ANSI/ASSP Z359.14-2021 (Class 1)

OSHA 29 CFR 1910.140

OSHA 29 CFR 1926.502

3M™ NANO-LOK® SELF-RETRACTING DEVICES

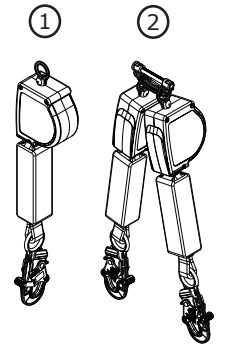
USER INSTRUCTIONS

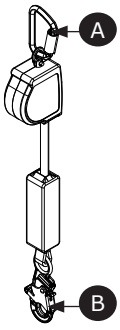
5908117 Rev. E

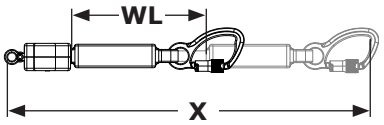
Fall Protection

☑ *For identification of product codes, refer to Table 1. See "Table 1 - Product Specifications" for more product information.*

Figure 1 - Product Overview

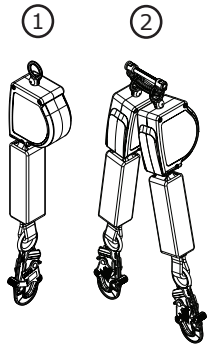


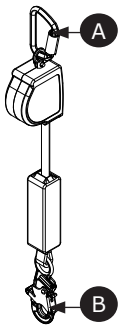


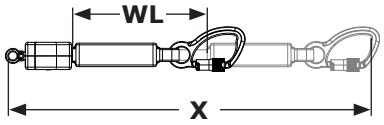


Arc Flash (ASTM F887)	Model		Connectors A	Connectors B	Housing Size	Lifeline	Extended Length (X)	Working Length (WL)
	3100590	1	C2	C7	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)
	3100591	1	C2	C5	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)
	3100592	1	C1	C5	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)
	3100593	1	C3	C7	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)
	3100594	1	C3	C13	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)
	3100595	1		C5	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)
	3100596	1	C1	C12	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)
	3100597	1	C2	C13	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)
	3100598	1	C6	C5	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)
	3100599	1	C2	C8	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100600	1	C2	C11	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100601	1	C2	C9	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100602	1	C2	C4	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100603	1	C1	C9	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100604	1	C1	C4	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100605	1	C3	C8	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100606	1	C3	C11	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100607	1	C1	C5	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100608	1	C2	C10	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100609	2	C2	C5	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)

Figure 1 - Product Overview







Arc Flash (ASTM F887)	Model		Connectors A	Connectors B	Housing Size	Lifeline	Extended Length (X)	Working Length (WL)
	3100610	②	C2	C7	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)
	3100611	②	C2	C13	Size A	DP1	11 ft. (3.35 m)	9.3 ft. (2.8 m)
	3100612	②	C2	C8	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100613	②	C2	C11	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100614	②	C2	C9	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100615	②	C2	C4	Size A	DP1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
	3100616	②	C2	C10	Size A	KW1	9.0 ft. (2.7 m)	7.1 ft. (2.1 m)
✓	**3100573**	①	C2	C5	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100574**	①	C2	C12	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100575**	①	C2	C4	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100576**	①	C2	C9	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100577**	①	C2	C7	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100578**	①	C2	C11	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft (1.9 m)
✓	**3100579**	①	C2	C8	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100580**	①	C1	C5	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100581**	①	C3	C7	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100582**	②	C2	C5	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100583**	②	C2	C12	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100584**	②	C2	C4	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100585**	②	C2	C9	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100586**	②	C2	C7	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100587**	②	C2	C11	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)
✓	**3100588**	②	C2	C8	Size A	KW1	8.0 ft. (2.4 m)	6.3 ft. (1.9 m)

SAFETY INFORMATION

Please read, understand, and follow all safety information contained in these instructions, prior to the use of this product. FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OR DEATH.

These instructions must be provided to the user of the equipment. Retain these instructions for future reference.

Intended Use:

This product is used as part of a complete Fall Protection system.

Use in any other application including, but not limited to, material handling, recreational or sports-related activities, or other activities not described in these instructions, is not approved by 3M and could result in serious injury or death.

This product is only to be used by trained users in workplace applications.

⚠ WARNING

This product is used as part of a complete Fall Protection system. All users must be fully trained in the safe installation and operation of their complete Fall Protection system. **Misuse of this product could result in serious injury or death.** For proper selection, operation, installation, maintenance, and service, refer to all instruction manuals and manufacturer recommendations. For more information, see your supervisor or contact 3M Technical Services.

- **To reduce the risks associated with using a Self-Retracting Device which, if not avoided, could result in serious injury or death:**
  - Inspect the product before each use and after any fall event, in accordance with the procedures specified in these instructions.
  - If inspection reveals an unsafe or defective condition, remove the product from service immediately and clearly tag it "DO NOT USE". Destroy or repair the product as required by these instructions.
  - Any product that has been subject to fall arrest or impact force must be immediately removed from service. Destroy or repair the product as required by these instructions.
  - Ensure that Fall Protection systems assembled from components made by different manufacturers are compatible and meet all applicable Fall Protection regulations, standards, or requirements. Always consult a Competent or Qualified Person before using these systems.
  - Ensure the product is kept free from all hazards including, but not limited to: entanglement with users, other workers, moving machinery, other surrounding objects, or impact from overhead objects that could fall onto the product or users.
  - Do not twist, tie, knot, or allow slack in the lifeline.
  - Avoid trip hazards with legs of the lifeline. Attach any unused lifeline legs to the lanyard parking elements on your full body harness, if present.
  - Do not exceed the number of allowable users specified in these instructions.
  - Do not use in applications that have an obstructed fall path. A clear path is required to lock the SRD. Working on slowly shifting materials (e.g. sand or grain), or within confined spaces or limited spaces, may not allow the worker to reach sufficient speed to lock the SRD.
  - Avoid sudden or quick movements during work operation because this may cause the SRD to unintentionally lock.
  - Use caution when installing, using, or moving the product as moving parts may create pinch points.
  - Use appropriate edge protection when the product may contact sharp edges or abrasive surfaces.
  - Ensure the product is configured and installed properly for safe operation as described in these instructions.
  - Immediately remove the product from service if it has been used in a descent.
  - Before use, ensure the descent path and landing area are clear of any obstructions or hazards.

- **To reduce the risks associated with working at height which, if not avoided, could result in serious injury or death:**
  - Your health and physical condition must allow you to safely work at height and to withstand all forces associated with a fall arrest event. Consult your doctor if you have questions regarding your ability to use this equipment.
  - Never exceed allowable capacity of your Fall Protection equipment.
  - Never exceed the maximum free fall distance specified for your Fall Protection equipment.
  - Do not use any Fall Protection equipment that fails inspection, or if you have concerns about the use or suitability of the equipment. Contact 3M Technical Services with any questions.
  - Some subsystem and component combinations may interfere with the operation of this equipment. Only use compatible connections. Contact 3M Technical Services before using this equipment in combination with components or subsystems other than those described in these instructions.
  - Use extra precautions when working around moving machinery, electrical hazards, extreme temperatures, chemical hazards, explosive or toxic gases, sharp edges, abrasive surfaces, or below overhead materials that could fall onto you or your Fall Protection equipment.
  - Ensure use of your product is rated for the hazards present in your work environment.
  - Ensure there is sufficient fall clearance when working at height.
  - Never modify or alter your Fall Protection equipment. Only 3M, or persons authorized in writing by 3M, may make repairs to 3M equipment.
  - Before using Fall Protection equipment, ensure a written rescue plan is in place to provide prompt rescue if a fall incident occurs.
  - If a fall incident occurs, immediately seek medical attention for the fallen worker.
  - Only use a full body harness for Fall Arrest applications. Do not use a body belt.
  - Minimize swing falls by working as directly below the anchorage point as possible.
  - A secondary Fall Protection system must be used when training with this product. Trainees must not be exposed to an unintended fall hazard.
  - Always wear appropriate Personal Protective Equipment when installing, using, or inspecting the product.
  - Never work below a suspended load or worker.
  - Always maintain 100% tie-off.

☑ *Always ensure you are using the latest revision of your 3M instruction manual. Visit www.3m.com/userinstructions or contact 3M Technical Services for updated instruction manuals.*

PRODUCT OVERVIEW:

Figure 1 illustrates the product models covered by this instruction. Self-Retracting Devices (SRDs) are drum-wound lifelines that retract into solid housings.

The following SRD types are covered by this instruction:

- **Class 1 Self-Retracting Device (Figures 1.1, 1.2; 2.1, 2.2):** Class 1 Self-Retracting Devices (SRDs) are suitable for applications where the lifeline remains generally vertical during use. This type may be used for Fall Arrest or Restraint applications.

Figure 2 identifies key components of the available SRD models. In a standard SRD, the Lifeline (A) extends and retracts from within the Housing (B). The Top Connector (D) secures the SRD to its mounting point and is connected to the SRD by means of the Swivel Eye (E). The Bottom Connector (C) is secured at the end of the Lifeline. Depending on system configuration, the Bottom Connector will attach to either the designated attachment element of the user's full body harness or to the system's anchorage point. Energy Absorbers (F) dissipate kinetic energy and limit deceleration forces during fall arrest.

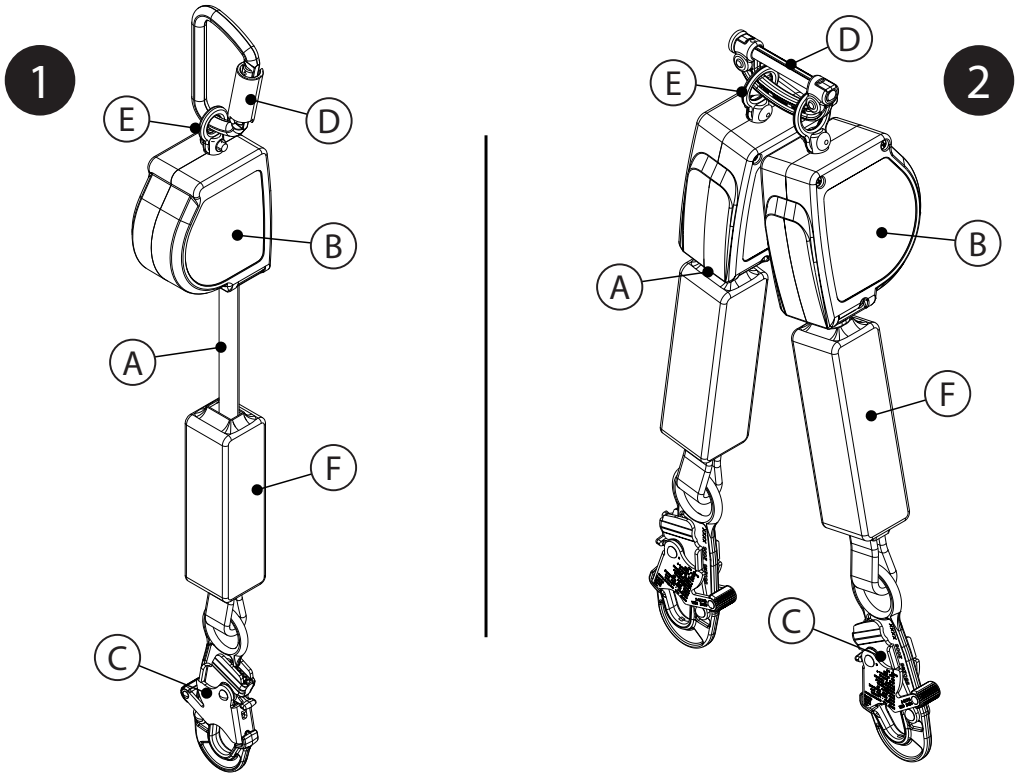
SRD models are available in single-SRD and twin-SRD configurations. Twin-SRD models include a single Top Connector (D) to be shared between the two SRDs. These connectors are designed to interface with harnesses so that the Twin-SRD model may be worn on the user's back. Twin-SRD models may be used to maintain 100-percent tie-off when transferring between anchorage points.

Each product model has its own particular size and its own combination of components as listed in Figure 1. See Table 1 for more information on Component Specifications.

Certain product models in this instruction include additional features or functionality. See Figure 1 for identification of these models.

- **Arc Flash:** "Arc Flash" models meet the requirements of ASTM F887 and are designed for use in environments where an arc flash or electrical explosion could occur.

Figure 2 - Components



☑ *Before using this equipment, record the product identification information from the ID label in the 'Inspection and Maintenance Log' at the back of this manual.*

Table 1 – Product Specifications

System Specifications:

Anchorage:

Anchorage structure requirements vary with the system application and whether it is a certified anchorage or non-certified anchorage. The anchorage structure must sustain static loads applied in the directions permitted by the anchorage connector.

System Application	Certified Anchorage	Non-Certified Anchorage	Defined by
Fall Arrest	2 times maximum arresting force	5,000 lbf (22.2 kN)	OSHA, ANSI
Restraint	2 times foreseeable force	1,000 lbf (4.4 kN) per ANSI 5,000 lbf (22.2 kN) per OSHA	OSHA, ANSI
Work Positioning	2 times foreseeable force	3,000 lbf (13.3 kN)	OSHA, ANSI
Rescue	5 times applied load	3,000 lbf (13.3 kN)	ANSI

When more than one system is attached to an anchorage, the strengths stated above must be multiplied by the number of systems attached to the anchorage. See ANSI/ASSP Z359.2 for more information.

☑ *Anchorage must be approved by a Qualified Person.*

Service Temperature:	-40°F to 130°F (-40°C to 54.4°C)
Standards:	Each product model is certified to, or conforms with, the applicable standards and regulations listed within Figure 1. If none are specified, then all standards and regulations listed on the cover apply.

Component Specifications:

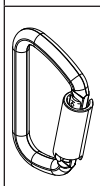
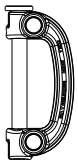
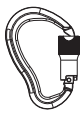
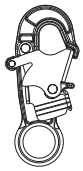
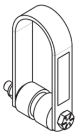
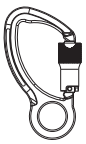
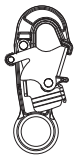
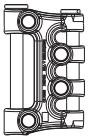
Figure 2 Reference	Component	Materials
Ⓐ	Lifeline	(see Lifeline Specifications)
Ⓑ	Housing	Nylon
Ⓒ	Bottom Connector	(see Connector Specifications)
Ⓓ	Top Connector	(see Connector Specifications)
Ⓔ	Swivel Eye	Zinc-plated steel
Ⓕ	Energy Absorber	Vinyl cover with Vectran lifeline Kevlar cover with polyester lifeline (Arc Flash models only)

☑ ***Internal Components:*** *Internal SRD components are made from a combination of Stainless Steel, Steel, and Aluminum.*

Connector Specifications:

Figure 1 Reference	Model Number	Description	Material	Gate Opening	Gate Strength	Tensile Strength
C1	2000112	Carabiner	Steel	17 mm (11/16 in.)	16 kN (3,600 lbf)	5,000 lbf (22.2 kN)
C2	3100197	Harness Interface	Zinc-Plated Steel	2 in. (51 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)
C3	2000025	Carabiner	Aluminium	0.81 in. (20 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)
C4	2109193	Rebar Hook	Zinc-Plated Steel	2.5 in. (63 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)
C5	9502116	Snap Hook	Zinc-Plated Steel	0.75 in. (19 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)
C6	3100247	Cab Mount	Stainless Steel	1-5/8 in. (51 mm)	---	5,000 lbf (22.2 kN)
C7	2000023	Carabiner	Aluminum	0.75 in. (19 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)
C8	2000209	Rebar Hook	Aluminum, Steel	2.5 in. (63 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)
C9	2000210	Rebar Hook	Zinc-Plated Steel	2.24 in (57 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)
C10	2000214	Rebar Hook	Aluminum, Steel	2.5 in. (63 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)
C11	9502058	Rebar Hook	Aluminum, Steel	2.24 in (57 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)
C12	9502195	Swivel Snap Hook	Zinc-Plated Steel	0.75 in. (19 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)
C13	9505254	Snap Hook	Aluminum, Steel	0.75 in. (19 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)
C14	3100196	Dual-Pin SRD Connector	Aluminum, Steel	2 in. (51 mm)	3,600 lbf (16 kN)	5,000 lbf (22.2 kN)

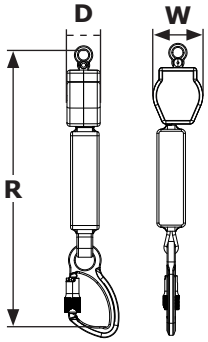
Table 1 – Product Specifications

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
													

Lifeline Specifications:	
Figure 1 Reference	**Description**
DP1	.781 in. width x .052 in. thick, Dyneema polyester with polyester thread; minimum tensile strength 4,946 lbf (22kN)
KW1	.781 in. width x .093 in. thick, Kevlar web with Kevlar thread

Performance - SRDs	**ANSI Z359.14-2021 OSHA 29 CFR 1910.140, 1926.502**	**OSHA 29 CFR 1910.140, 1926.502**
Capacity Range:	130 lb. - 310 lb. (59 kg - 140 kg)	Up to 420 lb. (191 kg)
Maximum Arresting Force:	1,800 lbf (8 kN)	1,800 lbf (8 kN)
Average Arresting Force:	1,125 lbf (5 kN)	1,125 lbf (5 kN)
Maximum Arrest Distance: **Assumes the SRD is mounted directly above the user.*	42 in. (1.1 m)	48 in. (1.22 m)
Maximum Deceleration Distance: **Assumes the SRD is mounted directly above the user.*	---	42 in. (1.1 m)
Minimum Fall Clearance Required: **Assumes the SRD is mounted directly above the user.*	5 ft. (1.52 m)	5.5 ft. (1.68 m)
Maximum Free Fall: **SRD must be mounted above user's D-ring.*	2 ft. (0.6 m)	2 ft. (0.6 m)

Performance - SRDs (Arc Flash Models)	**ANSI Z359.14-2021 OSHA 29 CFR 1910.140, 1926.502**	**OSHA 29 CFR 1910.140, 1926.502**
Capacity Range:	130 lb. - 310 lb. (59 kg - 140 kg)	Up to 420 lb. (191 kg)
Maximum Arresting Force:	1,800 lbf (8 kN)	1,800 lbf (8 kN)
Average Arresting Force:	1,125 lbf (5 kN)	1,125 lbf (5 kN)
Maximum Arrest Distance: **Assumes the SRD is mounted directly above the user.*	42 in. (1.1 m)	48 in. (1.22 m)
Maximum Deceleration Distance: **Assumes the SRD is mounted directly above the user.*	---	42 in. (1.1 m)
Minimum Fall Clearance Required: **Assumes the SRD is mounted directly above the user.*	5 ft. (1.52 m)	5.8 ft. (1.8 m)
Maximum Free Fall: **SRD must be mounted above user's D-ring.*	2 ft. (0.6 m)	2 ft. (0.6 m)

Dimensions:				
Figure 1 Reference	**D**	**W**	**R**	
Size A	2.13 in. (5 cm)	4.18 in. (11 cm)	25.0 in. (63.5 cm)	

1.0 PRODUCT APPLICATION

1.1 **PURPOSE:** 3M Self-Retracting Devices (SRDs) are designed for use as a connecting subsystem in a Fall Protection system. Once anchored, the lifeline extends and retracts automatically as the worker moves. If a fall occurs, a sensing mechanism activates the device and arrests the fall. For more information on system applications, refer to the "Product Overview" and Table 1.

1.2 **SUPERVISION:** Use of this equipment must be supervised by a Competent Person.

1.3 **STANDARDS:** Your product conforms to the national or regional standards identified on the front cover of these instructions. If this product is resold outside the original country of destination, the re-seller must provide these instructions in the language of the country in which the product will be used.

> ☑ *For more information on certification or conformance requirements, refer to the applicable standards and regulations listed for your product (e.g. the ANSI/ASSP Z359 Fall Protection codes).*

1.4 **TRAINING:** This equipment must be installed and used by persons trained in its correct application. These instructions are to be used as part of an employee training program as required by national, regional, or local standards. It is the responsibility of the users and installers of this equipment to ensure they are familiar with these instructions, trained in the correct care and use of this equipment, and are aware of the operating characteristics, application limitations, and consequences of improper use of this equipment.

1.5 **RESCUE PLAN:** When using this equipment and connecting subsystems, the employer must have a written rescue plan and the means to implement and communicate that plan to users, authorized persons, and rescuers. A trained, on-site rescue team is recommended. Team members should be provided with the equipment and techniques necessary to perform a successful rescue. Training should be provided on a periodic basis to ensure rescuer proficiency. Rescuers should be provided with these instructions. There should be visual contact or means of communication with the person being rescued at all times during the rescue process.

2.0 SYSTEM REQUIREMENTS

2.1 **ANCHORAGE:** Anchorage requirements vary with the Fall Protection application. The mounting structure on which the equipment is placed must meet the Anchorage specifications defined in Table 1.

2.2 **CAPACITY:** The user capacity of a complete Fall Protection system is limited by its lowest rated maximum capacity component. For example, if your connecting subsystem has a capacity that is less than your harness, you must comply with the capacity requirements of your connecting subsystem. See the manufacturer instructions for each component of your system for capacity requirements.

2.3 **ENVIRONMENTAL HAZARDS:** Use of this equipment in areas with environmental hazards may require additional precautions to prevent injury to the user or damage to the equipment. Hazards may include, but are not limited to: high heat, chemicals, corrosive environments, high voltage power lines, explosive or toxic gases, moving machinery, sharp edges, or overhead materials that may fall and contact the user or equipment. Contact 3M Technical Services for further clarification.

2.4 **LIFELINE HAZARDS:** Ensure the lifeline is kept free from all hazards including, but not limited to: entanglement with users, other workers, moving machinery, other surrounding objects, or impact from overhead objects that could fall onto the lifeline or users.

2.5 **FALL PATH AND SRD LOCKING SPEED:** Do not use in applications that have an obstructed fall path. A clear path is required to lock the SRD. Working on slowly shifting materials (e.g. sand or grain), or within limited spaces, may not allow the worker to reach sufficient speed to lock the SRD.

2.6 **COMPONENT COMPATIBILITY:** 3M equipment is designed for use with 3M equipment. Use with non-3M equipment must be approved by a Competent Person. Substitutions made with non-approved equipment may jeopardize equipment compatibility and may affect the safety and reliability of your Fall Protection system. Read and follow all instructions and warnings for all equipment prior to use.

2.7 **CONNECTOR COMPATIBILITY:** Connectors are compatible with connecting elements when the size and shape of either component does not cause the connector to inadvertently open, regardless of orientation. Connectors must comply with applicable standards. Connectors must be fully closed and locked during use.

3M Connectors (snap hooks and carabiners) are designed to be used only as specified in each instruction manual. Ensure connectors are compatible with the system components to which they are connected. Do not use equipment that is non-compatible. Use of non-compatible components may cause the connector to unintentionally disengage (see Figure 3). If the connecting element to which a connector attaches is undersized or irregular in shape, a situation could occur where the connecting element applies a force to the gate of the connector (A). This force could then cause the gate to open (B), disengaging the connector from the connecting element (C).

2.8 MAKING CONNECTIONS: All connections must be compatible in size, shape, and strength. See Figure 4 for examples of inappropriate connections. Do not attach connectors:

A. To a D-Ring to which another connector is attached.

B. In a manner that would result in a load on the gate. Large-throat snap hooks should not be connected to D-Rings or other connecting elements, unless the snap hook has a gate strength of 16 kN (3,600 lbf) or greater.

C. In a false engagement, where size or shape of the connector or connecting element is not compatible and, without visual confirmation, would seem to be fully engaged.

D. To each other.

E. Directly to harness webbing, lanyard leg material, or tie-back material unless such a connection is explicitly allowed for by the manufacturer instructions.

F. To any object whose size or shape does not allow the connector to fully close and lock, or that could cause connector roll-out.

G. In a manner that does not allow the connector to align properly while under load.

Figure 3 - Connector Compatibility

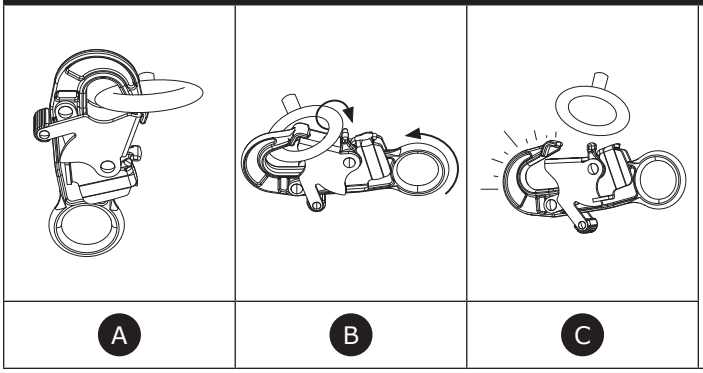
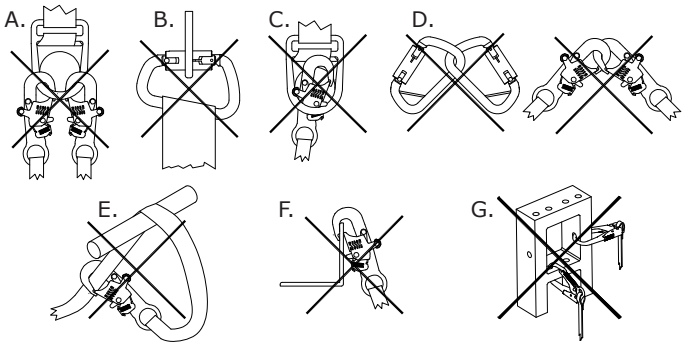


Figure 4 - Making Connections



3.0 INSTALLATION

3.1 OVERVIEW: Installing this product requires effective planning and knowledge of fall clearance requirements. In the event of a fall, there must be enough fall clearance present to safely arrest the user.

3.2 PLANNING: Plan your Fall Protection system before starting your work. Account for all factors that may affect your safety before, during, and after a fall. Consider all requirements and limitations specified in these instructions.

A. SHARP EDGES: Avoid working where system components may be in contact with, or scrape against, unprotected sharp edges and abrasive surfaces. All sharp edges and abrasive surfaces should be covered with protective material.

☑ *Only SRD-LEs may be used for applications with unprotected sharp edges or abrasive surfaces.*

3.3 FALL CLEARANCE: It is critical that the user is aware of fall clearance and its requirements before using this product.

A. DEFINITION: Fall clearance is the measure of distance between a user and the next obstruction below them. Before use of this product, the user should determine how much fall clearance is required to prevent them from striking an obstruction should they fall.

A user's **Required Fall Clearance (FC) is the sum of Free Fall (FF), Deceleration Distance (DD), Harness Stretch (HS), and a Safety Factor (SF).** See Figure 5.1 for reference.

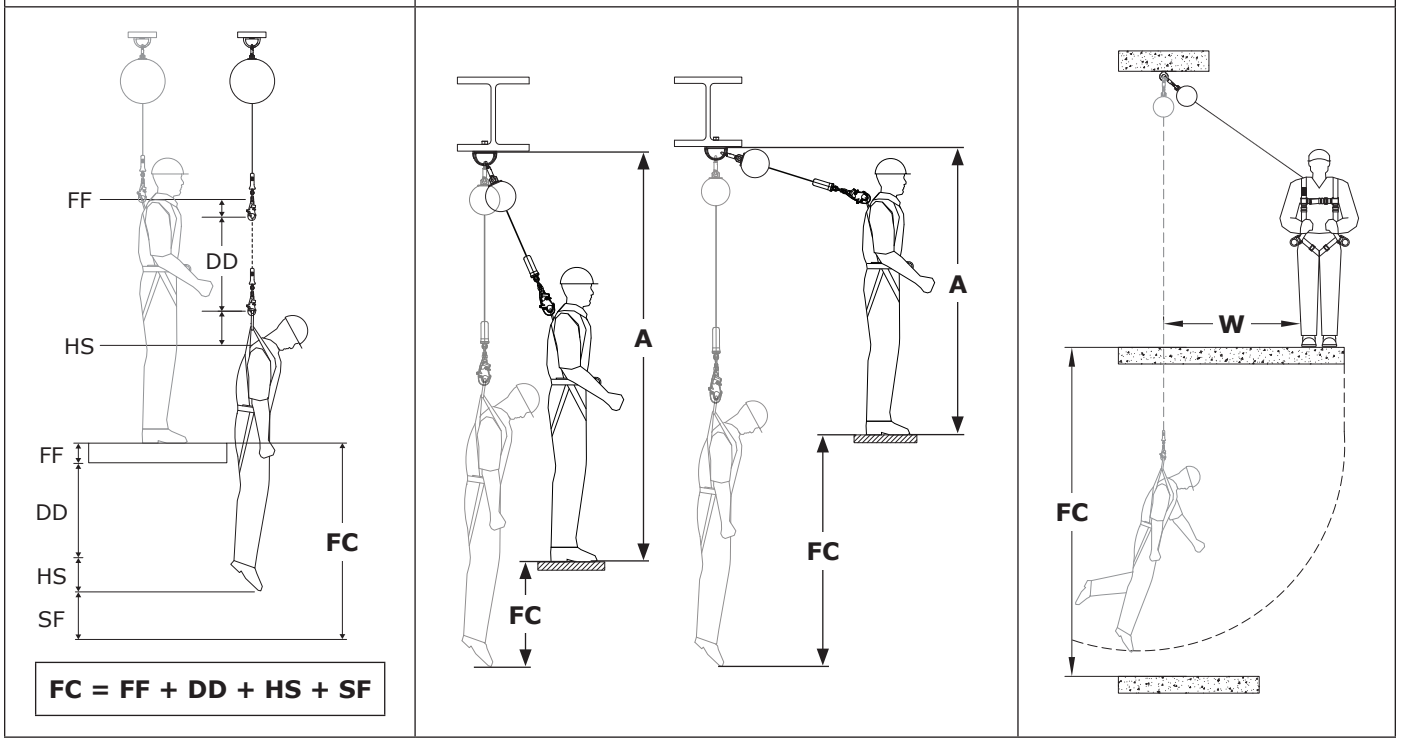
- **Free Fall (FF)** is the distance the user travels before activation of the deceleration device.
- **Deceleration Distance (DD)** is the distance the user falls measured from activation of the deceleration device until stopping.
- **Harness Stretch (HS)** is the amount of slack extending from the user's harness when the user is suspended by their harness attachment element.
- **Safety Factor (SF)** is a set amount of distance added to fall clearance to ensure user safety.

There may be additional factors affecting Required Fall Clearance within your Fall Arrest system, such as D-ring extension length and anchorage deflection. For coverage of these factors, and others not outlined above, refer to the manufacturer instructions for each component of your Fall Arrest system. Additional factors, when provided, should be added to the fall clearance values in this instruction.

B. MINIMIZING REQUIREMENTS: The user should always position their Fall Arrest system to minimize fall potential and potential fall distance. To keep fall clearance requirements to a minimum, it is recommended that the user work as directly below their anchorage point as possible.

- **ANCHORAGE HEIGHT:** The Required Fall Clearance (FC) for a user increases as Anchorage Height (A) decreases. The user experiences a greater amount of free fall when connected to an anchorage point below them, since the user will have to travel that much farther should they fall. See Figure 5.2 for reference.
- **SWING FALLS:** The Required Fall Clearance (FC) for a user increases as User Work Radius (W) increases. Swing falls occur when the anchorage point is not directly above the user when a fall occurs. See Figure 5.3 for reference.

Figure 5 - Fall Clearance Requirements

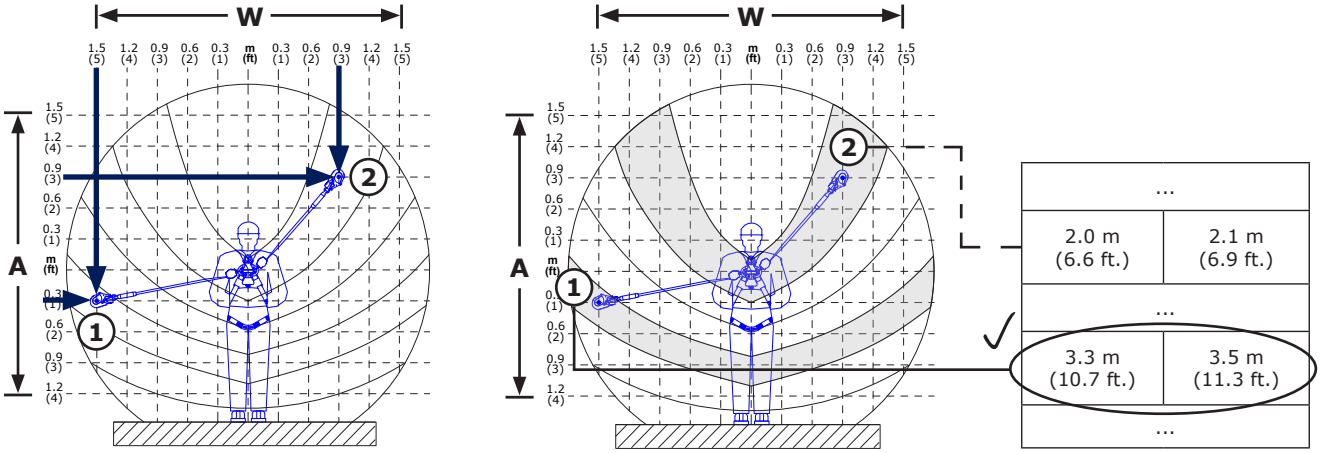


FALL CLEARANCE CHARTS

Required Fall Clearance has been provided within the charts below. To determine Required Fall Clearance:

1. **Locate your first connector (1).** Measure the Anchorage Height (A) and Maximum Work Radius (W) of your connector, relative to the height of your D-ring. Place your first connector in the chart where these intersect.
2. **Locate your second connector (2).** Use the same method from Step 1 to place your second connector in the chart.
3. **Find your Required Fall Clearance (FC).** Locate the chart "wing" each connector falls into, then locate the corresponding fall clearance in the table to the right. The fall clearance table is divided into columns, depending on capacity. Select the value within the column matching your total user capacity (including clothing, tools, etc.).

☑ *If your connectors are in different wings, you must use the greater fall clearance requirement between them.*

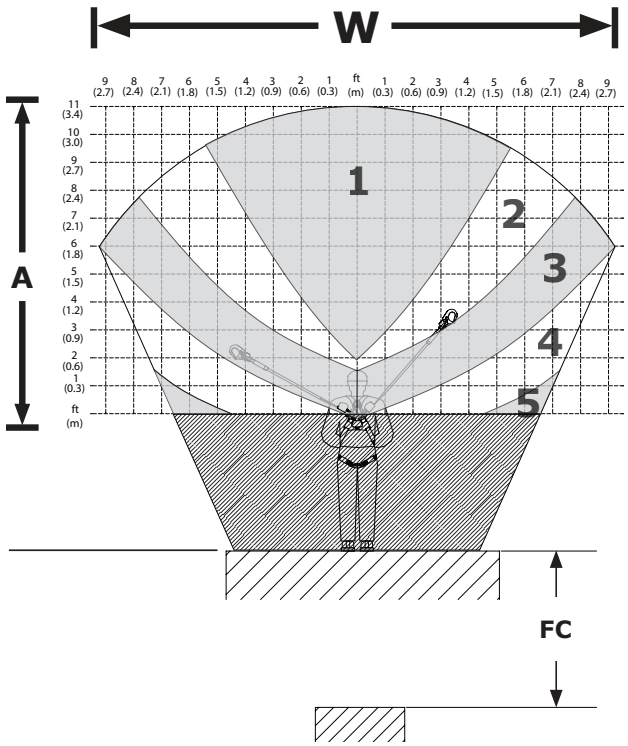


☑ *A Safety Factor of 0.5 ft. (0.15 m) and a user height of 6 ft. (1.8 m) were used for all values listed. Kneeling or crouching will reduce the position of the user above the platform and will require an additional 3.28 ft. (1.0 m) of fall clearance.*

☑ *Required Fall Clearance is calculated with the assumption that each leg of the SRD is extended a minimal distance behind the user, from wherever they may be positioned in the chart. The assumption of minimum setback distance ensures the user has enough fall clearance regardless of their actual setback distance.*

☑ *Never secure your connector within chart areas marked by cross hatching or crossed-out table cells.*

Fall Clearance Chart #1 (Web SRDs)

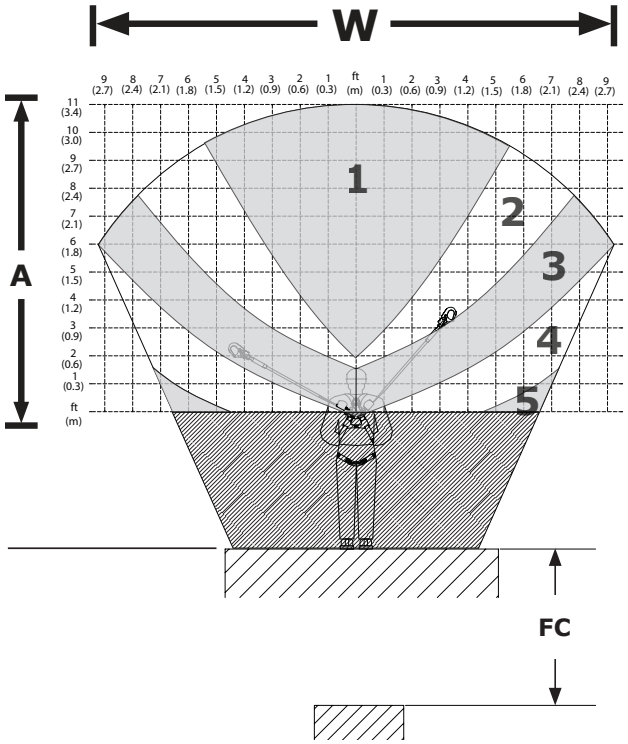


Weight	Chart Area				
	1	2	3	4	5
ANSI/OSHA 130-310 lb. (59-140 kg)	5 ft. (1.5 m)	6 ft. (1.8 m)	7 ft. (2.1 m)	8.5 ft. (2.6 m)	10 ft. (3.0 m)
OSHA 311-420 lb. (141-190 kg)	5.5 ft. (1.7 m)	7 ft. (2.1 m)	9 ft. (2.7 m)	10.5 ft. (3.2 m)	13.5 ft. (4.1 m)
	Fall Clearance (FC)				

Key
A = Anchorage Height W = Maximum Work Radius FC = Required Fall Clearance

☑ *Never secure your connector within chart areas marked by cross hatching or crossed-out table cells.*

Fall Clearance Chart #2 (Arc Flash Models Only)



Weight	Chart Area				
	1	2	3	4	5
ANSI/OSHA 130-310 lb. (59-140 kg)	5 ft. (1.5 m)	6 ft. (1.8 m)	7 ft. (2.1 m)	8.8 ft. (2.7 m)	10 ft. (3.0 m)
OSHA 311-420 lb. (141-190 kg)	5.8 ft. (1.8 m)	7 ft. (2.1 m)	9 ft. (2.7 m)	10.5 ft. (3.2 m)	13.5 ft. (4.1 m)
	Fall Clearance (FC)				

Key
A = Anchorage Height W = Maximum Work Radius FC = Required Fall Clearance

3.4 CONNECTING TO ANCHORAGE: Figure 7 illustrates typical SRD anchorage connections. The Anchorage (A) should be directly overhead to minimize free fall and swing fall hazards (see Section 3.3.B). Select an anchorage capable of sustaining the static loads defined in Table 1. Depending on system and product configuration, the SRD may be mounted on the anchorage point or on the user's full body harness.

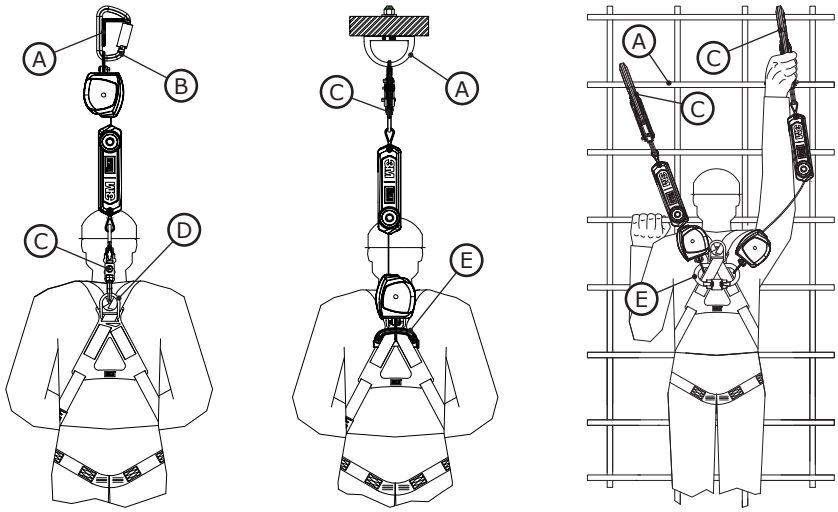
☑ *Large-throat snap hooks must never be secured to D-rings or other connecting elements unless they have a gate strength of 16 kN (3,600 lbf) or greater.*

A. ANCHORAGE MOUNTING: Single-SRD models may be mounted on anchorage points as long as they are installed properly and have the right connectors for securing on an anchorage point. The top connector must be a carabiner, snap hook, or rebar hook. To secure an SRD overhead, first secure the Top Connector (B) to the anchorage point. Then, secure the Bottom Connector (C) directly to the dorsal D-ring (D) of your harness.

B. HARNESS MOUNTING: Harness-mounted SRDs are secured to the full body harness directly by their Harness Interface (E). The user then secures to anchorage connection points using their Bottom Connectors (C). Twin-SRD models enable the user to maintain 100-percent tie-off when transferring between anchorage points.

☑ *Always ensure that you are appropriately securing and anchoring your SRD. Some SRD models may have anchorage height restrictions. See the fall clearance charts for more information on these restrictions, if present.*

Figure 6 - Connecting to Anchorage



3.5 INSTALLING A HARNESS-MOUNTED SELF-RETRACTING DEVICE: Single- and Twin-SRD models with harness web interfaces as their top connector may be installed directly onto the user's full body harness. This format enables easier transportation of the SRD and ensures that the SRD is within reach when moving between anchorage points. The methods for mounting an SRD on a harness vary with SRD model and the interface provided.

☑ *Harness interfaces may also be used in coordination with specific features of full body harnesses to secure the Single- or Twin-SRD to the harness. Examples include the pSRD Link and the molded X100 SRD Interface Loop present on some 3M harness models. The following instructions provide a general method for how each harness interface should be used. See the manufacturer instructions of your full body harness for more information on specific features for interfacing with SRDs.*

A. STANDARD HARNESS WEB INTERFACE: See Figure 7A for reference. To mount the SRD on a Full Body Harness with SRD Harness Interface

1. Loosen the harness webbing. Pull out on the Web Straps (A) where they pass through the bottom of the Dorsal D-ring (B) until there is enough space to slide the harness web interface through.
2. Open the harness web interface. Push down on the two Locking Buttons (C) to slide the Locking Pin (D) out.
3. Position the SRD on the Harness Web Interface (E). Thread the open harness web interface through the Swivel Eye (F) of your SRD. The SRD should hang from the backbone of the harness interface. If using a twin-SRD, position the SRDs such that one SRD is on the right side and the other is on the left side.
4. Position the open gate of the Harness Web Interface (E) around the loosened web straps of the harness.
5. Close the harness web interface. Push the Locking Pin (D) behind the loosened Web Straps (A), between the straps and the back pad of the harness. Push the Locking Pin through until it locks into place. Once closed, pull the Web Straps back through the harness to secure the harness web interface.

B. CARABINER INTERFACE: See Figure 7B for reference. These instructions apply to Triple Action Carabiner 2000159 when used with specific Full Body Harness models. No other carabiners may be substituted in place of 2000159.

1. Loosen the harness webbing. Pull out on the Web Straps (A) where they pass through the bottom of the Dorsal D-ring (B) until there is enough space to slide the carabiner through.
2. Open the carabiner. With the carabiner oriented as illustrated, push the Locking Sleeve (C) to the right, then turn clockwise to unlock the Gate (D). Push the Gate (D) down to open.

3. Thread the first SRD onto the carabiner. Insert the Nose (E) of the carabiner through the Swivel Eye (F) of the SRD, then loop the SRD through to the Gate End (G) of the carabiner.
4. Position the carabiner around the web straps. Insert the Nose (E) of the carabiner behind the loosened Web Straps (A), between the straps and the back pad of the harness. Rotate the carabiner until it surrounds the loosened straps.
5. Thread the second SRD onto the carabiner. Slide the Swivel Eye (F) of the SRD over the Nose (E) of the carabiner. Position the SRD along the nose end of the carabiner.
6. Close the carabiner. Release the gate and allow the carabiner to rotate back to its locked position. Once closed, pull the the Web Straps back through the harness to secure the carabiner.

Figure 7A - Standard Harness Interface

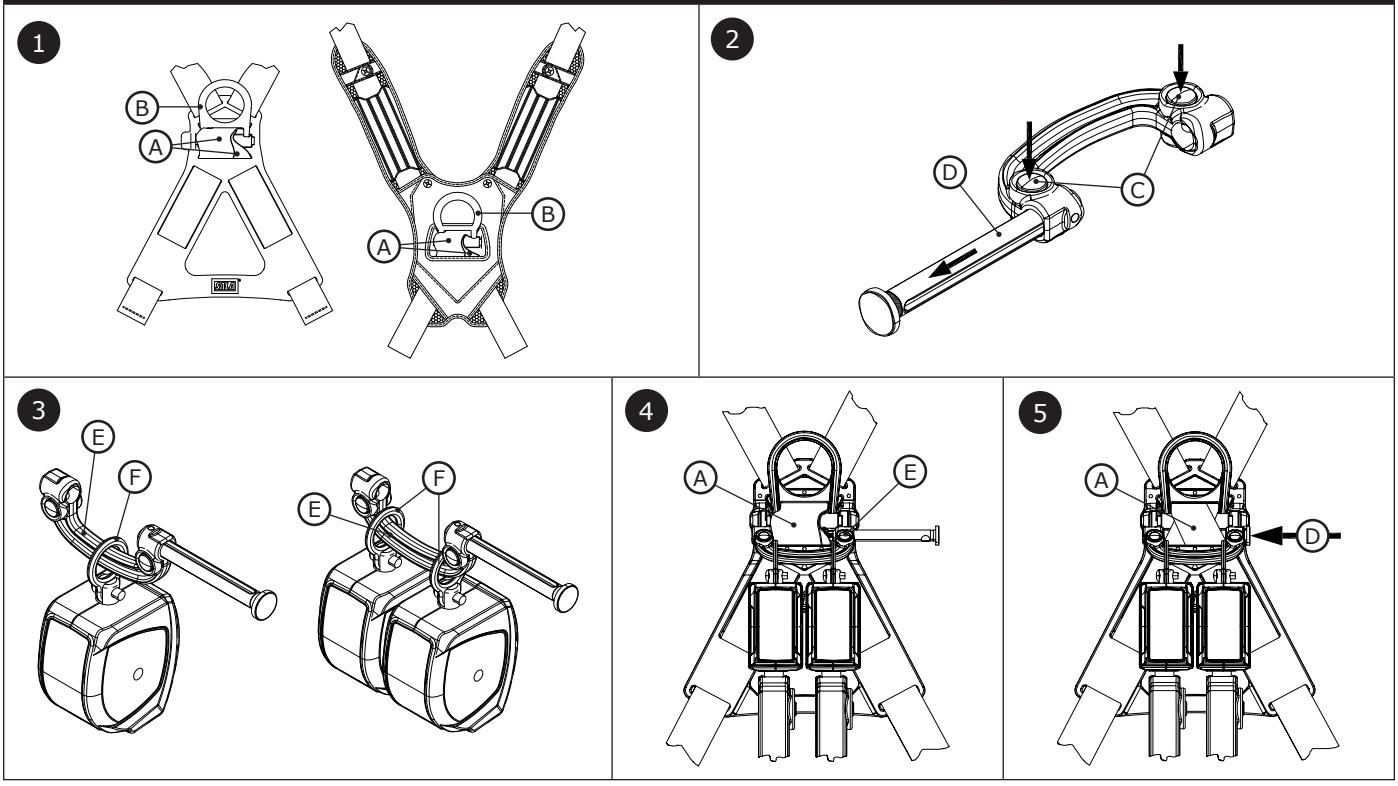


Figure 7B - Carabiner Interface

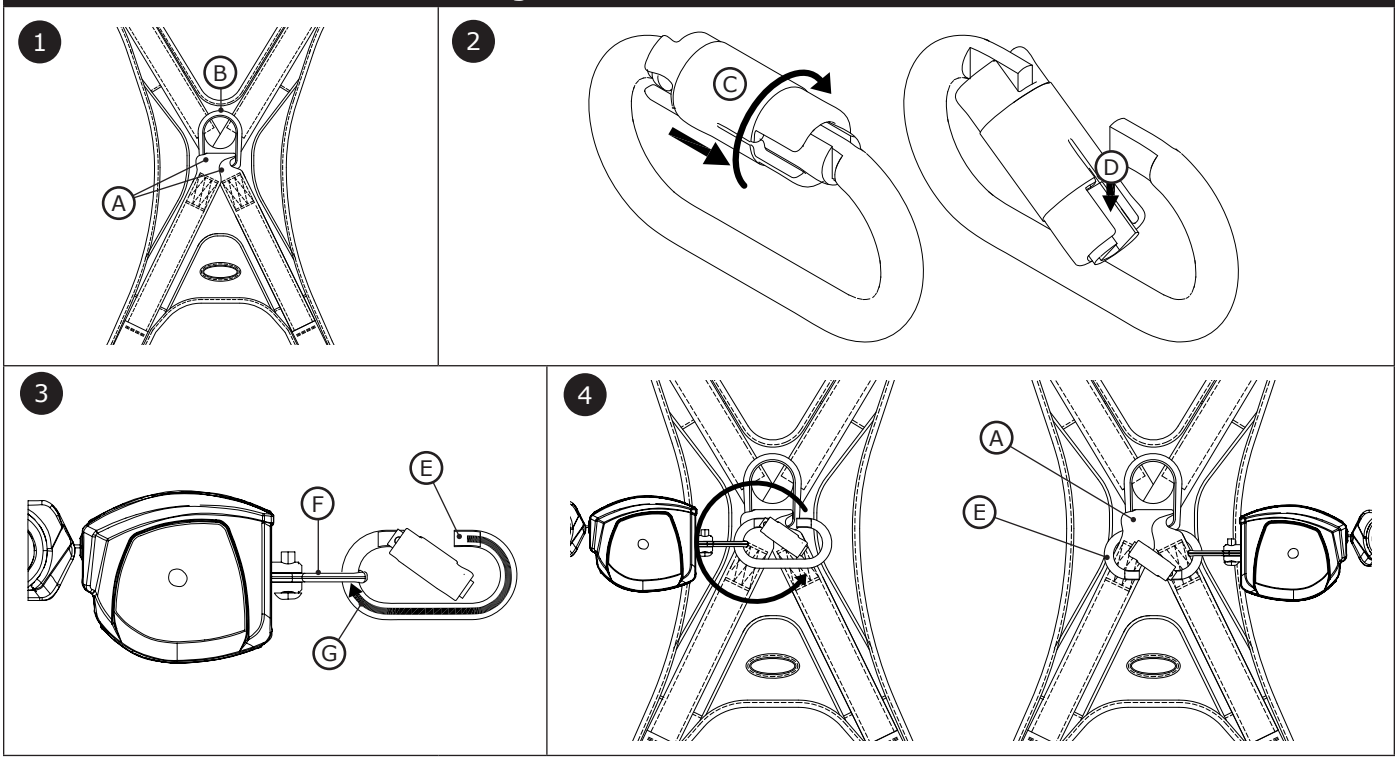
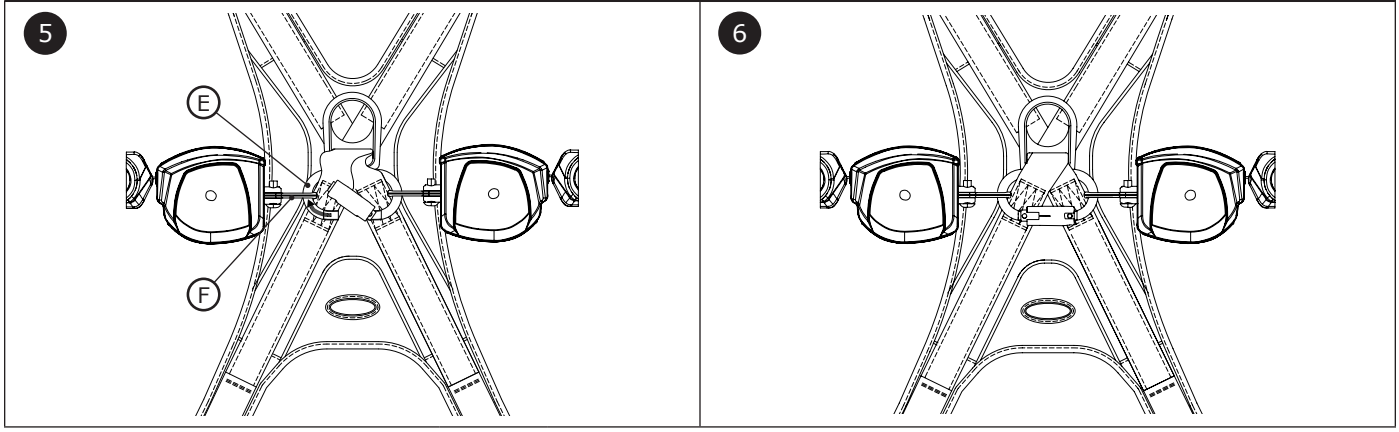


Figure 7B - Carabiner Interface



C. TWIN PIN CARABINER: These instructions apply to Carabiner 3100196 when used with specific Full Body Harness models to mount one Nano-Lok SRL, or two Nano-Lok SRLs in climbing applications where 100% tie-off is required. See Figure 8:

1. Loosen the harness webbing. Pull out on the Web Straps (A) where they pass through the bottom of the Dorsal D-Pull out on the Web Straps (A) where they pass through the bottom of the Dorsal D-Ring (B) until there is sufficient space to slide the Twin Leg Interface between the Web Straps and D-Ring Pad.
2. Simultaneously depress the two button on the bottom side of the connector while sliding the pin out to the right. Sliding this pin out creates an open space to insert the SRL swivel eye(s).
3. For twin configuration: place the swivel eye of one SRL in the open space closest to the pin and one SRL in the open space farthest from the pin. Slide the pin back in place until you hear a click. The pin should be firmly locked in place.
4. For single configuration: Place the swivel eye of a single SRL in the center open space. Slide the pin back in place until you hear a click. The pin should be firmly locked in place.
5. Simultaneously depress the two buttons on the harness side of the connector while sliding the pin out. Sliding this pin out creates on open space.
6. Pull up a small amount of slack in the webbing directly beneath the dorsal D-Ring on your harness. Place the harness side of the connector beneath the D-Ring.
7. Slide the pin back in place ensuring that the pin remains beneath both layers of harness webbing until you hear a click. The pin should be firmly locked in place.

D. SECURING CAB MOUNT BRACKETS: Cab mount brackets are unique connectors that may be secured to the cab top of an order picker. See Figure 9 for reference. To secure the cab mount bracket to an order picker:

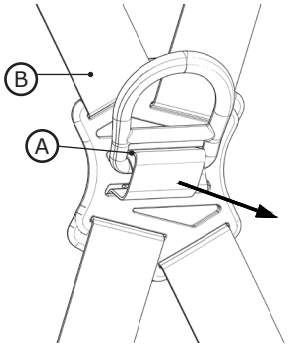
1. Remove the bolt (C) from the Cab Mount Bracket (B) and disassemble the Cab Mount Bracket.
2. Reassemble the Cab Mount Bracket on the SRD swivel eye over the end rung of the order picker cab top (A). Ensure that the bracket is assembled as shown, with the spacers facing the correct direction for your bracket model. Reinsert the bolt (C) to hold the bracket together. Torque the assembly to 150 in-lb. (16.95 N-m).

   ☑ *Use a 1/2 in. socket and wrench when installing the Cab Mount Bracket.*
3. Verify that the Cab Mount Bracket is installed correctly. Three to four threads of the bolt (C) should be visible past the end of the locking nut. If three to four threads are not visible, verify that the spacers are properly oriented and re-orient them if necessary.

   ☑ *Ensure the connection eye of the SRD does not become caught between the spacers of the Cab Mount Bracket. The smaller portion of each spacer (where the two spacers meet) should be threaded through the connection eye completely. Ensure the connection eye is able to rotate freely after installation.*

Figure 8 - Twin Pin Carabiner

1



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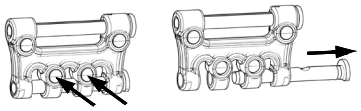

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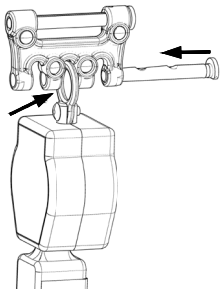

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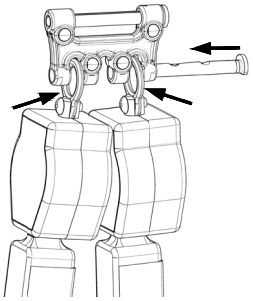

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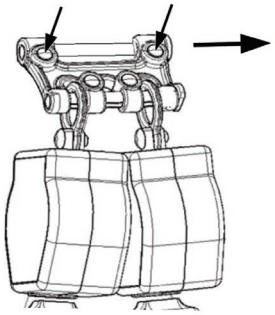

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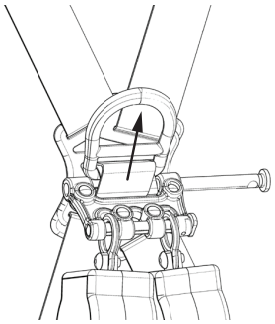

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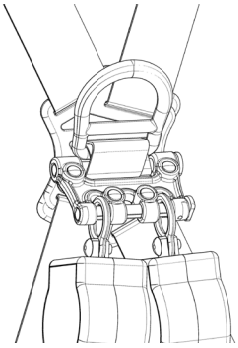
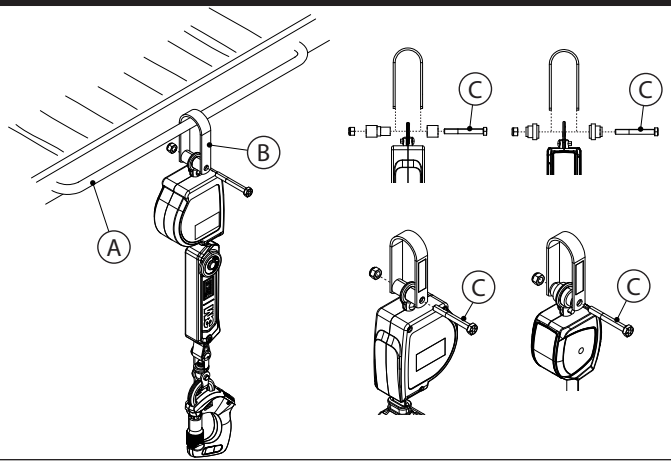


Figure 9 - Cab Mount Bracket



4.0 USE

4.1 **BEFORE EACH USE:** Verify that your work area and Fall Protection system meet all criteria defined in these instructions. Verify that a formal Rescue Plan is in place. Inspect the product per the 'User' inspection points defined in the "Inspection and Maintenance Log". If inspection reveals an unsafe or defective condition, or if there is any doubt about its condition for safe use, remove the product from service immediately. Clearly tag the product "DO NOT USE". See Section 5 for more information.

4.2 **AFTER A FALL:** If this equipment is subjected to fall arrest or impact force, remove it from service immediately. Clearly tag it "DO NOT USE". See Section 5 for more information.

4.3 **OPERATION:** Before using an SRD, the worker will need to secure the SRD to an anchorage connection point and an attachment element on their full body harness. Once secured, the worker may move within the established safe working area at normal speeds. During use, always allow the SRD lifeline to recoil back into the device under control.

4.4 **TAGLINES:** Depending on the worksite and system configuration, the user may not always be able to reach the SRD at its anchor point. In these situations, a tagline may be necessary. A tagline is a long piece of cord that loops through the bottom connector of the SRD before looping back in on itself. When connected in this way, the user can raise or lower the bottom connector of the SRD to their location by pulling on the tagline.

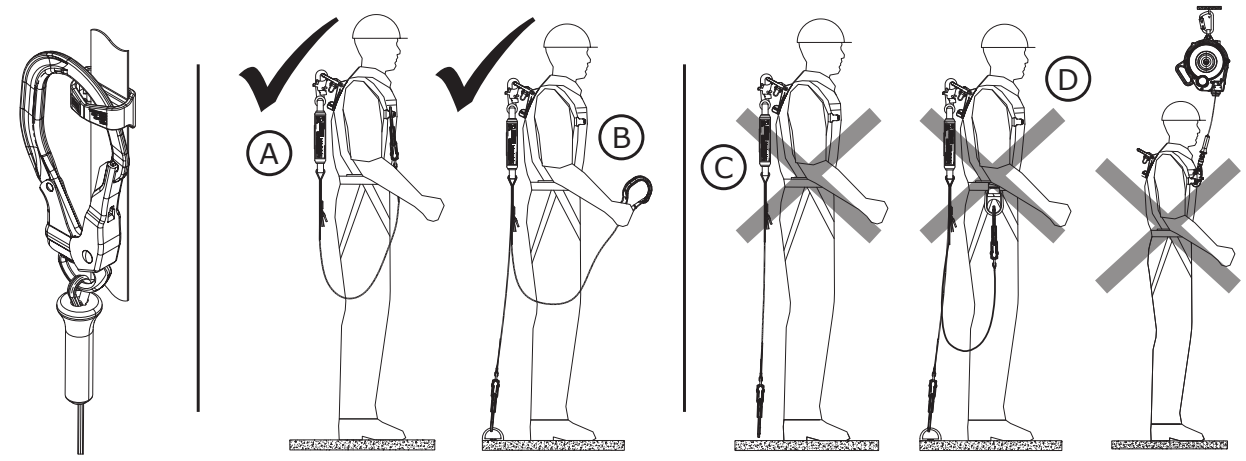
☑ *Ensure the free end of the tagline does not become entangled with other workers, equipment, or machinery. If necessary, restrain the free end of the tagline.*

4.5 **LANYARD PARKING ATTACHMENT:** When not in use, the free end of a lanyard or harness-mounted Self-Retracting Device (SRD) must be secured to the lanyard parking attachment on the user's harness (A) or be held securely within the user's hand (B). See Figure 10 for reference.

The free end of a connecting subsystem must always be properly secured. Never allow free ends to hang freely (C) and never secure free ends to an unused attachment element on the user's harness (D). Both of these situations could create a trip hazard or cause the user to become entangled.

☑ *Never use lanyard parking attachments as attachment elements for Fall Protection applications.*

Figure 10 – Lanyard Parking Attachment

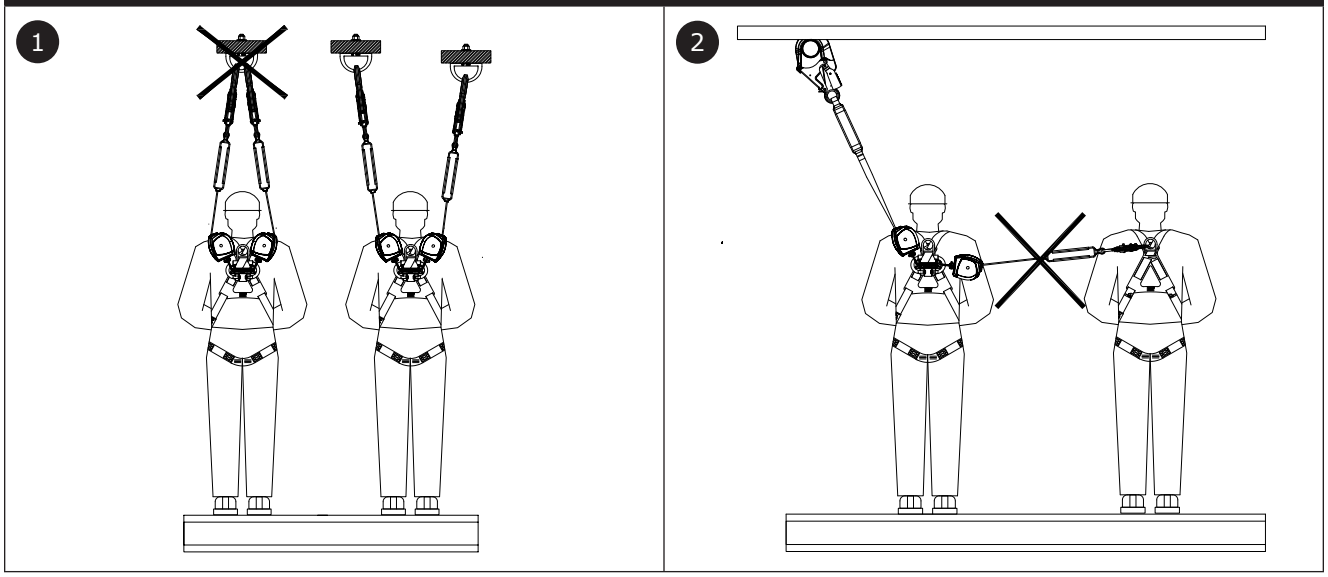


4.6 USING TWIN-SRD MODELS: Twin-SRD models, when mounted on a harness, may be used for Fall Arrest or Restraint applications. Additionally, Twin-SRDs may be used for climbing applications, such as ascending or descending a rebar structure. Twin-SRDs enable the user to maintain 100-percent tie-off when moving between anchorage points. As long as one SRD is secured to an anchorage point, the user may disconnect the other SRD and move it to a different anchorage point. By disconnecting and reconnecting each SRD in turn, the user may travel along a surface and still maintain tie-off during movement.

The user must always consider the following before using a Twin-SRD:

- When in the vicinity of a fall hazard, the user must always have at least one SRD connected to an anchorage point. Never connect both SRDs to the same anchorage point. See Figure 11.1 for reference.
- Never permanently secure both SRDs to anchorage points simultaneously. Twin connections should only be made for the purpose of maintaining 100-percent tie-off.
- Each individual anchorage point must be strong enough to meet the anchorage requirements listed in Table 1.
- The individual SRDs must only be used to secure to anchorage points. Never secure two workers via the same system. See Figure 11.2 for reference.
- The lifeline of each SRD must always be kept free from obstructions and entanglement. Do not pass either SRD under arms or between legs during use.

Figure 11 - Using Twin-SRD Models



4.7 USE WITH HORIZONTAL SYSTEMS: The SRDs covered in this instruction are compatible for use with horizontal systems, such as Horizontal Lifeline (HLL) systems and horizontal rail systems. See the manufacturer instructions of your horizontal system for more information on its compatibility with SRDs. SRDs may be used with a horizontal system only if both products allow for such use.

☑ *Required Fall Clearance values presented in these instructions are based on use with a rigid, stationary anchorage point. These values do not apply when the product is used with a Horizontal Lifeline (HLL) system. See the manufacturer instructions of your HLL system for fall clearance charts specific to that system, or for additional factors that must be accounted for before using the charts in these instructions.*

5.0 INSPECTION

☑ *After equipment has been removed from service, it may not be returned to service until a Competent Person confirms in writing that it is acceptable to do so.*

5.1 INSPECTION FREQUENCY: The product shall be inspected before each use by a user and, additionally, by a Competent Person other than the user at intervals of no longer than one year. A higher frequency of equipment use and harsher conditions may require increasing the frequency of Competent Person inspections. The frequency of these inspections should be determined by the Competent Person per the specific conditions of the worksite.

5.2 INSPECTION PROCEDURES: Inspect this product per the procedures listed in the "Inspection and Maintenance Log". Documentation of each inspection should be maintained by the owner of this equipment. An inspection and maintenance log should be placed near the product or be otherwise easily accessible to users. It is recommended that the product is marked with the date of next or last inspection.

5.3 DEFECTS: If the product cannot be returned to service because of an existing defect or unsafe condition, or because the product has been exposed to fall arrest or impact force, then the product must be destroyed.

5.4 PRODUCT LIFE: The functional life of the product is determined by work conditions and maintenance. As long as the product passes inspection criteria, it may remain in service.

6.0 MAINTENANCE, STORAGE, AND REPAIR

☑ *Equipment that is in need of maintenance or scheduled for maintenance should be tagged "DO NOT USE". These equipment tags should not be removed until maintenance is performed.*

6.1 **CLEANING:** Periodically clean the lifeline and the exterior of the product with water and a mild soap solution. Rinse the product thoroughly and air dry. Clean labels as necessary. For more information, please refer to the technical bulletin on our website: *https://www.3M.com/FallProtection/Mechanical-Device-Cleaning*

6.2 **DISPOSAL:** Cut or otherwise disable the lifeline, then dispose of the product appropriately.

6.3 **REPAIR:** This product is not repairable. Do not attempt to repair this product.

6.4 **STORAGE AND TRANSPORT:** Store and transport the product in a cool, dry, clean environment out of direct sunlight. Avoid areas where chemical vapors may exist. Thoroughly inspect components after extended storage.

7.0 LABELS and MARKINGS

7.1 **SUMMARY:** The "Product Labels" figure illustrates labels and markings present on the product. See below for a summary of information provided with each label and marking.

☑ *Label images are intended to be representative. Please refer to your product labels for specific information.*

☑ *Missing or damaged labels must be replaced. All labels must be fully legible.*

A	1) Logo Label
B	1) ID, Warning, and Inspection Label
C	1) Logo Label (Arc Flash Models Only)
D	1) ID, Warning, and Inspection Label (Arc Flash Models Only)
E	1) Energy Absorber Label

8.0 RFID Tag

8.1 **LOCATION:** 3M product covered in these user instructions is equipped with a Radio Frequency Identification (RFID) Tag. RFID Tags may be used in coordination with an RFID Tag Scanner for recording product inspection results. See "RFID Tag Location" for where your RFID Tag is located.

8.2 **DISPOSAL:** Prior to disposing of this product, remove the RFID Tag and dispose/recycle in accordance with local regulations. For more information, please visit our website: *http://www.3M.com/FallProtection/RFID*

9.0 GLOSSARY OF TERMS

9.1 **DEFINITIONS:** The following terms and definitions are used in these instructions.

☑ *For a comprehensive list of terms and definitions, please visit our website: www.3m.com/FallProtection/ifu-glossary*

- **AUTHORIZED PERSON:** A person assigned by the employer to perform duties at a location where the person will be exposed to a fall hazard.
- **COMPETENT PERSON:** One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
- **FALL ARREST SYSTEM:** A collection of Fall Protection equipment configured to protect the user in the event of a fall.
- **QUALIFIED PERSON:** A person with a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience has successfully demonstrated their ability to solve or resolve problems relating to Fall Protection and Rescue systems to the extent required by applicable national, regional, and local regulations.
- **RESCUER:** A person using the Rescue system to perform an assisted rescue.
- **RESTRAINT SYSTEM:** A collection of Fall Protection equipment configured to prevent the user from reaching a fall hazard. No free fall is permitted.
- **USER:** A person who performs activities while protected by a Fall Protection system.

Figure 12 - RFID Tag Location

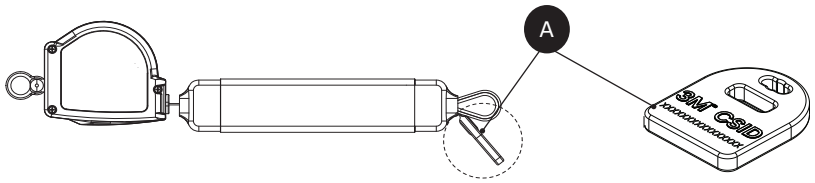
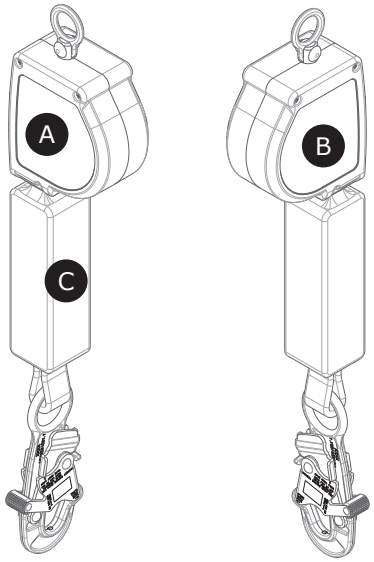
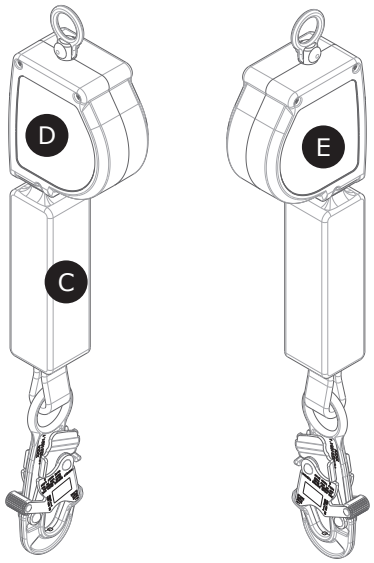


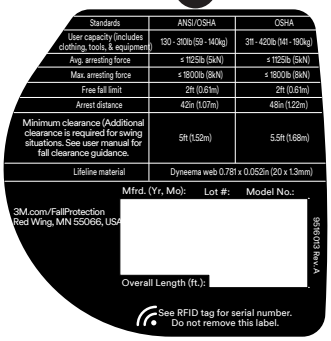
Figure 13 - Product Labels





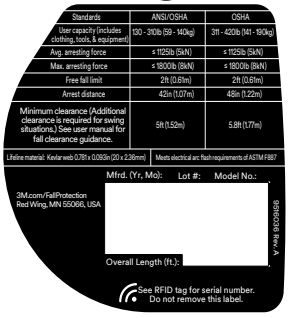
A

B



D

E



C

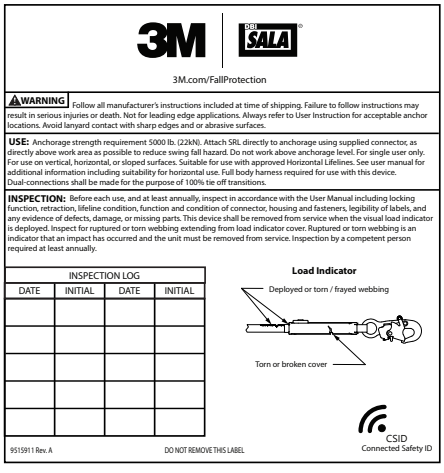


Table 2 – Inspection and Maintenance Log					
Model Number (Serial Number):					
Date Purchased:			**Date of First Use:**		
...					
☑ *This product must be inspected by the user before each use. Additionally, a Competent Person other than the user must inspect this equipment at least once each year.*					
...					
Component	**Inspection Procedure**		**Inspection Result**		
			Pass	**Fail**	
SRD - General (Figure 14.1)	Inspect for loose bolts and bent or damaged parts.		☐	☐	
	Inspect Housing (A) for distortion, cracks, or other damage.		☐	☐	
	Inspect the Swivel Eye (B) for distortion, cracks, or other damage. The Swivel Eye should be attached securely to the SRD, but should pivot freely.		☐	☐	
	The Lifeline (C) should pull out and retract fully without hesitation or creating a slack line condition.		☐	☐	
	Ensure device locks up when lifeline is jerked sharply. Lockup should be positive with no slipping.		☐	☐	
	Look for signs of corrosion on the entire unit.		☐	☐	
Connectors (Figure 14.2)	Inspect all SRD connectors for signs of damage and corrosion. Verify that all connectors are working properly. Where present: Gates (A) should open, close, lock, and unlock properly; Swivel Eyes (B) should rotate without interference; and locking buttons and pins should function correctly.		☐	☐	
Web Lifeline (Figure 14.3)	Inspect the webbing for Cuts (A), Frays (B), broken fibers, tears, abrasion, Heavy Soiling (C), mold, Burns (D), and discoloration. Inspect the lifeline stitching for pulled or cut stitches, since broken stitches may indicate that the product has been impact-loaded and must be removed from service.		☐	☐	
Wire Rope Lifeline (Figure 14.4)	Inspect wire rope for cuts, Kinks (A), Broken Wires (B), Bird-Caging (C), welding splatter, corrosion, chemical contact areas, or Severely-Abraded Areas (D). Slide the Lifeline Bumper (E) up and inspect the Ferrules (F) for damage. Replace the wire rope assembly if there are six or more broken wires in one revolution, or three or more broken wires in one strand in one revolution. Replace the assembly if there are any broken wires within 25 mm (1 in.) of the ferrules.		☐	☐	
Energy Absorber (Figure 15)	Verify that the integral energy absorber has not been activated. Verify that the Lifeline Cover (A) has not pulled out from the Energy Absorber Cover (B) on either end. None of the Energy Absorber Webbing (C) should be exposed. The Energy Absorber Cover should also be secure and free of Tears (D) or other damage.		☐	☐	
Labels (Figure 13)	All labels are present and fully legible.		☐	☐	
Fall Protection Equipment	Additional Fall Protection equipment that is used with the product is installed and inspected per the manufacturer instructions.		☐	☐	
...					
☑ *If the product fails an inspection procedure, then the product fails overall inspection. If the product fails inspection, remove it from service immediately. Clearly tag the product "DO NOT USE". See Section 5 for more information.*					
...					
Inspection Type:	☐ User	☐ Competent Person	**Overall Inspection Result:**	☐ Pass	☐ Fail
Inspected By:			**Date of Inspection:**		
Signature:			**Next Inspection Due:**		
...					
Additional Notes:					

Figure 14 - General Inspection

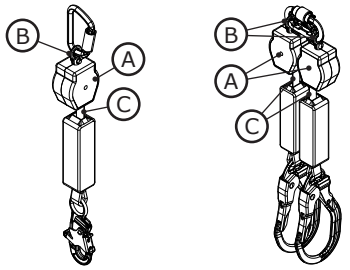
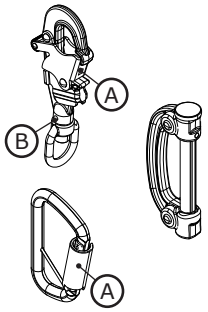
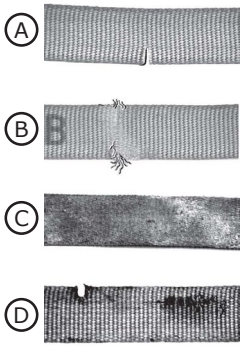
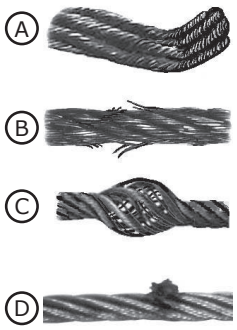
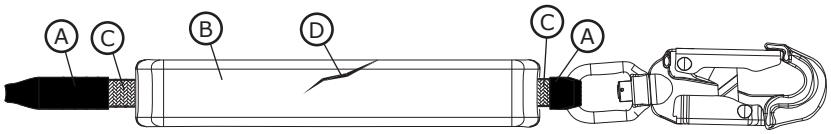
1	2	3	4
			

Figure 15 - Energy Absorber Inspection



ANSI/ASSP Z359.14-2021（1 类）

OSHA 29 CFR 1910.140

OSHA 29 CFR 1926.502

3M™ NANO-LOK®
速差自控器 S

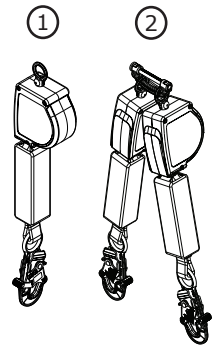
用户使用手册

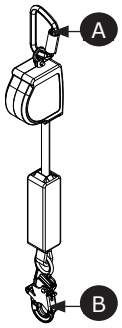
5908117 版本 E

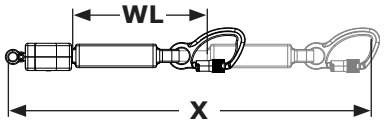
Fall Protection

☑ 有关产品代码的标识，请参阅表 1。有关更多产品信息，请参阅“表 1 – 产品规格”。

图 1 – 产品概述

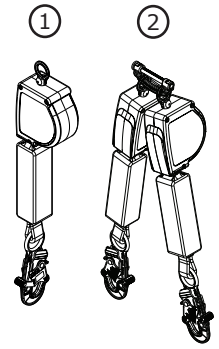


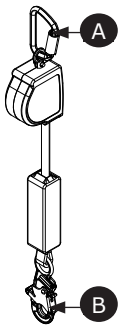


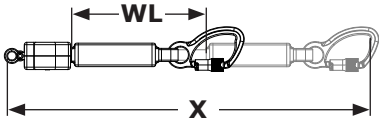


弧闪 (ASTM F887)	型号		连接器 A	连接器 B	外壳尺寸	救生索	伸展长度 (X)	工作长度 (WL)
	3100590	①	C2	C7	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）
	3100591	①	C2	C5	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）
	3100592	①	C1	C5	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）
	3100593	①	C3	C7	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）
	3100594	①	C3	C13	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）
	3100595	①		C5	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）
	3100596	①	C1	C12	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）
	3100597	①	C2	C13	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）
	3100598	①	C6	C5	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）
	3100599	①	C2	C8	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100600	①	C2	C11	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100601	①	C2	C9	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100602	①	C2	C4	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100603	①	C1	C9	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100604	①	C1	C4	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100605	①	C3	C8	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100606	①	C3	C11	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100607	①	C1	C5	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100608	①	C2	C10	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100609	②	C2	C5	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）

图 1 – 产品概述







弧闪 (ASTM F887)	型号		连接器 A	连接器 B	外壳尺寸	救生索	伸展长度 (X)	工作长度 (WL)
	3100610	②	C2	C7	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）
	3100611	②	C2	C13	规格 A	DP1	11 英尺（3.35 米）	9.3 英尺（2.8 米）
	3100612	②	C2	C8	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100613	②	C2	C11	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100614	②	C2	C9	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100615	②	C2	C4	规格 A	DP1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
	3100616	②	C2	C10	规格 A	KW1	9.0 英尺（2.7 米）	7.1 英尺（2.1 米）
✓	**3100573**	①	C2	C5	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100574**	①	C2	C12	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100575**	①	C2	C4	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100576**	①	C2	C9	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100577**	①	C2	C7	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100578**	①	C2	C11	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100579**	①	C2	C8	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100580**	①	C1	C5	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100581**	①	C3	C7	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100582**	②	C2	C5	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100583**	②	C2	C12	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100584**	②	C2	C4	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100585**	②	C2	C9	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100586**	②	C2	C7	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100587**	②	C2	C11	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）
✓	**3100588**	②	C2	C8	规格 A	KW1	8.0 英尺（2.4 米）	6.3 英尺（1.9 米）

ZHS 安全信息

在使用此产品之前，请阅读、理解并遵循这些说明书中包含的所有安全信息。否则可能会导致严重伤害或死亡。

说明书必须提供给装备的用户。请保留这些说明，以备将来参考。

预期用途：

该产品用作完整的坠落防护系统的一部分。

3M 不允许在任何其他应用（包括但不限于材料处理、娱乐或运动相关活动，或这些说明书中未描述的其他活动）中使用该产品，该行为可能会导致严重伤害或死亡。

本产品仅供经过培训的用户在工作场所应用中使用。

⚠ 警告

该产品用作完整的坠落防护系统的一部分。所有用户都必须接受完整的坠落悬挂系统的安全安装和操作培训。**误用本产品可能导致严重伤害或死亡。**有关正确的选择、操作、安装、维护和服务，请参阅所有使用说明书和制造商建议。如需更多信息，请咨询您的主管或联系 3M 技术服务部。

- **为了减少与使用速差自控器相关的风险（此类风险如不能避免，将导致重伤或死亡）：**
  - 在每次使用前和任何坠落事件后，请按照本说明书中规定的程序检查产品。
  - 如果检查发现有不安全或有缺陷的情况，应立即停止使用此产品，并明确标记“请勿使用”。按照这些说明书的要求销毁或修理产品。
  - 任何受到坠落悬挂或冲击力的产品必须立即停止使用。按照这些说明书的要求销毁或修理产品。
  - 确保由不同制造商制造的组件组装而成的坠落悬挂系统兼容并符合所有适用的坠落悬挂法规、标准或要求。在使用这些系统之前，一定要咨询合格或有资质的人员。
  - 确保产品免受所有危害，包括但不限于：与用户、其他工人、运动机械、周围的其他物体缠绕在一起，或被可能落在产品或用户身上的高空落物撞击。
  - 请勿使救生索扭曲、系结、打结或松弛。
  - 避免救生索支脚绊倒危险。将任何未使用的救生索腿带钩挂到全身系带上的救生索固定部件（如果有）。
  - 请勿超过这些说明书中允许的用户数量。
  - 不要在坠落路径受阻的应用中使用。锁定速差器需要畅通的路径。在缓慢移动的材料（例如沙子或粮食）上或封闭空间或受限空间内工作，可能无法让工人达到足够速度来锁定 SRD。
  - 作业期间避免突然或快速移动，因为这可能导致 SRD 意外锁定。
  - 安装、使用或移动产品时要小心，因为移动部件可能会产生夹伤点。
  - 当产品可能接触锋利边缘或磨蚀表面时，使用适当的边缘保护。
  - 确保按照这些说明书正确配置和安装产品，以确保安全操作。
  - 如果已在下降中使用，立即停止使用产品。
  - 使用前，确保下降路径和着陆区域畅通无阻且毫无危险。

- **减少与高空作业有关的风险，如果不加以避免，可能导致严重的伤害或死亡：**
  - 您的健康和身体状况必须允许您安全地在高处工作，以及承受与防坠落事件相关的所有力量。如果您对使用此装备的能力有疑问，请咨询您的医生。
  - 切勿超过坠落悬挂装备的允许负载。
  - 切勿超过您的坠落悬挂装备允许的最大自由坠落距离。
  - 如果您对装备的使用或适用性有疑虑，请勿使用任何未通过检查的坠落悬挂装备。如有任何问题，请联系 3M 技术服务。
  - 某些子系统和组件组合可能会干扰本装备的运行。仅使用兼容的连接。在将此装备与这些说明书中未描述的组件或子系统结合使用之前，请联系 3M 技术服务部。
  - 在运动机械、电气危险、极端温度、化学危险、爆炸性或有毒气体、锋利边缘、磨蚀性表面或可能落到您或您的坠落悬挂装备上的架空材料下方工作时，请采取更多预防措施。
  - 确保根据产品在危险工作环境中的使用是通过评定的。
  - 确保高空作业时有足够的坠落间隙。
  - 切勿修改或更改您的坠落悬挂装备。只有 3M 或 3M 书面授权的人员可以维修 3M 装备。
  - 在使用坠落悬挂装备之前，请确保有书面的救援计划，以便在发生坠落事故时提供及时的救援。
  - 如果发生坠落事故，请立即为坠落的工人寻求医疗救助。
  - 在坠落悬挂应用中仅可使用全身式系带。请勿使用腰带。
  - 尽可能在锚点正下方工作，以尽量减少摆动坠落。
  - 使用本产品进行培训时，必须使用辅助坠落悬挂系统。学员不得暴露于意外跌倒的危险中。
  - 安装、使用或检查产品时，始终佩戴适当的个人防护装备。
  - 切勿在悬挂的负载或工人下方工作。
  - 始终保持 100% 钩挂。

☑ *始终确保您使用的是 3M 使用手册的最新版本。访问 www.3m.com/userinstructions 或联系 3M 技术服务以获取更新的使用说明书。*

产品概述：

图 1 说明了本说明所涵盖的产品型号。速差自控器 (SRD) 是一种可缩回到坚固外壳中的卷筒式救生索。

本说明涵盖以下 SRD 类型：

- **1 类速差自控器（图 1.1、1.2；2.1、2.2）：**1 类速差自控器 (SRD) 适用于救生索在使用过程中通常保持垂直的应用。这种类型可用于坠落悬挂应用。

图 2 标识了可用 SRD 型号的关键部件。在标准 SRD 中，救生索 (A) 从外壳 (B) 伸出和缩回。顶部连接器 (D) 将 SRD 固定到其安装点，并通过旋转环 (E) 连接到 SRD。底部连接器 (C) 固定在救生索的末端。根据系统配置，底部连接器将连接到用户全身安全带的指定连接元件或系统的挂点。缓冲器 (F) 可在防坠落过程中消散动能并限制减速力。

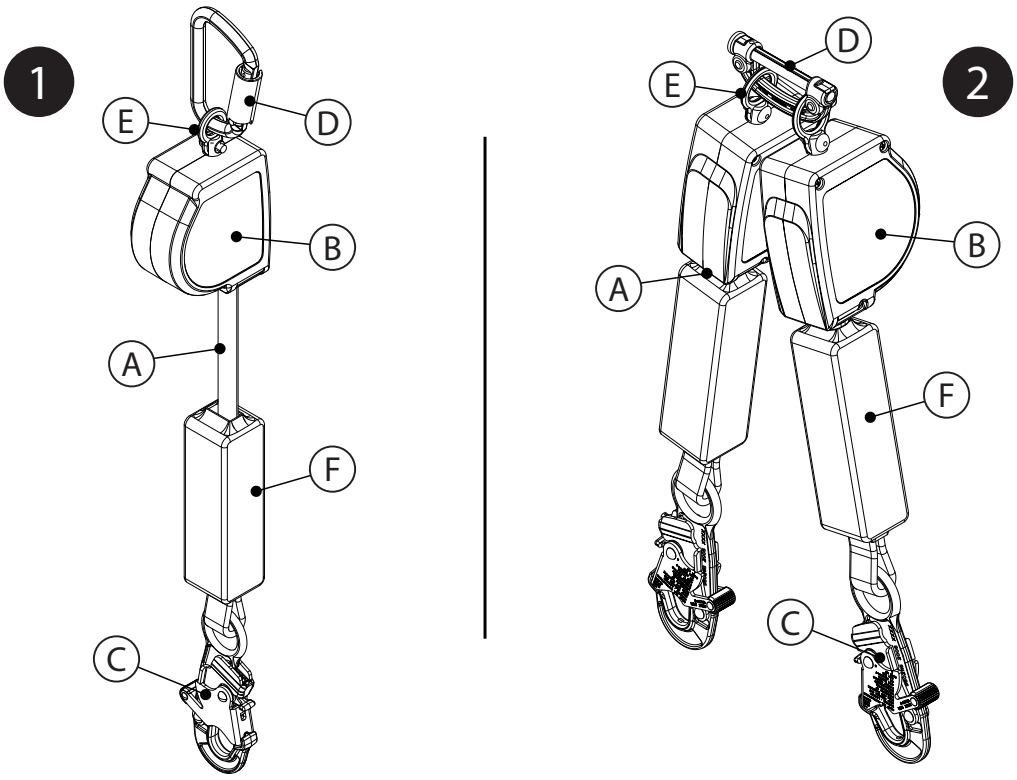
SRD 型号提供单 SRD 和双 SRD 配置。双 SRD 型号包括一个顶部连接器 (D)，可在两个 SRD 之间共享。这些连接器旨在与安全带连接，以便双 SRD 型号可以佩戴在用户的背上。双 SRD 型号可用于在挂点之间转移时保持 100% 挂钩。

每个产品型号都有自己特定的尺寸和部件组合，如图 1 所示。有关部件规格的更多信息，请参见表 1。

本说明书中的某些产品型号包括其他特性或功能。有关这些型号的标识，请参见图 1。

- **弧闪：**“弧闪”型号符合 ASTM F887 的要求，设计用于可能发生弧闪或电气爆炸的环境。

图 2 – 组件



☑ *在使用本装备之前，将 ID 标签上的产品识别信息记录在本手册背面的“检查和维护日志”中。*

表 1 – 产品规格

系统规格：

挂点：

根据系统应用，以及是否是经过认证的挂点，挂点结构要求有所区别。挂点结构必须承受沿挂点连接器允许的方向施加的静态载荷。

System Application	Certified Anchorage	Non-Certified Anchorage	Defined by
坠落悬挂	2 倍最大制动力	5000 磅力（22.2 千牛）	ANSI Z359, OSHA 29 CFR 1910.140, 1926.502
限制	2 倍可预见力	1,000 磅力（4.4 千牛）	ANSI Z359
		5000 磅力（22.2 千牛）	OSHA 29 CFR 1910.140, 1926.502
围杆作业	2 倍可预见力	3,000 磅力（13.3 千牛）	ANSI Z359, OSHA 29 CFR 1910.140, 1926.502
救援	5 倍外加负荷	3,000 磅力（13.3 千牛）	ANSI Z359

当挂点连接不止一套系统时，上述强度必须乘以挂点连接的系统的数量。如需了解更多信息，请参见 ANSI/ASSP Z359.2。

☑ 挂点必须得到合格人员的批准。

工作温度： -40° F 到 130° F（-40° C 到 54.4° C）

标准： 每个产品型号都经过认证或符合图 1 中列出的适用标准和法规。如果未指定，则适用封面上列出的所有标准和法规。

组件规格：

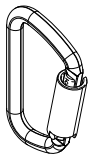
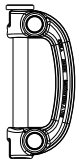
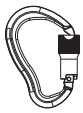
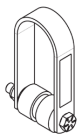
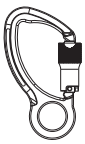
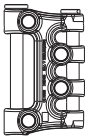
图 2 参考	组件	材料
Ⓐ	救生索	（参见救生索规格）
Ⓑ	外壳	尼龙
Ⓒ	底部连接器	（见连接器规格）
Ⓓ	顶部连接器	（见连接器规格）
Ⓔ	旋转环	镀锌钢
Ⓕ	缓冲器	乙烯基覆盖层，带有 Vectran 生命线 凯夫拉覆盖层，带有聚酯生命线（仅限电弧闪光型号）

☑ ***内部组件：****SRD 内部组件由不锈钢、钢和铝组合制成。*

连接器规格：

图 1 参考	型号	描述	材料	活门开口	活门强度	抗拉强度
C1	2000112	安全钩	钢	17 毫米（11/16 英寸）	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C2	3100197	安全带接口	镀锌钢	2 英寸 (51 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C3	2000025	卡扣	铝	0.81 英寸 (20 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C4	2109193	钢筋钩	镀锌钢	2.5 英寸 (63 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C5	9502116	挂钩	镀锌钢	0.75 英寸 (19 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C6	3100247	驾驶室安装座	不锈钢	1-5/8 英寸 (51 mm)	---	5,000 磅力 (22.2 kN)
C7	2000023	卡扣	铝	0.75 英寸 (19 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C8	2000209	钢筋钩	铝, 钢	2.5 英寸 (63 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C9	2000210	钢筋钩	镀锌钢	2.24 英寸 (57 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C10	2000214	钢筋钩	铝, 钢	2.5 英寸 (63 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C11	9502058	钢筋钩	铝, 钢	2.24 英寸 (57 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C12	9502195	旋转挂钩	镀锌钢	0.75 英寸 (19 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C13	9505254	挂钩	铝, 钢	0.75 英寸 (19 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)
C14	3100196	双针 SRD 连接器	铝, 钢	2 英寸 (51 mm)	3,600 磅力 (16 kN)	5,000 磅力 (22.2 kN)

表 1 – 产品规格

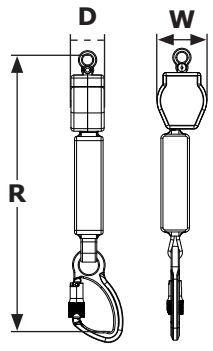
C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
													

救生索规格：	
图 1 参考	**描述**
DP1	宽 .781 英寸 x 厚 .052 英寸，Dyneema 聚酯纤维，聚酯线；最小抗拉强度 4,946 磅力 (22kN)
KW1	宽 .781 英寸 x 厚 .093 英寸，凯夫拉织带，凯夫拉线

性能 – SRD	ANSI Z359.14-2021 OSHA 29 CFR 1910.140, 1926.502	OSHA 29 CFR 1910.140, 1926.502
承重范围：	130 磅 – 310 磅（59 千克 – 140 千克）	最多 420 磅（191 千克）
最大制动力：	1,800 磅力（8 千牛）	1,800 磅力（8 千牛）
平均制动力：	1,125 磅力（5 千牛）	1,125 磅力（5 千牛）
最大制动距离： ** 假设 SRD 安装在用户正上方。*	42 英寸（1.1 米）	48 英寸（1.22 米）
最大减速度距离： ** 假设 SRD 安装在用户正上方。*	---	42 英寸（1.1 米）
所需最小坠落间隙： ** 假设 SRD 安装在用户正上方。*	5 英尺（1.52 米）	5.5 英尺（1.68 米）
最大自由坠落距离： **SRD 必须安装在用户 D 形环上方。*	2 英尺（0.6 米）	2 英尺（0.6 米）

性能 – SRD （电弧闪光型号）	ANSI Z359.14-2021 OSHA 29 CFR 1910.140, 1926.502	OSHA 29 CFR 1910.140, 1926.502
承重范围：	130 磅 – 310 磅（59 千克 – 140 千克）	最多 420 磅（191 千克）
最大制动力：	1,800 磅力（8 千牛）	1,800 磅力（8 千牛）
平均制动力：	1,125 磅力（5 千牛）	1,125 磅力（5 千牛）
最大制动距离： ** 假设 SRD 安装在用户正上方。*	42 英寸（1.1 米）	48 英寸（1.22 米）
最大减速度距离： ** 假设 SRD 安装在用户正上方。*	---	42 英寸（1.1 米）
所需最小坠落间隙： ** 假设 SRD 安装在用户正上方。*	5 英尺（1.52 米）	5.8 英尺（1.8 米）
最大自由坠落距离： **SRD 必须安装在用户 D 形环上方。*	2 英尺（0.6 米）	2 英尺（0.6 米）

尺寸：

图 1 参考	D	W	R	
规格 A	2.13 英寸 (5 厘米)	4.18 英寸 (11 厘米)	25.0 英寸 (63.5 厘米)	

1.0 产品应用

1.1 **目的：**3M 速差自控器（SRD）设计用作坠落防护系统中的连接子系统。钩挂完成后，救生索会随着工人的移动而自动伸缩。如果发生坠落，感测机构会激活装置并阻止坠落。有关系统应用的更多信息，请参阅“产品概述”和表 1。

1.2 **监督：**本装备必须在合格人员的监督下使用。

1.3 **标准：**您的产品符合这些说明书封面上标明的国家或地区标准。如果本产品在原目的地国家 / 地区以外转售，转售商必须以产品使用所在国家 / 地区的语言提供说明书。

> ☑ *有关认证或一致性要求的更多信息，请参阅为您的产品列出的适用标准和法规（例如 ANSI/ASSP Z359 坠落悬挂代码）。*

1.4 **培训：**该装备必须由受过正确应用培训的人员安装和使用。根据国家、地区或地方标准的要求，这些说明书将用作员工培训计划的一部分。本装备的用户和安装者有责任确保其熟悉说明书，接受过正确维护和使用本装备的培训，并了解本装备的操作特性、应用限制和不当使用本装备的后果。

1.5 **救援计划：**使用此装备和连接子系统时，雇主必须有书面的救援计划以及实施该计划的方法，并将该计划传达给用户、授权人员和救援人员。推荐训练有素的现场救援队。应为团队成员提供成功救援所需的装备和技术。应定期提供培训以确保救援人员的熟练程度。应向救援人员提供这些说明书。在救援过程中，应始终与被救援人员进行视觉接触或交流。

2.0 系统要求

2.1 **挂点：**挂点要求因坠落防护应用而异。放置设备的安装结构必须符合表 1 中定义的挂点规范。

2.2 **负载能力：**一个完整的坠落防护系统的用户负载能力，受其额定最大负载能力最低的部件的限制。例如，如果您的连接子系统的负载能力小于安全带，则您必须遵守连接子系统的负载能力要求。有关负载能力要求，请参阅系统每个组件的制造商说明书。

2.3 **环境危险：**在有环境危险的区域使用本装备可能需要额外的预防措施，以防止对用户造成伤害或损坏装备。危险可能包括但不限于：高温、化学品、腐蚀性环境、高压电力线、爆炸性或有毒气体、运动机械、锋利边缘或可能掉落并接触用户或装备的架空材料。如需进一步的说明，请联络 3M 技术服务部门。

2.4 **安全绳危害：**确保安全绳免受所有危害，包括但不限于：与用户、其他工人、运动机械、周围的其他物体纠缠在一起，或被可能落在救生索或用户身上的高空物体撞击。

2.5 **下落路径和 SRD 锁定速度：**不要在坠落路径受阻的应用中使用。锁定速差器需要畅通的路径。在缓慢移动的材质（例如沙子或粮食）上或有限空间内工作，可能无法让工人达到足够速度来锁定速差器。

2.6 **组件兼容性：**3M 设备设计为与 3M 设备搭配使用。与非 3M 装备一起使用必须得到合格人员的批准。使用未经批准的装备进行替换可能会危及装备兼容性，并可能影响您的坠落悬挂系统的安全性和可靠性。在使用前阅读并遵循所有设备的所有说明和警告。

2.7 **连接器兼容性：**当任一组件的尺寸和形状不会导致连接器意外滑脱时，无论方向如何，连接器都与连接元件兼容。连接器必须符合适用标准。连接器在使用过程中必须完全关闭并锁闭。

3M 连接器（挂钩和安全钩）设计为仅按照每本使用说明书中的规定使用。确保连接器与其所连接的系统组件兼容。请勿使用不兼容的装备。使用不兼容的组件可能会导致连接器意外滑脱（参见图 3）。如果连接器所附接的连接元件尺寸过小或形状不规则，则可能发生连接元件向连接器 (A) 的活门施加力的情况。该作用力可能会造成活门打开 (B)，进而使连接器从连接元件 (C) 脱落。

2.8 **连接：**所有连接器都必须在尺寸、形状和强度上全面兼容。请参见图 4 查看连接不当的示例。请勿连接连接器：

A. 连接到已连接另一个连接件的 D 形环。

B. 以会给活门带来负载的方式连接。大型喉状弹簧挂钩不得连接到 D 形环或其他连接元件，除非弹簧挂钩具有 16 千牛（3,600 磅力）的活门强度。

C. 以错误的啮合方式连接时，连接件或连接元件的尺寸和形状不兼容，在未经目视确定的情况下，它们看起来好像完全啮合一样。

D. 相互连接。

E. 直接用于线束织带、挂绳腿材料或系带材料，除非制造商说明明确允许此类连接。

F. 连接到尺寸或形状不允许连接件完全闭合并锁定，或可能导致连接件滑出的任何物体。

G. 以使连接件在负载情况下无法正确对齐的方式进行连接。

图 3 – 连接件兼容性

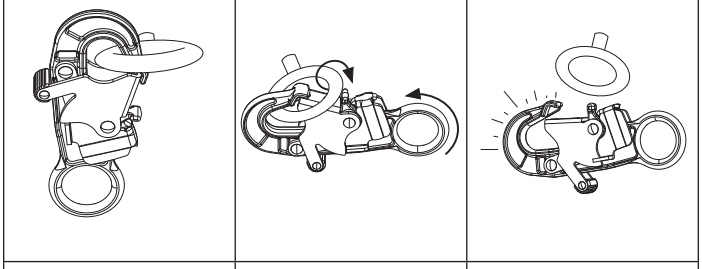
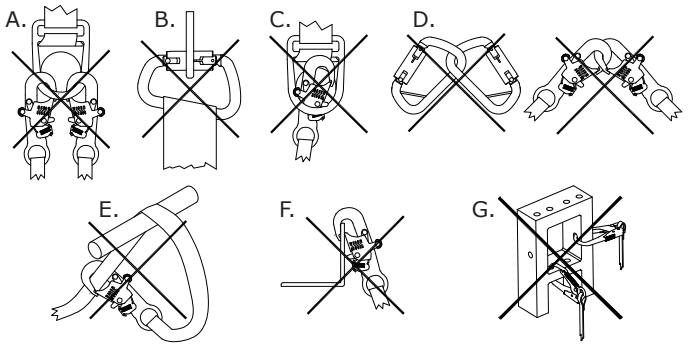


图 4 – 建立连接



3.0 安装

3.1 **概述：**安装本产品需要有效规划和了解坠落间隙要求。如果发生坠落，必须有足够的坠落间隙以安全地拦阻用户。

3.2 **规划：**在开始工作之前规划好您的坠落防护系统。考虑在坠落之前、期间和之后可能影响安全的所有因素。考虑这些说明中规定的所有要求和限制。

A. 锋利边缘：避免在系统部件可能接触或刮擦无保护锋利边缘和磨蚀表面的地方工作。所有锋利的边缘和磨蚀表面都应覆盖保护材料。

☑ *只有 SRD-LE 可用于具有未受保护的锋利边缘或磨蚀性表面的应用。*

3.3 **坠落间隙：**用户必须在使用本产品之前了解坠落间隙及其要求。

A. 定义：坠落间隙是用户与其下方下一个障碍物之间距离的度量。在使用本产品之前，用户应确定需要多大的坠落间隙，以防止在坠落时撞到障碍物。

用户的**所需的坠落间隙 (FC) 是自由坠落距离 (FF)、减速距离 (DD)、系带拉伸 (HS) 和安全系数 (SF) 的和。**请参见图 5.1。

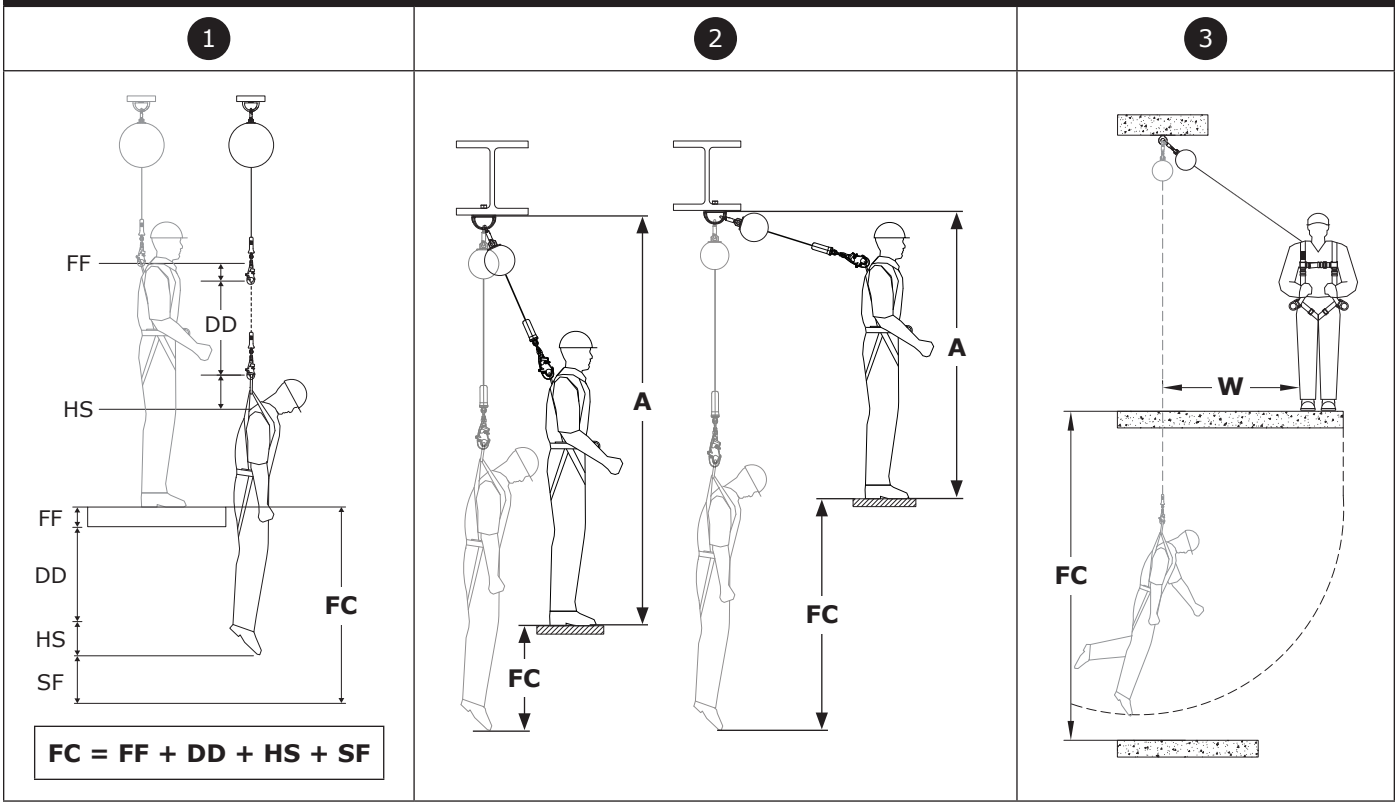
- **自由坠落 (FF)** 是用户在减速装置启动之前移动的距离。
- **减速距离 (DD)** 是从减速装置启动到停止测得的用户坠落距离。
- **系带拉伸 (HS)** 是当用户通过其系带连接元件悬吊时，从用户系带伸出的松弛长度。
- **安全系数 (SF)** 是为确保用户安全而添加到坠落距离的设定距离。

可能还有其他因素会影响您的坠落防护系统的坠落间隙要求，例如 D 形环拉伸长度和挂点的变形量。有关这些因素以及上面未列出的其他因素，请参阅坠落防护系统每个部件的制造商说明。如果提供了其他因素，则应将其添加到本说明中的坠落间隙值中。

B. 最大限度降低要求：用户应不断调整坠落防护系统，以尽量降低坠落的可能性和缩短可能的坠落距离。为将坠落间隙要求降至最低，建议用户尽可能在其挂点正下方工作。

- **挂点高度：**用户所需的坠落间隙（FC）随着挂点高度（A）的降低而增加。当连接到身体下方的挂点时，用户的自由坠落距离会变大，因为他们的坠落距离将远大于理论距离。请参见图 5.2。
- **摆动坠落：**用户所需的坠落间隙 (FC) 随着用户工作半径 (W) 的增加而增加。当挂点不在用户正上方发生坠落时，就会发生摆动坠落。请参见图 5.3。

图 5 – 坠落间隙要求

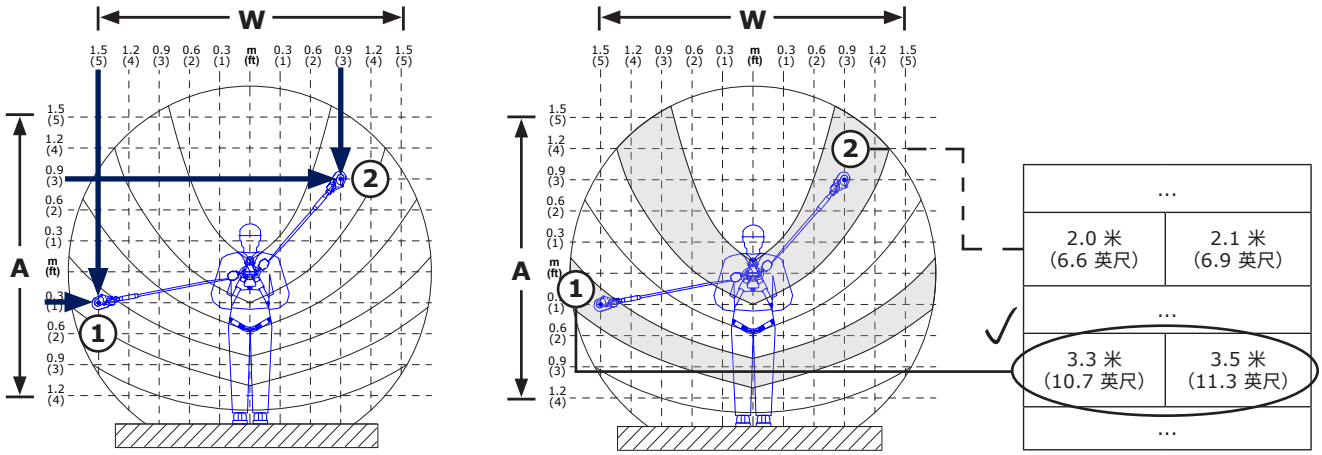


坠落间隙图表

下列图表中提供了所需的坠落间隙。要确定所需的坠落间隙：

1. **找到您的第一个连接器 (1)。**相对于 D 形环的高度，测量连接器的挂点高度 (A) 和最大工作半径 (W)。将第一个连接器放置在图表中的相交处。
2. **找到您的第二个连接器 (2)。**使用步骤 1 中的相同方法将第二个连接器放入图表中。
3. **找到您所需的坠落间隙 (FC)。**找到每个连接器落入的图表“翼”，然后在右侧的表格中找到相应的坠落间隙。坠落间隙表根据承载能力分为若干列。选择与用户总承载能力（包括服装、工具等）相匹配的数值。

> ☑ *如果您的连接器位于不同的两翼中，您必须在它们之间使用更大的坠落间隙要求。*

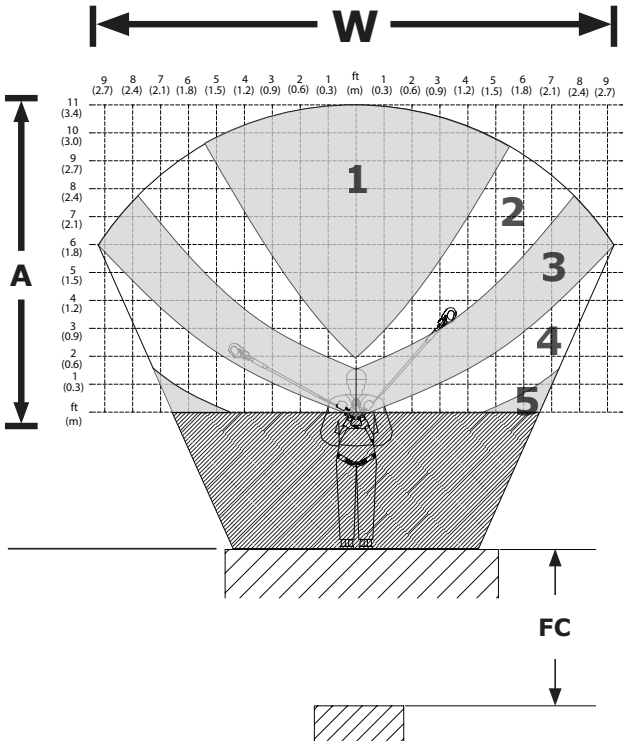


> ☑ *列出的所有值均使用 0.5 英尺（0.15 米）的安全系数和 6 英尺（1.8 米）的用户高度。跪姿或蹲姿会降低使用者在平台上方的位置，需要额外 3.28 英尺（1.0 米）的坠落间隙。*

> ☑ *计算所需的坠落间隙高度时，假定 SRD 的每条支腿都从用户在图表中的任何位置向其身后延伸一段最小距离。无论用户的实际避让距离如何，最小避让距离的假设都能确保用户有足够的坠落间隙。*

☑ *切勿将连接器固定在标有交叉阴影线或划掉的表格单元格的图表区域内。*

坠落间隙图表 #1（织带 SRD）

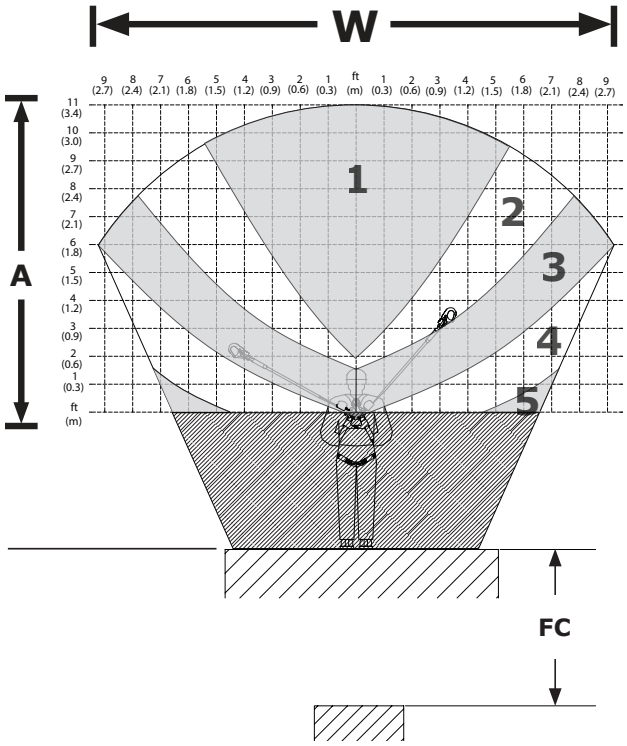


重量	图表区				
	1	**2**	**3**	**4**	**5**
ANSI/OSHA 130-310 磅 (59-140 kg)	5 英尺 (1.5 米)	6 英尺 (1.8 米)	7 英尺 (2.1 米)	8.5 英尺 (2.6 米)	10 英尺 (3.0 米)
OSHA 311-420 磅 (141-190 千克)	5.5 英尺 (1.7 米)	7 英尺 (2.1 米)	9 英尺 (2.7 米)	10.5 英尺 (3.2 米)	13.5 英尺 (4.1 米)
	坠落间隙 (FC)				

销子
A = 挂点高度 W = 最大工作半径 FC = 坠落间隙要求

☑ *切勿将连接器固定在标有交叉阴影线或划掉的表格单元格的图表区域内。*

坠落间隙图表 #2（仅限 弧闪 型号）



重量	图表区				
	1	**2**	**3**	**4**	**5**
ANSI/OSHA 130-310 磅 (59-140 千克)	5 英尺 (1.5 米)	6 英尺 (1.8 米)	7 英尺 (2.1 米)	8.8 英尺 (2.7 米)	10 英尺 (3.0 米)
OSHA 311-420 磅 (141-190 千克)	5.8 英尺 (1.8 米)	7 英尺 (2.1 米)	9 英尺 (2.7 米)	10.5 英尺 (3.2 米)	13.5 英尺 (4.1 米)
	坠落间隙 (FC)				

销子
A = 挂点高度 W = 最大工作半径 FC = 坠落间隙要求

3.4 **连接到挂点：**图 7 说明了典型速差器挂点连接。挂点 (A) 应在头顶正上方，以尽量减少自由坠落距离和摆动坠落的危险（参见第 3.3.B 节）。选择能够承受表 1 中规定的静载荷挂点。根据系统和产品配置，SRD 可以安装在挂点或用户的全身式安全带上。

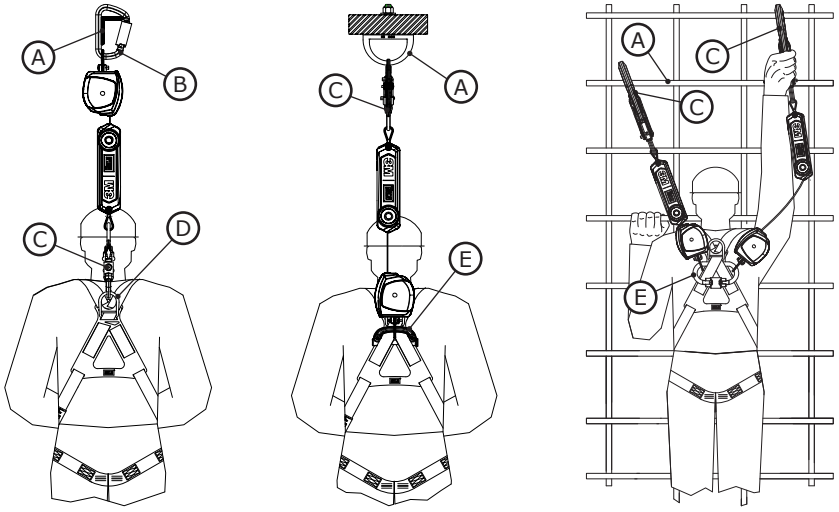
☑ *大型喉状弹簧挂钩不得连接到 D 形环或其他连接元件，除非弹簧挂钩达到或超过 16 千牛（3,600 磅力）的活门强度。*

A. **挂点安装：**单 SRD 型号可以安装在挂点上，只要它们安装正确，并且具有用于固定在挂点上的正确连接器。顶部接头必须是登山扣、弹簧钩或钢筋钩。要固定 SRD 头顶，首先将顶部连接器 (B) 固定到挂点。然后，将底部连接器 (C) 直接固定到安全带的背面 D 形环 (D) 上。

B. **全身式安全带安装：**安装在安全带上的 SRD 通过安全带接口 (E) 直接固定在全身式安全带上。然后，用户使用他们的底部连接器 (C) 固定到挂点连接点。双 SRD 型号可使用户在挂点之间转移时保持 100% 挂钩。

☑ *始终确保您正确地固定和锚固 SRD。某些 SRD 型号可能有挂点高度限制。有关这些限制（如果存在）的更多信息，请参阅坠落间隙图表。*

图 6 – 连接到挂点



3.5 **安装安全带速差自控器：**单、双 SRD 型号的顶部连接器为安全带编织带连接器，可直接安装在用户的全身式安全带上。这种形式便于 SRD 的运输，并确保在挂点之间移动时，SRD 可以触手可及。在安全带上安装 SRD 的方法因 SRD 型号和提供的连接器而异。

☑ *安全带连接器也可以与全身式安全带的特定功能配合使用，以将单 SRD 或双 SRD 固定到安全带上。示例包括某些 3M 安全带型号上的 PSRD 链环和模制 X100 SRD 接口回路。以下说明提供了如何使用每个安全带连接器的通用方法。有关与 SRD 连接的特定功能的更多信息，请参阅全身式安全带的制造商说明。*

A. **标准安全带织带连接器：**请参见图 7A。若要通过 SRD 全身式安全带连接器将 SRD 连接到全身式安全带上

1. 松开全身式安全带织带。拉出穿过背侧 D 形环底部 (B) 的织带 (A)，直到有足够的空间滑过安全带织带连接器。
2. 打开全身式安全带织带连接器。向下按两个锁定按钮 (C)，插入锁定销 (D)。
3. 将 SRD 放在全身式安全带织带连接器上 (E)。将开放式全身式安全带织带连接器穿过 SRD 的旋转环 (F)。SRD 应悬挂在系带接口的主干上。如果使用双 SRD，SRD 的位置应是一个在右侧，另一个在左侧。
4. 将安全带织带接头 (E) 打开的活门放在已松开的安全带织带周围。
5. 关闭全身式安全带织带连接器。将锁定销 (D) 推到松开的织带 (A) 后面，位于安全带的带子和背垫之间。将锁销推入，直至锁入到位。闭合后，将织带拉回安全带，以固定安全带织带连接器。

B. **安全钩接口：**请参见图 7B。这些说明适用于与特定型号的全身安全带一起使用时的三动式安全钩 2000159。不得用其他安全钩代替 2000159。

1. 松开全身式安全带织带。拉出穿过背侧 D 形环底部 (B) 的织带 (A)，直到有足够的空间滑过安全钩。
2. 打开安全钩。按照图示的方向安装安全钩，将锁定套筒 (C) 推至右侧，然后顺时针旋转以解锁活门 (D)。向下推活门 (D) 以打开。
3. 将第一个 SRD 穿到安全钩上。将安全钩的尖头 (E) 插入 SRD 的旋转环 (F)，然后将 SRD 绕到安全钩的活门端 (G)。
4. 将安全钩套到编织带上。将安全钩的鼻端 (E) 插入松开的织带 (A) 后面，在织带和安全带背垫之间。旋转安全钩，直到其环绕松开的带子。
5. 将第二个 SRD 拧到安全钩上。将 SRD 的旋转环 (F) 滑到安全钩的鼻端 (E) 上。将 SRD 沿安全钩的鼻端放置。
6. 关闭安全钩。松开活门，让安全钩旋转回其锁定位置。关闭后，通过安全带将织带向后拉，以固定安全钩。

图 7A – 标准安全带连接器

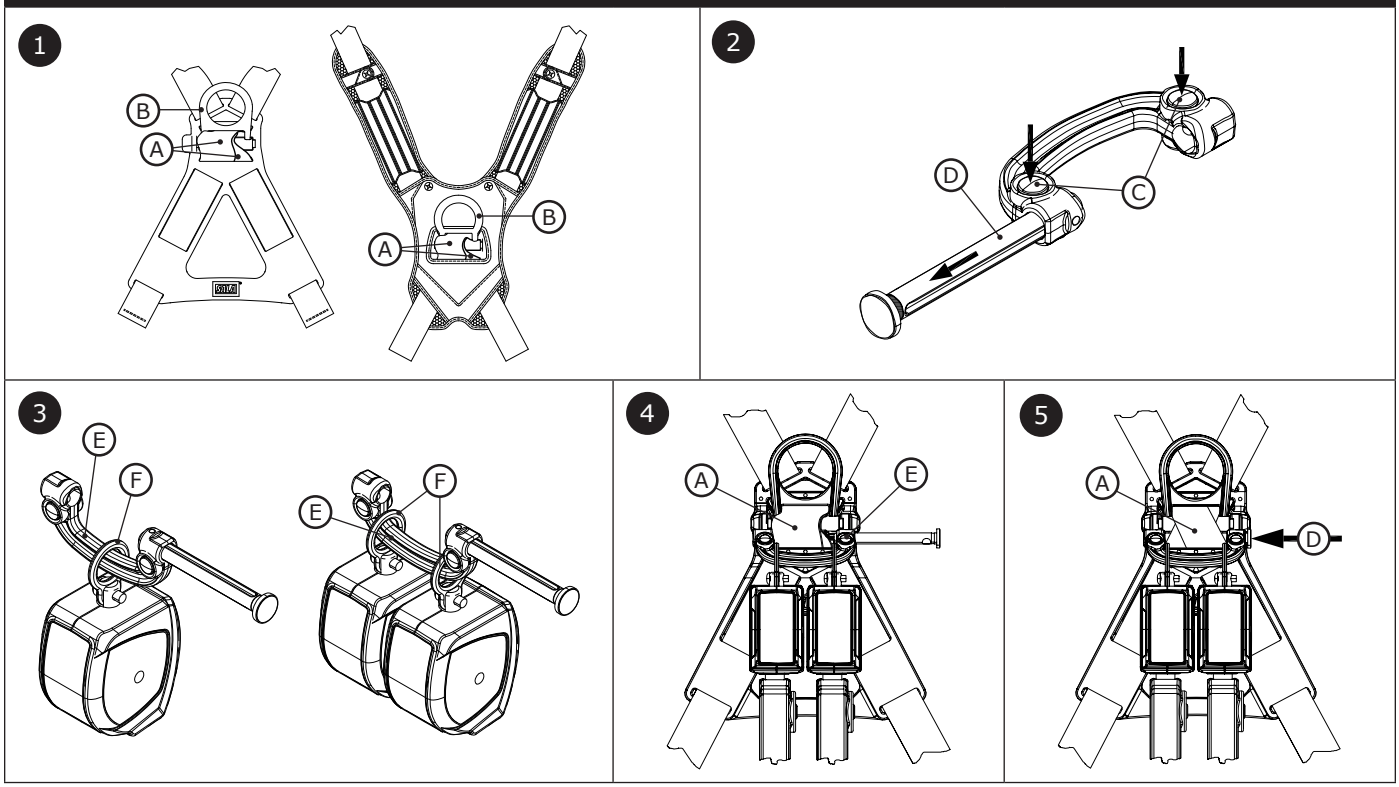


图 7B – 安全钩接口

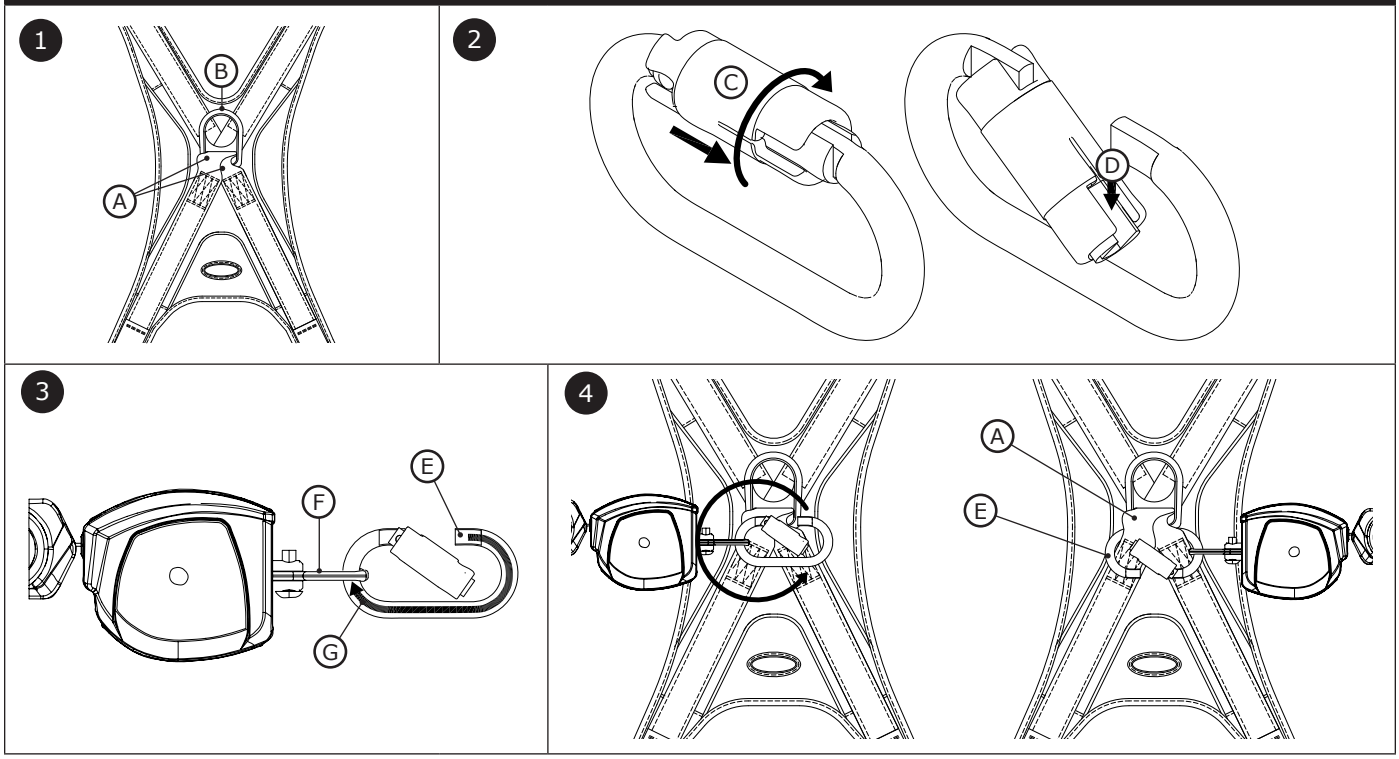
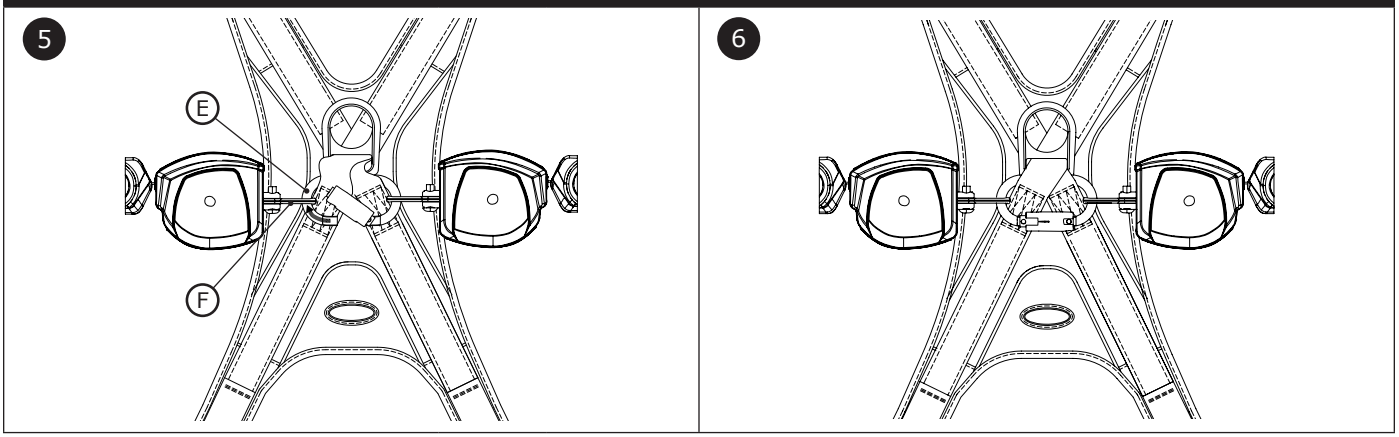


图 7B – 安全钩接口



C. **双销安全钩：**这些说明适用于与特定型号的全身式安全带一起使用的安全钩 3100196，用于安装一个 Nano-Lok SRL 或两个 Nano-Lok SRL（在需要 100% 钩挂的攀爬应用中）。参见图 8：

1. 松开全身式安全带织带。在穿过背部 D 形环 (B) 底部的位置拉出织带 (A) 在穿过背部 D 形环 (B) 底部的地方拉出织带 (A)，直到有足够的空间在织带和 D 形环垫之间滑动双钩接口。
2. 同时按下连接器底部的两个按钮，并向右滑动销。将销滑出，可为插入 SRL 旋转环留出空间。
3. 对于双配置：将一个 SRL 的旋转环放到距销最近的开放空间中，将另一个 SRL 的旋转环放到距销最远的开放空间中。将销滑回到位，直到听见咔哒声为止。销应该牢固固定到位。
4. 对于单配置：将单速差自控器的旋转环放到中间的开放空间。将销滑回到位，直到听见咔哒声为止。销应该牢固固定到位。
5. 同时按住连接器安全带侧的两个按钮，向外滑动销。将销滑出以形成开放空间。
6. 在全身式安全带背部 D 形环下方直接向上拉少量松弛的织带。将连接器的安全带侧放到 D 形环下面。
7. 将销 (D) 滑回到位，确保销在两层安全带织带下面，直到听到咔哒声为止。销应该牢固固定到位。

D. **固定驾驶室安装托架：**驾驶室安装托架是独特的连接器，可以固定在拣选车的驾驶室顶部。请参见图 9。要将驾驶室安装托架固定到拣选车上：

1. 从驾驶室安装托架（B）上拆下螺栓（C），然后拆卸驾驶室安装托架。
2. 将拣选车驾驶室顶部（A）端部横档上方的 SRD 旋转环上的驾驶室安装托架重新组装。确保如图所示组装支架，垫片朝向适用于您的支架型号的正确方向。重新插入螺栓 (C) 以将支架固定在一起。将组件拧紧至 150 英寸 - 磅。(16.95 牛米)。

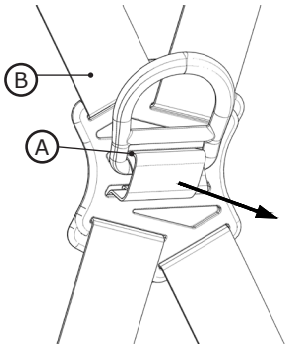
   ☑ *安装驾驶室安装托架时，请使用 1/2 英寸套筒和扳手。*

3. 验证 驾驶室 安装托架是否安装正确。在锁紧螺母的末端应能看到三到四个螺栓螺纹 (C)。如果看不到 3 到 4 个螺纹，请验证垫片的方向是否正确，并在必要时重新调整它们的方向。

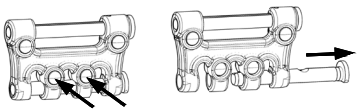
   ☑ *确认 SRD 的连接环眼没有卡在驾驶室安装托架的垫片之间。每个垫片的较小部分，即两个垫片相遇的地方，应完全穿过连接环眼。确保连接环眼在安装后能够自由旋转。*

图 8 – 双销安全钩

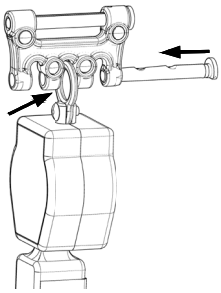
1



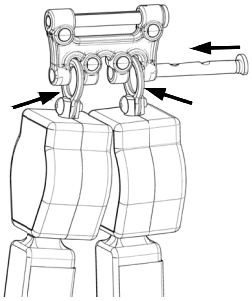
2



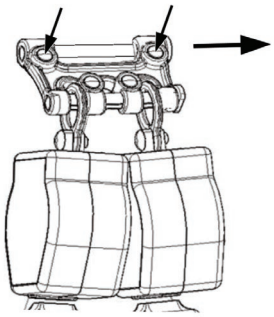
3



4



5



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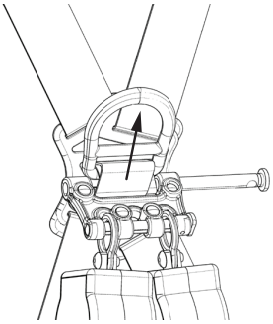


7

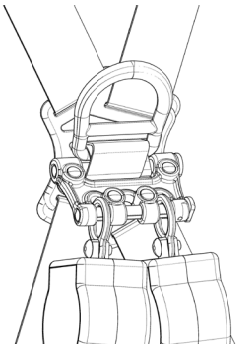
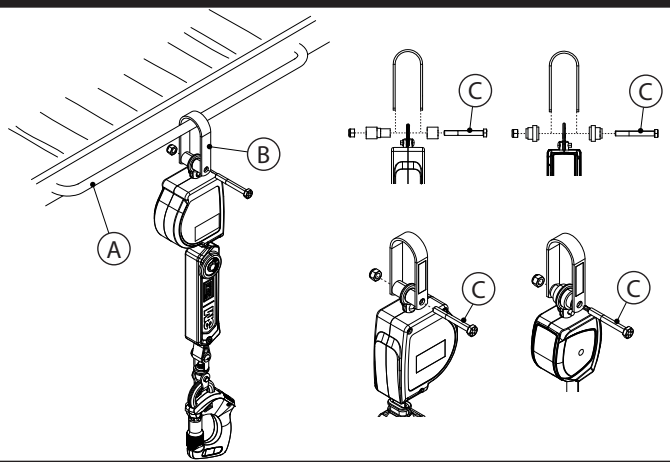


图 9 – 驾驶室安装



4.0 使用

4.1 **每次使用前：**验证您的工作区和坠落防护系统是否符合本说明中定义的所有标准。验证是否有正式救援计划。根据“检查和维护日志”中定义的“用户”检查点检查产品。如果检查发现不安全或有缺陷的状况，或者如果对产品的安全使用状况有任何疑问，请立即停止使用产品。清楚地标记产品“请勿使用”。如需了解更多信息，请参见第 5 部分。

4.2 **坠落之后：**如果此装备受到坠落悬挂或冲击力，请立即停止使用。清楚地在上面标记“请勿使用”。如需了解更多信息，请参见第 5 部分。

4.3 **操作：**在使用 SRD 之前，工人需要将 SRD 固定到挂点连接点和全身式安全带上的连接元件。固定好后，工人可以在既定的安全工作区内以正常速度移动。在使用过程中，一定要让 SRD 救生索在控制下回缩到设备中。

4.4 **吊绳：**根据工作场所和系统配置的不同，用户不一定总能到达 SRD 的锚点。在这种情况下，可能有必要使用吊绳。吊绳是一条长绳，穿过 SRD 的底部连接器，然后再绕回到自身上。以这种方式连接时，用户可以通过拉动吊绳将 SRD 的底部连接器升高或降低到自己的位置。

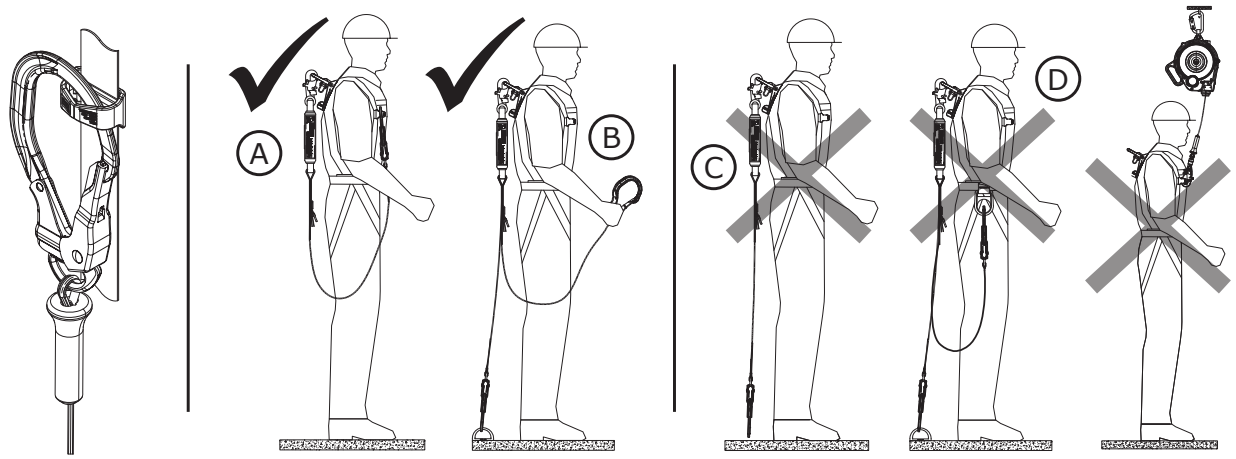
☑ *确保吊绳的自由端不会与其他工人、设备或机器缠在一起。如有必要，限制吊绳的自由端。*

4.5 **安全绳挂扣：**不使用时，挂绳或安装在安全带上的速差自控器 (SRD) 的自由端必须固定在用户安全带上的挂绳停放附件上 (A) 或牢固地握在用户的手中 (B)。请参见图 10。

必须始终正确固定连接子系统的自由端。切勿让自由端自由悬挂 (C)，切勿将自由端固定到用户安全带 (D) 上未使用的连接元件。这两种情况都可能造成绊倒危险或导致用户被缠住。

☑ *切勿将安全绳固定附件用作坠落保护应用的附件元件。*

图 10 – 救生索固定附件

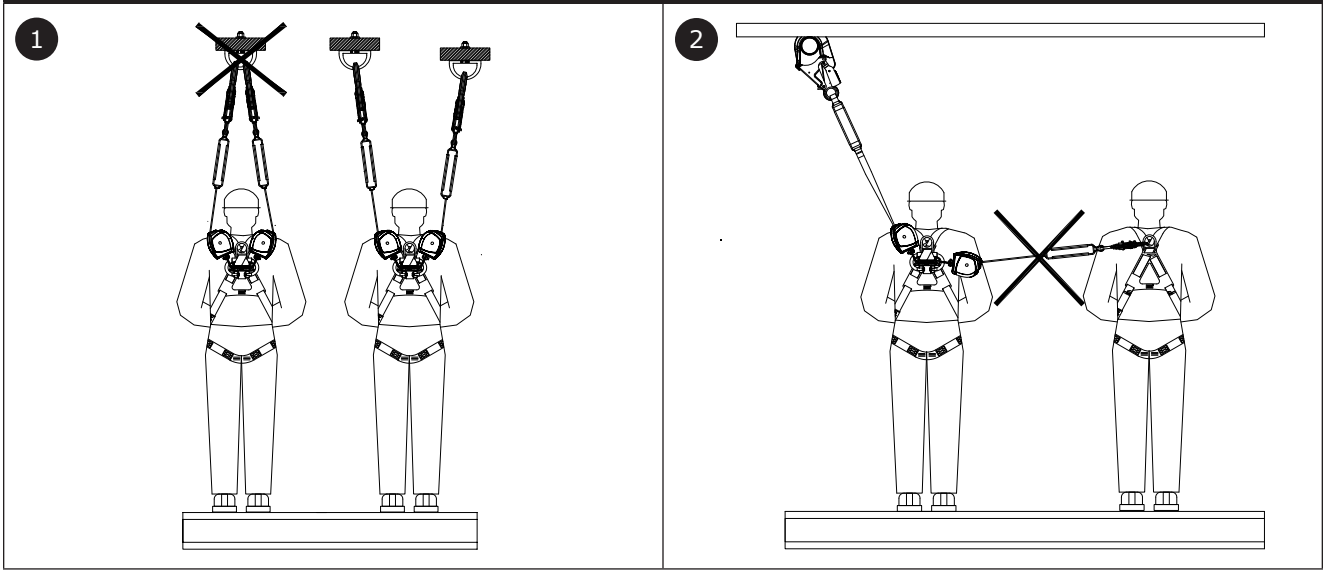


4.6 **使用双 SRD 型号：**双 SRD 型号安装在安全带上时，可用于坠落防护或区域限制应用。此外，双 SRD 可用于攀爬应用，例如上下钢筋结构。双 SRD 使用户能够在挂点之间移动时保持 100% 钩挂。只要有一个 SRD 固定到一个挂点，用户就可以断开另一个 SRD 并将其移动到不同的挂点。通过依次断开和重新连接每个 SRD，用户可以沿着表面行进移动并且在移动期间仍然保持钩挂。

在使用双 SRD 之前，用户必须始终考虑以下事项：

- 在可能发生坠落危险的位置附近，用户必须始终将至少一条 SRD 连接到挂点。不得将两条速差自控器连接到同一个挂点。请参见图 11.1。
- 切勿同时将两个 SRD 永久固定到挂点。双连接只能以保持 100% 的连接为目的。
- 每个单独的挂点必须足够坚固，以满足表 1 中列出的挂点要求。
- 单个 SRD 只能用于固定到挂点。切勿通过同一系统保护两名工人。请参见图 11.2。
- 必须始终避免每个 SRD 的救生索受到阻碍和发生缠绕。使用过程中，请勿将 SRD 穿过手臂下方或两腿之间。

图 11 – 使用双 SRD 型号



4.7 **与水平系统一起使用：**本说明中涵盖的 SRD 与水平系统兼容，例如水平救生索 (HLL) 系统和水平导轨系统。有关其与 SRD 兼容性的更多信息，请参阅水平系统的制造商说明。只有当两种产品都允许这样使用时，SRD 才能与水平系统一起使用。

☑ *本说明书中列出的所需坠落净空值是以使用刚性固定锚固点为基础的。这些数值不适用于与水平救生索 (HLL) 系统一起使用的产品。有关 HLL 系统专用的坠落间隙图表，或在使用本说明中的图表之前必须考虑的其他因素，请参阅 HLL 系统制造商的说明。*

5.0 检查

☑ *装备停止使用后，在合格人员书面确认可以使用之前，不得恢复使用。*

5.1 **检查频率：**在每次使用产品之前，使用者必须进行检查；此外，除了使用者之外，还须由合格人员予以检查，检查间隔期限不超过一年。更高频率的装备使用和更恶劣的条件，可能需要增加合资格人员检查的频率。这些检查的频率应由合格人员根据工地的具体条件确定。

5.2 **检查程序：**按照“检查和维护日志”中列出的程序检查本产品。该装备的所有者应保存每次检查的文件。检查和维护日志应放置在产品附近或以其他方式方便用户访问。建议在产品上标注下一次或最后一次检查的日期。

5.3 **缺陷：**如果由于存在缺陷或不安全状况，或者产品由于受到防坠落制动力或冲击力而无法恢复使用，则必须销毁产品。

5.4 **产品寿命：**产品的使用寿命由工作条件和维护情况决定。只要产品符合检验标准，就可以继续使用。

6.0 维护、存放和修理

☑ *需要维护或计划维护的装备应标记为“请勿使用”。在执行维护之前，不应移除这些装备标签。*

6.1 **清洁：**定期用清水和温和的肥皂液清洁救生索和产品外部。彻底冲洗产品并晾干。根据需要清洁标签。有关更多信息，请参阅我们网站上的技术公告：*https://www.3M.com/FallProtection/Mechanical-Device-Cleaning*

6.2 **弃置：**剪断或以其他方式使救生索无法使用，然后适当处理此产品。

6.3 **维修：**本产品不可维修。请勿尝试修理本产品。

6.4 **存放和运输：**在避免阳光直射的凉爽、干燥、清洁环境中储存和运输产品。避开可能存在化学气体的区域。在长期存放后，应彻底检查各个组件。

7.0 标签和标记

7.1 **摘要：**“产品标签”图说明产品上显示的标签和标记。请参阅下文，了解每个标签和标记提供的信息摘要。

☑ *标签图像用于呈现标签的大致内容。有关具体信息，请参阅您的产品标签。*

☑ *缺失或损坏的标签必须更换。所有标签必须清晰可见。*

A	1) 徽标标签
B	1) ID、警告和检查标签
C	1) 徽标标签（仅限弧闪型号）
D	1) ID、警告和检查标签（仅限弧闪型号）
E	1) 缓冲器标签

8.0 RFID 标签

8.1 **位置：**本使用说明中涵盖的 3M 产品均配备无线射频识别 (RFID) 标签。RFID 标签可与 RFID 标签扫描仪搭配使用以记录产品检查结果。请参阅“RFID 标签位置”，了解 RFID 标签的位置。

8.2 **弃置：**在弃置本产品之前，去除 RFID 标签并根据当地法规弃置 / 回收。欲了解更多信息，请访问我们的网站：*http://www.3M.com/FallProtection/RFID*

9.0 专业术语

9.1 **定义：**这些说明书中使用了以下术语和定义。

☑ *有关术语和定义的完整列表，请访问我们的网站：www.3m.com/FallProtection/ifu-glossary*

- **授权人员：**由雇主指定在会面临坠落危险的位置执行任务的人员。
- **合格人员：**能够识别周围环境或工作条件中不利员工健康或对其有危害或危险的现有和预期危险，同时亦有权采取及时纠正措施来消除这些危险的人员。
- **坠落悬挂系统：**一套坠落悬挂装备，配置用于在坠落时保护用户。
- **合格人员：**拥有公认的学位、证书或专业地位的人，或通过广泛的知识、培训和经验成功地证明他们有能力解决与坠落悬挂和救援系统相关问题，符合适用的国家、地区和地方法规的要求。
- **救援人员：**使用救援系统执行辅助救援的人员。
- **区域限制系统：**一套坠落悬挂装备，配置用于防止用户发生坠落危险。不允许自由坠落。
- **用户：**在有坠落悬挂系统保护的情况下进行活动的人。

图 12 – RFID 标签位置

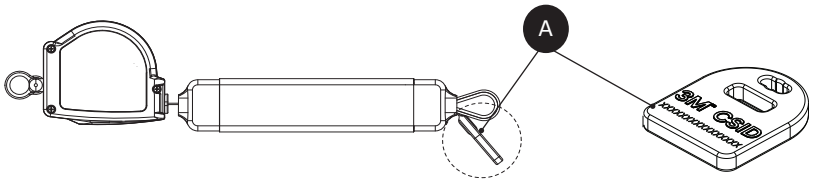
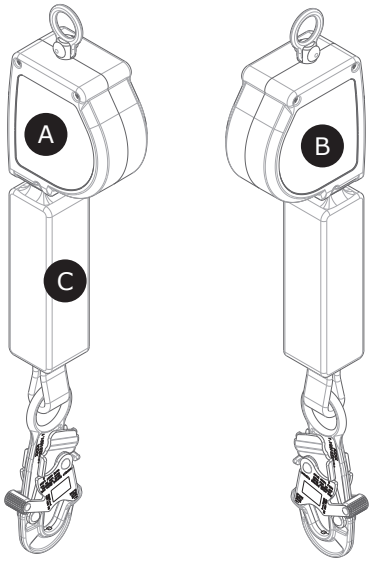
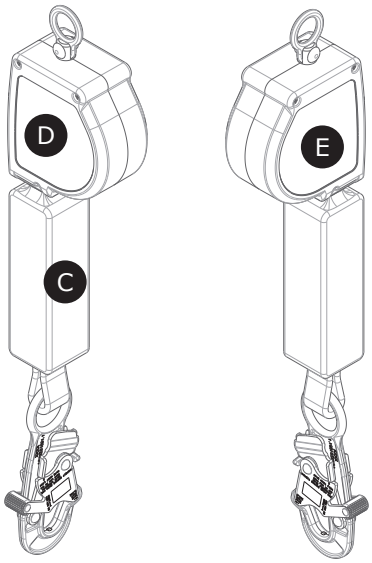


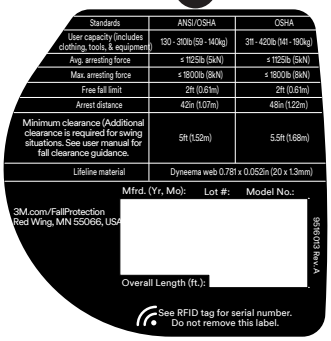
图 13 – 产品标签





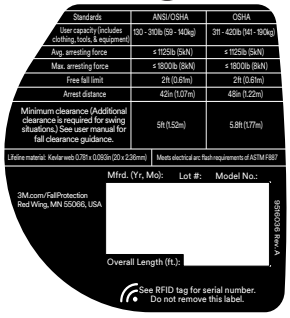
A

B



D

E



C

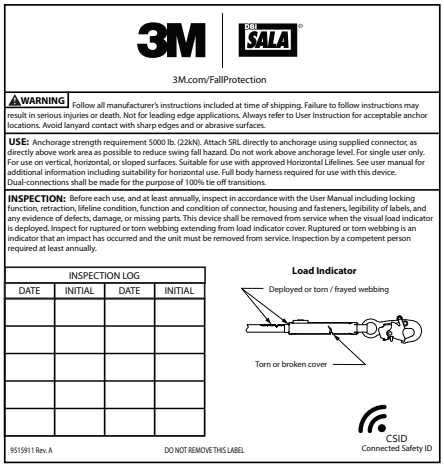


表 2 – 检查和维护日志

型号（序列号）：					
购买日期：			**首次使用日期：**		
...					
☑ *本产品在每次使用前必须由用户进行检查。此外，用户以外的合格人员必须每年至少检查一次此装备。*					
...					
组件	**检查程序**			**检查结果**	
				通过	**未通过**
SRD – 一般检查（图 14.1）	检查螺栓是否松动，部件是否弯曲或损坏。			☐	☐
	检查外壳 (A) 是否有变形、裂缝或其他损坏。			☐	☐
	检查旋转环 (B) 是否有变形、裂缝或其他损坏。旋转环应牢固连接到 SRD 上，但应该能自由旋转。			☐	☐
	救生索 (C) 应顺畅地完全拉出和收回，否则将会导致救生索松弛。			☐	☐
	确保设备在救生索被猛拉时能锁定。锁定应为正向，且不会滑动。			☐	☐
	寻找整套设备的腐蚀迹象。			☐	☐
连接器（图 14.2）	检查所有 SRD 连接器是否有损坏和腐蚀的迹象。验证所有连接器是否正常工作。如有：活门 (A) 应正确打开、关闭、锁定和解锁；旋转吊环 (B) 应无干扰地旋转；并且锁定按钮和锁定销应正常工作。			☐	☐
织带救生索（图 14.3）	检查织带是否有割伤 (A)、磨损 (B)、断丝、撕裂、磨蚀、重脏污 (C)、霉菌、烧伤 (D) 和变色。检查救生索缝线是否有拉线或断线，因为断线可能表明产品已受到冲击载荷，必须停止使用。			☐	☐
钢缆救生索（图 14.4）	检查钢丝绳是否有切口、扭结 (A)、断丝 (B)、钢丝打结 (C)、焊接飞溅、腐蚀、化学接触区域或严重磨蚀区域 (D)。向上滑动救生索缓冲器 (E) 并检查金属环 (F) 是否损坏。如果一周缠绕有 6 根或更多断丝，或一周缠绕的一股中有 3 根或更多断丝，则更换钢缆组件。如果金属环的 25 毫米（1 英寸）长度中有任何断线情况，请更换组件。			☐	☐
缓冲器（图 15）	确认一体式缓冲器未激活。检查救生索盖 (A) 是否从缓冲器盖 (B) 的任一端拉出。缓冲器织带 (C) 均不得外露。缓冲器盖还应牢固且没有撕裂 (D) 或其他损坏。			☐	☐
标签（图 13）	所有标签均清晰可见。			☐	☐
坠落悬挂装备	根据制造商说明书，安装和检查与产品一起使用的附加坠落悬挂装备。			☐	☐
...					
☑ *如果产品未通过检验程序，则产品未通过整体检验。如果产品未通过检查，请立即停止使用。清楚地标记产品“请勿使用”。如需了解更多信息，请参见第 5 部分。*					
...					
检查类型：	☐ 用户	☐ 合格人员	**整体检查结果：**	☐ 通过	☐ 未通过
通过检查：			**检查日期：**		
签名：			**下次检验到期时间：**		
...					
补充说明：					

图 14 – 一般检查

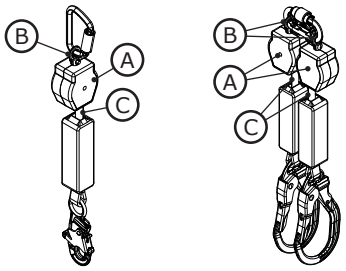
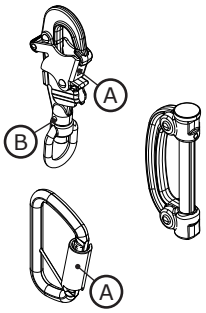
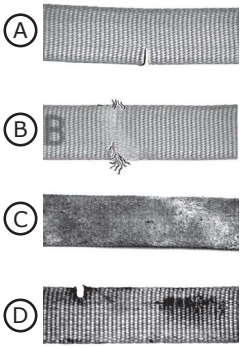
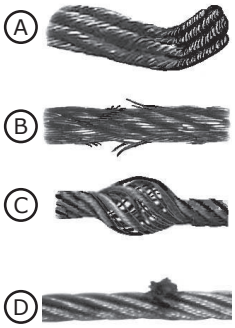
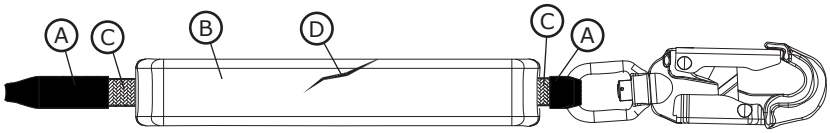
1	2	3	4
			

图 15 – 缓冲器检查



GLOBAL PRODUCT WARRANTY, LIMITED REMEDY AND LIMITATION OF LIABILITY

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