



ALFARAIL SYSTEM[®]

Owner's Manual: Installation, Operation, Maintenance



- Be sure to read this operation manual and the other related manuals before attempting to install, operate, or perform maintenance on this system.
- Keep the operation manuals in a location near the system where they can be referenced in a regular manner.
- Failure to observe the instructions and safety precautions indicated in these manuals could result in serious injury or death, and could cause system and other property damage.

Introduction

Thank you for purchasing TOYOTSU TECHNO CORPORATION's "ALFARAIL System".

The ALFARAIL is a material handling system which permits a hoist unit and a load of up to 0.5 tons to be moved as desired.

Be sure to read this operation manual carefully in order to ensure that the ALFARAIL System is used in a safe and correct manner which makes full use of its functions.

After reading this manual, keep it (together with the "ALFARAIL System Catalog" and the "ALFARAIL System Standard Mounting Fixture List") in a location near the ALFARAIL System so that it can be easily referenced when performing maintenance (periodic inspections, troubleshooting), etc.

When using the ALFARAIL System in combination with the KENSUI Hoist Unit, the "KENSUI Hoist Unit Operation Manual" should also be kept together with the above materials.

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[1] ALFARAIL System

1. ALFARAIL System Component Names

(The ALFARAIL System configuration is shown below.)

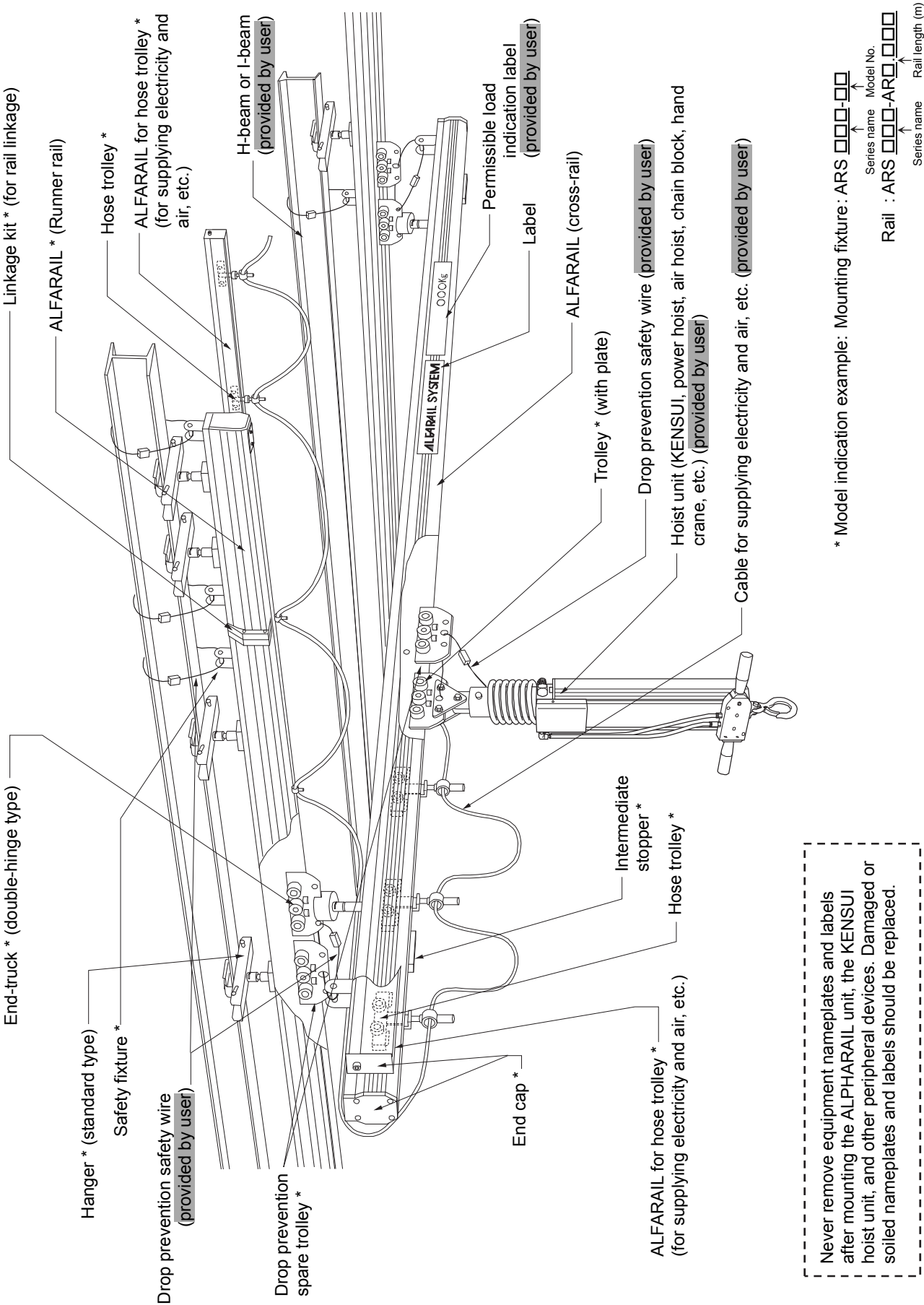


Fig. 1

2. About The ALFARAIL System

The ALFARAIL System is designed for applications related to production, production assistance, and shipping (packing tasks, etc.), and represents a material handling system which permits a [hoist unit + load] weight of up to 0.5 tons to be freely moved by hand in a horizontal manner along the system's runner-rails and cross-rail. When used in combination with a hoist unit (power chain bloc, hand crane, etc.), the ALFARAIL System permits a suspended load to be moved as desired through its working range, thereby reducing the burden placed on workers and increasing their work efficiency.


[2] Safety Precautions

In order to use the ALFARAIL System (installation, operation, maintenance, inspection) in a safe and correct manner, be sure to read this manual carefully, making certain to understand its content. Moreover, be sure that this manual is made available to both the system operator and the supervisor, and that it is kept (together with the "ALFARAIL System Catalog" and the "ALFARAIL System Standard Mounting Fixture List") in a location near the ALFARAIL System so that it can be easily referenced as necessary. When using the ALFARAIL System in combination with the KENSUI Hoist Unit, the "KENSUI Hoist Unit Operation Manual" should also be kept together with the above materials. The graphical safety precautions which appear in this manual are designed to prevent injuries (to the operator, maintenance personnel, and bystanders) and property damage. These precautions are explained below.


1. Safety Headings


Precautions are classified under the following graphical headings, based on the degree of risk involved:


Failing to observe this precaution could result in an extremely hazardous condition which will result in serious injury or death to the user or to other persons in the vicinity.


Failing to observe this precaution could result in serious injury or death to the user or to other persons in the vicinity.


Failing to observe this precaution could result in minor to moderate injury to the user or to other persons in the vicinity, and could cause system and other property damage.


Failing to observe this precaution could result in damage to the system and other property.



Follow all of the precautions in this section. Failure to do so could result in serious injury, death or property damage.

I: General Handling

- Only persons familiar with this operation manual and the warning label content for the peripheral devices may operate this system.
- Crane and sling procedures may be performed only by trained workers. Do not allow any other workers to perform these procedures.
- Be sure to observe the "Installation Precautions" (page 8), "Safety Measures" (page 9), "ALFARAIL System Installation Standard" (pages 10 and 11), and perform the procedures described in the "ALFARAIL System Installation Check Sheet" (pages 26 to 27), and "Periodic Inspections" (pages 30 to 31).
- This equipment is designed only to move loads. Do not use for any other purpose.
- Moreover, this equipment is designed to handle only vertical loads. Never attempt to reverse the up/down orientation, or to use a horizontal orientation.
- Do not remove the nameplates and warning labels from the ALFARAIL System, the KENSUI Hoist Unit, and other peripheral devices. If a nameplate or label is missing or illegible, it must be replaced. To obtain new nameplates and labels, please contact the equipment installer, the sales outlet, or TOYOTSU TECHNO CORPORATION.

II: Installation And Worksite

- Installation work must be performed by an employee with specialized knowledge and training, and who has carefully read this manual.
- Use only the name-brand parts specified by TOYOTSU TECHNO CORPORATION.
- Verify that the installation site is suitable, and that it offers adequate strength.
- Before installing, be sure to verify that the suspension span's usage range and the permissible load conform to the drawings, specifications, and relevant safety standards.
- Do not install outdoors or in a harsh environment (extremely high or low temperatures, dusty, corrosive gases, etc.).
- During the installation, be sure to install intermediate stoppers and end caps at both ends of the runner-rails and the cross-rail.
- Only installation workers should be allowed into the installation worksite.

III: Operation (1)

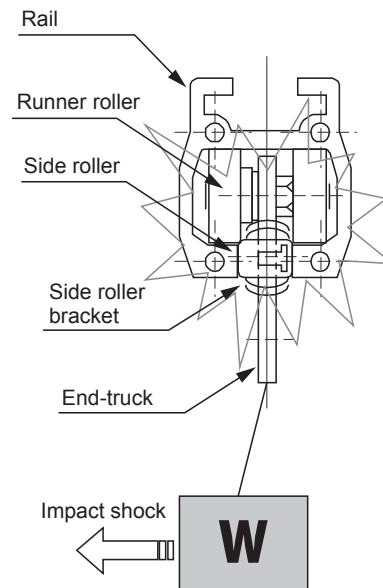
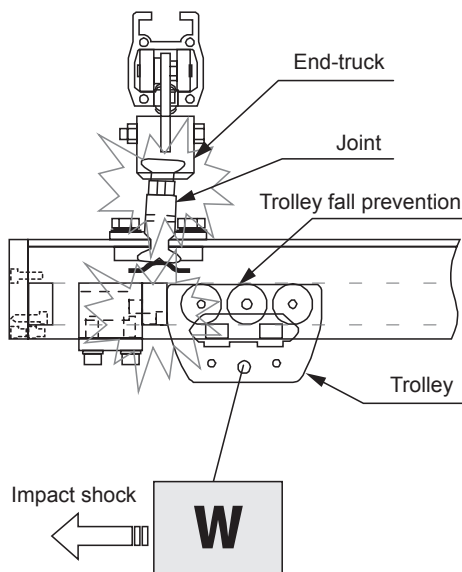
- Do not allow persons to operate this equipment unless they have been trained and have read this manual carefully."
- Never suspend a load which exceeds the permissible load limit.
- Keep persons off the suspended load, and never use the system for moving people.
- Never stand under a suspended load.
- Always monitor the hoist unit's range of motion carefully during operation, and stop the system if a person is located within that range.
- Never move loads in a manner which allows the load to pass above a person's head.
- Pay close attention to the suspended load at all times during operation.
- Do not operate in a manner which causes the load to sway.
- Never leave the operating position while a load is suspended.
- Move a load only in the up/down and left/right directions. Never perform slanting movement.
- Do not attempt to lift structural objects which are secured to the ground.
- Stop system operation immediately if abnormal sound or vibration occurs.



Follow all of the precautions in this section. Failure to do so could result in serious injury, death or property damage.

III: Operation (2)

- Allowing the trolley or end-truck to strike the intermediate stopper and end-cap as illustrated below could damage the ALFARAIL system and increase the risk of dropped loads. There is a risk of serious disaster which could lead to death, serious accident, or system damage.



- If a safety problem, malfunction, or damage, etc., occurs at the pre-operation inspection, or during operation, stop operation immediately and do not use the system again until repairs have been made.
- Use care to prevent a suspended load from catching on structural objects and wiring, etc.
- Never suspend a single load from two trolleys (shared suspension).

IV: Maintenance, Periodic Inspections, And Repairs

- Do not modify the system design or its accessory parts unless authorized by TOYOTSU TECHNO CORPORATION.
- Use only the brand-name products specified by TOYOTSU TECHNO CORPORATION.
- Maintenance, periodic inspections, and repairs should be undertaken only by a person with adequate expertise who has carefully read this manual.
- Power or air shutoff must comply with OSHA lockout/tagout procedures when performing maintenance, periodic inspections, and repairs, and only after verifying that no load is attached.
- When safety problems or other abnormalities are found in the course of maintenance and periodic inspections, do not use the system again until repairs have been made.
- When performing maintenance, periodic inspections, and repairs, always display warning signs ("Inspection In Progress", "Do Not Turn Power ON", "Overhead Work In Progress", etc.) in locations where they can be easily seen.

[3] Installation

1. Installation Precautions

■ Items to check before installing



Follow all of the precautions in this section. Failure to do so could result in serious injury, death or property damage.

- Do not install in the following locations. Doing so could result in damage and malfunctions.
 - Outdoors, or in a location exposed to spraying/splashing water.
 - Do not use the system in environments where the risk of explosions and corrosion exist.
 - * The system may not be usable in excessively dusty environments because dust accumulations can impede the rail motion. Consult with the sales outlet or TOYOTSU TECHNO CORPORATION in advance regarding acceptable ambient environment conditions.
 - Near strong corrosive chemicals such as acid and alkali, etc.
 - In a location where the ambient temperature falls below 5°C (41°F)
 - In a location where the ambient temperature rises above 40°C (104°F)
 - In a location exposed to vibration.
 - In a dirty or dusty location.
- Do not operate this system with linked cross-rails.
- Verify that all the ALFARAIL System parts (rails, hangers, end-truck, trolley, etc.) are present.
- Verify the installation site's air source position, the primary pressure value, and the connection port size before beginning the installation.
- Verify the installation site's power supply position, the primary power voltage, and the ground wire, etc., before beginning the installation.
- Verify that all the ALFARAIL System parts (rails, hangers, end-truck, trolley, etc.) are present.
- Verify the installation site's air source position, the primary pressure value, and the connection port size, etc., before beginning the installation.
- Verify the installation site's power supply position, the primary power voltage, and the ground wire, etc., before beginning the installation.
- Verify the installation site's beam strength, construction, and beam shape, etc., before beginning the installation.

This system installation requires steel I-beams or H-beams (*) with widths of 75 to 125mm.

 - * The system is installed with its hanger spacers already mounted.
- Verify that the mounting positions of this system's hangers (mounting fixtures) are compatible with the installation site beams. For details, refer to "5. Relationship Between The Suspension Span And The Permissible Suspended Load" on page 12", and also to the separate "Standard ALFARAIL System Mounting Fixture List" sheet.
- Verify that the installation site's work area is free of items (such as light fixtures, wiring/piping duct, and frame structures, etc.) which could obstruct installation.
- Verify that height from the bottom of the installation site's beam to the floor satisfies the system's required suspension height condition.

■ Items to check after installation

- 1) After completing the installation work, use the "ALFARAIL System Installation Check Sheet" (pages 26 and 27) to verify that all the work has been performed correctly.
- 2) Be sure to perform the required periodic inspections one month after the installation, and every six months thereafter (see pages 30 to 31).

2. Safety Measures

Drop-prevention safety wire must be installed by operator between the beams and runner-rails, between the cross-rail and the end-trucks, and between the trolley and the hoist unit.

⚠ DANGER

- The safety wire diameter must be 6mm or more, with a slack of approximately 30mm.
- Secure the wire with two or more clips. (provided by user)
- Secure each wire clip with two or more nuts (double-nut specs.).

Example of Recommended Drop-Prevention Safety Wire Mounting Positions (The equipment installer must verify the end-user's safety standards before installation.)

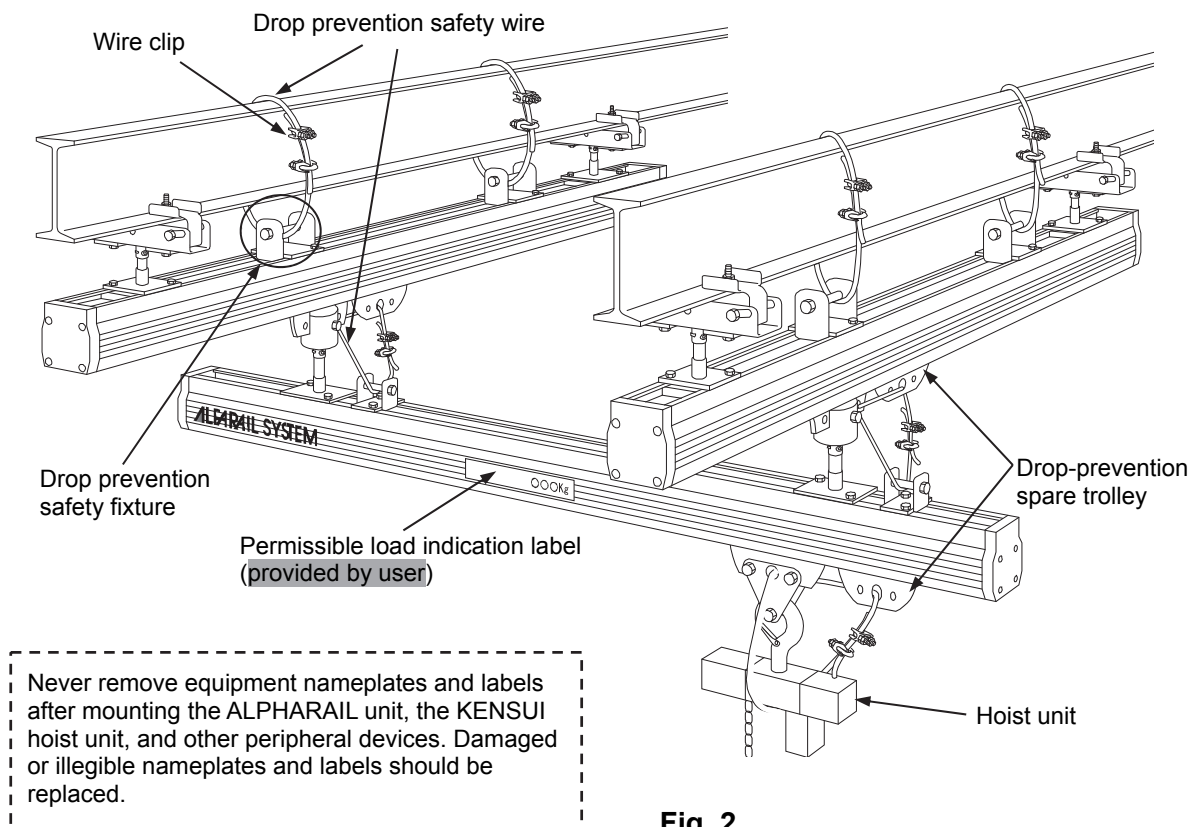


Fig. 2

3. Tools Used To Assemble The ALFARAIL System

The following tools are required to assemble the ALFARAIL System.

Table 1

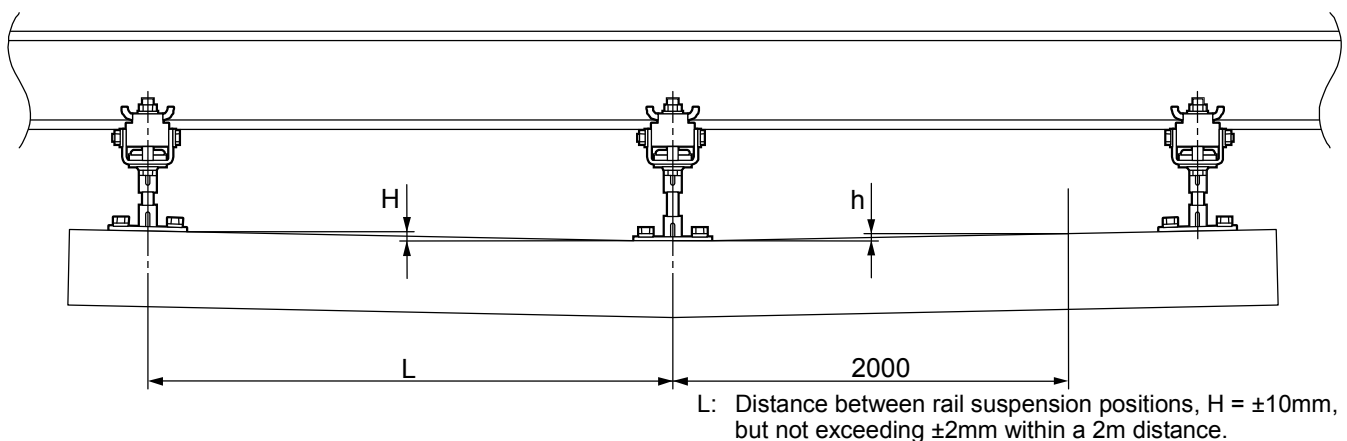
Name	Specification	Quantity	ARS500H ARS500	ARS200H ARS200	ARS050H ARS50
Spanner (Box-wrench)	10mm (for M6)	2	Required	Required	Required
	13mm (for M8)	2	Required	Required	
	17mm (for M10)	2	Required	Required	
	19mm (for M12)	2	Required	Required	
Monkey wrench	250mm	1	Required	Required	
Hexagon wrench	4mm	1			Required
	5mm (for M6)	1		Required	Required
	6mm (for M8)	1	Required		
Torque wrench (socket type)	10mm (for M6) Set to 7N-m	1	Required	Required	Required
	13mm (for M8) Set to 17.5N-m	1	Required	Required	
	17mm (for M10) Set to 34N-m	1	Required	Required	
	19mm (for M12) Set to 61N-m	1	Required	Required	
Torque wrench (hexagon socket type)	4mm Set to 7N-m	1			Required
	5mm (for M6) Set to 7N-m	1		Required	
	6mm (for M8) Set to 17.5N-m	1	Required		
Pliers		1	Required	Required	
Plastic hammer		1	Required	Required	
Hose trolley	Phillips screwdriver	1	Required	Required	Required

4. ALFARAIL System Installation Standard

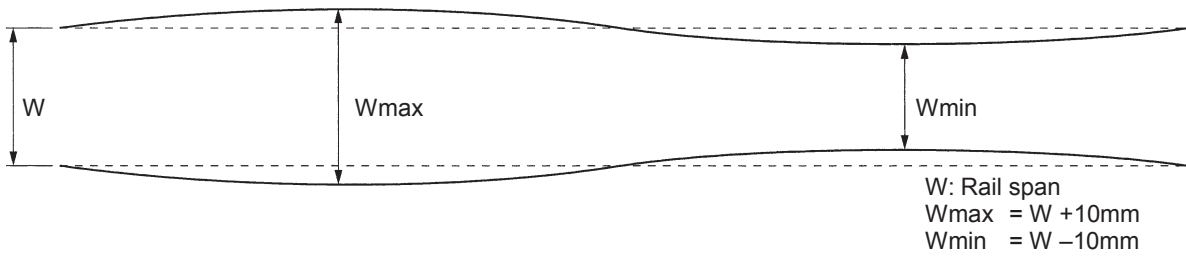
⚠ DANGER

Failing to install the ALFARAIL system in a manner which complies with the ALFARAIL installation standard could result in uncontrolled trolley and end-truck (cross-rail from which the hoist unit is suspended) motion, causing the equipment/load to collide with personnel who are present within the operating range, or with other equipment. This represents an extremely hazardous condition which result in serious injury, death or equipment damage. Verify that all adjusting bolts are perpendicular.

© **Permissible height difference between suspension positions: H**



◎ **Permissible rail span difference: W**



◎ **Permissible height difference between parallel runner-rails: H**

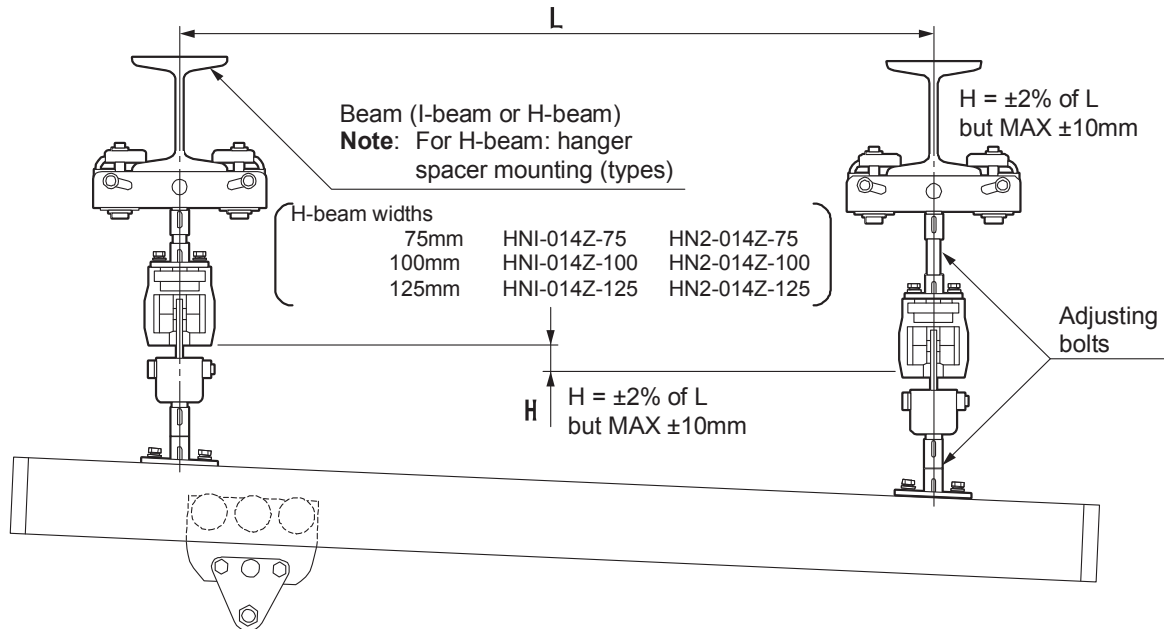


Fig. 3

◎ **The permissible sway angle of hanger and end-truck universal joints is $\pm 5^\circ$.**
 (Verify that hanger and end-truck adjusting bolts are perpendicular when installed)

< Hanger >

<End-truck>

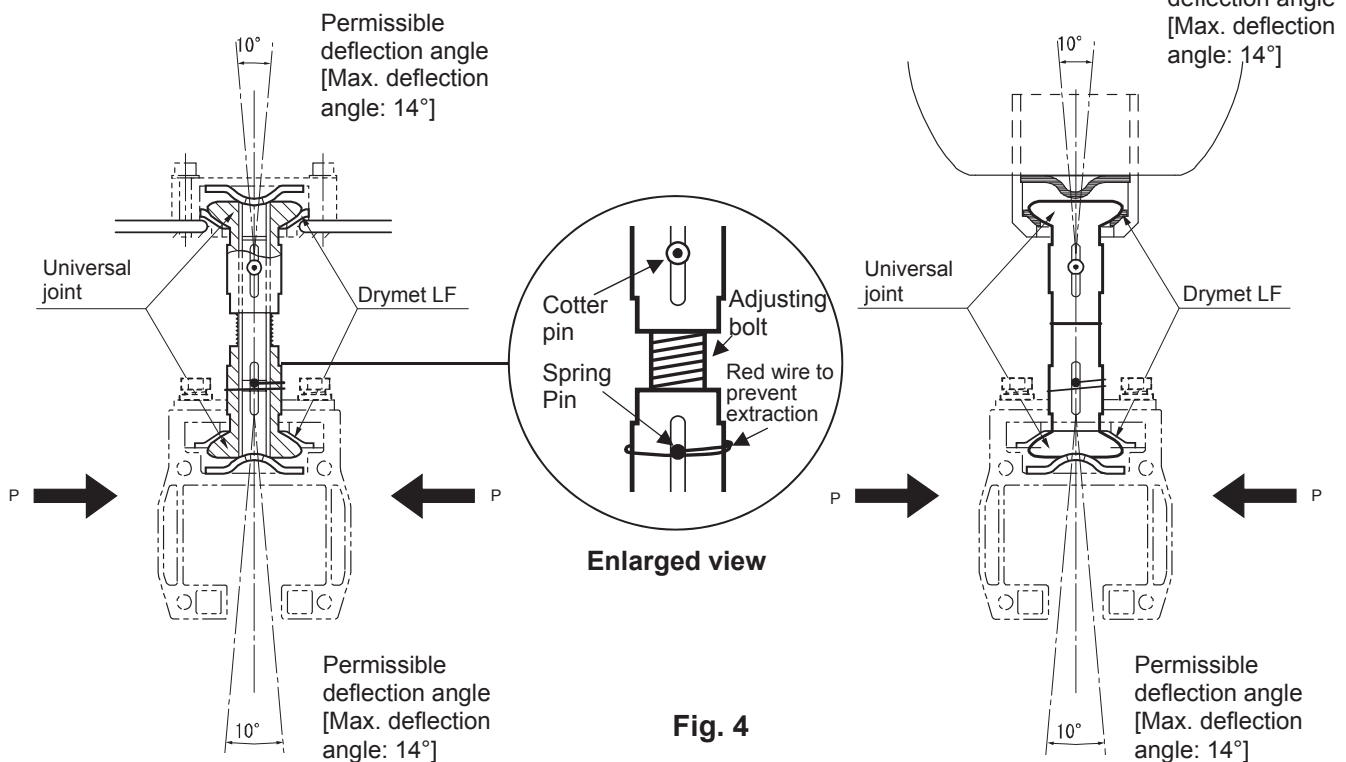


Fig. 4

5. Relationship Between The Suspension Span And The Permissible Suspended Load

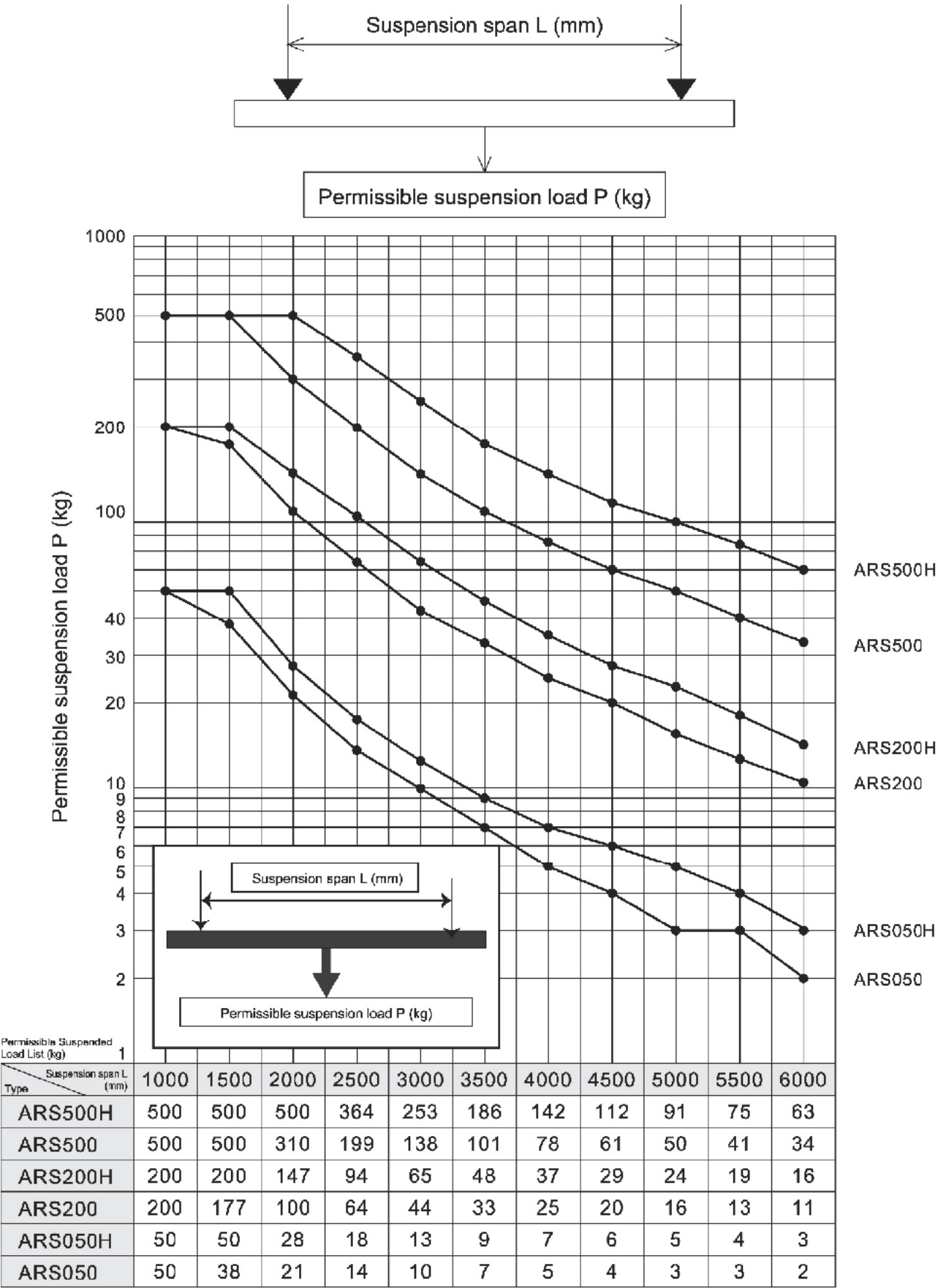


Fig. 5

6. Bolt And Nut Tightening Standard

 **WARNING**

To help ensure a safe installation, nuts and bolts must be tightened in accordance with the torque standard shown below.

Table 2 Prescribed tightening torques for each bolt

Accessory Bolt/Nut Size	Mechanical Strength Category (JIS B 1051, 1052)	Tightening Torque
M6	10.9	7N-m
M8	10.9	17.5N-m
M10	10.9	34N-m
M12	10.9	61N-m

7. ARS500(H) And ARS200(H) Series Assembly Procedure

1) Runner-rail linkage

Please contact the sales outlet or TOYOTSU TECHNO CORPORATION for assistance in the event that a runner-rail linkage is required. If such a linkage is judged as possible, it must be performed in accordance with the procedure given below. The linkage kit (2 pieces) is used to link the rails.



- The use of linked cross-rails is not recommended.
- If tightened hexagon socket-head bolts are removed, they must be coated with a locking agent again when reused.

Gaps or steps in the rail linkage joints can cause trolley decelerations and stops. Verify that the trolley moves smoothly and quietly through the joint area (minimal joint transit sound).

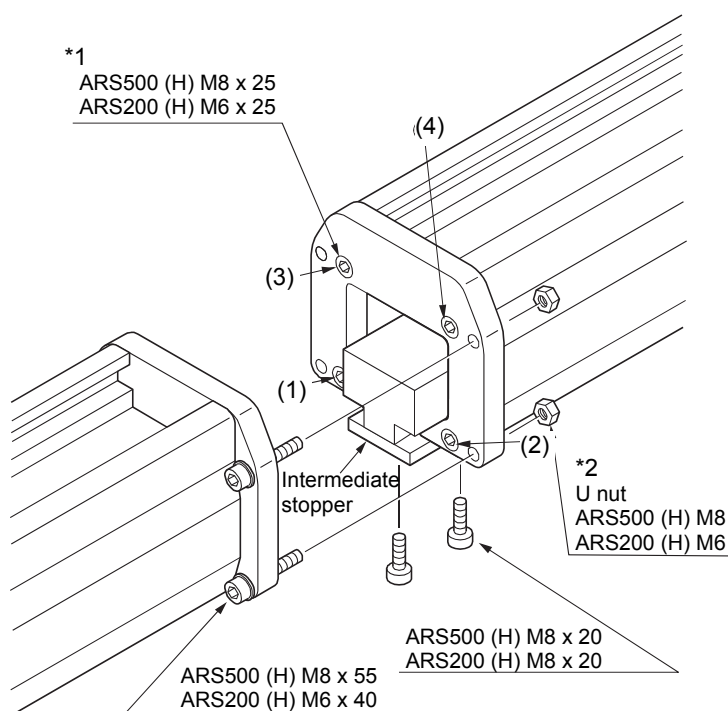
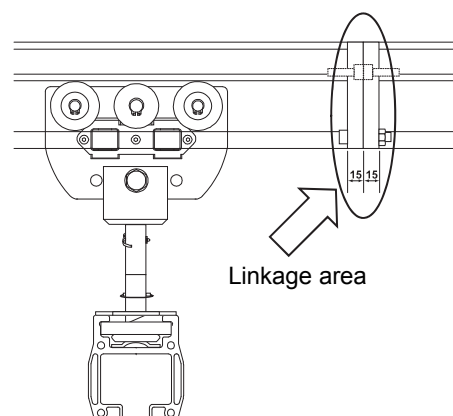


Fig. 6

1. Fit the rail and the linkage kit onto the intermediate stopper, then secure them.
2. Align the linkage kit piece with the rail's inner shape (with counterbore face on the outer side), then use the accessory bolts to secure it at the 4 holes on the rail end.
3. Secure the intermediate stopper at the prescribed position. Tighten the bolts in a diagonal tightening manner (bolts 1 and 4 first, then bolts 2 and 3) in order to minimize the step in the runner-rail face.
4. Perform the above procedure at both rails.
5. Align the two linkage kits, then insert the bolts and U-nuts in the 4 holes at the outer side of the linkage kits, and securely tighten them.
6. Use a felt-tip marker, etc., to mark the U-nut so that any loosening of the nut can be easily detected.

[Tools Used]

●ARS500H, ARS500

Spanner (box wrench)	: 13mm (for M8)
Hexagon wrench	: 6mm (for M8)
Torque wrench	: 6mm (for M8)
(Hexagon socket type)	
Tightening torque	: Set to 17.5N-m

●ARS200H, ARS200

Spanner (box wrench)	: 10mm (for M6)
Hexagon wrench	: 5mm (for M6)
Torque wrench	: 5mm (for M6)
(Hexagon socket type)	
Tightening torque	: Set to 7N-m

*1 The accessory bolts are provided with a bolt locking agent. If commercially available bolts are used, a locking agent must be applied. (Commercially available bolts which are used must have a mechanical strength of 10.9 or more.)

*2 Use only the accessory U-nuts. Do not use commercially available nuts.

2) Assembling the runner rail and hanger

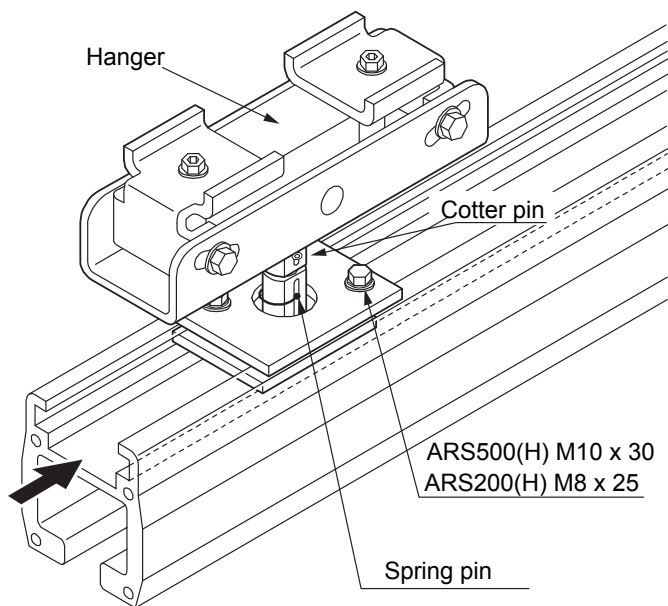


Fig. 7

1. Slide the required number of hangers (one hanger for each suspension point) onto the runner rail.
 2. Securely tighten the hangers with the bolts at their predetermined positions.
- * Be sure to install the safety fixtures near both ends of the rail (at any position) when mounting the hangers.

[Tools Used]

●ARS500H, ARS500

Spanner (box wrench) : 17mm (for M10)
Torque wrench (socket) : 17mm (for M10)
Tightening torque : Set to 34N-m

●ARS200H, ARS200

Spanner (box wrench) : 13mm (for M8)
Torque wrench (socket) : 13mm (for M8)
Tightening torque : Set to 17.5N-m

3) Adjusting the height between the runner-rail and beam

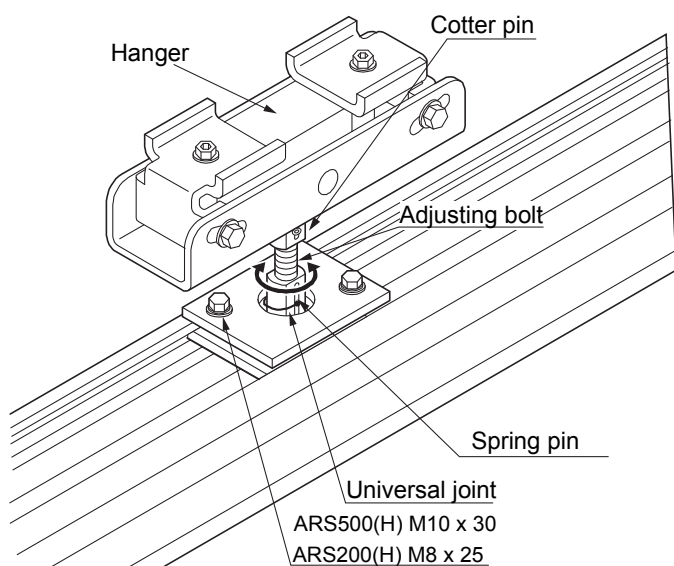


Fig. 8

CAUTION

Make the adjustment within the universal joint's slot. (A height adjustment is not possible for parallel type hangers.)

1. Remove the cotter pin that prevents universal joint and adjusting bolt rotation.
2. Using a ruler, etc., to measure the height dimension, rotate the universal joint until adjusted to the correct height.
3. Insert a new cotter pin (accessory).
4. Adjust the other hangers in the same manner.

[Tools Used]

●ARS500H, ARS500

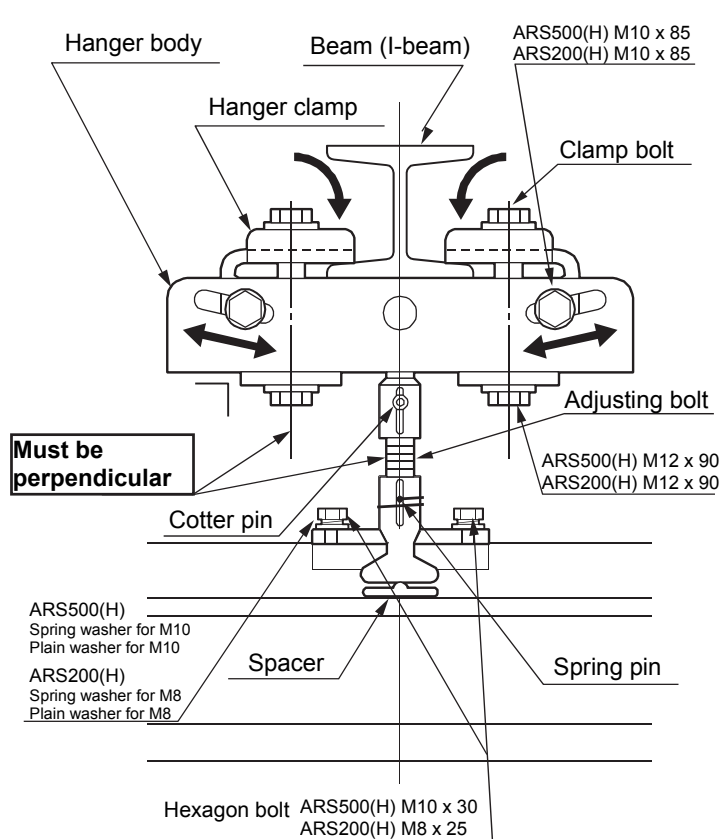
Spanner: 22mm

●ARS200H, ARS200

Spanner: 14mm

4)-1 Mounting runner-rails on I-beams

Mount the 1) and 2) runner-rail and hanger assembly on the beam (I-beam).



Tighten so that the clamp bolt and adjusting bolt are perpendicular.

1. Loosen the adjusting bolt and clamp bolt, and adjust so that the hanger clamp fits into the beam flange.
2. Press the hanger body against the flange face and adjust the hanger clamp position so that the beam flange is between the hanger body and the hanger clamp.
3. Securely tighten the adjusting bolt and clamp bolt.

[Tools Used]

●ARS500H, ARS500, ARS200H, ARS200

- Spanner (box wrench) : 19mm (for M12)
- Torque wrench (socket) : 19mm (for M12)
- Tightening torque : Set to 61N-m
- Spanner (box wrench) : 17mm (for M10)
- Torque wrench (socket) : 17mm (for M10)
- Tightening torque : Set to 34N-m

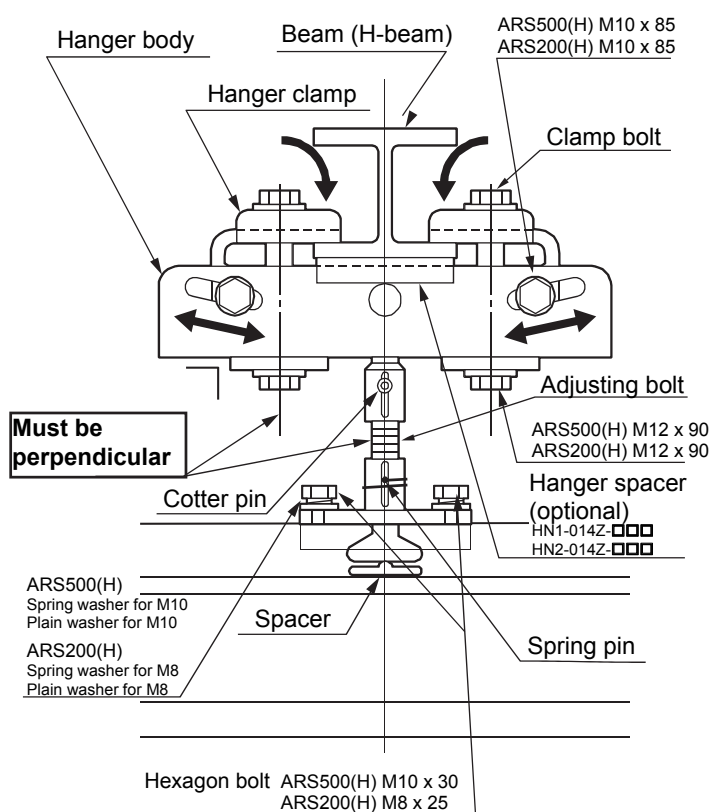
(NOTE)

For the ARS□□□-HN1-F model (hanger rise-prevention specifications), install with a spacer between the bottom of the universal joint and the rail's top face.

Fig. 9

4)-2 Mounting runner-rails on H-beams

Mount the 1) and 2) runner-rail and hanger assembly on the beam (H-beam).



Tighten so that the clamp bolt and adjusting bolt are perpendicular.

1. Loosen the adjusting bolt and clamp bolt, and adjust so that the hanger clamp fits into the beam flange.
2. Set a hanger spacer (optional item) with a width equal to the beam width on the hanger body. (A hanger spacer is only required when mounting on H-beams.)
3. Press the hanger spacer against the beam's flange face and adjust the hanger clamp position so that the beam's flange is between the hanger spacer and the hanger clamp.
4. Securely tighten the adjusting bolt and clamp bolt.

[Tools Used]

●ARS500H, ARS500, ARS200H, ARS200

- Spanner (box wrench) : 19mm (for M12)
- Torque wrench (socket) : 19mm (for M12)
- Tightening torque : Set to 61N-m
- Spanner (box wrench) : 17mm (for M10)
- Torque wrench (socket) : 17mm (for M10)
- Tightening torque : Set to 34N-m

* For the ARS□□□-HN1-F model (hanger rise-prevention specifications), install with a spacer between the bottom of the universal joint and the rail's top face.

Fig. 10

When hanger spacers are required, please specify the model when ordering the mounting fixture (spacers are provided at no cost).

■ Hanger spacer models

Hanger Model	Beam Width		
	75mm	100mm	125mm
ARS500-HN1	HN1-014Z-75	HN1-014Z-100	HN1-014Z-125
ARS500-HN1-F			
ARS200-HN1			
ARS200-HN1-F			
ARS200H-HN1			
ARS200H-HN1-F	HN2-014Z-75	HN2-014Z-100	HN2-014Z-125
ARS500-HN2			
ARS200-HN2			

[Example]

For hanger model "ARS500-HN1" and a beam width of "100mm", select hanger spacer model "HN1-014Z-100".

* Hanger spacers with widths larger than the beam width cannot be installed. If unsure of the correct hanger model to use, please contact the sales outlet or TOYOTSU TECHNO CORPORATION.

5) Installing the cross-rail and end-truck

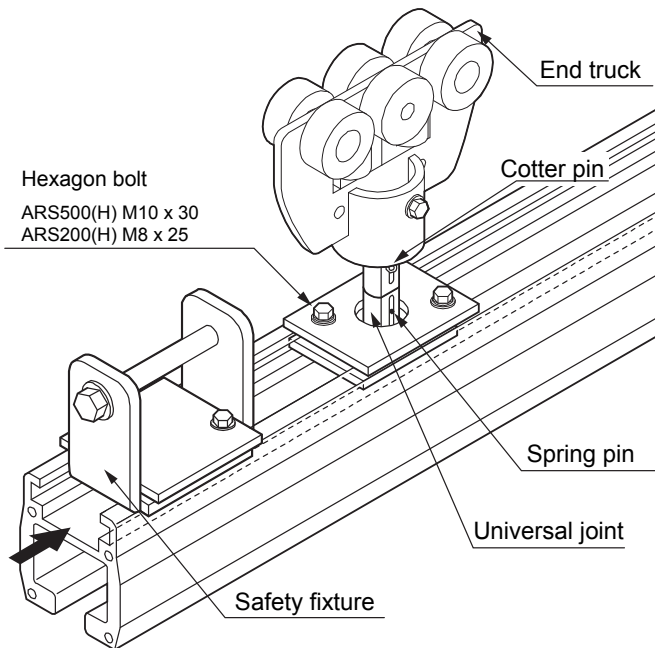


Fig. 11

1. Slide the required number of hangers (one hanger for each suspension point) onto the cross rail.
2. Align the end-truck with the runner rail span, then securely tighten it with the bolts.

CAUTION

Be sure to install the safety fixtures near both ends of the rail (at any position) when mounting the hangers.

[Tools Used]

●ARS500H, ARS500

Spanner (box wrench) : 17mm (for M10)
Torque wrench (socket) : 17mm (for M10)
Tightening torque : Set to 34N-m

●ARS200H, ARS200

Spanner (box wrench) : 13mm (for M8)
Torque wrench (socket) : 13mm (for M8)
Tightening torque : Set to 17.5N-m

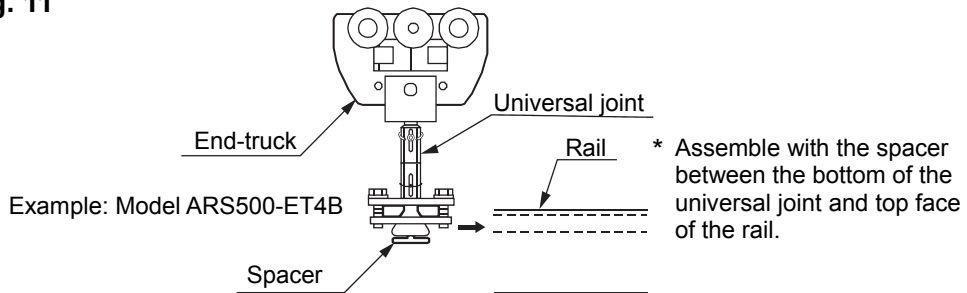


Fig. 12

6) Adjusting the height between the runner-rail and the cross-rail (This is possible only for the ARS500-ET7A model and the ARS500-ET4A "Repair Part" model.)

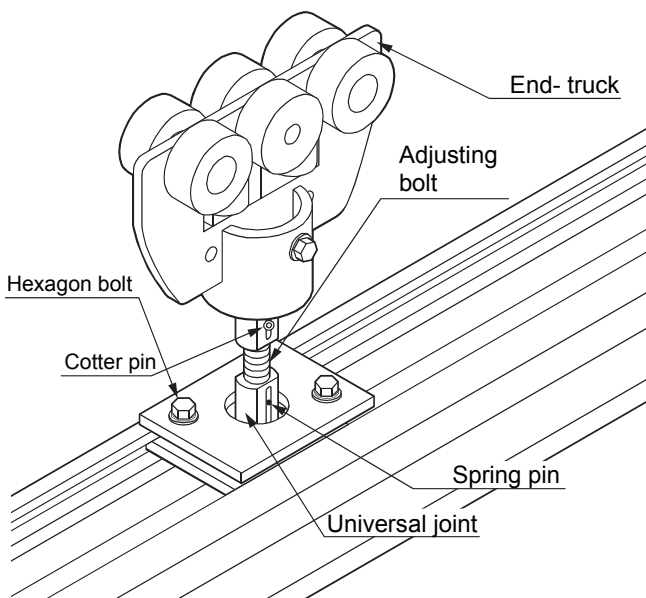


Fig. 13

CAUTION

Make the adjustment within the universal joint's slot.

NOTICE

End-truck height adjustments are not possible with ARS500 (excluding the ARS500-ET7A, ARS500-ET4A models), ARS200H, and ARS200 models. Do not attempt to make adjustments.

1. Remove the cotter pin that prevents universal joint and adjusting bolt rotation.
2. Using a ruler to measure the height dimension, rotate the universal joint until adjusted to the correct height.
3. Insert a new cotter pin (accessory).
4. Adjust the other hangers in the same manner.

[Tools Used]

●ARS500H, ARS500

Spanner: 22mm

7) Mounting the trolley

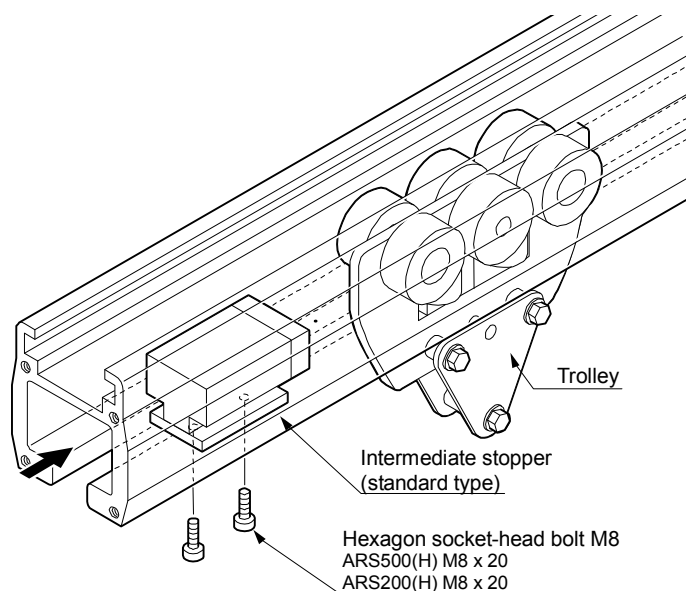


Fig. 14

8) Attaching the end-cap to the cross-rail

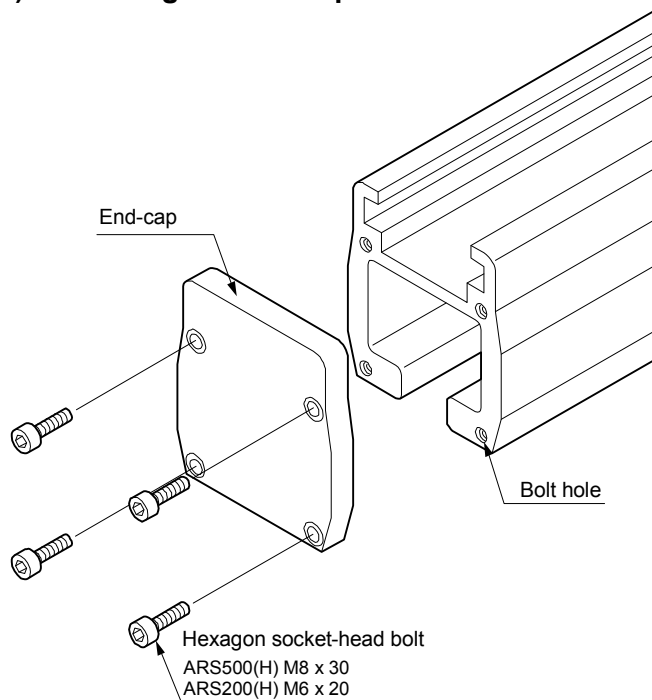


Fig. 15

WARNING

If tightened hexagon socket-head bolts are removed, they must be coated with a locking agent again when reused.

1. Insert the required number of trolleys, hose trolleys, and intermediate stoppers into the cross-rail groove of the "cross-rail and end-truck" assembled at step 5).
2. Be sure to install the intermediate stoppers at the desired positions (at both rail ends).

[Tools Used]

●ARS500H, ARS500, ARS200H, ARS200

Hexagon wrench	: 6mm (for M8)
Torque wrench (hexagon socket)	: 6mm (for M8)
Tightening torque	: Set to 17.5N-m

WARNING

Apply a locking agent to the hexagon socket-head bolts before tightening them or re-tightening them.

1. Verify that the installation procedure up to step 7) has been completed.
2. Align the end-cap with the rail shape and use the 4 hexagon socket head bolts to tighten it securely at the threaded holes on the end of the rail.

[Tools Used]

●ARS500H, ARS500

Hexagon wrench	: 6mm (for M8)
Torque wrench (hexagon socket)	: 6mm (for M8)
Tightening torque	: Set to 17.5N-m

●ARS200H, ARS200

Hexagon wrench	: 5mm (for M6)
Torque wrench (hexagon socket)	: 5mm (for M6)
Tightening torque	: Set to 7N-m

9) Installing the cross-rail on the runner-rails

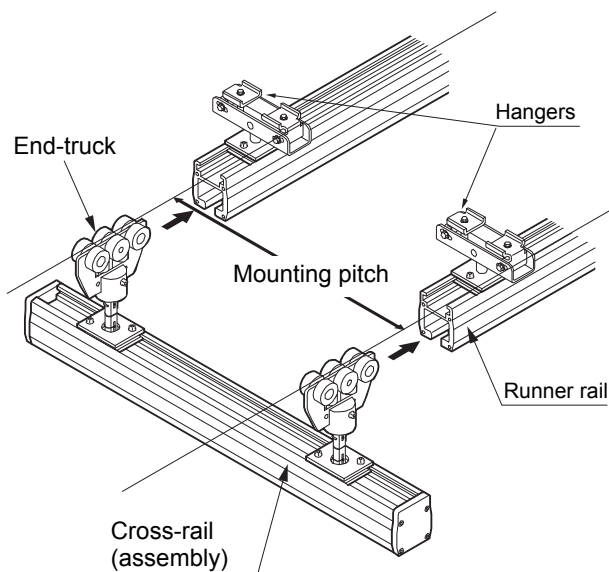


Fig. 16

1. Install the cross-rail assembly (assembled at steps 5) to 8) above) on the runner-rails.
2. Verify that the pitch of the cross-rail mounted end-trucks matches the span of the runner rails.
3. Slide the end-truck rollers into the runner rail's roller grooves.
4. Also slide the intermediate stoppers and drop-prevention spare trolleys into the roller grooves.

NOTICE

When necessary, also slide hose trolleys into the roller grooves.

10) Attaching the end-caps to the runner-rails

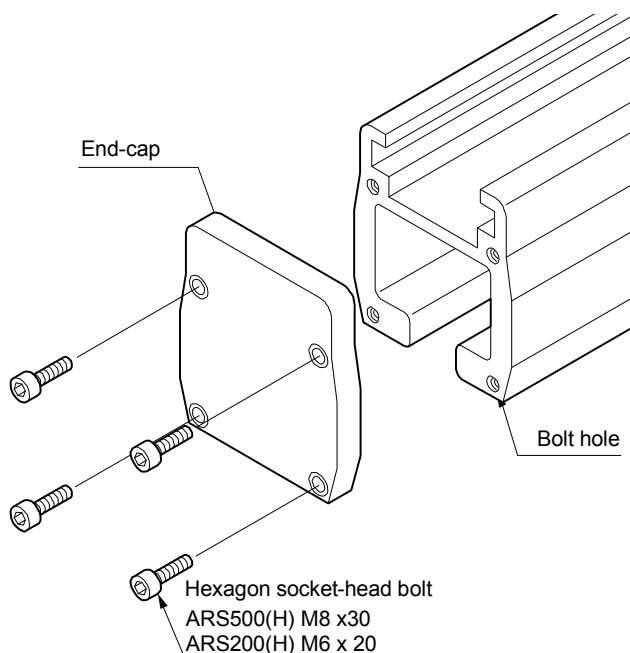


Fig. 17

WARNING

There is an increased risk of death, serious injury or system damage if the trolley or end-truck collides with the intermediate stopper or the end caps.

WARNING

Apply a locking agent to the hexagon socket-head bolts before tightening them. In addition, if a tightened hexagon socket-head bolt has been removed, apply a locking agent before tightening it again.

1. There are 4 bolt holes on the rail's end-face. Align the end-cap with the rail shape, then secure it by tightening the 4 hexagon socket-head bolts.

[Tools Used]

●ARS500H, ARS500

Hexagon wrench : 6mm (for M8)
Torque wrench (hexagon socket) : 6mm (for M8)
Tightening torque : Set to 17.5N-m

●ARS200H, ARS200

Hexagon wrench : 5mm (for M6)
Torque wrench (hexagon socket) : 5mm (for M6)
Tightening torque : Set to 7N-m

8. ARS050(H) Series Assembly Procedure

1) Rail linkage

Always use the rail linkage kit to link the rails.



WARNING

If tightened hexagon socket-head bolts are removed, they must be coated with a locking agent again when reused.

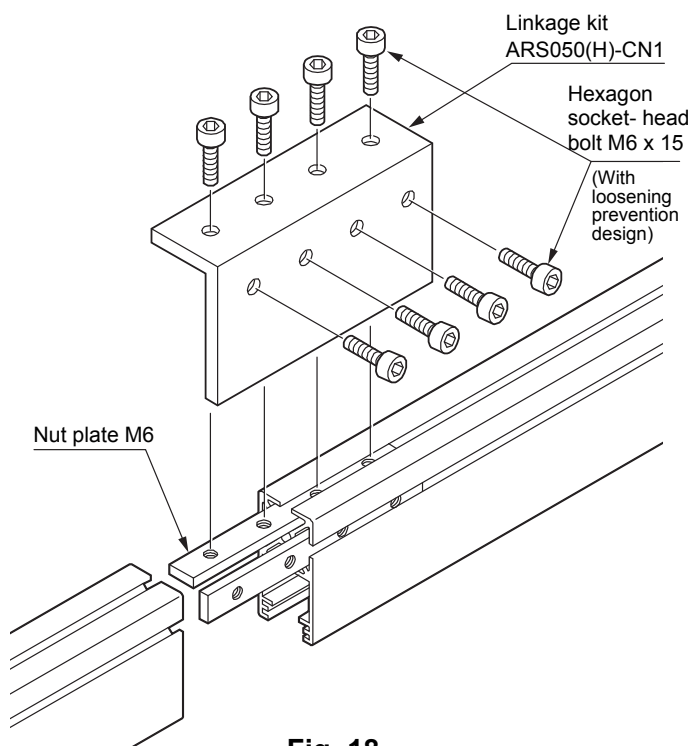


Fig. 18

1. Insert the linkage kit's nut plate into the rail's T-groove so that the rail is sandwiched between the linkage kit body and the nut plate.
2. Insert the linkage kit's nut plate at the other rail in the same manner, then place the rail ends against each other and adjust the linkage kit position so that the kit's center is at the point where the two rails meet.
3. In this condition, tighten the 8 hexagon socket-head bolts to the prescribed torque.

* The accessory bolts are provided with a bolt locking agent. If commercially available bolts are used, a locking agent must be applied.

NOTICE

Gaps or steps in the rail linkage joints can cause trolley decelerations and stops. Verify that the trolley moves smoothly and quietly through the joint area (minimal joint transit sound).

[Tools Used]

Spanner (box wrench) : 10mm (for M6)
Torque wrench (socket) : 10mm (for M6)
Tightening torque : Set to 7N-m

2) Installing the rail hanger on the ARS050H and ARS050

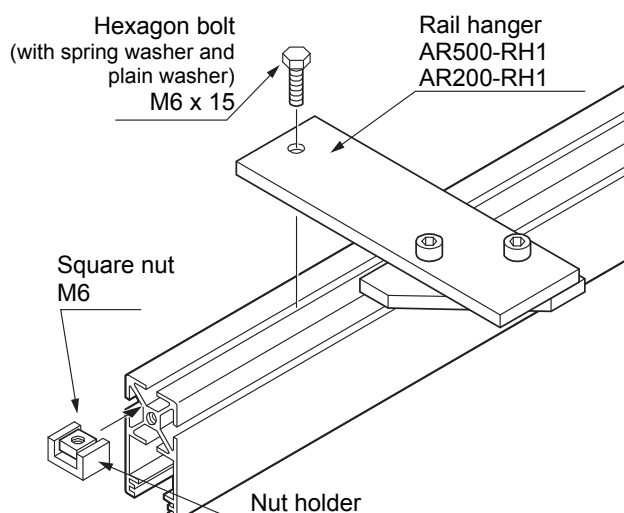


Fig. 19

3) Installing the hose trolleys on the rail

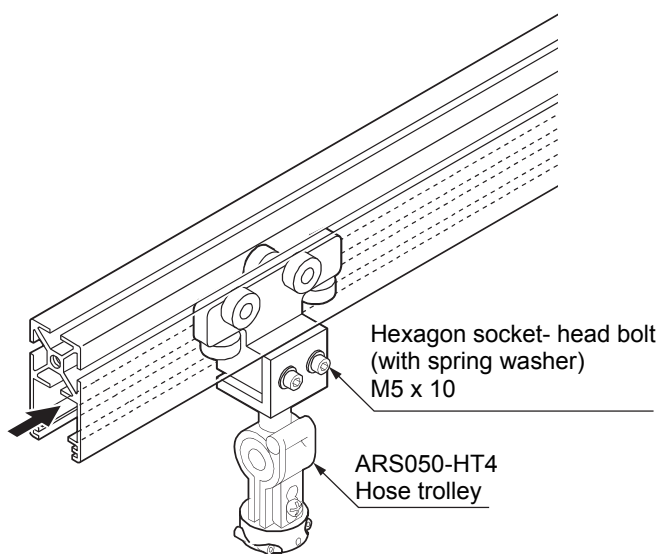


Fig. 20



WARNING

Apply a locking agent to the hexagon bolts before tightening them or re-tightening them.

1. Slide the rail hanger's square nut and nut holder into the rail groove and use the square nut to secure the rail hanger at the predetermined position.
2. Securely tighten the hexagon bolt.

[Tools Used]

- Spanner (box wrench) : 10mm (for M6)
- Torque wrench (socket) : 10mm (for M6)
- Tightening torque : Set to 7N-m

1. Insert the required number of hose trolleys into the rail's roller groove.

4) Attaching the end-cap to the rail

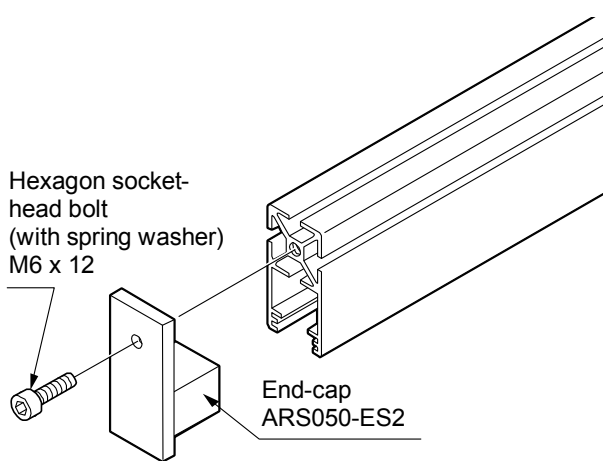


Fig. 21

WARNING

Apply a locking agent to the hexagon socket-head bolts before tightening them or re-tightening them.

1. Attach the end-cap to the rail's end-face and secure it by tightening the accessory hexagon socket-head bolt.

[Tools Used]

Hexagon wrench	: 5mm (for M6)
Torque wrench (hexagon socket)	: 5mm (for M6)
Tightening torque	: Set to 7N-m

5) Installing ARS050(H) on ARS500(H) and ARS200(H)

Install the ARS050(H) rail assembly (assembled at steps 1) to 4) above) on the ARS500(H) and ARS200(H).

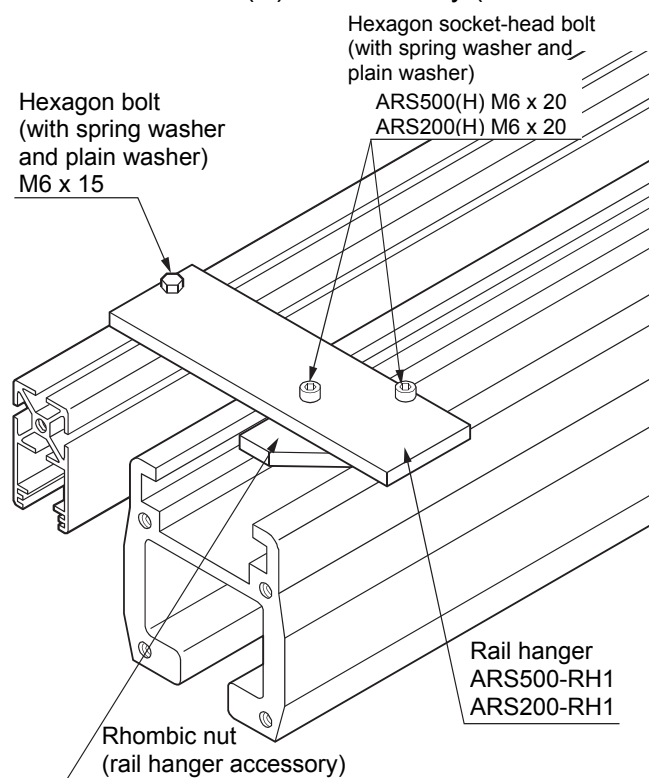


Fig. 22

WARNING

Apply a locking agent to the hexagon socket-head bolts before tightening them or re-tightening them.

1. Remove one of the rhombic nut's hexagon socket-head bolts, align with the rail shape, then insert the rhombic nut into the upper groove of the ARS500(H), ARS200(H) rail.
2. After inserting the rhombic nut into the rail's groove, turn it back to its original posture and re-attach the hexagon socket-head bolt that was removed above.
3. When properly positioned, tighten the 2 hexagon socket-head bolts to the prescribed torque.

[Tools Used]

Spanner (box wrench) : 10mm (for M6)
Torque wrench (socket) : 10mm (for M6)
Tightening torque : Set to 7N-m

9. ALFARAIL System Installation Check Sheet (1/2)

Immediately after installing the ALFARAIL system, be sure to have the supervisor (customer personnel or another person with specialized knowledge) and the installer (commercial installer or sales outlet personnel) verify each of the items listed on the following ALFARAIL System Installation Check Sheet.



WARNING

Do not use ALFARAIL system if it has not been installed correctly. Doing so could result in serious injury, death or property damage.

No.: _____ Installing Dept.: _____ Installation date: _____(year)____(month)____(day)

Table 3

Item	Inspection Content		Method	Supervisor	Installer
Hangers	1) Check for missing or loose bolts. Verify that bolts are tightened to the prescribed torques.	M8 17.5N-m	Torque check		
		M10 34N-m	Torque check		
		M12 61N-m	Torque check		
	2) Verify that all bolts and nuts bear their post-tightening markings.		By eye		
	3) Verify that clamp bolts are in a perpendicular position. Check for bending, cracking, and positional deviations.		By eye		
	4) Verify that adjusting bolts are in a perpendicular posture. Check for bending, cracking, and positional deviations.		By eye		
	5) Verify that cotter pins and spring pins are properly inserted into the adjusting bolt holes.		By eye		
	6) Verify that the load is evenly distributed among the adjusting bolts. Verify that motion is not being impeded by any of the bolts.		By touch		
End-trucks	1) Check for missing or loose bolts. Verify that bolts are tightened to the prescribed torques.	M8 17.5N-m	Torque check		
		M10 34N-m	Torque check		
	2) Verify that all bolts and nuts bear their post-tightening markings.		By eye		
	3) Verify that cotter pins and spring pins are properly inserted into the adjusting bolt holes.		By eye		
Runner-rails and cross-rails	1) Verify that cross-rail motion is smooth.		By operating		
	2) Verify that end-cap bolts are securely tightened.	M6 7N-m	Torque check		
		M8 17.5N-m	Torque check		
	3) Verify that intermediate stopper bolts are securely tightened.	M6 7N-m	Torque check		
		M8 17.5N-m	Torque check		
	4) Verify that all bolts and nuts bear their post-tightening markings.		By eye		
	5) Verify that the intermediate stopper is not serving as a trolley positioning stopper. The trolley must not make constant contact with the intermediate stopper.		By operating		
	6) Check for rail scratching and deformation.		By eye		
	7) Verify that the drop-prevention safety fixtures, spare trolley, and safety wire have been installed. (*)		By eye		
	8) Verify that the proper number of drop-prevention safety wire clamps have been installed, and that they are correctly oriented. Also verify that the wire diameter is 6mm or larger, and that a double-nut configuration has been used (2 or more nuts at each wire clip).		By eye		

* Items indicated by an asterisk (*) shall conform to the user's safety standards.


9. ALFARAIL System Installation Check Sheet (2/2)

Item	Inspection Content		Method	Supervisor	Installer
Trolleys	1) Verify that trolley motion is smooth.		By operating		
	2) Verify that the drop-prevention spare trolley, and safety wire have been installed. (*)		By eye		
	3) Verify that the proper number of drop-prevention safety wire clamps have been installed, and that they are correctly oriented. Also verify that the wire diameter is 6mm or larger, and that a double-nut configuration has been used (2 or more nuts at each wire clip).		By eye		
Rail linkage	1) Verify that there are no missing or loose linkage bolts. Verify that bolts are tightened to the prescribed torques.	M6 7N-m	Torque check		
		M8 17.5N-m	Torque check		
	2) Verify that all bolts and nuts bear their post-tightening markings.		By eye		
	3) Verify that trolley and end-truck motion is smooth across linkage transitions.		By operating		
	4) Verify that hangers have been installed at both the left and right sides. (*)		By eye		
	5) Verify that the drop-prevention safety fixtures and safety wires have been installed at both the left and right sides. Verify that the proper number of drop-prevention safety wire clamps have been installed, and that they are correctly oriented. Also verify that the wire diameter is 6mm or larger, and that a double-nut configuration has been used (2 or more nuts at each wire clip).		By eye		
Cables and curl hoses	1) Verify that 2 or more nuts (double-nut specs.) are present at each wire clip on the messenger wire's mounting hook.		By eye		
	2) Verify that cables and curl hoses are not twisted or tangled.		By eye		
General	1) Verify that reinforcement beams and brackets are secure (no movement).		By operating		
	2) Verify that labels which indicate permissible loads are affixed.		By eye		
	3) Verify that there are no obstacles to trolley motion.		By eye		

* Items indicated by an asterisk (*) shall conform to the user's safety standards.

[4] Operation

Before operating this system, be sure to read the safety precautions listed on pages 5 to 8 of this operation manual.

 WARNING
If a safety problem, malfunction, or damage, etc., occurs at the pre-operation inspection, or during operation, contact the maintenance supervisor, the sales outlet, or TOYOTSU TECHNO CORPORATION. Do not operate the system until repairs have been made.

1. Pre-Operation Inspection And Operating Precautions

To ensure safe operation of the ALPHARAIL system, be sure to perform the following inspection procedure each day.

Inspection Point	Inspection Description	Corrective Action
1) ALPHARAIL body	Lightly move the runner rail and end-trucks and the cross-rail trolleys and check for abnormal sounds and vibrations, etc.	Abnormal sounds and vibrations represent a hazardous condition. If found, stop operation immediately and contact the supervisor or maintenance personnel. (See Table 5 on page 33)
2) ALPHARAIL system components	Check for deformation, damage, missing parts, and loose screws/bolts at each of the hangers, end-trucks, trolleys, safety fixtures, intermediate stoppers, end-caps, and at each part of the hoist unit, etc.	These faults represent a hazardous condition. If found, stop operation immediately and contact the supervisor or maintenance personnel. (See Table 5 on page 33)
3) Suspension load labels and KENSUI warning labels	Check for peeling or illegibility.	These faults represent a hazardous condition. If found, stop operation immediately and contact the supervisor or maintenance personnel. Operation should be resumed only after replacing the illegible warning labels with new ones.

2. Troubleshooting

Contact the supervisor or maintenance person when any of the following conditions occur.

- Abnormal trolley or end-truck motion.
- Abnormal universal joint motion.
- Abnormal trolley or end-truck motion at rail linkage areas.
- The cross-rail or trolley tends to move (by gravity) to either side.
- Abnormal runner-rail trolley transit motion across a rail linkage area.
- Abnormal sound or vibration.

[5] Maintenance



Be sure to read the safety precautions for maintenance, periodic inspections, and repairs on page 8 of this manual. Failure to follow these precautions could result in serious injury, death or equipment damage.

1. Initial inspection 1 month after installation

This inspection must be performed by either the system installer (commercial enterprise) or by TOYOTSU TECHNO CORPORATION (fee charged).

One month after operation first begins, the following items must be inspected with reference to the ALFARAIL System Installation Check Sheet (see pages 26 and 27): hangers, end-trucks, rails, end-caps, intermediate stoppers, etc., bolt-connected joints, spring pins, connection areas. Bolts should also be tightened at this time.

2. Periodic inspections

Periodic inspections (every 6 months) should be performed by either the system installer (commercial enterprise) or by TOYOTSU TECHNO CORPORATION (fee charged).

■ Inspection item table

Table 4

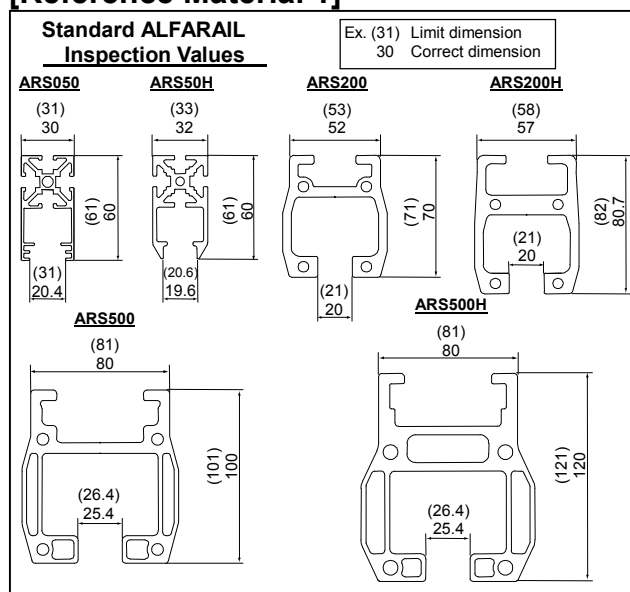
No.	Inspection Location	Inspection Content	Inspection Schedule
1	General (overall ALFARAIL System)	Convene a meeting with the system operators to verify the general operating status and to discuss any problems which may exist.	
2	Hangers	Verify that bolts are tightened to the prescribed torques.	* (1)
		Verify that system parts are not deformed or damaged.	* (2)
		Check the universal joint's spherical hub for wear and installation condition abnormalities.	* (3)
		Check for missing spring pins and cotter pins.	
3	End-trucks	Verify that bolts are tightened to the prescribed torques.	* (1)
		Verify that system parts are not deformed or damaged.	* (2) (3)
		Check the universal joint's spherical hub for wear and installation condition abnormalities.	* (4)
		Check for missing spring pins and cotter pins.	
		Check the runner-rail rollers for uneven wear, deformation, damage, and looseness.	* (5)
		Check the side rollers for uneven wear, deformation, damage, and looseness.	* (6)
		Verify that cross-rail motion is smooth.	
4	ALFARAIL (runner-rails and cross-rail)	Verify that the runner surface wear condition is OK.	* (7)
		Verify that no foreign matter is present on the runner surface.	* (7)
		Verify that there is no deformation or damage.	* (8)
5	ALFARAIL linkage areas	Verify that bolts are tightened to the prescribed torques.	* (1)
		Verify that there are no gaps between the linkage kit and the face on which it is mounted.	
		Verify the linkage kit is not deformed or damaged.	
		Verify that the runner roller motion is smooth across the linkage transitions.	
		Verify that the rubber areas and body are not deformed or damaged.	

NOTE: The asterisk and number in this chart refer to information on page 31.

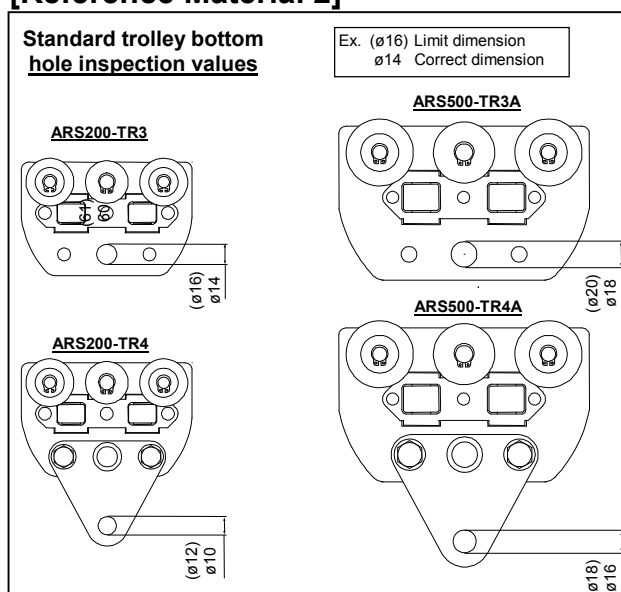
No.	Inspection Location	Inspection Content		Inspection Schedule
6	End-caps and end-stoppers	Verify that bolts are tightened to the prescribed torques.	* (1)	
7	Intermediate stoppers	Verify that bolts are tightened to the prescribed torques.	* (1)	
		Verify that the rubber areas and body are not deformed or damaged.		
		Verify that the damper rubber area is not deformed or damaged, and that the shaft motion is normal with no oil leakage.		
8	Trolleys	Verify that bolts are tightened to the prescribed torques.	* (1)	
		Verify that system parts are not deformed or damaged.		
		Check for missing spring pins and cotter pins.		
		Check the runner rollers for uneven wear, deformation, damage, and looseness.	* (4)	
		Check the side rollers for uneven wear, deformation, damage, and looseness.	* (5)	
		Verify that running motion is smooth.		
		Verify that the area connected to the hoist unit is not worn or damaged.	* (9)	

- * (1) Recommended bolt tightening torques: M6: 7N-m, M8: 17.5N-m, M10: 34N-m, M12: 61N-m
 - * (2) Impact shocks to intermediate stoppers and end-caps can cause part damage which is outside the scope of the warranty.
 - * (3) Verify that the end-truck dimensions (hole diameter and mounting dimensions) are within tolerance. Refer to the end-truck drawing (Reference Material 3) given on page 32.
 - * (4) Bearing life varies according to the usage conditions. For details, please contact TOYOTSU TECHNO CORPORATION.
 - * (5) Verify that operation motion occurs smoothly and without rattling (abnormal) sounds. The system life varies according to usage conditions. For details, please contact TOYOTSU TECHNO CORPORATION.
 - * (6) Move the trolley to one of the sides and verify that the gap between the rail and trolley plate is 11mm or less. Replace trolley with a new one if the gap exceeds 11mm (replacement must be performed by the commercial installer or by TOYOTSU TECHNO CORPORATION (fee charged).
 - * (7) Feel the rail's working range by hand, verifying that the surface is even and free of foreign matter (dust, etc.).
 - * (8) Verify that the rail dimensions (height, width, groove width) at the hanger and end-truck mounting areas are within the specified ranges. (See the Rail Drawing [Reference Material 1] below.)
 - * (9) Verify that the suspension hole dimensions are within the prescribed ranges. (See the Trolley Drawing [Reference Material 2] below.)
- The trolley models are as follows: ARS500-TR3A, ARS500-TR4A, ARS200-TR3, ARS200-TR4

[Reference Material 1]



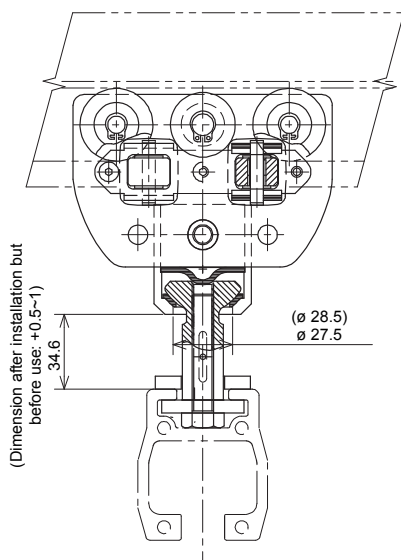
[Reference Material 2]



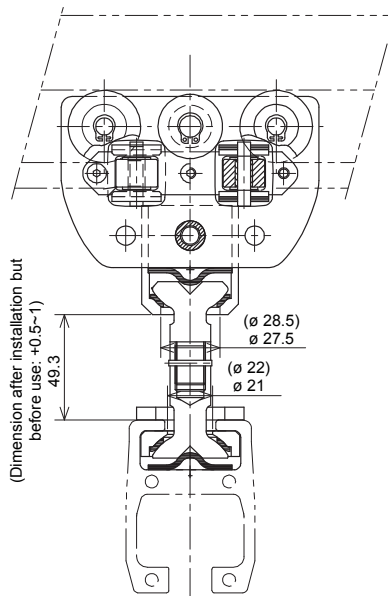
End-truck inspection reference values

Example: (ø 31) Limit dimension
ø 30 Correct (normal) dimension

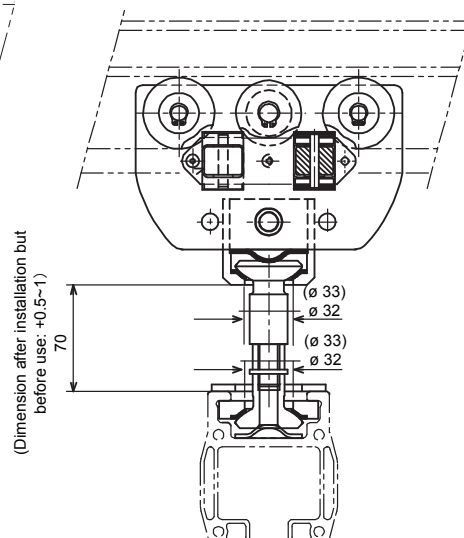
ARS200-ET5



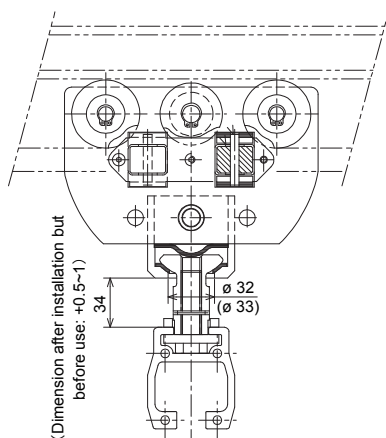
ARS200H-ET4



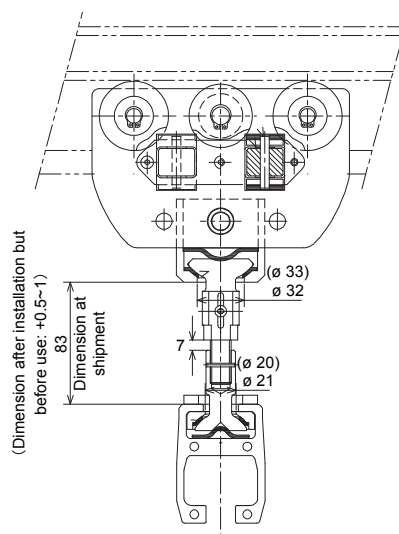
ARS500-ET4B



ARS500-ET6A



ARS500-ET7A



3. Troubleshooting



<div style="text-align: center;"> WARNING</div>
<ul style="list-style-type: none"> • Always turn OFF the hoist unit's main power before beginning a system failure check or repair. • Failure checks and repairs must be performed by a person with adequate expertise and training and who has read this manual carefully. • Use only the brand-name parts specified by TOYOTSU TECHNO CORPORATION.
<div style="text-align: center;"> CAUTION</div>
<ul style="list-style-type: none"> • Where part names/models are unclear, please contact either the sales outlet or TOYOTSU TECHNO CORPORATION.

Table 5

Problem	Cause	Corrective Action
Abnormal trolley or end-truck motion.	Uneven wear at resin roller, or damaged resin roller bearing.	Stop operation immediately, then replace the trolley or end-truck with a brandnew item.
	Foreign matter at the roller's running face (inside rail), or the running face is damaged or uneven.	Clean the roller's running face inside the rail. If damaged or uneven, replace with a new rail.
The hanger or end-truck height adjusting bolt is bent or damaged.	Impact shock loads are being applied to the adjusting bolt during operation causing bolt damage.	Stop operation immediately, then replace the hanger or end-truck with a brandnew item. Also, operate in a manner which prevents impact shocks from occurring. If necessary, extend the rail to prevent such impacts.
Abnormal universal joint motion at hanger or end-truck.	Uneven wear at the spherical hub (oil-containing bearing material).	Stop operation immediately, then replace the hanger or end-truck with a brandnew item.
Abnormal trolley or end-truck motion at a rail linkage area.	Rail linkage deviation (at rail and linkage kit bracket) due to incorrect installation creates a misalignment in the roller's running face.	Adjust the rail and linkage kit alignment (see page 14).
The cross-rail or the trolley in the cross-rail tends to move toward one side (gravity induced motion).	The rail is not horizontal.	Adjust the hanger or end-truck height adjusting bolt so that the cross-rail is horizontal (within the height tolerance range). (See pages 15 and 18.)
Abnormal sound or looseness occurs during rail system operation.	Loose or missing mounting fixture bolt or screw.	Stop operation immediately, then inspect all mounting fixtures and tighten the bolts and screws. If bolts or screws are missing, replace them with new ones.

- Replacement trolleys, end-trucks, and hangers, etc., can be provided only as assemblies. Replace only with new items.

[6] After-Service

1. Repair and Inspection

Repairs and inspections (fee charged) can be requested from a qualified commercial service, the sales outlet, or from TOYOTSU TECHNO CORPORATION. The free repair or replacement warranty period is 1 year from the date of purchase.

2. Warranty Period

- The free repair or replacement warranty period is 1 year from the date of purchase.
- TOYOTSU TECHNO CORPORATION shall bear all costs associated with repair and replacement with regard to defects in workmanship and materials which occur within the warranty period, and which are determined by TOYOTSU TECHNO CORPORATION to be its responsibility. (For ALPHARAIL systems installed outside of Japan, only system replacements shall be performed (no repairs).)
- The following faults are outside the scope of this warranty, and the customer shall bear the repair costs associated with them.
 - (1) Equipment failure and/or damage due to improper use or unauthorized repair/modification work and disassembly.
 - (2) Equipment failure and/or damage incurred by other equipment.
 - (3) Equipment failure and/or damage resulting from natural disasters, environmental pollution, and damage caused by salt and chemicals, etc.
- The customer shall bear the cost of any repairs requested after the warranty period expires.

3. Spare Parts Inventory and Holding Period

Although maintenance and repair parts shall be kept in stock for a period of 7 years after the manufacture of that product is discontinued, some parts may not be immediately available.

Repair of some equipment failures may be possible even after the 7-year period expires. Please contact TOYOTSU TECHNO CORPORATION for this information.

* Changes to improve equipment functionality may be undertaken at any time and without prior notification.

4. Standard Specifications Table

1) ALPHARAIL

Type	Model Name	Unit Weight	Rail Length	R (curved surface) Rail
ARS500 Series	ARS500H	8.50kg/m	1m to 6m (for each meter) Contact TOYOTSU TECHNO CORPORATION for end dimensions	
	ARS500	5.80kg/m		R1200 90° (use dedicated trolley)
ARS200 Series	ARS200H	4.72kg/m		
	ARS200	3.67kg/m		R750 90° (use dedicated trolley)
For hose trolley	ARS050	1.30kg/m		R750 90°

2) Component Parts

Part Name				Type	
				ARS500 Series	ARS200 Series
Mounting fixtures	Hanger	Standard type		ARS500-HN1	ARS200-HN1
		Standard type rise-prevention		ARS500-HN1-F	ARS200H-HN1
					ARS200H-HN1-F
	Parallel type		ARS500-HN2	ARS200-HN2	
	Safety fixture		ARS500-SJ1	ARS200-SJ1	
Trolley	Standard type		ARS500-TR3A	ARS200-TR3	
	With plate		ARS500-TR4A	ARS200-TR4	
End-truck	Double-hinge type		ARS500-ET4B	ARS200H-ET4	
	Single-hinge type		ARS500-ET5A	ARS200-ET5	
	ARS500/200 Assembly	Single-hinge type	ARS500-ET6A		
	ARS500/200H Assembly	Double-hinge type	ARS500-ET7A		
Intermediate stopper	Standard type		ARS500-MS2	ARS200-MS2	
	With brake		ARS500-MS3	ARS200-MS3	
	With damper		ARS500-MS4	ARS200-MS4	
Rail related devices	End-cap		ARS500H-EC1	ARS200H-EC1	
			ARS500-EC1	ARS200-EC1	
	Linkage kit		ARS500H-CN1	ARS200H-CN1	
			ARS500-CN1A	ARS200-CN1	
Utility supply related devices 1	Hose trolley		ARS500-HT4	ARS200-HT4	
	Rail hanger		ARS500-RH1	ARS200-RH1	
Utility supply related devices 2 (for ARS050 ALPHARAIL)	Hose trolley		ARS050-HT4		
	Linkage kit		ARS050-CN1		
	End-cap		ARS050-ES2		

* For detailed specifications, refer to the separate "Standard Mounting Fixtures list".

Please direct any inquiries regarding this manual to TOYOTSU TEC CORPORATION at the following address:



15-13, Hayato, Hiroji-Cho, Showa-ku, Nagoya, Aichi, 466-0834 Japan
Tel: +81-52-832-6621 Fax: +81-52-832-2512
<https://www.toyotsu-tec.net/lp/alfarail/>

Sales Outlets

-
- The specifications of products which appear in this manual may be changed at any time without prior notice.
 - Actual product colors may vary slightly from the printed colors.
 - Do not use this products for applications other than those given in this catalog. Contact TOYOTSU TEC if the product is to be used for a different application.
 - Unauthorized excerption, copying, or reproduction of this manual content is prohibited.
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