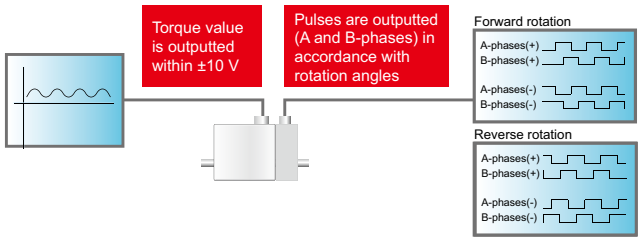
(R) (H) Rotary encoder option: 0.05 to 500 N m

CE RoHS2

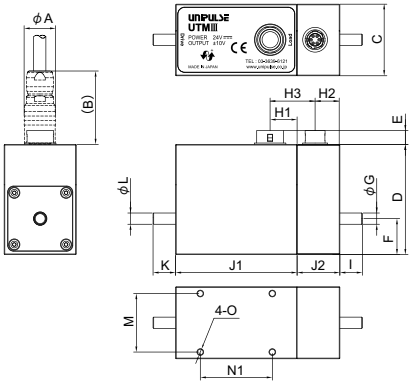
- Optical encoder
- Ideal for detecting torque versus angle
- Mounting instruction
  Fix the main unit to prevent it from moving in rotational direction.



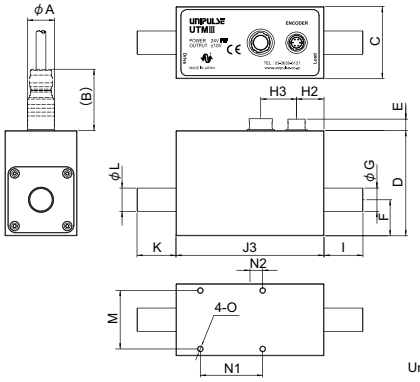
- Torque signal (analog ±10 V) and rotation angle signals (A and B phase line driver outputs) are outputted.



■ UTMⅢ-0.05Nm(R) to 500Nm(R)



■ UTMⅢ-0.05Nm(H) to 500Nm(H)

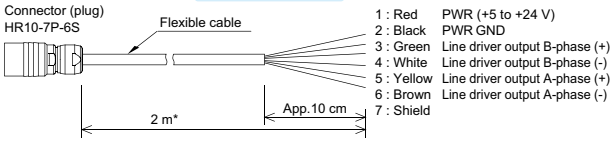


Unit: mm

Measurement range	Pulses per rev.		Maximum measurable rotation speed (rpm)		Torsional spring constant (N m/rad)	Maximum torsional angle (rad)	Inertia moment (kg m²)		Approx. weight (g)	
	(R)	(H)	(R)	(H)	(R)(H)common	(R)(H)common	(R)	(H)	(R)	(H)
0.05 N m	3600	360	5000	25000	5.55	9.01×10^{-3}(0.516°)	1.39×10^{-6}	1.26×10^{-6}	190	185
0.1 N m					11.08	9.02×10^{-3}(0.517°)	1.40×10^{-6}	1.27×10^{-6}		
0.2 N m					23.73	8.43×10^{-3}(0.483°)	1.41×10^{-6}	1.28×10^{-6}		
0.5 N m					88.32	5.66×10^{-3}(0.324°)	1.90×10^{-6}	1.81×10^{-6}	210	207
1 N m					169.41	5.90×10^{-3}(0.338°)	1.93×10^{-6}	1.84×10^{-6}		
2 N m					333.57	6.00×10^{-3}(0.344°)	1.83×10^{-6}	1.74×10^{-6}		
5 N m					831	6.02×10^{-3}(0.345°)	4.18×10^{-6}	4.16×10^{-6}	320	306
10 N m					1492	6.70×10^{-3}(0.384°)	4.28×10^{-6}	4.26×10^{-6}		
20 N m		720		20000	4390	4.56×10^{-3}(0.261°)	2.85×10^{-5}	3.03×10^{-5}	780	765
50 N m					7578	6.60×10^{-3}(0.378°)	2.92×10^{-5}	3.10×10^{-5}		
100 N m			2500	15000	15.9×10^{3}	6.28×10^{-3}(0.36°)	7.49×10^{-5}	1.11×10^{-4}	1.2 k	1.19 k
200 N m				12000	37.6×10^{3}	5.32×10^{-3}(0.305°)	1.55×10^{-4}	1.54×10^{-4}	1.7 k	1.59 k
500 N m		1080		10000	106×10^{3}	4.71×10^{-3}(0.27°)	5.10×10^{-4}	5.16×10^{-4}	2.9 k	2.78 k

Measurement range	A	B	C	D	E	F	G	H1	H2 (R)	H2 (H)	H3 (R)	H3 (H)	I	J1	J2	J3	K	L	M	N1	N2	O
0.05 N m	14	31.5	32	49	6.1	16	5h7	12	11	10	20	20.9	10	54	19	73	10	5h7	26	32	6.5	M3 Depth5
0.1 N m																						
0.2 N m																						
0.5 N m																						
1 N m							8h7						15				15	8h7				
2 N m																						
5 N m			37	54		18.5	12h7	13.5	11	14	21.5	18.4	20	57		76	20	12h7	30			
10 N m																						
20 N m			47	63		24	20h7	23	10	21	30	19.4	40	70		87	40	20h7	40	40	11.5	M3 Depth6
50 N m													50									
100 N m			56	63.5		28	25h7			11		25	55		17		55	25h7	46	38	11	
200 N m			61	68		30	30h7	18.5	8	10	27.5	24.1	60	67		84	60	30h7	50	30	6.5	M4 Depth8
500 N m			71	78		35	40h7			12		23.9	75				75	40h7	63			

■ Supplied cable **Flexible cable**



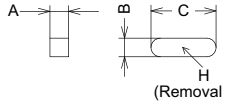
* Cable length is switchable to 5 m (Option: UTMⅢ-R5)

(K) Key groove option: 5 to 10000 N m

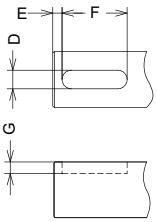
■ UTMⅢ-5Nm(K) to 10000Nm(K)

CE RoHS2

・Key (Included in (K) option)



・Key groove



Measurement range	A	B	C	D	E	F	G	H
5 N m	$4^{+0}_{-0.03}$	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 N m								
20 N m	$6^{+0}_{-0.03}$	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 N m			$38^{+0}_{-0.25}$			$38^{+0.3}_{+0.1}$		
100 N m	$7^{+0}_{-0.036}$	8h9 $^{+0}_{-0.036}$	$48^{+0}_{-0.25}$	$8^{-0.015}_{-0.051}$		$48^{+0.3}_{+0.1}$	$4^{+0.2}_{-0}$	
200 N m			$53^{+0}_{-0.25}$			$53^{+0.3}_{+0.1}$		
500 N m	$8^{+0}_{-0.09}$	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 N m	$11^{+0}_{-0.11}$	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 N m	$12^{+0}_{-0.11}$	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 N m	$14^{+0}_{-0.11}$	25h9 $^{+0}_{-0.052}$	$135^{+0}_{-0.4}$	$25^{-0.022}_{-0.074}$		$135^{+0.3}_{+0.1}$	$9^{+0.2}_{-0}$	
10000 N m	$18^{+0}_{-0.11}$	32h9 $^{+0}_{-0.062}$	$162^{+0}_{-0.4}$	$32^{-0.026}_{-0.088}$		$162^{+0.5}_{+0.1}$	$11^{+0.3}_{-0}$	M10

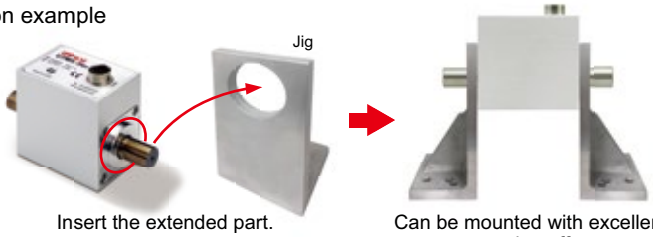
* During high-speed rotation, consider the imbalance caused by the key and adjust the rotation balance of the entire device.

Unit: mm

Centering location type suitable for mounting a main unit

In a scene like this…
- Wants center point of axis as reference for installation
- Wants to stop vibration & fix main unit

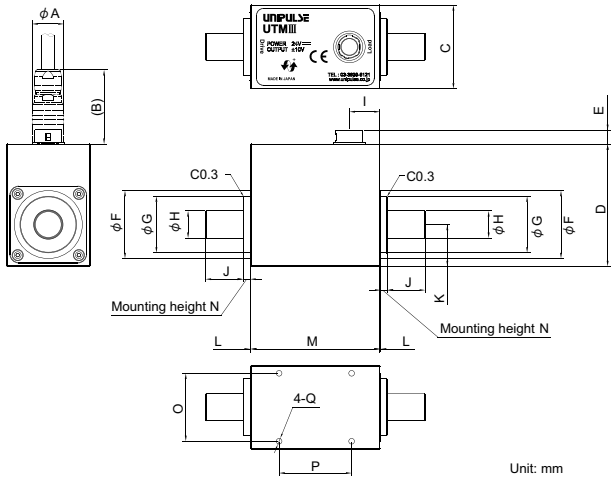
Installation example



* For this setup use double disc couplings on both sides.
* If the main unit rotates, please install a stopper to avoid 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)

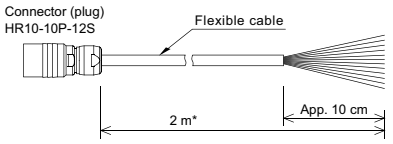
Measurement range	±0.05 N m	±0.1 N m	±0.2 N m	±0.5 N m	±1 N m	±2 N m	±5 N m	±10 N m	±20 N m	±50 N m	±100 N m	±200 N m	±500 N m
Torsional spring constant (N m/rad)	5.67	11.57	26.10	93.1	188	414	691	1851	5386	8428	17.3×10^3	41.7×10^3	117×10^3
Maximum torsional angle (rad)	8.81×10^{-3} (0.505°)	8.64×10^{-3} (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 (kg m²)	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 N m	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 N m																	
0.2 N m																	
0.5 N m								8h7		11.8							
1 N m																	
2 N m																	
5 N m			37	54		30	25h7	12h7	13.5	16.7	18.5	0.3	57		30		
10 N m																	
20 N m			47	63		41	36h7	20h7	23	36.5	24		70		40	40	M3 Depth 6
50 N m										46.5							
100 N m			56	63.5		48	40h7	25h7		51.5	28	0.5			46	38	
200 N m			61	68		51	45h7	30h7	18.5	56.5	30		67		50	30	M4 Depth 8
500 N m			71	78		62	55h7	40h7		70.5	35			4	63		

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



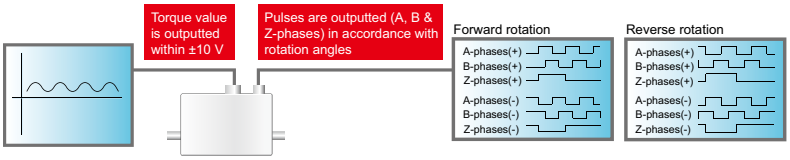
* Cable length is switchable to 5 m (Option: UTMⅢ-L5)

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.

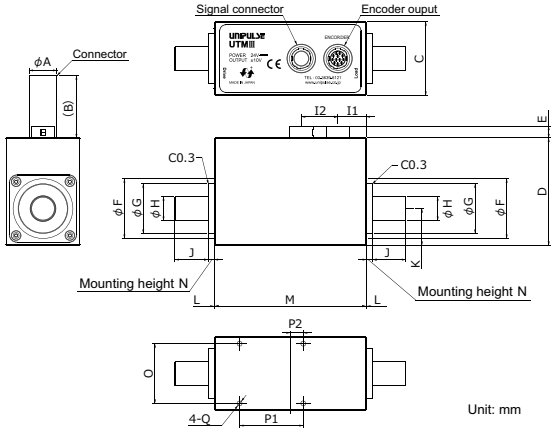
■ UTMⅢ-0.05Nm(RC) to 500Nm(RC)

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



- Angular resolution: 3600 per rotation
- Maximum measurable rotation speed:
  5000 rpm (0.05 to 50 N m)
  2500 rpm (100, 200, 500 N m)

Measurement range	±0.05 N m	±0.1 N m	±0.2 N m	±0.5 N m	±1 N m	±2 N m	±5 N m	±10 N m	±20 N m	±50 N m	±100 N m	±200 N m	±500 N m
Torsional spring constant (N m/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 (kg m²)	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

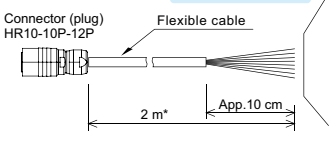


Unit: mm

* For key and key groove of RCK option, see P.8 for details.

Measurement range	A	B	C	D	E	F	G	H	I1	I2	J	K	L	M	N	O	P1	P2	Q
0.05 N m	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 Depth 5
0.1 N m																			
0.2 N m																			
0.5 N m								8h7			11.8								
1 N m																			
2 N m																			
5 N m			37	54		30	25h7	12h7	14.1	18.4	16.7	18.5	0.3	76		30			
10 N m																			
20 N m			47	63		41	36h7	20h7	20.6	19.4	36.5	24		87		40	40	11.5	M3 Depth 6
50 N m											46.5								
100 N m			56	63.5		48	40h7	25h7	10.5	25	51.5	28	0.5			46	38	11	
200 N m			61	68		51	45h7	30h7	10.4	24.1	56.5	30		84		50	30	6.5	M4 Depth 8
500 N m			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	