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Professional Tool

# TIGON SPRING BALANCER

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## INSTRUCTION MANUAL

### • SPECIFICATION

MODEL	CAPACITY		STROKE		PRODUCT WEIGHT	
	kg	lbs	m	ft	kg	lbs
TW-90	70~90	154.3~198.4	2.1	6.8	27	59.5
TW-105	85~105	187.4~231.5			29	63.9
TW-120	100~120	220.4~264.5			30	66.1

- These specifications and the profile may be changed for improvement without prior notice.

- Please read this manual before using.
- Please keep this manual available.

Thank you for purchasing Nitto Kohki-Mijin product.

Before you use this SPRING BALANCER, read this manual carefully to ensure proper, efficient operation.

Especially, “**Instructions for safety**” is basic safety precautions for keeping user’s safety and reducing loss of property. Surely read it and use it correctly.

## Safety alert symbol and message



CAUTION indicates hazardous situation which could result in minor or moderate injury, damage or destruction of the equipment and others if not obeyed.



WARNING indicates hazardous situation which could result in death or serious injury, damage or destruction of the equipment and others if not obeyed.



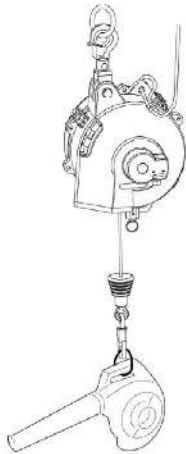
DANGER indicates hazardous situation which could result in death or serious injury frequently if not obeyed.

## Instructions for Safety



WARNING

Incorrect use of spring balancer could cause personal injury. Please observe following basic safety-measures to prevent injuries.

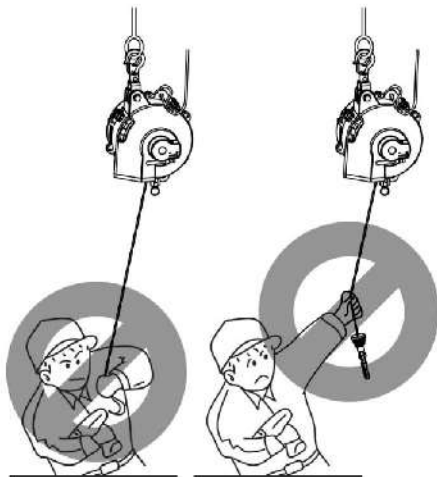


Install the balancer correctly.

- Surely install an additional support chain or wire-rope.
- It can protect user if the MAIN HANGER is broken.



DO NOT work under the suspended tool or device.



- DO NOT remove tool(device) while the cable is pulled.
- DO NOT pull the cable when tool(device) is unloaded.



DO NOT separate spring from the spring case.

- It causes personal injury.

- Do not alter the balancer.
- Do not use two or more balancers at the same time to a tool (device).
- Do not use the balancer over the range of capacity.
- Adjust the torque before using.      • Inspect the balancer periodically.

## Function and Feature

- Fall-prevention safety device
  - The Mechanism which prevent falling of the suspended tool(device) when the spring is broken.
  - (Stop under specification stroke, 2.1m)
  - When the spring is broken, the safety pin of the spring case pops up and stops rotation of drum.



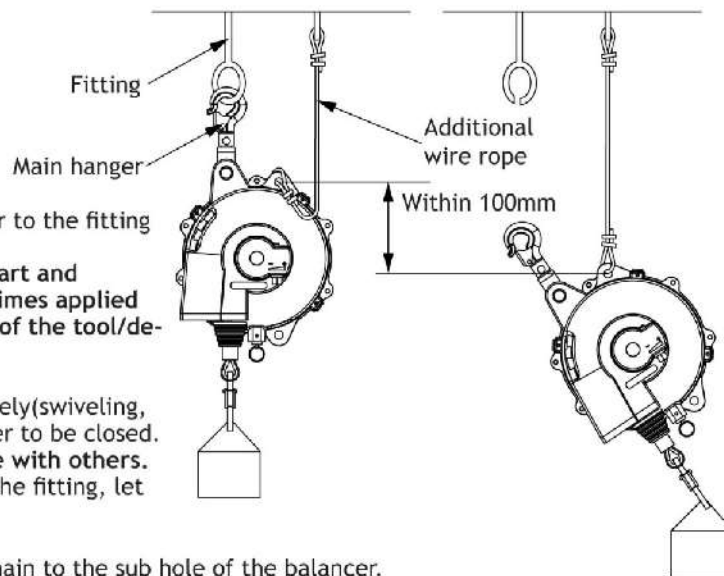
This mechanism can not prevent fall of the tool(device) 100% falling of the tool(device) when the spring is broken. So, **DO NOT** work under the suspended tool(device).

- Drum lock device(reference: page 6, drum lock set/release)
  - Function fixing rotation of the drum by every 20 degrees.(18 steps per revolution)
  - Usage: Exchanging the suspended tool(device) or the cable.(Refer to page 6)
- Easy replacement of the cable
- Swivel&Hinge function of the main hanger

## Installation



- **Install the balancer correctly.**  
Incorrect installation causes personal injury or loss of property.
- **Surely attach an additional support wire-rope or chain.**  
It protects user from breakage of the fitting or main hanger.



1) Suspend the hook of the main hanger to the fitting directly.  
– The fitting must not have opened part and must be able to support at least ten times applied load(weight of the balancer + weight of the tool/device).

2) Check the balancer to be moving freely(swiveling, tilting) and the latch of the main hanger to be closed.  
– Check the balancer does not collide with others.  
– Do not make the main hanger fix to the fitting, let it move freely.

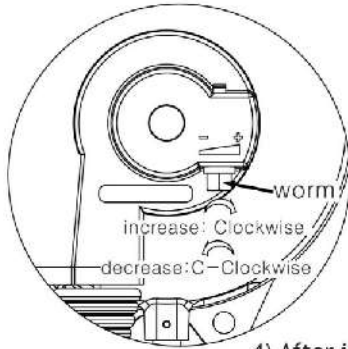
3) Install the additional wire-rope or chain to the sub hole of the balancer.  
– The additional wire-rope(chain) must be able to support ten times applied load.(same with clause 1)

4) Install the other side of additional wire-rope(chain) to another fitting.  
– It must be installed to another new fitting(different from main hanger's fitting)  
– Make the balancer be able to move freely but it must not fall more than 100mm when the main hanger is damaged.(refer to the picture)



- **Use the balancer within its needed capacity.**  
It must be set the capacity of applying load not only weight of the tool (device) but also weight of the accessory(air hose, wire, etc.).

## Attaching tool(device) and Torque adjustment



1) Before attachment, check that total weight of the tool(including accessory) is within the capacity of the balancer.

2) Adjust the spring torque to the total weight of the tool, referring to the gauge, by turning the worm with a wrench or etc.

- Increase torque: clockwise
- Decrease torque: counter clockwise
- Utilize the gauge as a reference.
- It could be changed by using circumstances.

3) Lift up the tool to the cable hook and install it.  
- Don't install the tool to make pull the cable hook.

4) After installation the tool, adjust the spring torque again to be balanced the tool.



- **DO NOT pull the cable when the tool(device) is unloaded.**  
It can cause personal injury because the cable snapback takes place when the tool (device) is unloaded



If the spring torque is adjusted over the maximum capacity of balancer, its cable stroke (spec: 2.1m) of range could be shorten and the durability of spring also gets shorter. If the spring torque is adjusted under minimum capacity, the fall-prevention mechanism will be activated and stop the working.

## Checking work-range(Stroke)



Pulling over the cable of its maximum stroke (2.1m) could cause damage of the balancer and the bigger movement of stroke, the shorter spring durability.

1) Check that the cable length is suitable for working circumstances.

2) Adjust the height of balancer or add a suitable connection part between cable hook and tool (device), it is good to increase the durability of spring.

## How to use



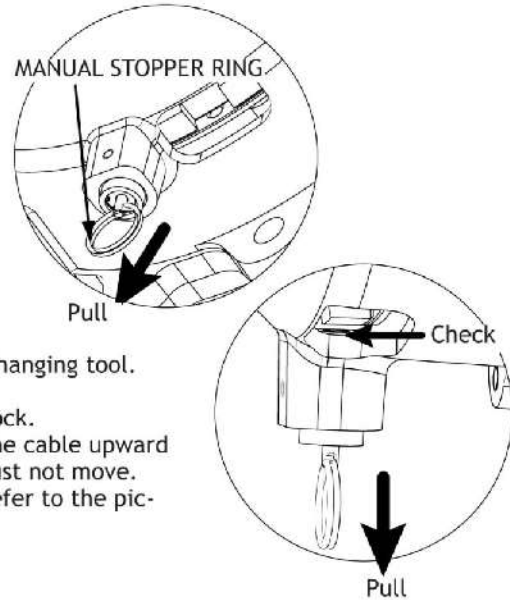
- NEVER remove attached tool(device) from the hook when the cable is pulled.
- NEVER work under the working tool(device).
- Do not alter the balancer.



- Always use within only the specified capacity of balancer.
- Adjust the spring torque before using.
- Do not extend the cable over the stroke.(2.1m)
- Do not pull the cable bias.


• **Drum rotation lock set/release**

- 1) Drum rotation lock set  
– Pull the manual stopper ring to arrow direction until it's clicking.
- 2) Drum rotation lock release  
– Pull again the manual stopper ring to arrow direction until it's clicking when the drum rotation is locked.




• **Exchange of the attached tool/device**

- 1) Adjust the cable to put down convenience height for exchanging tool.
- 2) Pull the manual stopper ring and set the drum rotation lock.  
– For checking the drum rotations is locked or not, move the cable upward and downward. If the drum rotation is locked, the cable must not move. Also check the stopper pin was pop up through the hole. (refer to the picture)
- 3) Detach the tool(device) from the cable hook.



**DANGER** Surely check **THE DRUM ROTATION IS LOCKED** before detaching of using tool(device). It frequently causes personal injury or damage of the balancer detaching the using tool(device) from the cable hook when the drum rotation is not locked safely.

- 4) Adjust the spring torque suitably to compare the weight of using tool (device) with new one.
- 5) After installation new tool (device), release the drum rotation lock and adjust the spring torque again to be balanced.



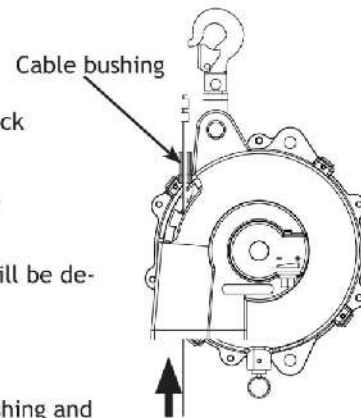
**WARNING**

- **NEVER release the drum rotation lock when no tool(device) is attached.** It causes personal injury or damage of the balancer.
- **Do readjust the spring torque before releasing drum rotation lock if the weight of the new tool is different from the using one.** It causes personal injury or loss of property because of rapid retracting of cable or falling of tool(device).

• **Replacement of the cable**

You can exchange the cable without disassembly.

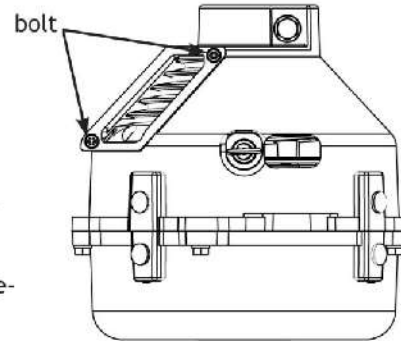
- 1) Please extend the cable fully.(2.1m)
- 2) Make sure the drum rotation is locked.(referring to “Drum rotation lock set”) And then detach the using tool from the cable hook.
- 3) Push the cable, like patting, to arrow direction. You can find that the cable and cable bushing should be pop up from the drum.
- 4) Remove the cable bushing and pull the cable downward. The cable will be detached from the drum.
- 5) Move the Shock-absorber and Collar from the using cable to new one.
- 6) Insert the end of cable into the hole of drum. Assemble the cable bushing and pull the cable downward.(In reverse order of assembly)
- 7) Attach the tool which is detached on step 2) to cable hook and release the drum rotation lock.



• **Replacement of the insert-guide**

It is possible to replace the insert-guide at the cable entrance when it is worn.

- 1) Detach the cable from the drum.(Refer to “replacement of the cable”, of step 1 ~ step 4)
- 2) Unscrew the insert-guide and replace it.
- 3) Reassemble the cable to drum.(Refer to “replacement of the cable” of step 6-7)



• **Release way of fall-prevention safety device**

– In case that the spring torque is adjusted under minimum capacity.

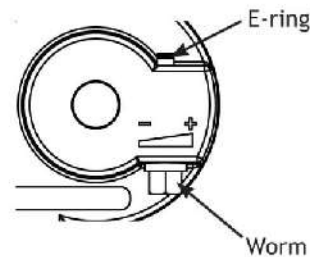
- 1) Make sure the gauge is set under minimum capacity.
- 2) Wind the worm clockwise to increase the spring torque until it is released, moving upward and downward the tool(device).
- 3) Make sure fall-prevention is not activated in whole stroke.(2.1m)
- 4) If it is not balanced because the minimum torque is bigger than weight of the tool, you must exchange the balancer of lower capacity model.

• **In case that the cable is jammed between case and drum**

- 1) Pull the cable strongly with the tool (device) installed.
- 2) If the cable is not pulled, rewind the cable after disassembling of the cover (Refer to “Assembly & disassembly of the cover”)
- 3) Check the wire status with the cable rewinding. Do replace if there’s twisted or kinked mark or scratch on the cable.

• **Assembly&disassembly of the cover**

- 1) Remove the E-ring from the end of the worm.
- 2) Unloose the worm until it is getting out.(counter clockwise)
- 3) Remove the 4-safety arms(Refer to exploded view no. 4 and 5).
- 4) Unscrew the cover and detach the case.
- 5) Assembly is reverse order of disassembly.



## Troubleshooting



WARNING

- If a malfunction occurs during operation, stop the operation immediately and take necessary steps to solve the problem.
- DO NOT detach the suspended tool when malfunction occurs. It can cause personal injury or loss of property because the cable retracts immediately.

MALFUNCTION	CAUSE	SOLUTION
The cable is almost locked up	Manual stopper is activated	Release the manual stopper(Refer to “Drum rotation lock set/release”)
	Cable is jammed between the case and drum	Unloose the spring torque and rewind the cable after disassembly
The cable moves a little bit.(80-160mm)	Fall prevention device is activated because spring torque is under the minimum torque.	- Increase spring torque - Exchange for suitable model
	Fall prevention device is activated because the spring is broken	Replace the spring ass'y

## Replacement of spring



- NEVER separate the spring from the spring case. It could cause injury.
- Replace the whole spring assembly.

Disassemble the balancer following this order referring the exploded view.



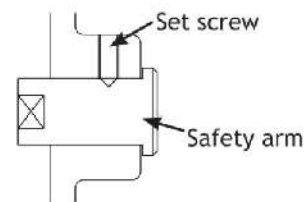
Make sure ask shop or service center to replace spring. There are 3-4 springs inside the spring case. Then torque might remain on a spring or more in case of spring breakage.

- 1) Lock the drum rotation referring “drum rotation lock set” and detach the tool(device) from cable hook.
- 2) Detach the spring balancer from the attached fitting and put it down on a worktable.
- 3) Remove the E-ring(8) from the end of worm.
- 4) Unloose the spring torque by turning the worm counter clockwise. The worm will be separated from case soon after the torque fades away.
- 5) Unscrew the set-screw(4,34) and detach the safety-arm(5,33) all.
- 6) Detach the cable from drum.(referring “replacement of the cable”)
- 7) Open the cover by unscrewing the bolt(38) 6EA and separate the spring-case(24), drum(22), spindle(21) together(with assembled) from the case.
- 8) Detach the spindle(21).



**NEVER separate the spring from the spring case. It could cause injury. Even do not open the cover of the spring case.**

- 9) Unscrew hex head socket bolt(30) and separate the drum from spring case ass'y(24).
- 10) Assemble in reverse order of disassembly. At this moment, assemble safety-arm(5,33) after adjusting spring torque.
- 11) Wind the spring by turning the worm clockwise. The cable will be wound on the drum by turning the worm. At this moment, pull the cable lightly, tightly in order to prevent that the cable would not get jammed between case and drum until the cable is fully retracted into the case.
- 12) Continue to turning the worm until the spring torque would be increased suitably.
- 13) Attach a weight(middle of capacity) at cable hook and adjust the torque again. Then set the gauge by set load.(Gauge set is possible unscrewing the screw(37) which is at center of gauge.)
- 14) Assemble the safety-arm.(referring right picture) The fall-prevention safety device may not work properly.



**Surely replace the safety-device pin(26) also with replacing the spring, please. It may not work properly due to the damage when it's activated.**



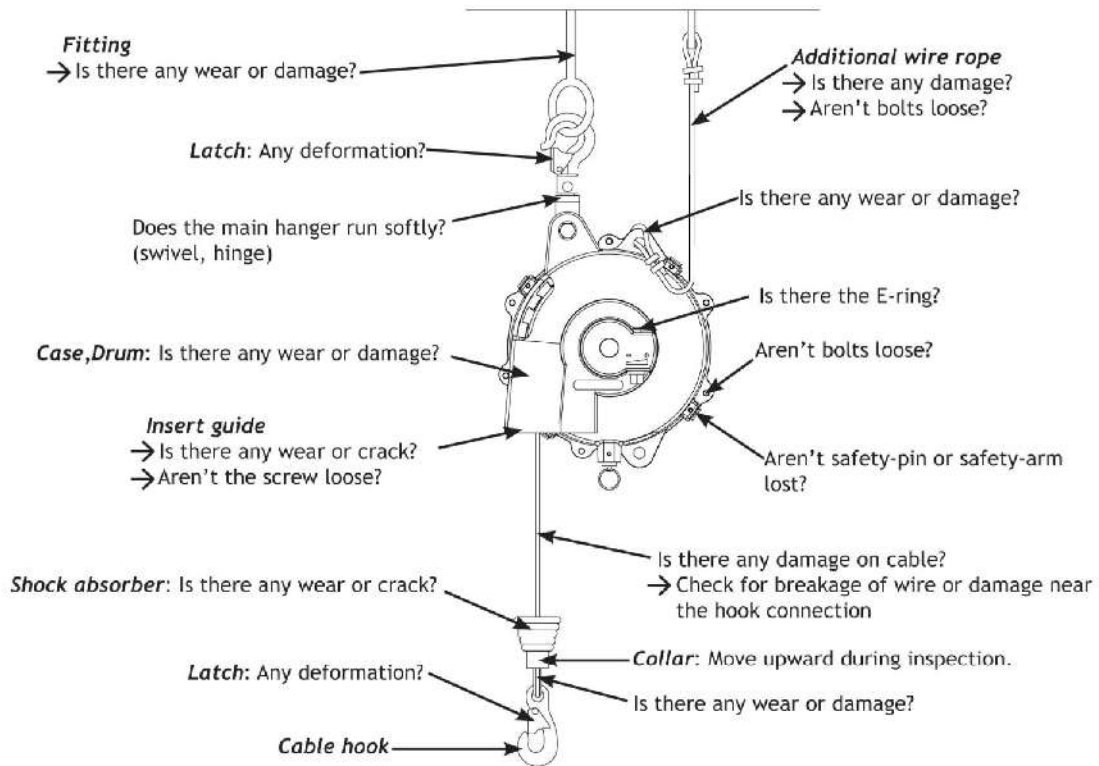
# Maintenance and Inspection

Inspect the balancer periodically. If there are any wear or damaged parts to be found, stop using the balancer and replace them. Inspect closely under high frequency or hard circumstance.



- Inspect the balancer periodically and stop using the balancer immediately if there are any wear or damage to be found at cable & hook.
- Always use genuine parts for replacement.

## Periodic inspection check point



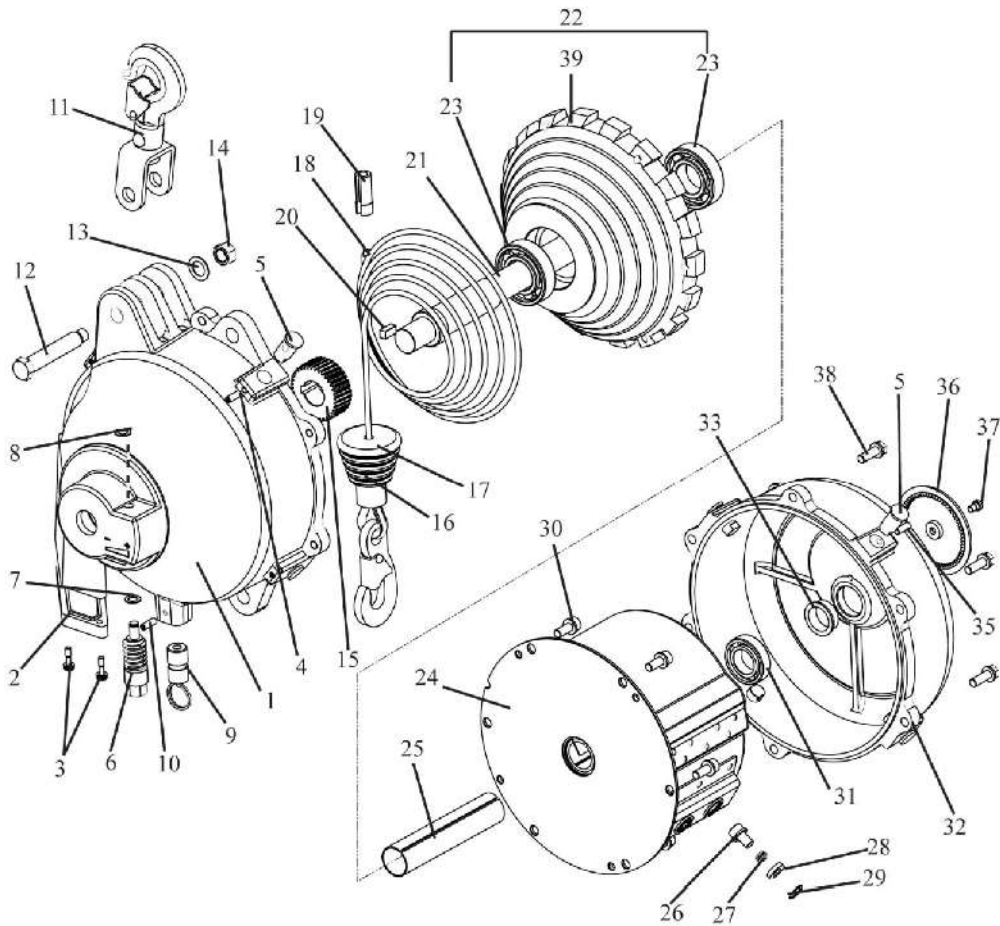
## Exploded view and Part-list

This exploded view is a reference. It's better not to disassemble for end-user.  
Please ask shop or service center if repair or replacement of part is required.

The part number which is inside of ( ) are the components of ASS'Y

No.	Part No.	Part name	Quantity		
			TW-90	TW-105	TW-120
1	TB06546	CASE ASS'Y	1SET	1SET	1SET
-	(TQ08797)	CASE	1	1	1
2	(TQ08800)	INSERT GUIDE	1	1	1
3	(TQ08801)	(+)PAN HEAD SCREW WITH S/W M5x15	2	2	2
4	TQ08824	SET SCREW M6x20	4	4	4
5	TQ08798	SAFETY ARM	8	8	8
6	TQ08158	WORM	1	1	1
7	TQ08672	THRUST WASHER	1	1	1
8	TQ08688	E-RING	1	1	1
9	TB06547	MANUAL STOPPER ASS'Y	1SET	1SET	1SET
10	TQ08843	SET SCREW M6x8	1	1	1
11	TB06566	MAIN HANGER BRACKET ASS'Y	1SET	1SET	1SET
12	TQ08845	MAIN HANGER PIN	1	1	1
13	TQ08846	SPACER	1	1	1
14	TQ08847	U-NUT	1	1	1
15	TQ08836	WORM WHEEL	1	1	1
16	TQ08107	COLLAR	1	1	1
17	TQ08818	SHOCK ABSORBER	1	1	1
18	TB06559	CABLE SUB ASS'Y	1SET	1SET	1SET
19	TQ08832	CABLE BUSHING	1	1	1
20	TQ08837	KEY	1	1	1
21	TQ08833	SPINDLE	1		
	TQ08834			1	
	TQ08835				1
22	TB06557	DRUM SUB ASS'Y	1SET	1SET	1SET
39	(TQ08812)	DRUM	1	1	1
23	(TQ08813)	BALL BEARING 6206ZZ	2	2	2
24	TB06554	SPIRAL SPRING SUB ASS'Y	1SET		
	TB06555			1SET	
	TB06556				1SET
25	TQ08838	SPRING BUSHING	1		
	TQ08839			1	
	TQ08840				1
26	TQ08154	SAFETY DEVICE PIN	2	2	2
27	TQ08899	SAFETY DEVICE SPRING	2	2	2
28	TQ08810	SAFETY DEVICE SPACER	2	2	2
29	TQ08811	SNAP RING	2	2	2
30	TQ08814	HEX SOCKET BOLT WITH S/W M8x20	6	6	6
31	TQ08831	BALL BEARING 6005ZZ	1	1	1
32	TB06561	COVER SUB ASS'Y	1SET		
	TB06530			1SET	
	TB06531				1SET
33	(TQ08822)	COVER BUSH	1	1	1

-	(TQ08819)	PRODUCT LABEL	1		
	(TQ08820)			1	
	(TQ08821)				1
35	TQ08780	SET SCREW M6x10			4
	TQ08824	SET SCREW M6x20	4	4	
36	TB06562	GAUGE SUB ASS'Y	1SET		
	TB06532			1SET	
	TB06533				1SET
37	TQ08043	GAUGE SCREW	1	1	1
38	TQ08841	HEX HEAD BOLT WITH S/W M8x25	6	6	
	TQ08842	HEX HEAD BOLT WITH S/W M8x45			6





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