4.5.1 Dimensions

The torque limiter is available for worm gearbox type NMRL050, SWL040, SWL050, SWL063, SWL075, SWL090 in J position only. The MTV torque limiter is univocally supplied for every gear unit with the hollow output shaft diameter equal to dimension D shown in the table. Different diameters could be provided upon request, after technical and manufacturing control. Upon request it's possible to assemble an output solid shaft kit, different from the standard one available in the catalogue.



	NMRL					
	050	063	075	090		
I. I.	63,5	74	78,5	89,5		
S	46	56	60	70		
Dg	56	62	68	80		
g	M40x1,5	M45x1,5	M50x1,5	M60x2		
b	8	8	8	10		
t	28,3	28,3	31,3	38,3		
D	25	25	28	35		
т1	33	37	40	45		
T2	33	37	40	45		

	SWL					
	040	050	063	075	090	
I	55	63,5	74	78,5	89,5	
S	39	46	56	60	70	
Dg	44	56	62	68	80	
g	M30x1,5	M40x1,5	M45x1,5	M50x1,5	M60x2	
b	6	8	8	8	10	
t	20,8	28,3	28,3	31,3	38,3	
D	18	25	25	28	35	
T1	28	33	35	40	45	
Т2	28	33	37	40,5	45	

4.5.2 Operating principle

In this mechanical device the transmission of movement takes place by means of friction between the driving surface (input shaft (10)) and the driven surface (wormwheel (9)). These are subject of a determined compression created by the plate (7) which is generated by two belleville washers (6), arranged in series. The belleville washers action is generated by the bushing (3), driven by the external locking ring nut (1) which is screwed on the output shaft. The shift (X) is guaranteed by the connection between the two conical elements of the hub (2) and the worm wheel.

The transmission of movement has a standard operation up to a maximum admissible torque value (slip torque); over this value the torque limiter starts to work generating a slip between the worm wheel, which continues to spin conducted by the input shaft, and the hub which remains still. Over the slip torque expected from the regulation, the torque limiter is still "on hold": it transmits the set value and it doesn't transmit higher values. This ensures to the machine to restart automatically without external action.

For safety reasons it isn't recommended to install this device in lifting equipment: in case of overloads or irregularities, during the shift, the weight could not be maintained in suspension.



4.5.3 Description

The torque limiter is a mechanical device designed to protect the transmission from movement caused by accidental overloads or irregularities. It is applied to the output of the worm gear reducers and it works as an internal friction applied on the output shaft, which can be adjusted manually through an external locking ring nut. Compared to electronic or external mechanical devices, this solution presents the following advantages:

- Limited additional dimensions compared to the version without the torque limiter;
- Hollow output shaft without changes in terms of diameter compared to the standard version;
- Quick action directly on the transmission that must be protected;
- It has been designed for oil-bath operation, therefore wear-free and reliable;
- Manual adjustment of the slip torque;
- Over the slip torque, the torque limiter is still "on hold", ensuring the automatic machine restart without external intervention;
- Using the torque limiter, it 's possible also to rotate the gearbox shaft by loosening the external locking ring nut, for example in case of mechanical locks due to worm irreversibility.

The torque limiter device must to be installed as a protection system for accidental events and not as protection of **wrong gearbox selection** (for example after selecting a gearbox with a low service factor compared with the real needs of the application).

The torque limiter is available for worm gear reducers type NMRL050 / NMRL-P063-075-090 / SWL040-050-063-075-090 and it is applicable in all combined unit configurations provided in the catalogue, usually on the last gearbox. The torque limiter is supplied on the gearbox output shaft in J or K position.

4.5.4 Slip torque setting

A slip torque setting is easily adjustable from the outside through the rotation of the locking ring nut, characterized by 4 marks to define the number of turns (each mark is equivalent to ¼ of a turn). The device is preliminary set during the assembly phase. The following factors may affect the setting: temperature and period of adjustment. It is therefore recommended, during the installation, to actually verify the slip torque limit, in according to the real needs of the application.

The standard direction of rotation for the registration of the ring nut is clockwise. Looking frontally from the ring nut side, the torque limiter is in J position when the motor position is on the right side; with the motor on left side the torque limiter is in K position.

It's recommended for long stops, even if the machine restarts automatically, to return the ring nut to its original position and to set it again.

As previously mentioned, for each reducers size (040-050-063-075-090) the slip torque range depends by the ratio and the direction of rotation of the gearbox, which affects the tolerances between the two conical components that generate the slip (there is an axial component which tends to approach or move their away). Therefore in the setting diagrams are shown two lines which represent the approximate limits within the provided slip torque could change. The slip torque setting must be always checked afterward to determine if the number of turns of the ring nut guarantees the desired slip torque value.

	Ring nut rotation
040 <	1/2 (turn)
050	1/2 (turn)
063	3/4 (turn)
075	1 (turn)
090	1 (turn)

4.5.5 Adjustment graphs

IMP: the values ($\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, 1 $\frac{1}{4}$...) correspond to the center of the column.

