

# UTM II ROTATING TORQUE METER



## Compact design suitable for installation in equipment — Contactless torque meter for automation of torque control

Rotating torque meter, UTM II, designed with Unipulse's improved unique torque sensing technology!  
Suitable for installing in small confined space of machines which were not possible in the past.

- Available in 17 different capacity ranging from 0.05Nm to 10000Nm.
- Cut-off frequency of 1kHz with high-speed sampling at 6kHz.
- Safe overload of 500%
- Power supply DC24V
- No external amplification required:  $\pm 5V$  analog output voltage
- A rotational pulse generating circuit (4 pulses/revolution) is built in as standard.
- Improved noise immunity with insulated powering and signaling system.

### Compact and easy to install

The six models (0.05, 0.1, 0.2, 0.5, 1, 2Nm) are particularly compact and light: 54Wx50Hx40Dmm in size, 200g or less in weight.

### Maintenance-free

No slip-ring.  
The lifetime of UTM II is mainly determined by the lifetime of bearings.

### Max. rotational speed 25000rpm

0.05 to 10Nm	25000rpm
20, 50Nm	20000rpm
100Nm	15000rpm
200Nm	12000rpm
500Nm	10000rpm
1000Nm	7000rpm
2000Nm	6000rpm
5000Nm	5000rpm
10000Nm	4000rpm

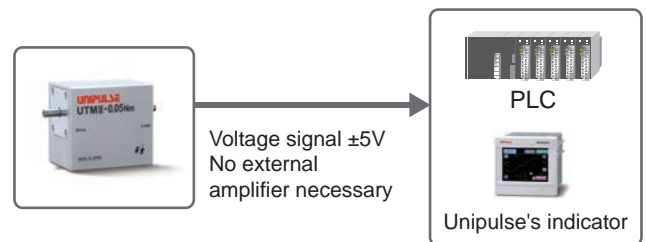
### High accuracy and stability

1/10000 resolution with outstanding zero stability.  
UTM II accurately measures tiny torque variations.

### Small starting torque

The starting torque of the bearing in the UTM II-0.05Nm is only 0.00001Nm (0.03 %FS).  
Actually, the effect of rotating friction can be negligible.

### Smart system configuration with no external circuits needed



### Indicators for UTM II

Easy connection to UTM II just by using a snap-on cable.

- TM301:basic type  
Torque, rotation speed, and power are displayed simultaneously.



- TM400:portable type  
Torque vs. rotation speed / torque-angle waveform can be monitored.



- TM700:graphic monitor with high sampling speed  
Torque, rotation speed and power are measured at 20kHz sampling rate.



- TM500:angle monitor  
Torque vs. Angle curve" is monitored. (Designed for UTM II encoder option)



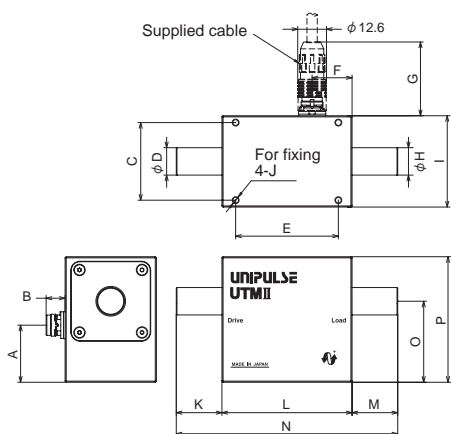
- TM201:for R&D and laboratory use  
A USB interface converter for UTM II. Torque, rotation speed and power are monitored on PC.



## Specifications

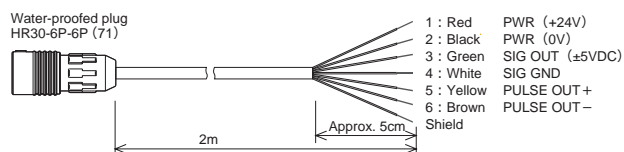
Measurement range	±0.05Nm ±0.1Nm ±0.2Nm ±0.5Nm ±1Nm ±2Nm ±5Nm ±10Nm ±20Nm ±50Nm ±100Nm ±200Nm ±500Nm ±1000Nm ±2000Nm ±5000Nm ±10000Nm																									
Power supply	DC24V±15%																									
Consumption current	100mA or less								150mA or less				160mA or less													
Output range	±5V Load resistance must be more than 2k																									
Bandwidth	1kHz																									
Rotation signal	4 pulses per 1 rotation Open collector Max. ratings 30V DC, 10mA																									
Safe overload	500%FS																									
Non-linearity	0.03%FS																									
Hysteresis	0.03%FS																									
Repeatability	0.03%FS																									
Operation temp. range	-10 to +50°C																									
Temp. effect on zero	0.01%FS/°C																									
Temp. effect on span	0.01%FS/°C																									
Max. rotation speed	25000rpm				20000rpm				15000rpm		12000rpm		10000rpm		7000rpm		6000rpm		5000rpm		4000rpm					
Torsional spring constant Nm/rad	5.67	11.57	26.10	93.1	188	414	691	1851	5386	8428	17.3×10 <sup>3</sup>	41.7×10 <sup>3</sup>	117×10 <sup>3</sup>	377×10 <sup>3</sup>	717×10 <sup>3</sup>	1649×10 <sup>3</sup>	3255×10 <sup>3</sup>									
Maximum torsional angle rad	8.81 ×10 <sup>-3</sup> (0.505°)	8.64 ×10 <sup>-3</sup> (0.495°)	7.66 ×10 <sup>-3</sup> (0.439°)	5.37 ×10 <sup>-3</sup> (0.308°)	5.32 ×10 <sup>-3</sup> (0.305°)	4.83 ×10 <sup>-3</sup> (0.277°)	7.24 ×10 <sup>-3</sup> (0.415°)	5.40 ×10 <sup>-3</sup> (0.310°)	3.71 ×10 <sup>-3</sup> (0.213°)	5.93 ×10 <sup>-3</sup> (0.340°)	5.78 ×10 <sup>-3</sup> (0.331°)	4.79 ×10 <sup>-3</sup> (0.275°)	4.28 ×10 <sup>-3</sup> (0.246°)	2.65 ×10 <sup>-3</sup> (0.152°)	2.79 ×10 <sup>-3</sup> (0.160°)	3.03 ×10 <sup>-3</sup> (0.174°)	3.07 ×10 <sup>-3</sup> (0.176°)									
Inertia moment kgm <sup>2</sup>	8.77 ×10 <sup>-7</sup>	8.87 ×10 <sup>-7</sup>	8.99 ×10 <sup>-7</sup>	1.49 ×10 <sup>-6</sup>	1.52 ×10 <sup>-6</sup>	1.42 ×10 <sup>-6</sup>	3.56 ×10 <sup>-6</sup>	3.66 ×10 <sup>-6</sup>	2.60 ×10 <sup>-5</sup>	2.67 ×10 <sup>-5</sup>	6.60 ×10 <sup>-5</sup>	1.40 ×10 <sup>-4</sup>	4.70 ×10 <sup>-4</sup>	2.90 ×10 <sup>-3</sup>	5.89 ×10 <sup>-3</sup>	2.01 ×10 <sup>-2</sup>	5.16 ×10 <sup>-2</sup>									
Dimension (case size) WxHxD mm	54x50x40						57x55x40				70x68x51		67x74x57		67x79x72		86x103x98		86x119x111		97x141x137		103x166x162			
Total length mm	74			84			97			150		170		177		217		286		306		387		447		
Shaft diameter mm	φ5			φ8			φ12			φ20			φ25		φ30		φ40		φ60		φ70		φ90		φ110	
Approx. weight	160g			180g			270g			700g			1.1kg		1.5kg		2.6kg		7.3kg		10.5kg		21.4kg		36kg	
Supplied cable	6 conductor shield cable 2m End treatment 7 leads																									
Optionally available cable	CATM51 : 6 conductor shield cable 5m End treatment 7 leads CATM12 : 6 conductor shield cable 10m End treatment 7 leads																									
Option	Rotary encoder	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Key groove								○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Key groove & Rotary encoder								○	○	○	○														
	Square drive													○												
	Square drive & Rotary encoder									○	○	○	○													
CE marking certification	EMC directives EN61326-1, EMC directives EN61326-2-3																									

## External dimension



Measurement range	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
0.05	25	8.3	32	5h7	45	18	32.3	5h7	40	M3 Depth 6	10	54	10	74	33	50	
0.1																	
0.2																	
0.5																	
1	31.5	6.8	48	25h7	54	20.5	30.8	20h7	51		M4 Depth 8	15	70	50	170	40	150
2																	
5																	
10																	
20																	
50																	
100	25	5.3	86	60h7	66	28.5	29.3	60h7	98	M5 Depth 10	60	67	60	187	48	79	
200																	
500																	
1000																	
2000	4.8	124	90h7	72	72	28.8	110h7	137	111	M6 Depth 12	75	75	217	43	103	103	
5000																	
10000																	
										M8 Depth 16	145	97	145	387	72.5	141	

### Supplied cable

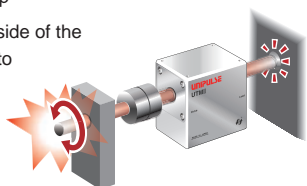


Unit:mm

## Cautions for use

### Possibility of overload during setup

When installing the sensor with one side of the shaft fixed, overload may occur due to unintended torque. Please pay extra attention to low capacity model.



### Protection against water and condensation

Do not let water enter the shafts. Do not use the sensor in an environment where the main unit gets condensed.



### Alter the shape of shafts

Do not alter the shape of shafts under any circumstances (Will affect accuracy). Shafts of UTM III/UTM II have sensing function.

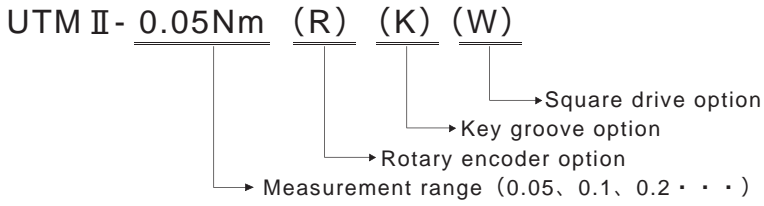


### Overload due to resonance vibration

If sensor is used with vibrating devices, please be advised that torque may overload due to resonance.



Structure of product code



\* You can add both rotary encoder and key groove options to 5Nm, 10Nm, 20Nm and 50Nm capacity type. Model numbers are UTM II - ○Nm(RK) respectively.

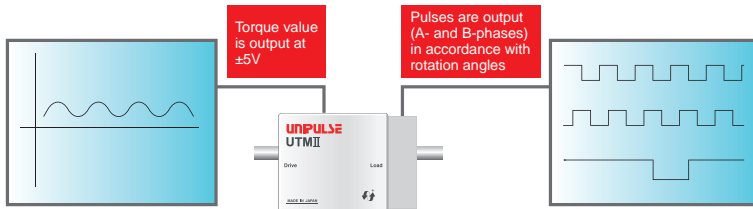
\* You can add both rotary encoder and square drive options to 10Nm, 20Nm, 50Nm, 100Nm and 500Nm capacity type. Model numbers are UTM II - ○Nm(WR) respectively.

(R) Rotary encoder option : 0.05 to 50Nm



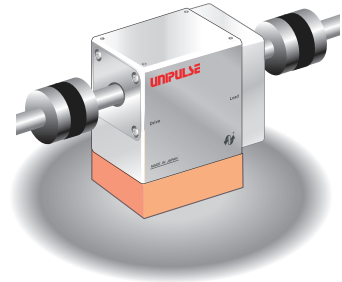
- Optical encoder  
0.05 to 10Nm : 2000C/T  
20Nm, 50Nm : 1440C/T
- Suitable for measurement of torque against angular variation
- \* Maximum rotation speed  
0.05 to 10Nm : 4500rpm  
20Nm, 50Nm : 2000rpm

- Torque signal (analog ±5V) and rotation angle signals (A, B and Z photo coupler outputs) are outputted.

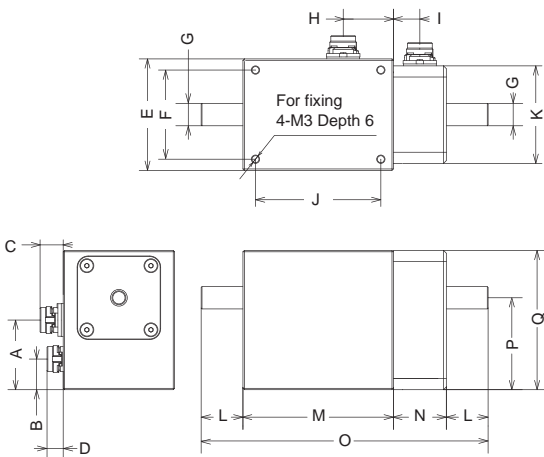


- Installation

Fix the main unit loosely to prevent angular error induced by rotation of the main unit.



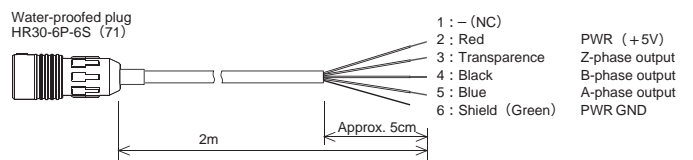
■ UTM II-0.05Nm (R) to 50Nm (R)



Measurement range	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
0.05																	
0.1				6.8			φ 5h7					10				93	
0.2						32		18			35		54			33	50
0.5	25		8.3		40					9.5	45		15		19		103
1				5.8			φ 8h7										
2																	
5																	
10		13.5		6.8		34	φ 12h7	19.5				37	20	57		116	35.5
20																	
50	31.5	13	6.8	8.5	51	43	φ 20h7	20.5	7	58	51		40	70	17	167	42.5
												50				187	68

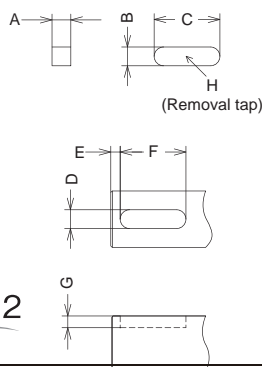
Unit mm

■ Rotary encoder attached cable



(K) Key groove option : 5 to 10000Nm

■ UTM II-5Nm (K) to 10000Nm (K)



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



**Contactless torque detection enables stable measurement without missing data.**

It is ideal to monitor torque of nut runners (fastening tools).  
With the high accuracy and high-speed response of UTM II, torque fluctuation can be monitored while tightening nuts.

\* Note: Please do not use it with impact wrenches.

Drive(Nut runner)

Load(Socket)



**Specifications**

■ UTM II (W)

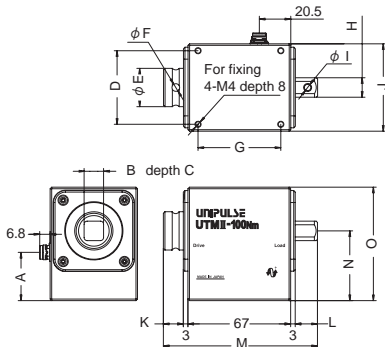
Model	UTM II-100Nm(W)	UTM II-500Nm(W)
Measurement range	±100Nm	±500Nm
Power supply	DC24V ±15%	
Power consumption	150mA or less	
Output range	±5V Load resistance must be more than 2k	
Bandwidth	1kHz	
Rotation signal	4 pulses per 1 rotation Open collector Max. ratings 30V, 10mA	
Safe overload	500%FS	
Non-linearity	0.03%FS	
Hysteresis	0.03%FS	
Repeatability	0.03%FS	
Operation temp. range	-10 to +50°C	
Temp. effect on ZERO	0.01%FS/°C	
Temp. effect on span	0.01%FS/°C	
Max. rotation speed	15000rpm	10000rpm
Torsional spring constant	38.5×10 <sup>3</sup> Nm/rad	265×10 <sup>3</sup> Nm/rad
Maximum torsional angle	2.60×10 <sup>-3</sup> rad(0.149°)	1.88×10 <sup>-3</sup> rad(0.108°)
Inertia moment	3.8×10 <sup>-5</sup> kgm <sup>2</sup>	2.15×10 <sup>-4</sup> kgm <sup>2</sup>
Case size	67(W)×74(H)×57(D)mm	67(W)×79(H)×72(D)mm
Total length	100.5mm	115mm
Shaft diameter	12.7mm	19.05mm
Weight	Approx. 0.8kg	Approx. 1.4kg
CE marking certification	EMC directives EN61326-1 EMC directives EN61326-2-3	

■ UTM II (WR)

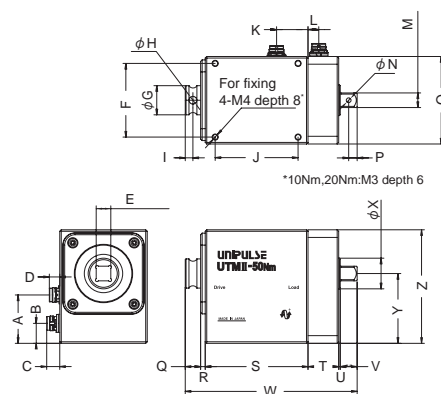
Model	UTM II-10Nm(WR)-6.35	UTM II-20Nm(WR)-6.35	UTM II-50Nm(WR)-9.53	UTM II-100Nm(WR)-12.7	UTM II-100Nm(WR)-19.05	UTM II-500Nm(WR)-19.05
Measurement range	±10Nm	±20Nm	±50Nm	±100Nm	±100Nm	±500Nm
Power supply	DC24V ±15%					
Power consumption	100mA or less			150mA or less		
Output range	±5V Load resistance must be more than 2k					
Bandwidth	1kHz					
Rotation signal	4 pulses per 1 rotation Open collector Max. ratings 30V, 10mA					
Angle of rotation (encoder) output	3600 pulses per rotation					
Safe overload	300%FS	150%FS				500%FS
Non-linearity	0.03%FS					
Hysteresis	0.03%FS					
Repeatability	0.03%FS					
Operation temp. range	-10 to +50°C					
Temp. effect on ZERO	0.01%FS/°C					
Temp. effect on span	0.01%FS/°C					
Max. rotation speed (Measurable range for angle)	10000rpm (800rpm)					
Torsional spring constant	2.15×10 <sup>3</sup> Nm/rad		17.6×10 <sup>3</sup> Nm/rad	26.4×10 <sup>3</sup> Nm/rad	54.6×10 <sup>3</sup> Nm/rad	136×10 <sup>3</sup> Nm/rad
Maximum torsional angle	4.64×10 <sup>-3</sup> rad(0.266°)	9.29×10 <sup>-3</sup> rad(0.532°)	2.84×10 <sup>-3</sup> rad(0.163°)	3.78×10 <sup>-3</sup> rad(0.217°)	1.83×10 <sup>-3</sup> rad(0.105°)	3.68×10 <sup>-3</sup> rad(0.211°)
Inertia moment	4.0×10 <sup>-6</sup> kgm <sup>2</sup>		3.33×10 <sup>-5</sup> kgm <sup>2</sup>	3.58×10 <sup>-5</sup> kgm <sup>2</sup>	1.92×10 <sup>-4</sup> kgm <sup>2</sup>	2.06×10 <sup>-4</sup> kgm <sup>2</sup>
Case size	77(W)×55(H)×40(D)mm		87(W)×74(H)×57(D)mm		87(W)×79(H)×72(D)mm	
Total length	96.5mm		112mm	120.5mm	133mm	
Shaft diameter	6.35mm		9.53mm	12.7mm	19.05mm	
Weight	Approx. 0.3kg		Approx. 0.8kg	Approx. 0.9kg	Approx. 1.7kg	Approx. 1.8kg
CE marking certification	EMC directives EN61326-1, EMC directives EN61326-2-3					

**External dimension**

■ UTM II -100Nm/500Nm (W)



■ UTM II -10Nm/20Nm/50Nm/100Nm/500Nm (WR)



Measurement range	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
UTM II -100Nm (W)	31.5	12.7	±0.3	18	48	25	5	54	12.7	±0.15	4.2	57	13	14.5	100.5	74
UTM II -500Nm (W)	21.5	19.05	±0.38	27	64	38	6	52	19.05	±0.13	6	72	19	23	115	79

Measurement range	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z			
UTM II -10Nm(WR)-6.35	25	12.9	8.5	8.5	6.35	±0.28	depth 8.5	34	12	2.1	4	45	17.5	7	6.35	±0.09	2.1	40	3.5	10	1	57	20	1	7.5	96.5	12	35.5	55
UTM II -20Nm(WR)-6.35																													
UTM II -50Nm(WR)-9.53	31.5	13	8.5	6.8	9.53	±0.22	depth 12	48	19	5	5	54	20.5	7	9.53	±0.09	3.1	57	5.5	10	3	67	20	1	11	112	20	45.5	74
UTM II -100Nm(WR)-12.7	31.5	13	8.5	6.8	12.7	±0.3	depth 18	48	25	5	8	54	20.5	7	12.7	±0.15	4.2	57	6.5	13	3	67	20	1	14.5	118.5	20	45.5	74
UTM II -100Nm(WR)-19.05	25	21.5	6.8	8.5	19.05	±0.38	depth 27	64	38	6	10.2	52	20.5	9	19.05	±0.13	6	72	10.3	19	3	67	20	1	23	133	28	43	79
UTM II -500Nm(WR)-19.05	21.5	25	8.5	6.8																									

Unit : mm