MITSUBISHI ELECTRIC
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Maintenance Manual for Brake of Gearless Traction Machine with Permanent Magnet Motor

D55005-A
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Contents

1. Introduction

This manual describes the maintenance of brake equipment of gearless traction machines whose type written in the nameplate begins with PM.

Elevators need to be inspected and maintained periodically by competent maintenance persons.

If elevators are used without proper maintenance, they may not be able to deliver the performance that we expect. The components specified in this manual are particularly critical for safety of users and maintenance persons. Therefore, please plan for proper maintenance in accordance with this manual.

For maintenance of Mitsubishi Electric elevators, we recommend that you sign a maintenance contract with our official distributor. To contact our official distributor, please visit our website below.

http://www.mitsubishielectric.com/elevator/network/index.html

This manual specifies important points which require special attention in basic maintenance. The owner of the installation and operation manager shall request the maintenance organization to be sure to include those points in maintenance.

This manual is applicable only to the region (Region and Locale) and the product (Elevator) selected when you downloaded this manual from our website.
Do not use this manual for other regions and products.

2. Maintenance of brake of traction machine with permanent magnet motor

The brake of elevators is a critical component, as it deteriorates over time. Since deterioration speed differs depending on the frequency and environment of use of elevator, it is necessary to carry out maintenance to keep it in good condition at all times.

This document describes key points to be checked in basic maintenance of traction machines with permanent magnet motor.

3. General precaution

This manual summarizes important maintenance information for competent maintenance persons who carry out basic elevator maintenance. The competent maintenance persons shall understand and observe the instructions thoroughly.

3.1 Safety symbols

Safety symbols below represent the degree of hazard that would arise should the provided instructions be neglected. The definitions of the symbols are as follows.

(1) Definitions of danger, warning and caution symbols

Symbol	Description
 **Danger**	Indicates an imminently hazardous situation which, if it is not observed, will result in death or serious injury.
 **Warning**	Indicates a potentially hazardous situation which, if it is not observed, could result in death or serious injury.
 **Caution**	Indicates a potentially hazardous situation which, if it is not observed, may result in injury or damage to the elevator equipment.

(2) Definitions of precaution symbols

Symbol	Description
	Indicates a mandatory action.
	Indicates a prohibited action.
	Warns of electricity. (This symbol reminds workers to take care to avoid coming into contact with electricity.)

3.2. Precautions after inspection and maintenance

(1) Fault

If any fault has been found during inspection and/or maintenance, take appropriate measures immediately.

1) Take the elevator out of service until the fault is repaired. Report the state to the operation manager.
2) Record the detail of fault, replacement and repair in the Work Log, and maintain it permanently.
3) If any abnormality has been found during inspection and replacement, repair or adjustment by Mitsubishi Electric Corporation is required, please contact our official distributor.

Caution	**Make sure to close the doors of the elevator taken out of service.** **Use the Mitsubishi Electric's genuine parts for replacement.** **If there is any problem with the product, contact our official distributor.**

(2) Restoration

1) Restore screws loosened, covers removed, etc. for inspection or maintenance to the original state.
2) If no abnormality has been found during inspection and/or maintenance, confirm the safety and restore the elevator to the automatic (normal) operation.

Caution	**Before resuming automatic (normal) operation, check that there is no problem with elevator operation by first running the car manually, then stopping the car at every floor in automatic (normal) operation, and running the car from the top to the bottom floor in automatic (normal) operation at the end.**

3.3. Latest maintenance information

For supply of parts, contact our official distributor.

Please note however that parts supply may not be possible when the product is too old or is used in poor condition. In that case, we recommend modernization of the product.

Caution	**This manual may be subject to change without notice. Before starting maintenance, visit the URL below to check the latest manual.** **http://www.mitsubishielectric.com/elevator/maintenance/index.html**

Danger	**Do not carry out disassembly unspecified in this document.** **Do not apply oil or lubricant on and around the brake.**

Check the type of traction machine with the nameplate attached on the traction machine.

4. Check items and frequency of maintenance

Carry out maintenance at a frequency specified in Table 1.

Table 1 Check items and frequency of maintenance

Basic maintenance	Section No.	Check item	Frequency of maintenance (standard)
Check of brake condition and operation (visual check)	5.1	Brake operation	Less than 1 year*
	5.2	Brake drum (disk) and lining	
	5.3	Alignment of marks on brake bolts	
	5.4	Lower drain tube condition	
Check of brake coil stroke and lining clearance	6.1	Brake coil stroke	1 year
	6.2	Brake lining clearance	
Check of brake torque to hold a car stationary	7	Brake torque to hold a car stationary	1 year

*Carry out the maintenance more frequently depending on the start frequency of the elevator.

5. Check of brake condition and operation (visual check)

Caution	**To check brake condition and operation, stop the car at the top floor, unload the car to 0% load and close the car doors and the landing doors.**

5.1. Checking brake operation

Check that the brake functions properly and that there is no abnormality such as slip.
Also, check that the moving parts operate properly.

5.2. Checking brake drum (disk) and lining

Check that there is no foreign object, oil, rust, wear or any other abnormality on the brake drum (disk) and the lining.

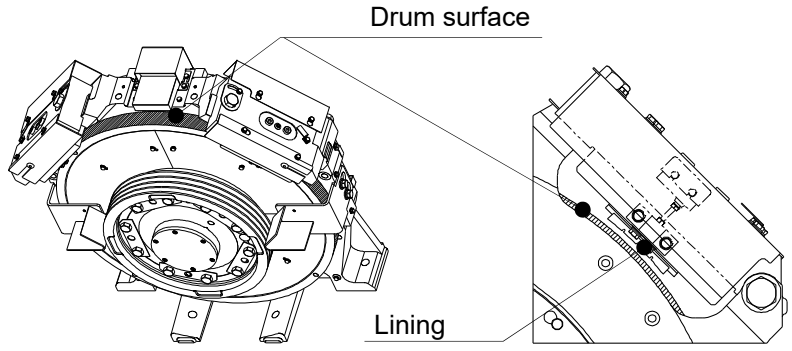
Check the entire surface of brake drum (disk).

The check parts differ depending on the traction machine type. See the instructions in an appropriate section, referring to Table 2 below.

Table 2 Referral section for checking brake drum (disk) and lining

Traction machine type	Referral section	
	Group	Fig.
PM3P7SS, PM6P5SS, PM6P5SS2, PM011SS, PM011SS2 PM3P7SR, PM6P5SR, PM6P5SR2, PM011SR, PM011SR2, PM016SR PM015S, PM018S, PM021S, PM025S PM2P8GS, PM025MR, PM040MR	A	Fig. 1
PMF018S, PMF025S, PMF015SR, PMF021SR PMF011MB, PMF016MB, PMF020MB, PMF027MB PMF027MS, PMF021MM	B	Fig. 2
PMF3P7S-E, PMF6P5S-E, PMF011S-E PMF3P7S4, PMF011S4, PMF016S	C	Fig. 3
PML-F037EB, PML-F065EB, PML-F110EB, PML-F180	D	Fig. 4
PML-0028A, PML-0037C, PML-0046A PML-0065B, PML-0062B, PML-0110B	E	Fig. 5
PMF011ML, PMF016ML, PMF020ML, PMF027ML PML-63AL, PML-63AR, PML-94BL, PML-94BR PML-25AR, PML-40AR, PML-25BR, PML-40BR PML-F25AL, PML-F25AR, PML-F40AL, PML-F40AR PML-34AL, PML-34AR, PML-50AL, PML-50AR PML-F34AL, PML-F50AL, PML120LAL, PML120LAR, PML120MAL, PML120MAR, PML120SAL, PML120SAR, PML-F81AL	F	Fig. 6

Traction machine type (Group A)
PM3P7SS, PM6P5SS, PM6P5SS2, PM011SS, PM011SS2 PM3P7SR, PM6P5SR, PM6P5SR2, PM011SR, PM011SR2, PM016SR PM015S, PM018S, PM021S, PM025S, PM2P8GS, PM025MR, PM040MR



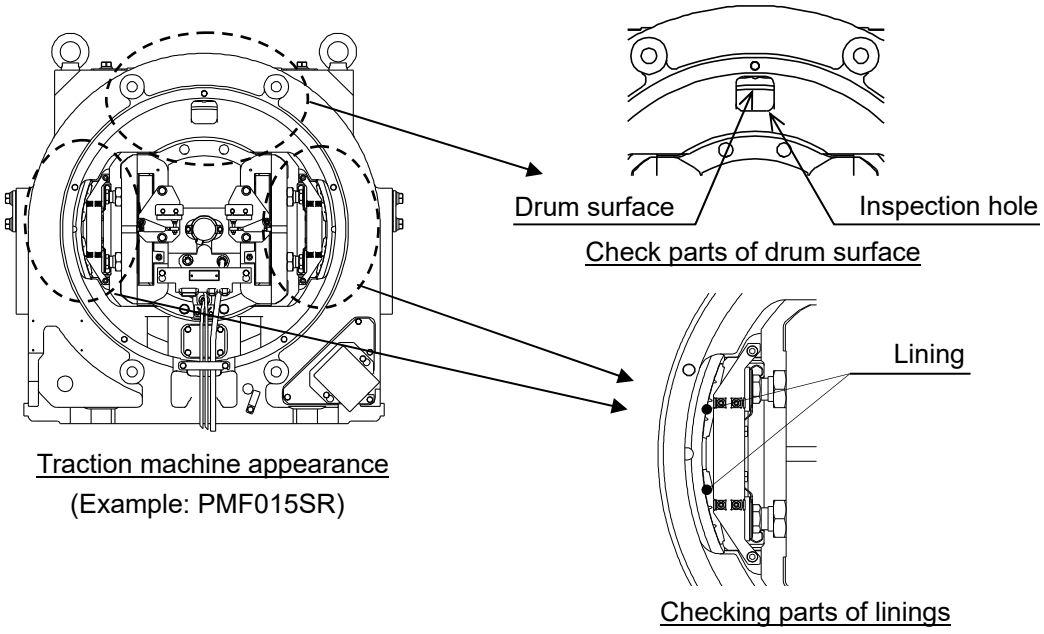
Traction machine appearance
(Example: PM3P7SR)

Check parts

Fig.1 Instructions for checking drum surface and lining of traction machine group A

Traction machine type (Group B)
PMF018S, PMF025S, PMF015SR, PMF021SR PMF011MB, PMF016MB, PMF020MB, PMF027MB, PMF027MS, PMF021MM

Check the drum surface through the inspection hole.



Traction machine appearance
(Example: PMF015SR)

Check parts of drum surface

Checking parts of linings

Fig. 2 Instructions for checking drum surface and lining of traction machine group B

Traction machine type (Group C)
PMF3P7S-E, PMF6P5S-E, PMF011S-E, PMF3P7S4, PMF011S4, PMF016S

Remove the cover of the inspection hole and check the drum surface through the hole.

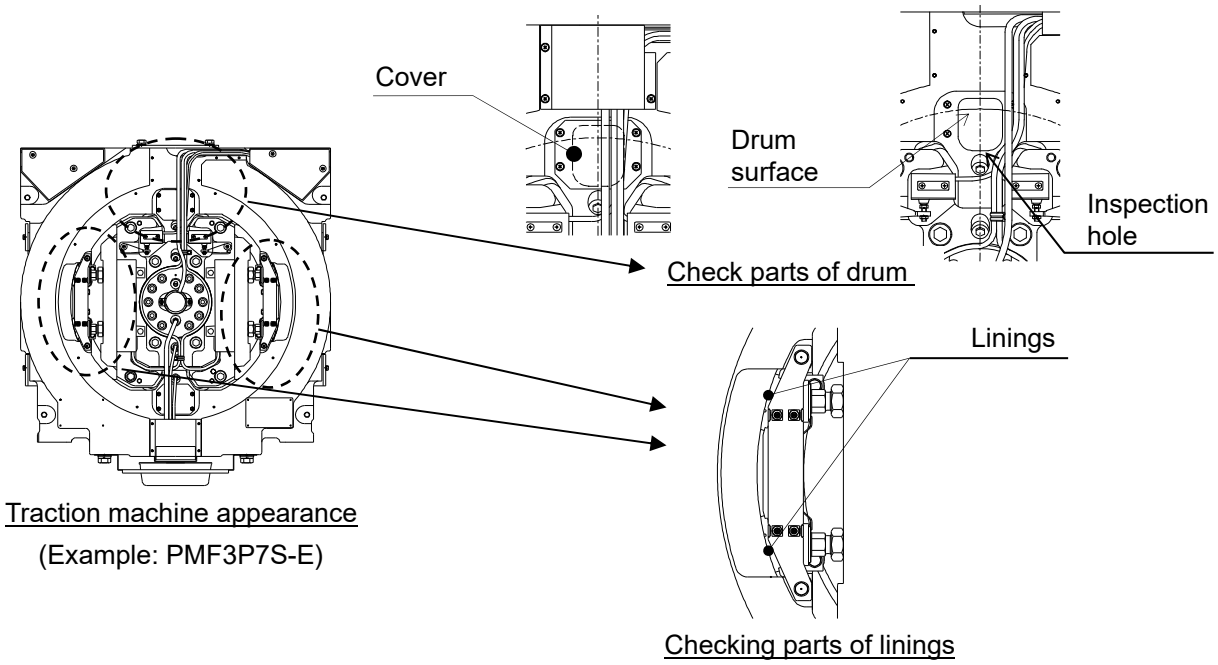


Fig. 3 Instructions for checking drum surface and lining of traction machine group C

Traction machine type (Group D)
PML-F037EB, PML-F065EB, PML-F110EB, PML-F180

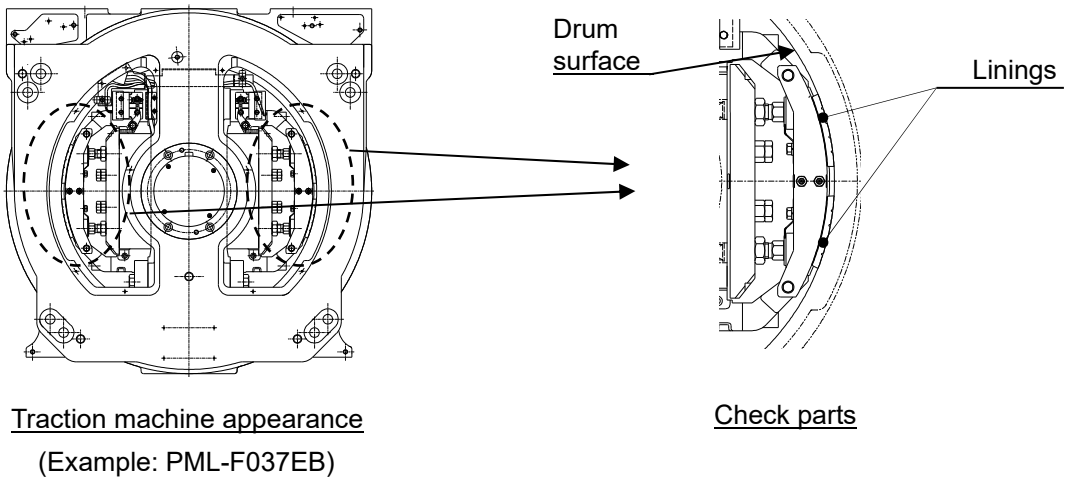


Fig. 4 Instructions for checking drum surface and lining of traction machine group D

Traction machine type (Group E)
PML-0028A, PML-0037C, PML-0046A, PML-0065B, PML-0062B, PML-0110B

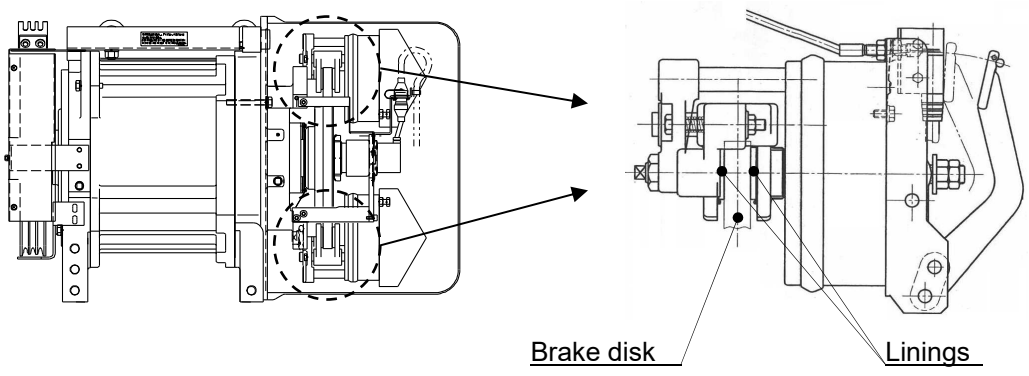


Fig. 5 Instructions for checking disk surface and lining of traction machine group E

Traction machine type (Group F)
PMF011ML, PMF016ML, PMF020ML, PMF027ML, PML-63AL, PML-63AR, PML-94BL, PML-94BR PML-25AR, PML-40AR, PML-25BR, PML-40BR, PML-F25AL, PML-F25AR, PML-F40AL, PML-F40AR, PML-34AL, PML-34AR, PML-50AL, PML-50AR, PML-F34AL, PML-F50AL, PML120LAL, PML120LAR, PML120MAL, PML120MAR, PML120SAL, PML120SAR, PML-F81AL

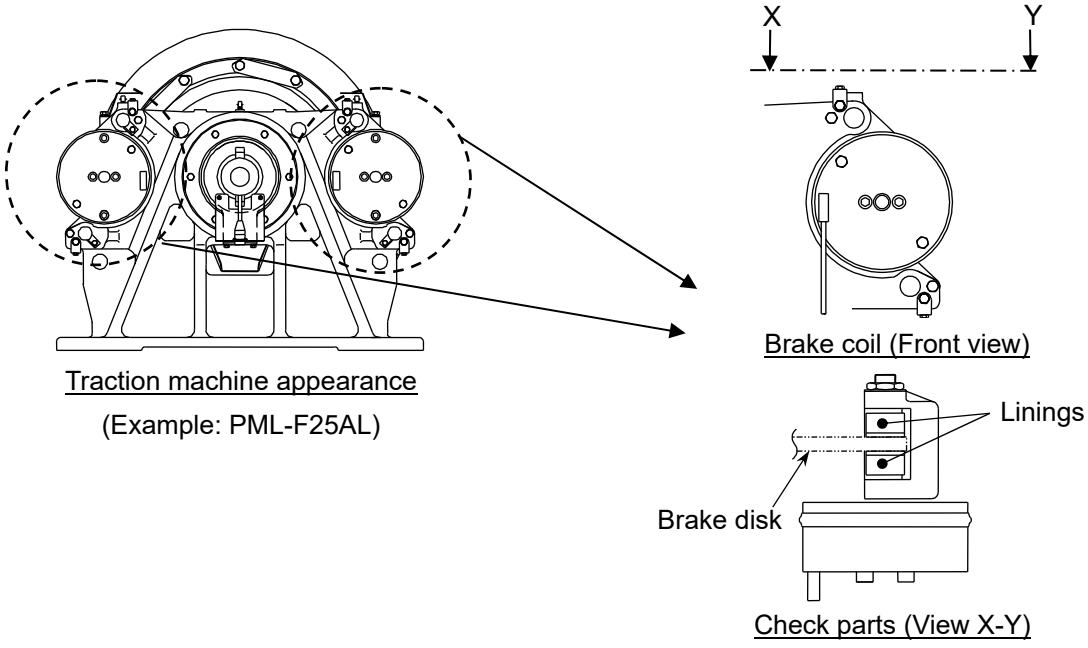


Fig. 6 Instructions for checking disk surface and lining of traction machine group F

5.3. Checking alignment of marks on brake bolts

Check that the marks on the brake bolts are aligned with the marks on the brake.

If there is no mark on the brake, check that the bolts are tightened securely.

The check parts differ depending on the traction machine type. See the instructions in an appropriate section, referring to Table 3 below.

Table 3 Referral section for checking alignment of marks on brake bolts

Traction machine type	Referral section	
	Group	Fig.
PM3P7SS, PM6P5SS, PM6P5SS2, PM011SS, PM011SS2, PM3P7SR, PM6P5SR, PM6P5SR2, PM011SR, PM011SR2, PM016SR, PM015S, PM018S, PM021S, PM025S	a	Fig. 7
PM2P8GS	b	Fig. 8
PMF018S, PMF025S, PMF015SR, PMF021SR PMF011MB, PMF016MB, PMF020MB, PMF027MB PMF027MS, PMF021MM PMF3P7S-E, PMF6P5S-E, PMF011S-E PMF3P7S4, PMF011S4, PMF016S	c	Fig. 9
PML-F037EB, PML-F065EB, PML-F110EB	d	Fig. 10
PML-F180	e	Fig. 11
PM025MR, PM040MR	f	Fig. 12
PML-0028A, PML-0037C, PML-0046A PML-0065B, PML-0062B, PML-0110B	g	Fig. 13
PMF011ML, PMF016ML, PMF020ML, PMF027ML	h	Fig. 14
PML-63AL, PML-63AR, PML-94BL, PML-94BR	i	Fig. 15
PML-25AR, PML-40AR, PML-25BR, PML-40BR PML-F25AL, PML-F25AR, PML-F40AL, PML-F40AR PML-34AL, PML-34AR, PML-50AL, PML-50AR PML-F34AL, PML-F50AL, PML120LAL, PML120LAR, PML120MAL, PML120MAR, PML120SAL, PML120SAR, PML-F81AL	j	Fig. 16

Traction machine type (Group a)
PM3P7SS, PM6P5SS, PM6P5SS2, PM011SS, PM011SS2 PM3P7SR, PM6P5SR, PM6P5SR2, PM011SR, PM011SR2, PM016SR PM015S, PM018S, PM021S, PM025S

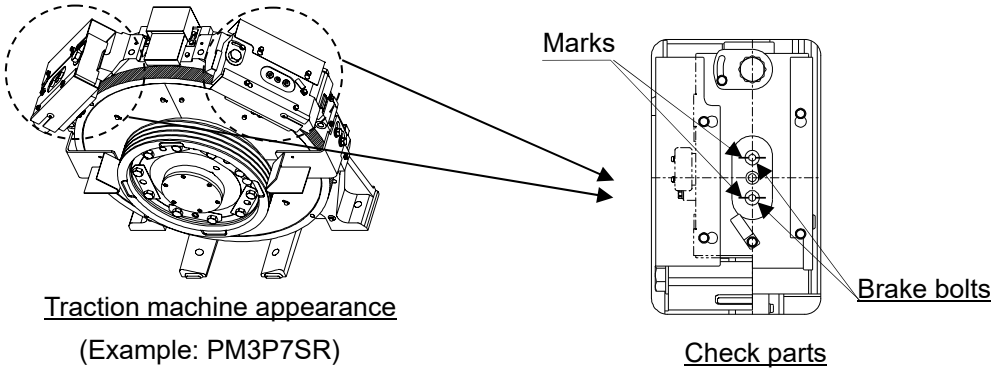


Fig. 7 Instructions for checking alignment of marks on brake bolt of traction machine group a

Traction machine type (Group b)
PM2P8GS

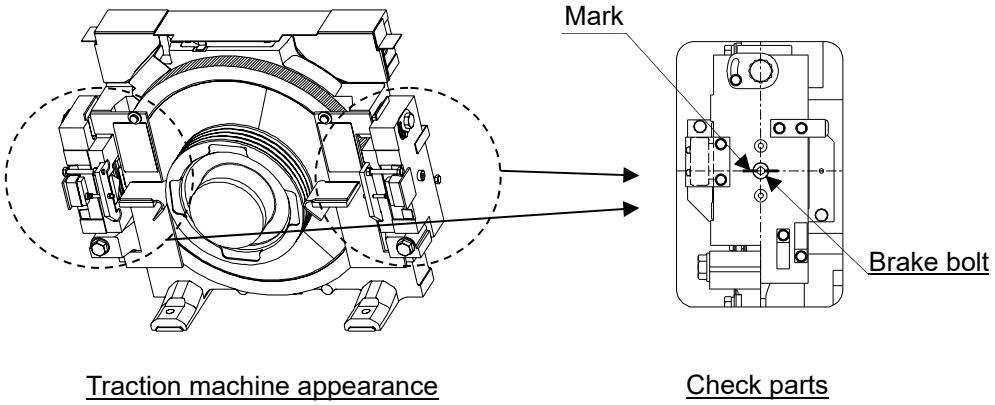


Fig. 8 Instructions for checking alignment of marks on brake bolt of traction machine group b

Traction machine type (Group c)
PMF018S, PMF025S, PMF015SR, PMF021SR PMF011MB, PMF016MB, PMF020MB, PMF027MB, PMF027MS, PMF021MM PMF3P7S-E, PMF6P5S-E, PMF011S-E, PMF3P7S4, PMF011S4, PMF016S

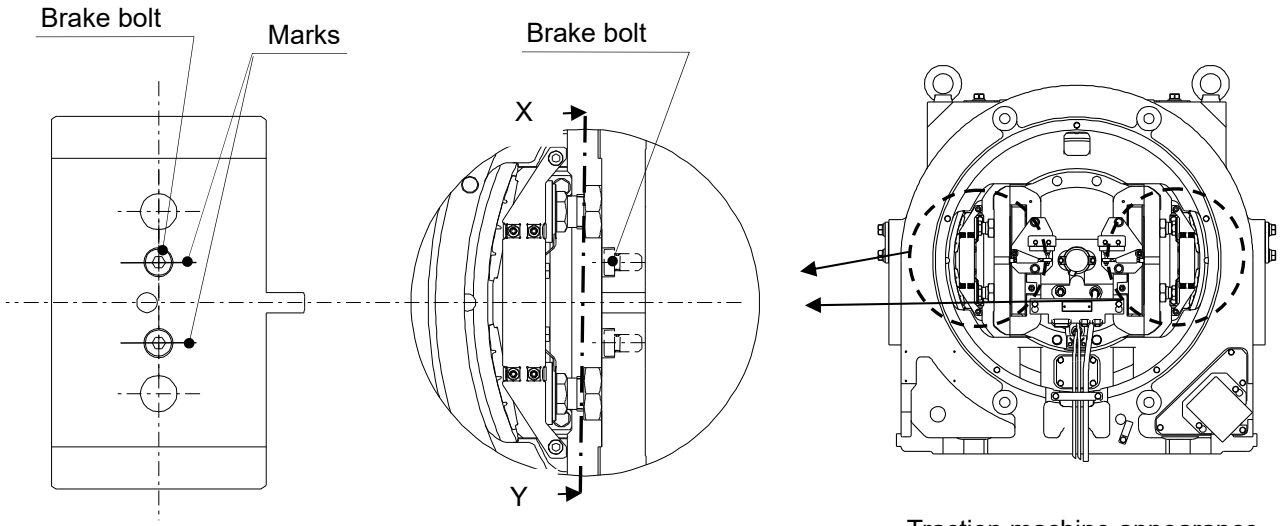


Fig. 9 Instructions for checking alignment of marks on brake bolt of traction machine group c

Traction machine type (Group d)
PML-F037EB, PML-F065EB, PML-F110EB

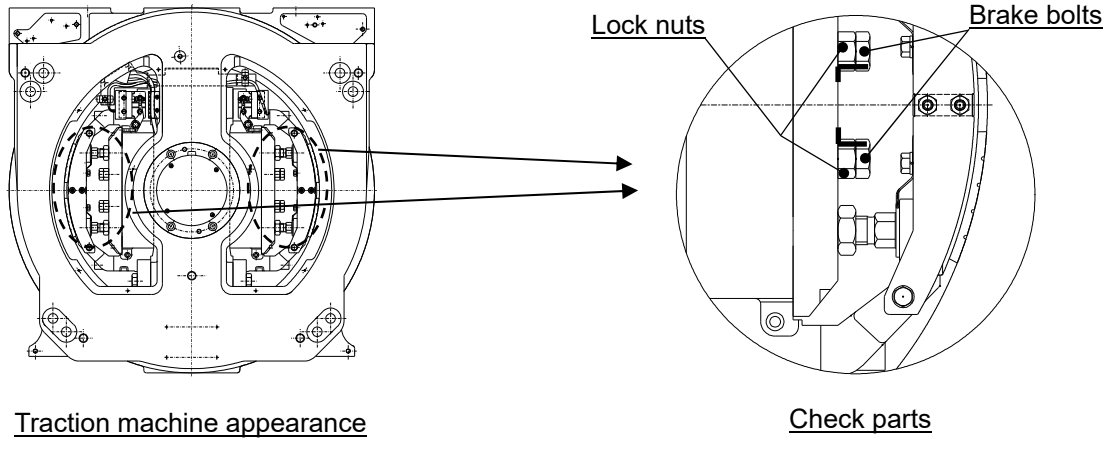


Fig. 10 Instructions for checking alignment of marks on brake bolt of traction machine group d

Traction machine type (Group e)
PML-F180

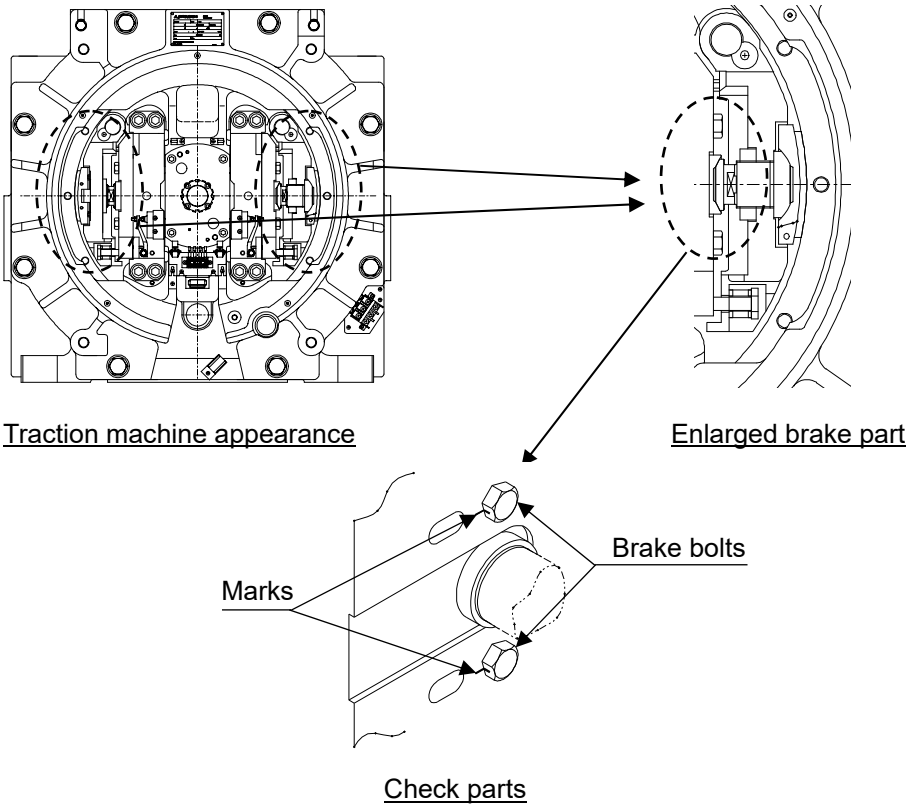


Fig. 11 Instructions for checking alignment of marks on brake bolt of traction machine group e

Traction machine type (Group f)
PM025MR, PM040MR

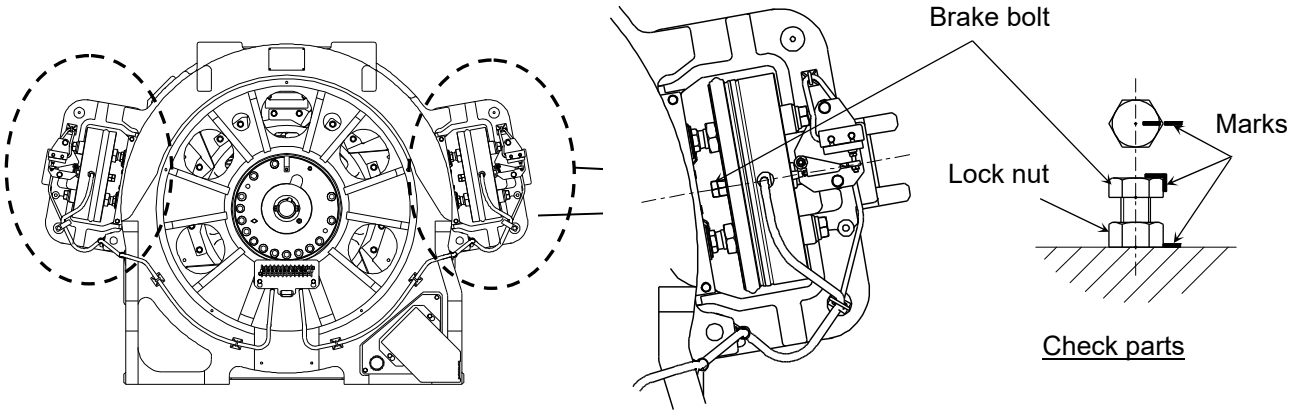


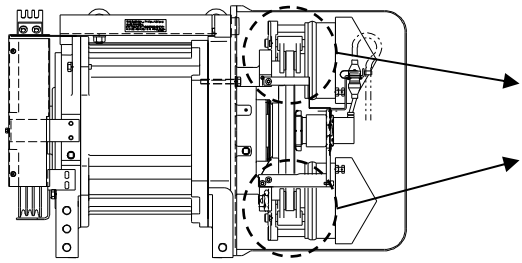
Fig. 12 Instructions for checking alignment of marks on brake bolt of traction machine group f

Traction machine type (Group g)
PML-0028A, PML-0037C, PML-0046A, PML-0065B, PML-0062B, PML-0110B

There is no mark on the brake bolts of these traction machine types. Therefore, check that the brake bolts are tightened properly in accordance with the instruction, referring to Table 4.

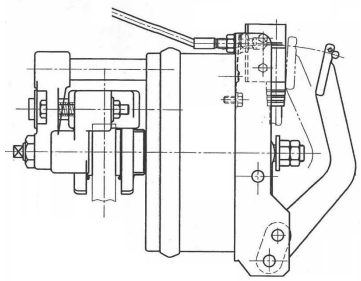
Table 4 Check of brake bolt of traction machine group g

Traction machine type		Check item	Detail view
PML-0028A, PML-0037C, PML-0065B		Brake bolts are fully tightened.	Brake bolt (a)
PML-0046A	Color of brake bolt: Silver	Brake bolts are fully tightened.	
PML-0062B PML-0110B	Color of brake bolt: Gold	Length of underhead of brake bolt: 10.5 to 12 mm	Brake bolt (b)

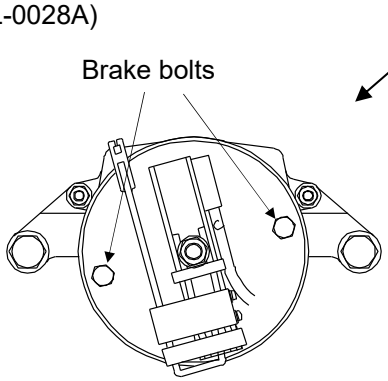


Traction machine appearance

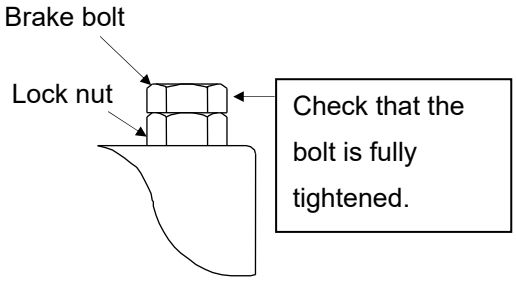
(Example: PML-0028A)



Brake coil (Side view)

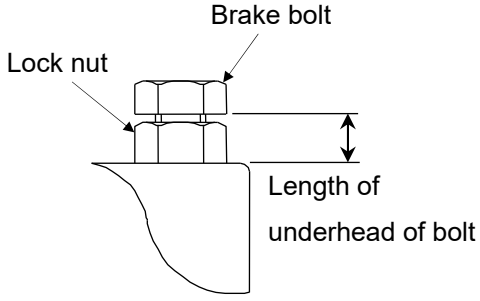


Brake coil (Front view)



Detail view of brake bolt (a)

(Check part)



Detail view of brake bolt (b)

(Check part)

Fig. 13 Instructions for checking brake bolt of traction machine group g

Traction machine type (Group h)
PMF011ML, PMF016ML, PMF020ML, PMF027ML

There is no mark on the brake bolts of these traction machine types. Therefore, check that the brake bolts are fully tightened.

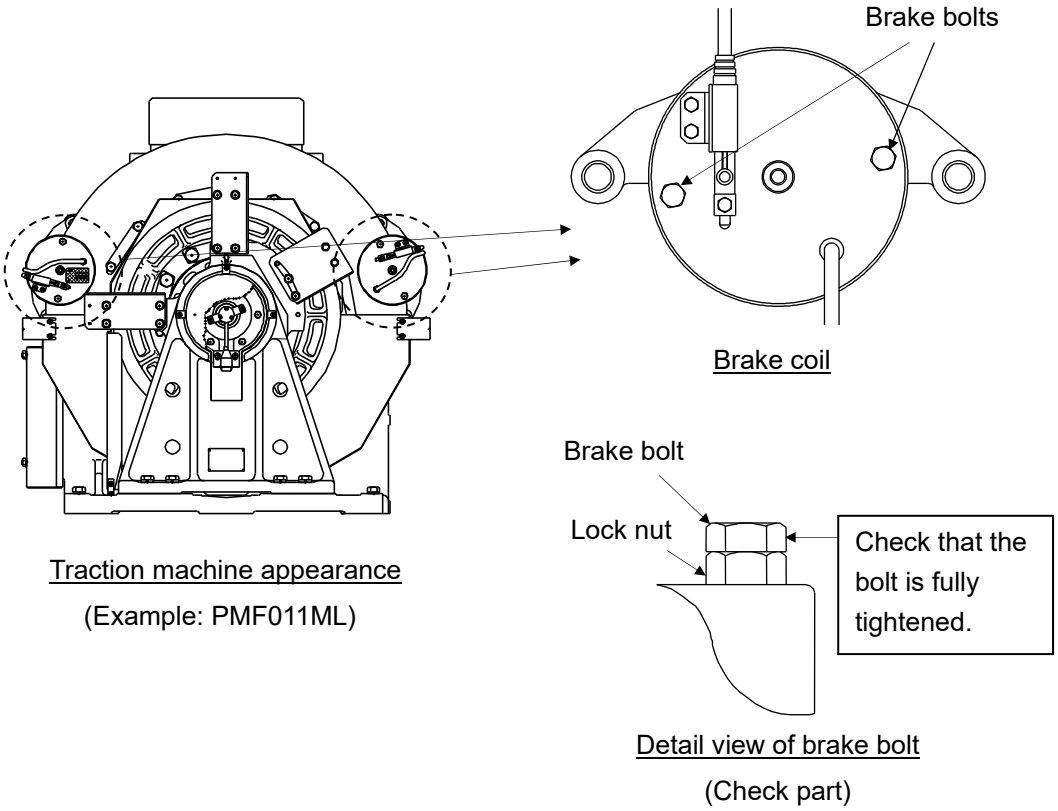


Fig. 14 Instructions for checking brake bolt of traction machine group h

Traction machine type (Group i)
PML-63AL, PML-63AR, PML-94BL, PML-94BR

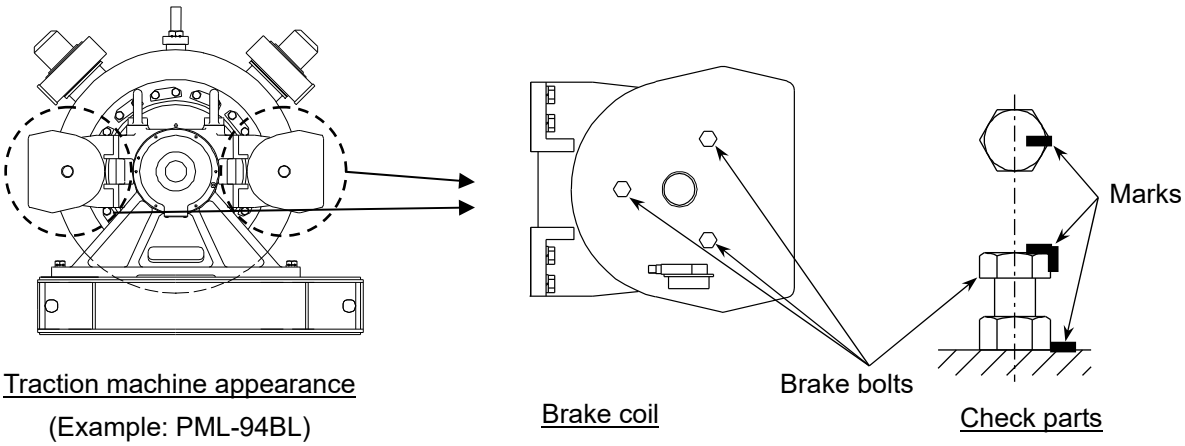


Fig .15 Instructions for checking alignment of marks on brake bolt of traction machine group i

Traction machine type (Group j)
PML-25AR, PML-40AR, PML-25BR, PML-40BR PML-F25AL, PML-F25AR, PML-F40AL, PML-F40AR PML-34AL, PML-34AR, PML-50AL, PML-50AR, PML-F34AL, PML-F50AL, PML120LAL, PML120LAR, PML120MAL, PML120MAR, PML120SAL, PML120SAR, PML-F81AL

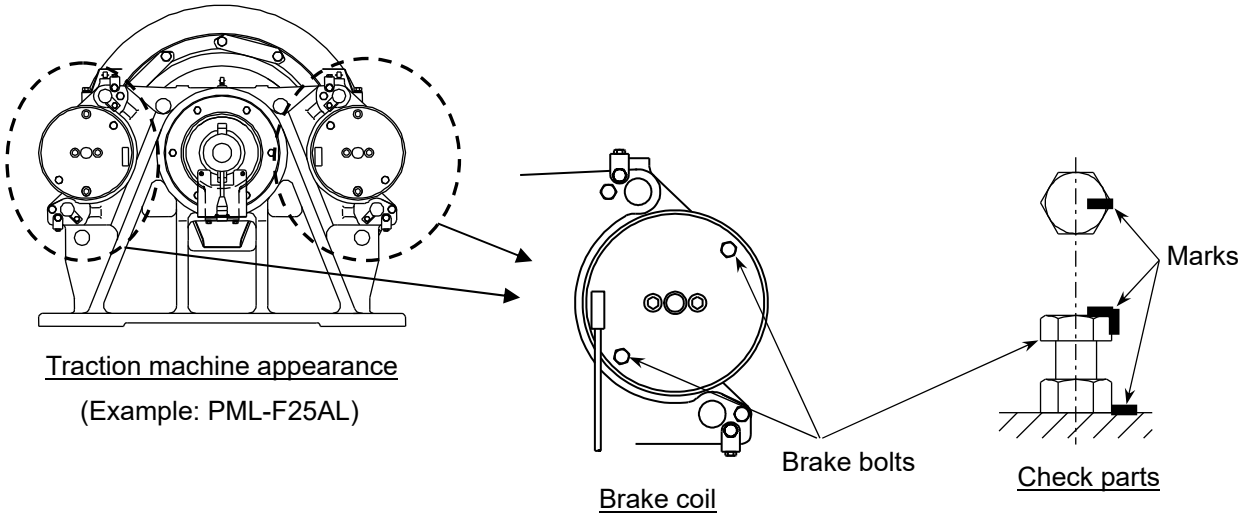


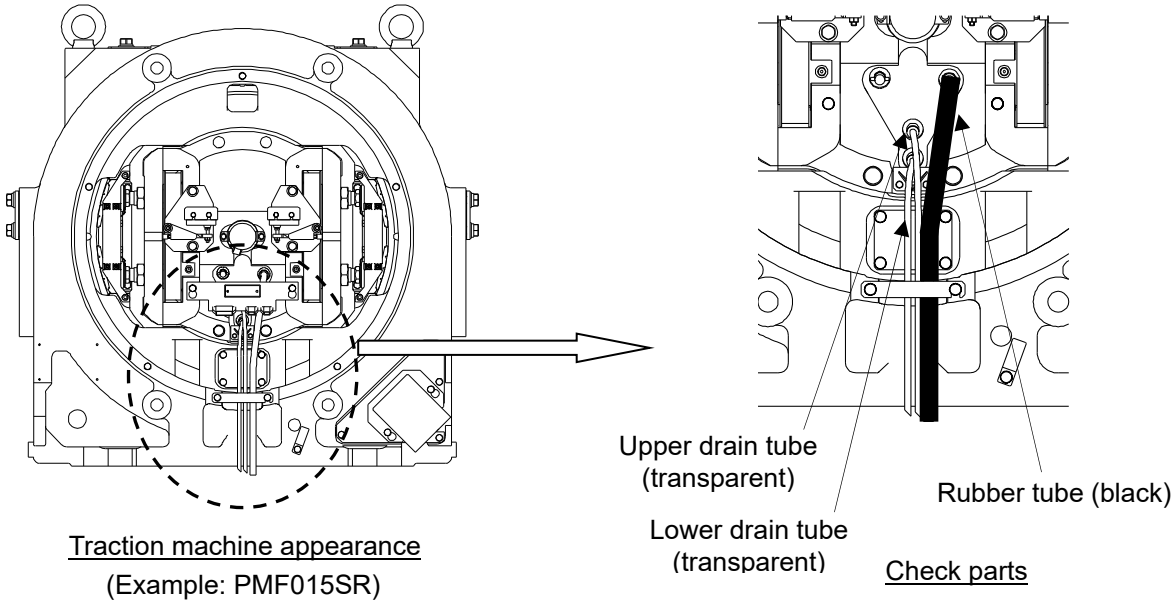
Fig. 16 Instructions for checking alignment of marks on brake bolt of traction machine group j

5.4. Checking lower drain tube condition

For the traction machine group α listed below, check that oil is not adhering to the lower drain tube.

Danger	**If oil is adhering to the lower drain tube, the brake torque may have been reduced. In that case, contact our official distributor.**

Traction Machine Type (Group α)
PMF018S, PMF025S, PMF015SR, PMF021SR
PMF011MB, PMF016MB, PMF020MB, PMF027MB, PMF027MS, PMF021MM
PMF3P7S-E, PMF6P5S-E, PMF011S-E, PMF3P7S4, PMF011S4, PMF016S



Traction machine appearance
(Example: PMF015SR)

Fig. 17 Instructions for checking lower drain tube

6. Check of brake coil stroke and lining clearance

6.1. Checking brake coil stroke

Check the brake coil stroke.

The procedure for checking coil stroke and lining clearance differs depending on the traction machine type. See the instructions in an appropriate section, referring to Table 5.

Contact our official distributor if there is any abnormality (the stroke is out of the allowable range).

Table 5 Referral section for checking coil stroke

Traction machine type	Referral section	
	Group	Fig.
PM3P7SS, PM6P5SS, PM6P5SS2, PM011SS, PM011SS2 PM3P7SR, PM6P5SR, PM6P5SR2, PM011SR, PM011SR2, PM016SR PM015S, PM018S, PM021S, PM025S	T	Fig. 18
PM2P8GS		Fig. 19
PMF018S, PMF025S, PMF015SR, PMF021SR		Fig. 20
PMF011MB, PMF016MB, PMF020MB, PMF027MB PMF027MS, PMF021MM		Fig. 21
PMF3P7S-E, PMF6P5S-E, PMF011S-E PMF3P7S4, PMF011S4, PMF016S		Fig. 22
PML-F037EB, PML-F065EB, PML-F110EB		Fig. 23
PML-F180	U	-
PM025MR, PM040MR	V	Fig. 24
PML-0028A, PML-0037C, PML-0046A PML-0065B, PML-0062B, PML-0110B	W	Fig. 25
PMF011ML, PMF016ML, PMF020ML, PMF027ML	X	Figs. 26, 27
PML-63AL, PML-63AR, PML-94BL, PML-94BR	Y	Fig. 28
PML-25AR, PML-40AR, PML-25BR, PML-40BR PML-F25AL, PML-F25AR, PML-F40AL, PML-F40AR PML-34AL, PML-34AR, PML-50AL, PML-50AR PML-F34AL, PML-F50AL, PML120LAL, PML120LAR, PML120MAL, PML120MAR, PML120SAL, PML120SAR, PML-F81AL	Z	Fig. 29

Traction machine type (Group T)
PM3P7SS, PM6P5SS, PM6P5SS2, PM011SS, PM011SS2
PM3P7SR, PM6P5SR, PM6P5SR2, PM011SR, PM011SR2, PM016SR
PM015S, PM018S, PM021S, PM025S, PM2P8GS
PMF018S, PMF025S, PMF015SR, PMF021SR
PMF011MB, PMF016MB, PMF020MB, PMF027MB, PMF027MS, PMF021MM
PMF3P7S-E, PMF6P5S-E, PMF011S-E, PMF3P7S4, PMF011S4, PMF016S
PML-F037EB, PML-F065EB, PML-F110EB

Procedure for checking coil stroke of traction machine group T

(1) Preparation of feeler gauge

Prepare the feeler gauge provided for the traction machine, referring to Table 6.

Table 6 Feeler gauge for traction machine type T

Traction machine type	PM3P7SR PM6P5SR PM6P5SR2	PM011SR PM011SR2 PM016SR	PM3P7SS PM6P5SS PM6P5SS2	PM011SS PM011SS2	PM015S PM018S PM021S PM025S	PM2P8GS	PMF015SR PMF021SR	PMF018S PMF025S
Gauge thickness (quantity)	0.62 mm (0.10 mm × 1 0.12 mm × 1 0.20 mm × 2)	0.67 mm (0.12 mm × 1 0.15 mm × 1 0.20 mm × 2)	0.54 mm (0.10 mm × 1 0.12 mm × 2 0.20 mm × 1)	0.59 mm (0.12 mm × 2 0.15 mm × 1 0.20 mm × 1)	0.73 mm (0.15 mm × 1 0.18 mm × 1 0.20 mm × 2)	0.72 mm (0.10 mm × 1 0.12 mm × 2 0.18 mm × 1 0.20 mm × 1)	0.38 mm (0.10 mm × 2 0.18 mm × 1)	0.35 mm (0.10 mm × 2 0.15 mm × 1)

Traction machine type	PMF011MB PMF016MB PMF021MM	PMF020MB PMF027MB PMF027MS	PMF3P7S-E PMF6P5S-E PMF3P7S4	PMF011S-E PMF011S4 PMF016S	PML-F037EB PML-F065EB	PML-F110EB
Gauge thickness (quantity)	0.40 mm (0.10 mm × 1 0.12 mm × 1 0.18 mm × 1)	0.40 mm (0.10 mm × 1 0.12 mm × 1 0.18 mm × 1)	0.35 mm (0.10 mm × 2 0.15 mm × 1)	0.40 mm (0.10 mm × 1 0.12 mm × 1 0.18 mm × 1)	0.35 mm (0.10 mm × 2 0.15 mm × 1)	0.40 mm (0.10 mm × 1 0.12 mm × 1 0.18 mm × 1)

(2) Coil stroke check

Insert the feeler gauges into the center of the space between the field (fixed side) and the armature (movable side) as deep as possible and check that the line marked on the gauge is still outside the coil.

Caution	**Check coil stroke while the brake coil is not being energized (the brake is being applied). Check the coil stroke of either right or left brake at a time.**

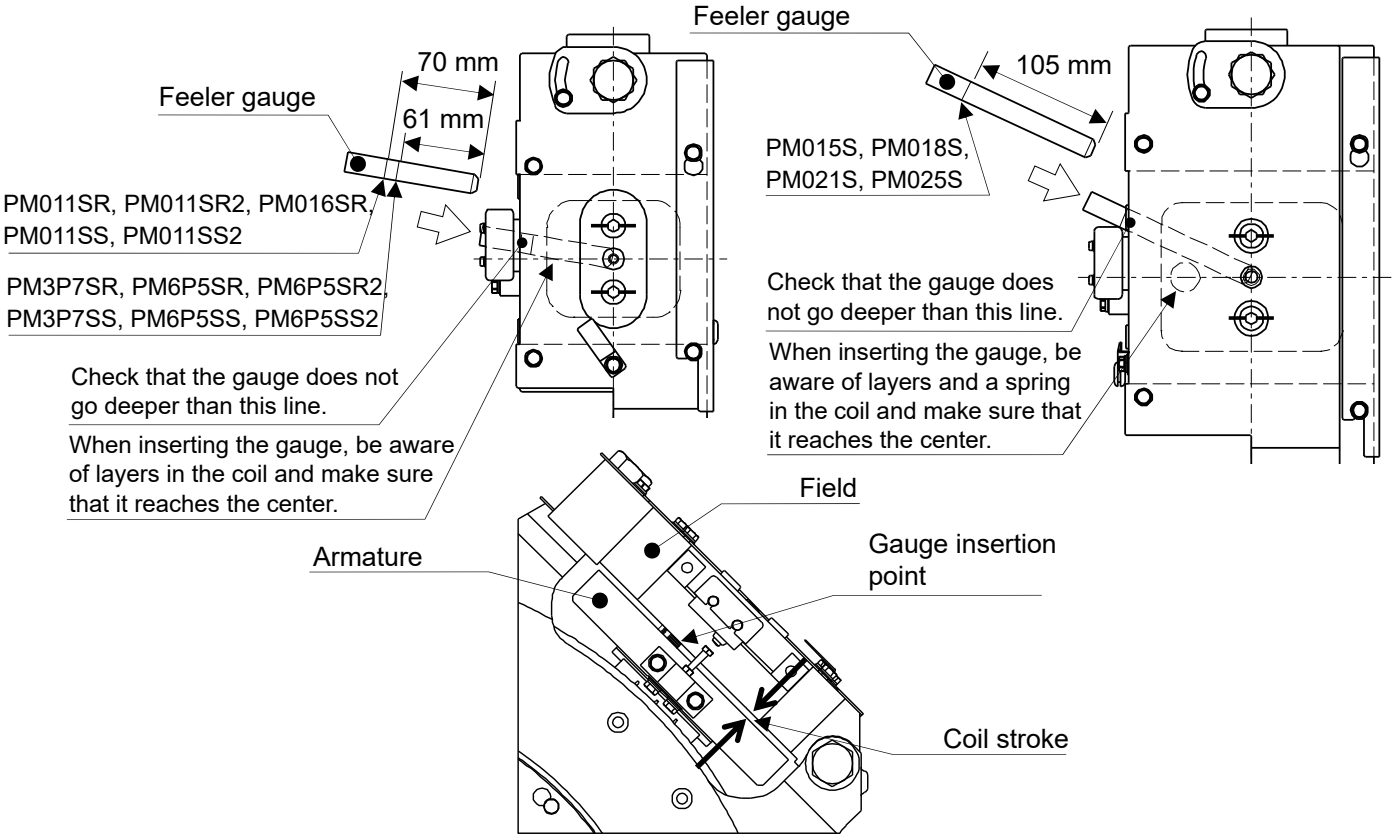


Fig. 18 Procedure (1) for checking coil stroke of traction machine group T

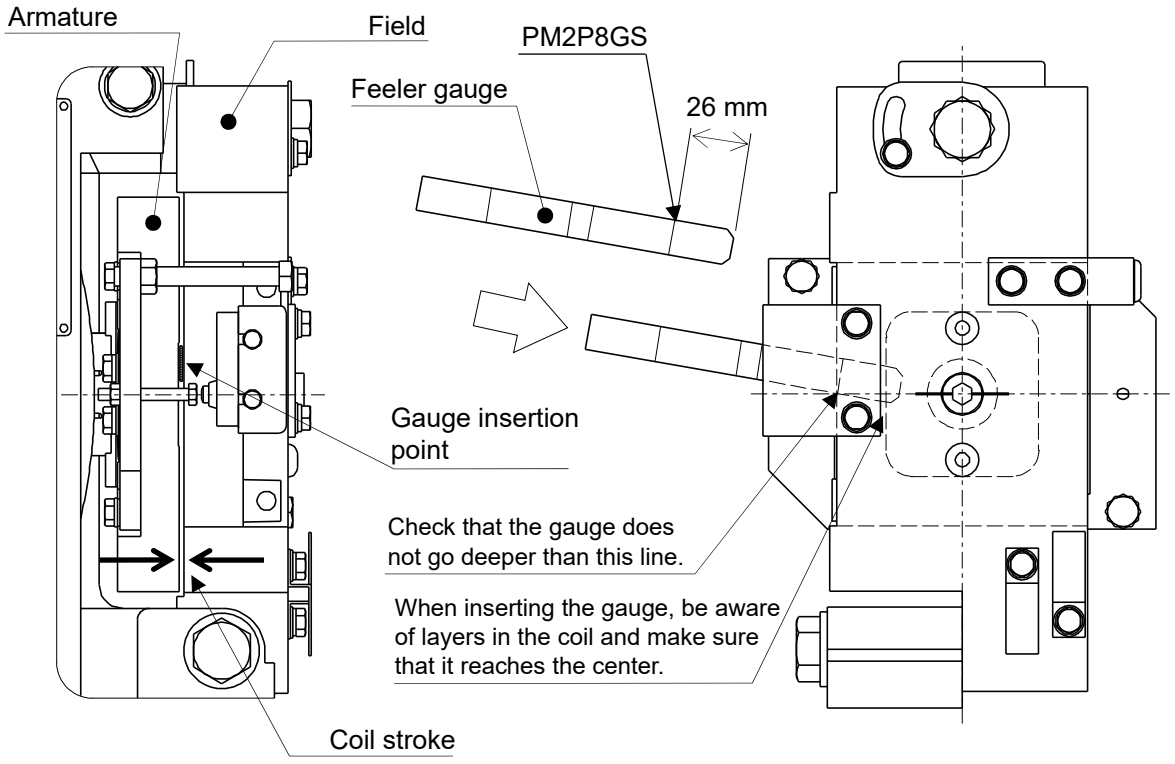


Fig. 19 Procedure (2) for checking coil stroke of traction machine group T

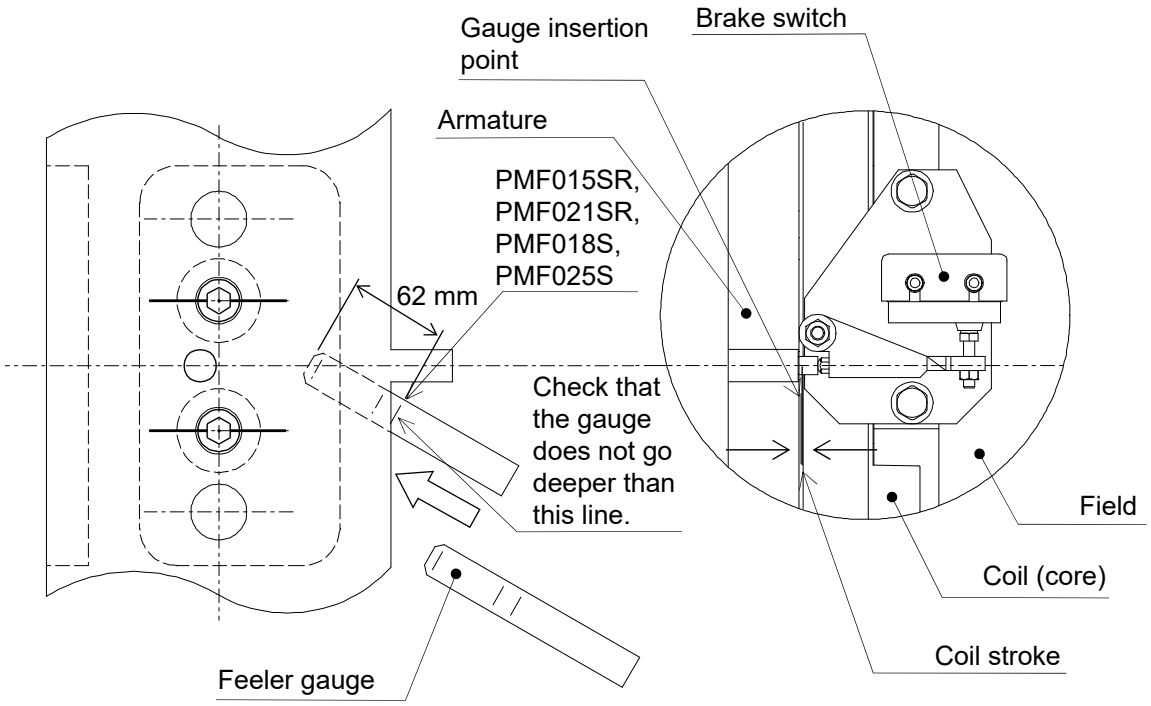


Fig. 20 Procedure (3) for checking coil stroke of traction machine group T

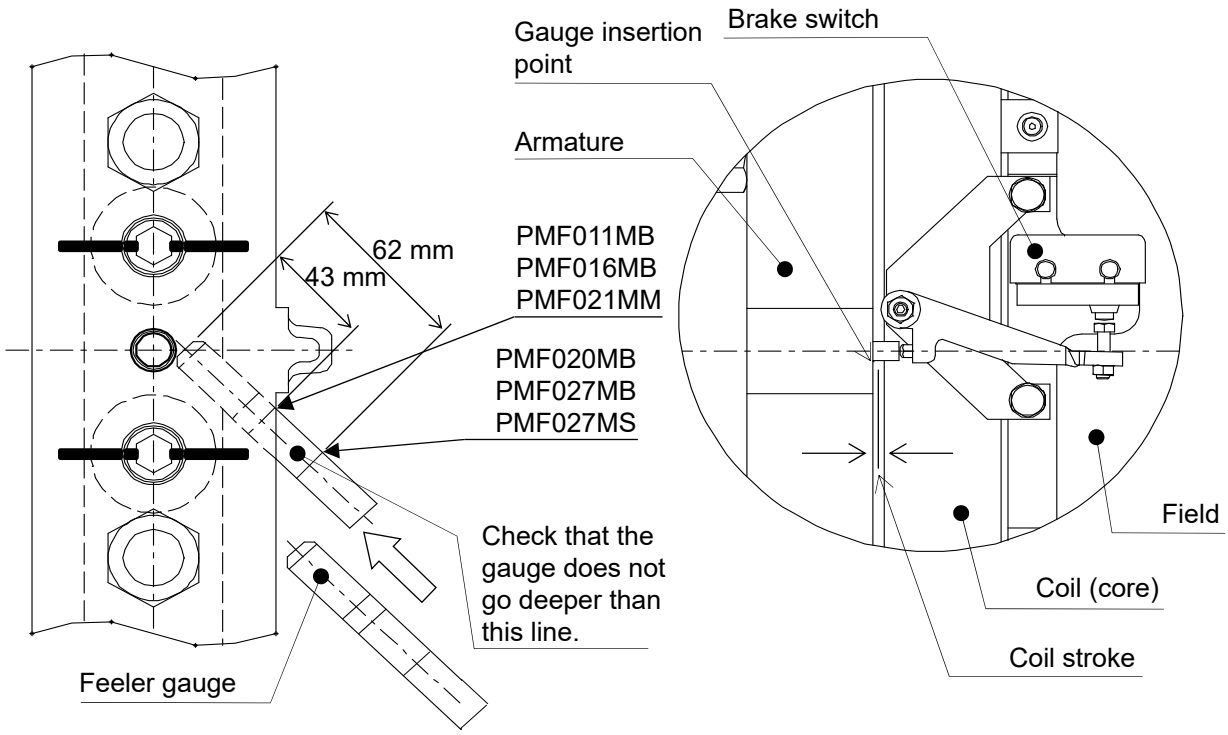


Fig. 21 Procedure (4) for checking coil stroke of traction machine group T

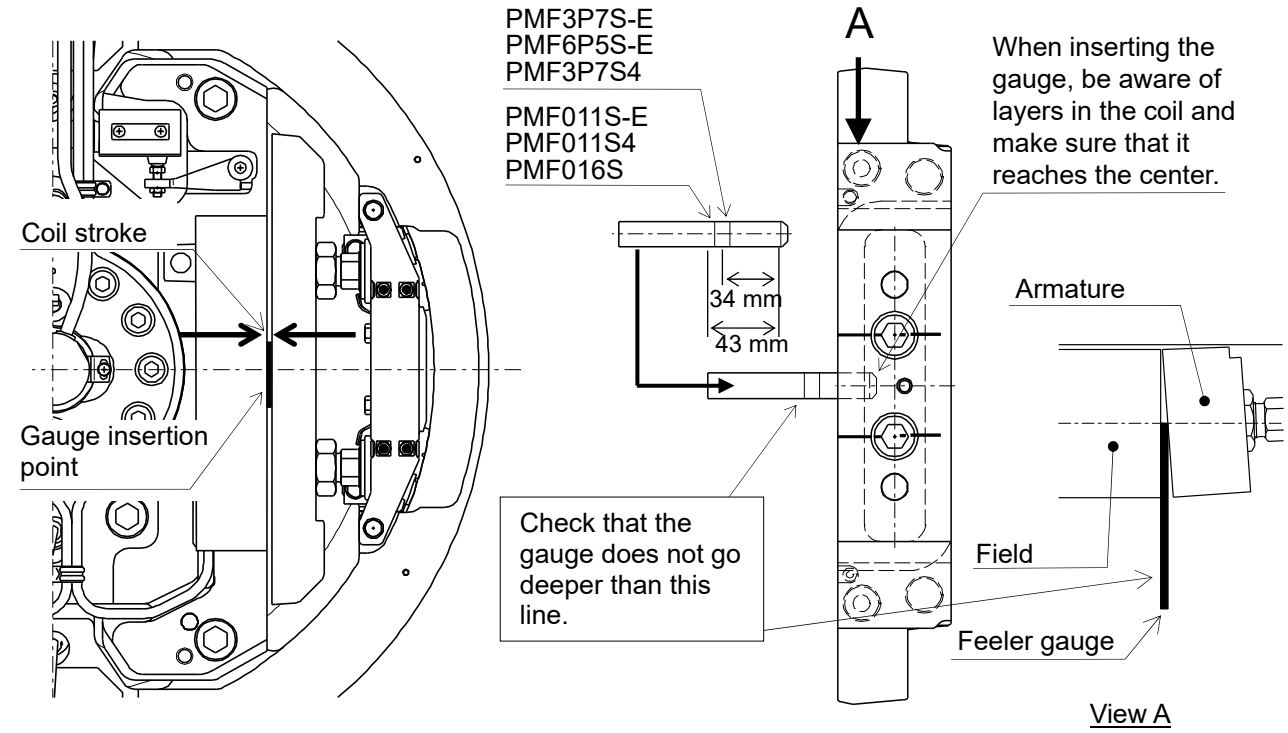


Fig. 22 Procedure (5) for checking coil stroke of traction machine group T

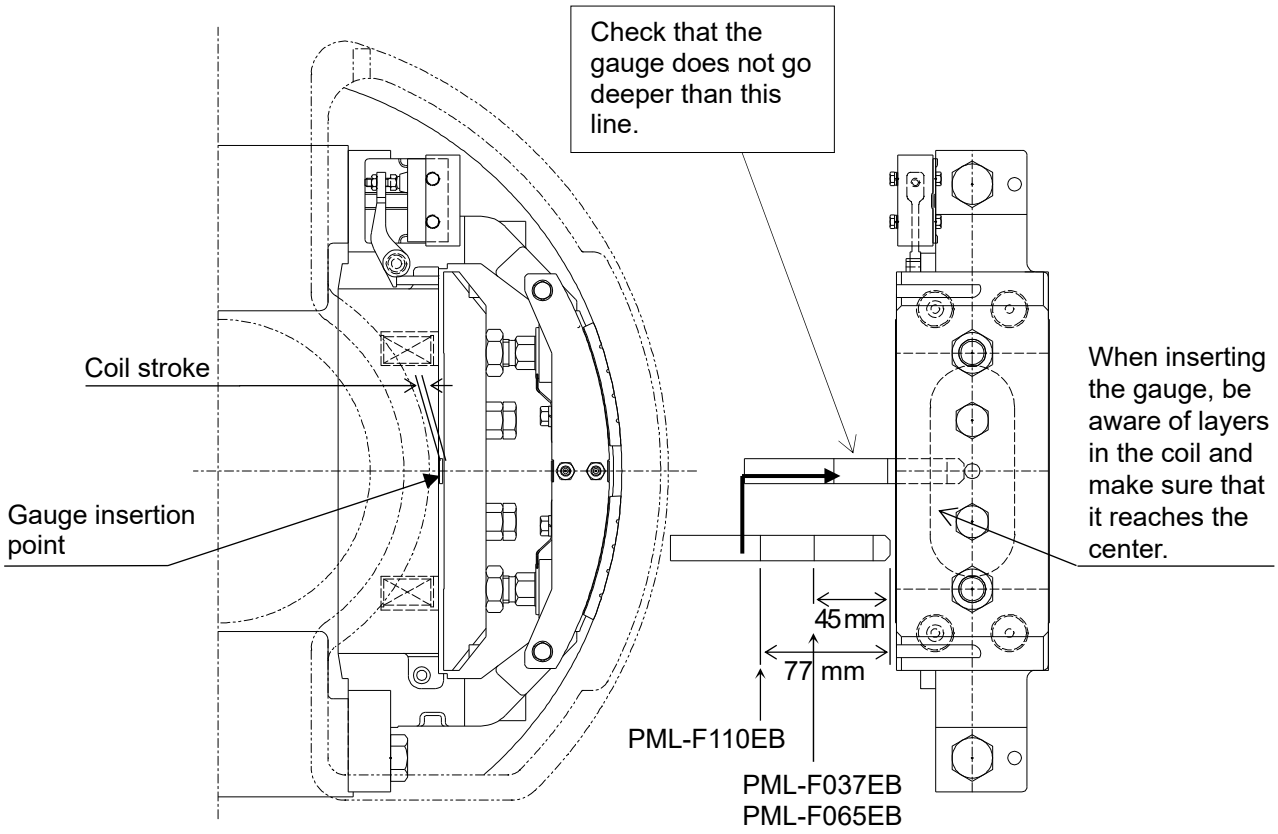


Fig. 23 Procedure (6) for checking coil stroke of traction machine group T

Traction machine type (Group U)
PML-F180

Procedure for checking coil stroke of traction machine group U

Check that there is no rubbing noise from between the linings and the drum (when the brake is released). Also, check that the operating brake sound is not detected in the car and hall.

Traction machine type (Group V)
PM025MR, PM040MR

Procedure for checking coil stroke of traction machine group V

(1) Preparation of feeler gauge

Prepare the feeler gauge provided for the traction machine, referring to Table 7.

Table 7 Feeler gauge for traction machine group V

Traction machine type	PM025MR, PM040MR
Gauge thickness (quantity)	Upper limit gauge: 0.20 mm (0.10 mm × 2) Lower limit gauge: 0.28 mm (0.18 mm × 1, 0.10 mm × 1)

(2) Adjustment of dust-proof cover

Move the dust-proof cover to the armature (movable side).

(3) Coil stroke check

i) Insert the upper limit gauge from the encoder side into the upper clearance between the field and the armature. Check that the line marked on the gauge goes beyond the reference plane for brake installation (the tip of the gauge goes beyond the center of the armature into the sheave side). Check the lower clearance as well.

ii) Insert the lower limit gauge from the encoder side into the upper clearance between the field and the armature. Check that the gauge stops before the line marked on the gauge goes beyond the reference plane for brake installation (the tip of the gauge does not cross the center of the armature toward the sheave side). Check the lower clearance as well.

Caution	**Check coil stroke while the brake coil is not being energized (the brake is being applied). Check the coil stroke of either right or left brake at a time.**

(4) Restoration of dust-proof cover

After coil stroke check is complete, set the dust-proof cover to the original position.

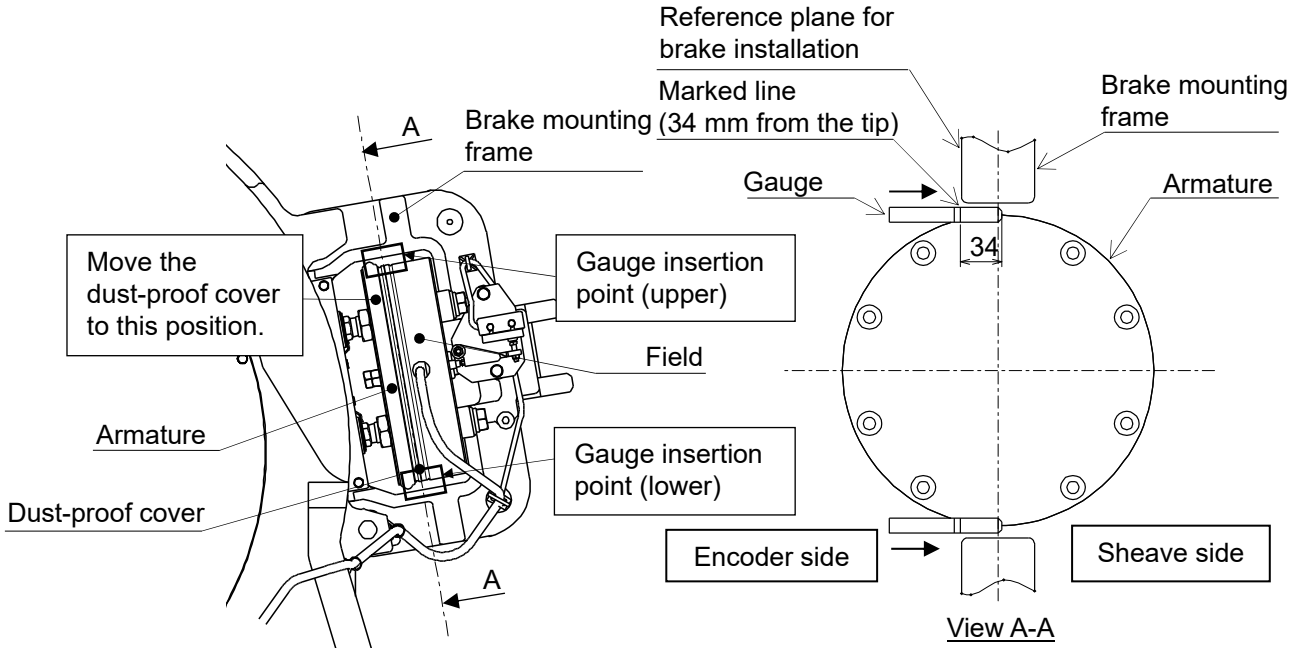


Fig. 24 Procedure for checking coil stroke of traction machine group V

Traction machine type (Group W)
PML-0028A, PML-0037C, PML-0046A, PML-0065B, PML-0062B, PML-0110B

Procedure for checking coil stroke of traction machine group W

(1) Preparation of feeler gauge

Prepare the feeler gauge provided for the traction machine, referring to Table 8.

Table 8 Feeler gauge for traction machine group W

Traction machine type	PML-0028A, PML-0037C, PML-0065B	PML-0046A, PML-0062B, PML-0110B
Gauge thickness (quantity)	0.40 mm [0.10 mm x 1 0.15 mm x 2]	0.45 mm [0.15 mm x 3]

(2) Adjustment of dust-proof cover position

Move the dust-proof cover by finger.

(3) Coil stroke check

Insert the feeler gauge into the space between the field (fixed side) and the armature (movable side) as deep as possible and check that the line marked on the gauge is still outside the coil on both right and left sides.

Caution	**Check coil stroke while the brake coil is not being energized (the brake is being applied). Check the coil stroke of either right or left brake at a time.**

(4) Restoration of dust-proof cover

After coil stroke check is complete, set the dust-proof cover to the original position.

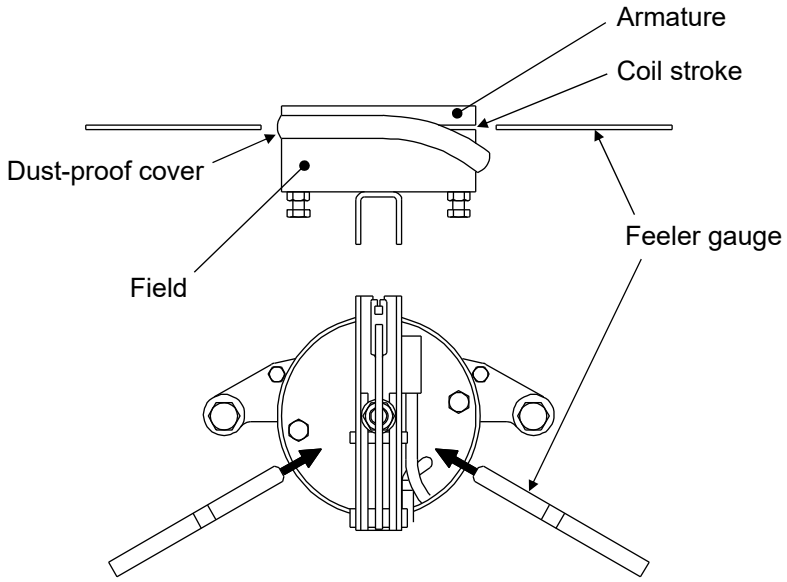


Fig. 25 Procedure for checking coil stroke of traction machine group W

Traction machine type (Group X)
PMF011ML, PMF016ML, PMF020ML, PMF027ML

Procedure for checking coil stroke of traction machine group X

(1) Preparation of coil stroke checking jig and feeler gauge

Prepare the coil stroke checking jig and the feeler gauge provided for the traction machine, referring to Fig. 26 and Table 9.

Table 9 Feeler gauge for traction machine group X

Traction machine type	PMF011ML, PMF016ML, PMF020ML, PMF027ML
Gauge thickness (quantity)	0.10 mm × 4 0.15 mm × 2 0.50 mm × 1

(2) Jig setting

Mount the coil stroke checking jig on the brake in accordance with the procedure below. (Refer to Fig. 26.)

Caution	**Check coil stroke while the brake coil is not being energized (the brake is being applied).**

i) Remove M10 bolts and nuts from the adjusting plate of the jig.

ii) Fix the adjusting plate on the center of the field with M12 bolt. Tighten the bolt with a wrench.

iii) Attach M10 bolts and nuts to the adjusting plate.

iv) Check that M10 bolts are apart from the field. Fasten the bolts by hand so that they just touch the field (fasten the bolts until it is suddenly hard to rotate).

v) Tighten M10 nuts by hand to lock the bolts.

Danger	**Do not tighten the M10 bolts with a wrench. If the bolts are tightened by a wrench, the brake may be released. (Refer to Fig. 26.)**

(3) Coil stroke check 1

Release the brake (brake coil is energized) and check the clearance between the tip of M10 bolt and the field in accordance with the procedure below. (Refer to Fig. 26.)

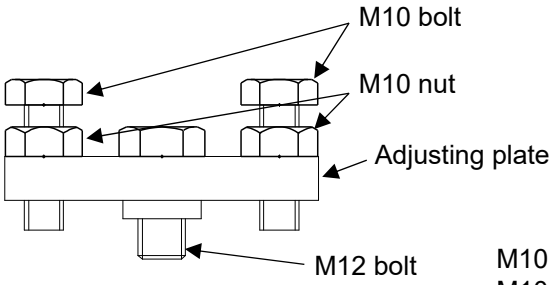
i) Insert the feeler gauge into the coil stroke C and measure the clearance.
(Prepare a proper feeler gauge, referring to Table 11.)

ii) Check the coil stroke D value corresponding to the measured value of coil stroke C, referring to Table 10. Check that the lower limit gauge can be inserted and the upper limit gauge cannot be inserted into the clearance.

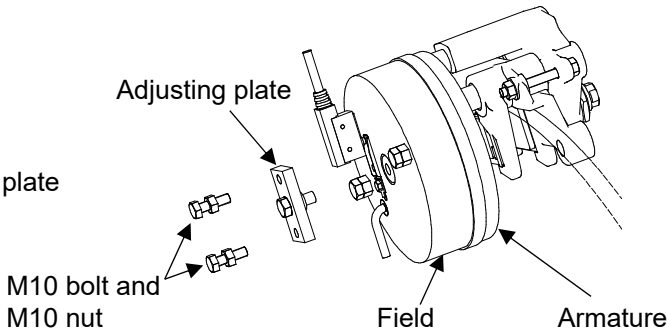
Caution	**Check the coil stroke of either right or left brake at a time.**

(4) Restoration

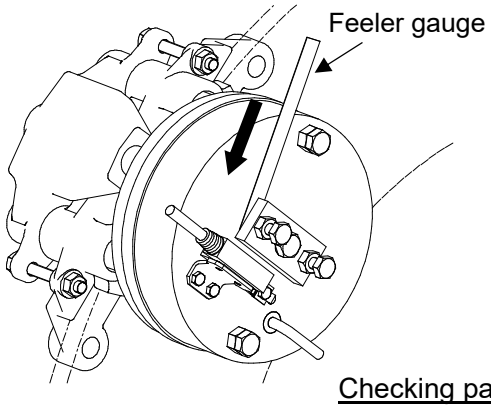
Remove the coil stroke checking jig.

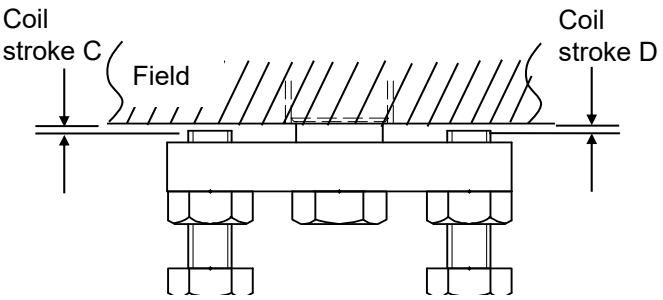


Coil stroke checking jig



Setting of coil stroke checking jig





Checking parts of coil stoke

Fig. 26 Procedure (1) for checking coil stroke of traction machine group X

Table 10 Coil stroke

Measured value of coil stroke C	Coil stroke D	
	Lower limit gauge (Check that the gauge can be inserted)	Upper limit gauge (Check that the gauge cannot be inserted)
0.55	0.75	1.00
0.60	0.70	0.95
0.65	0.65	0.90
0.70	0.60	0.85
0.75	0.55	0.80
0.80	0.50	0.75
0.85	0.45	0.70
0.90	0.40	0.65
0.95	0.35	0.60
1.00	0.30	0.55

Table 11 Combination of feeler gauge

Thickness	Quantity			Thickness	Quantity		
	0.1 mm	0.15 mm	0.5 mm		0.1 mm	0.15 mm	0.5 mm
0.30	3			0.7	2		1
0.35	2	1		0.75	1	1	1
0.40	4			0.8	3		1
0.45	3	1		0.85	2	1	1
0.50			1	0.90	4		1
0.55	4	1		0.95	3	1	1
0.60	1		1	1.00	2	2	1
0.65		1	1	1.05	4	1	1

(5) Coil stroke check 2 (final check)

Check the coil stroke in accordance with the procedure below. (Refer to Fig. 27.)

i) Move the dust-proof cover.

ii) Insert the 0.15 mm-feeler gauge into the clearance between the field (fixed side) and armature (movable side). Check that the gauge can be inserted 3 mm or deeper into the entire clearance.

Caution	**Check coil stroke while the brake coil is not being energized (the brake is being applied). Check the coil stroke of either right or left brake at a time.**

iii) Set the dust-proof cover to the original position.

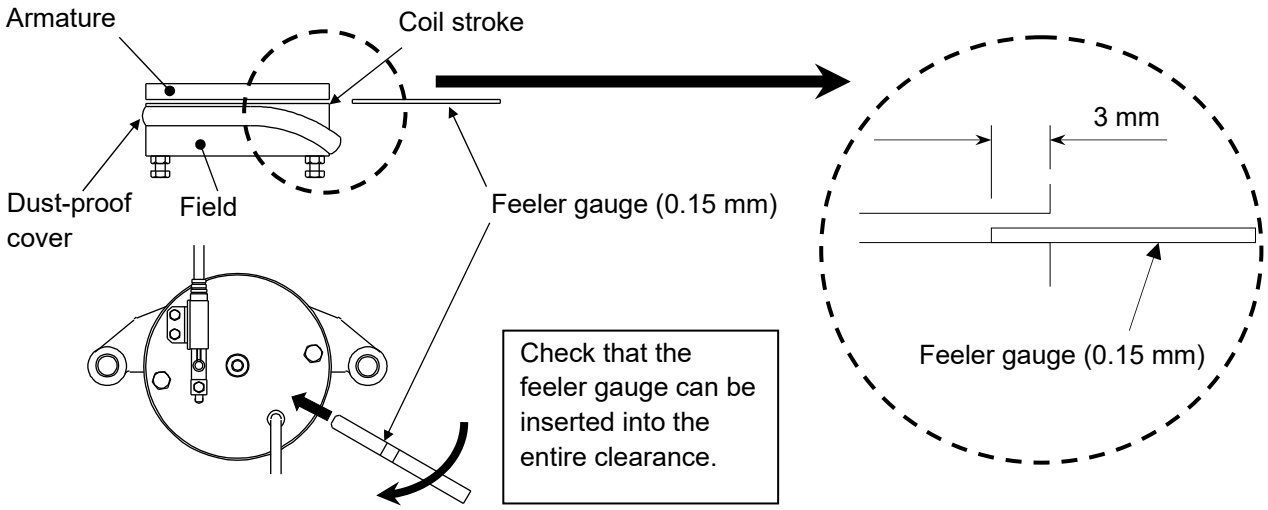


Fig. 27 Procedure (2) for checking coil stroke of traction machine group X

Traction machine type (Group Y)
PML-63AL, PML-63AR, PML-94BL, PML-94BR

Procedure for checking coil stroke of traction machine group Y

(1) Preparation of feeler gauge

Prepare a feeler gauge.

No feeler gauge is attached to the traction machine group Y.

(2) Adjustment of dust-proof cover position

Move the dust-proof cover slightly so that the faces of the field and the armature can be seen.

(3) Coil stroke check

Insert the feeler gauge into the clearance between the field (fixed side) and the armature (movable side). Check that the clearance (average value of four-point measurement) is 0.6 mm.

The difference between the maximum value and minimum value of measured clearance (at four points) shall not exceed 0.5 mm.

Caution

Check coil stroke while the brake coil is not being energized (the brake is being applied). Check the coil stroke of either right or left brake at a time.

(4) Restoration of dust-proof cover

After coil stroke check is complete, set the dust-proof cover to the original position.

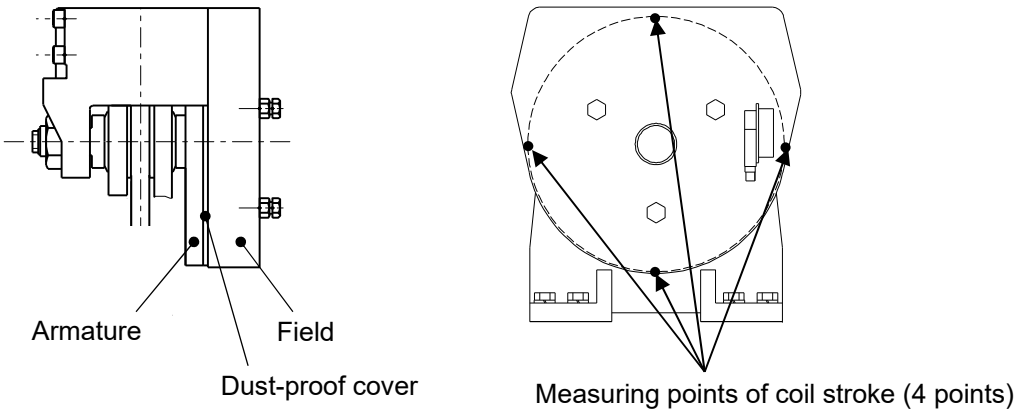


Fig. 28 Procedure for checking coil stroke of traction machine group Y

Traction machine type (Group Z)
PML-25AR, PML-40AR, PML-25BR, PML-40BR, PML-F25AL, PML-F25AR, PML-F40AL, PML-F40AR PML-34AL, PML-34AR, PML-50AL, PML-50AR, PML-F34AL, PML-F50AL, PML120LAL, PML120LAR, PML120MAL, PML120MAR, PML120SAL, PML120SAR, PML-F81AL

Procedure for checking coil stroke of traction machine group Z

(1) Preparation of coil stroke checking jig and feeler gauge

Prepare the coil stroke checking jig and the feeler gauge provided for the traction machine, referring to Fig. 29 and Table 13.

Table 13 Feeler gauge for traction machine group Z

Traction machine type	PML-25AR, PML-40AR, PML-25BR, PML-40BR, PML-F25AL, PML-F25AR, PML-F40AL, PML-F40AR PML-34AL, PML-34AR, PML-50AL, PML-50AR, PML-F34AL, PML-F50AL, PML120LAL, PML120LAR, PML120MAL, PML120MAR, PML120SAL, PML120SAR, PML-F81AL
Gauge thickness (quantity)	Upper limit gauge: 0.70 mm (0.35 mm × 2) Lower limit gauge: 0.50 mm (0.50 mm × 1)

(2) Jig setting

Set the coil stroke checking jig to the center of the brake coil in accordance with the procedure below. (Refer to Fig. 29.)

Caution	**Check coil stroke while the brake coil is not being energized (the brake is being applied).**

i) Assemble the coil stroke checking jig as shown in Fig. 29 and attach it to the center of the brake coil.

Fasten the M16 bolt by hand, and turn it with a wrench approximately 90 degrees.

Loosen the M16 nut to keep the checking plate apart from the hex socket cap bolts.

ii) Adjust the position of the checking plate so that it just touches the hex socket cap bolts. Then, tighten the M16 nut to fix the plate.

iii) Move the car and release the brake in manual operation. Check that the plate is fixed firmly and M16 nut is fastened. If the plate moves or the nut is loose, reset the jig.

Danger	**Once the checking plate comes in contact with the hex socket cap bolts, do not tighten the M16 bolt further. It is very dangerous because the brake may be released forcibly. (Refer to Fig. 29.)**

(3) Coil stroke check

Move the car and release the brake in manual operation. Insert the feeler gauge into the clearance between the checking plate and hex socket cap bolts, and check that the conditions below are met.

i) The lower limit gauge (0.5 mm) can be inserted.

ii) The upper limit gauge (0.7 mm) cannot be inserted.

Caution	Check the coil stroke of either right or left brake at a time.

(4) Restoration

Remove the coil stroke checking jig.

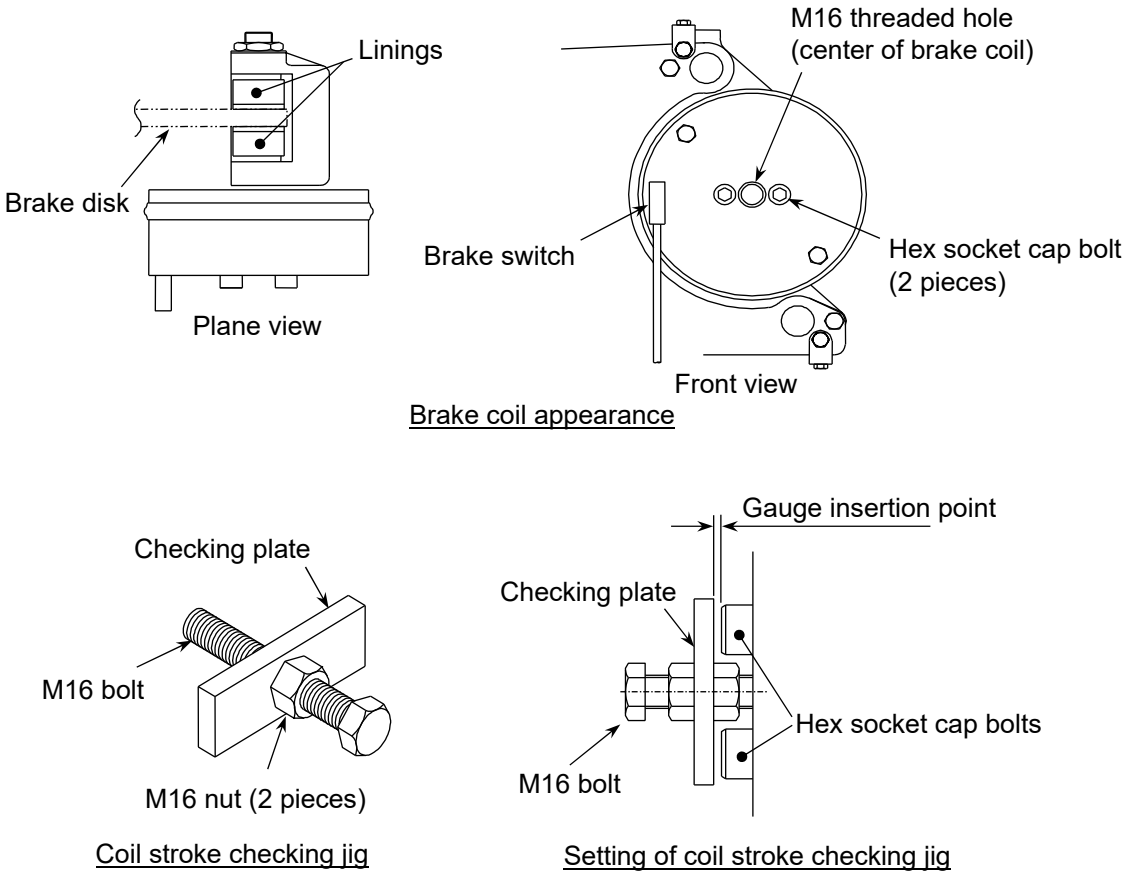


Fig. 29 Procedure for checking coil stroke of traction machine group Z

6.2. Checking brake lining clearance

Check the lining clearance in accordance with the procedure for each traction machine.

Contact our official distributor if there is any abnormality (the clearance is out of the allowable range).

Traction machine type (Group y)
PM3P7SS, PM6P5SS, PM6P5SS2, PM011SS, PM011SS2
PM3P7SR, PM6P5SR, PM6P5SR2, PM011SR, PM011SR2, PM016SR
PM015S, PM018S, PM021S, PM025S, PM2P8GS
PMF018S, PMF025S, PMF015SR, PMF021SR
PMF011MB, PMF016MB, PMF020MB, PMF027MB, PMF027MS, PMF021MM
PMF3P7S-E, PMF6P5S-E, PMF011S-E, PMF3P7S4, PMF011S4, PMF016S
PML-F037EB, PML-F065EB, PML-F110EB, PML-F180
PM025MR, PM040MR

Procedure for checking lining clearance of traction machine group y

Move the car up and release the brake in manual operation. Visually check that the linings are lifted off of the drum. If it is difficult to check it visually, check that there is no rubbing noise from between the linings and the drum.

Traction machine type (Group z)
PML-0028A, PML-0037C, PML-0046A, PML-0065B, PML-0062B, PML-0110B
PMF011ML, PMF016ML, PMF020ML, PMF027ML, PML-63AL, PML-63AR, PML-94BL, PML-94BR
PML-25AR, PML-40AR, PML-25BR, PML-40BR, PML-F25AL, PML-F25AR, PML-F40AL, PML-F40AR
PML-34AL, PML-34AR, PML-50AL, PML-50AR, PML-F34AL, PML-F50AL,
PML120LAL, PML120LAR, PML120MAL, PML120MAR, PML120SAL, PML120SAR, PML-F81AL

Procedure for checking lining clearance of traction machine group z

Move the car and release the brake in manual operation. Visually check that the conditions below are met.

i) The lining does not come in contact with the brake disk.

ii) The gaps A and B between the lining and the brake disk are almost equal.

*The above a) and b) can be easily checked by illuminating the area from the opposite side.

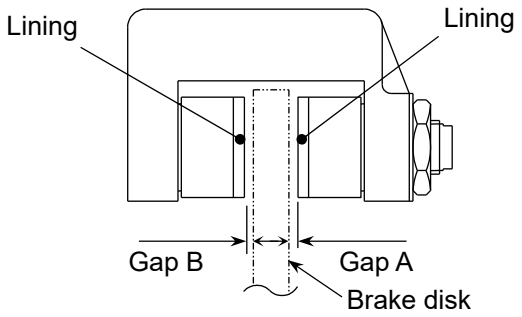


Fig. 30 Procedure for checking coil stroke of traction machine group z

7. Check of brake torque to hold a car stationary

Check the brake torque in accordance with the procedure below.

Procedure for checking brake torque

Load the weight of 160% of the rated capacity in the car and check that the car remains stationary.

*Observe the following instructions to prevent the car from moving down.

Danger	**Park the car at the bottom floor to load weights.** **Do not load many weights at a time. Load them in several batches.** **Do not put weights on one side of the car. Disperse them to spread the load evenly over the floor.** **Be careful not to damage the hall and car when loading weights.**