

Calmark offers the Series 225 "Card-Lok" Retainer for cold plate-heat exchanger applications. This is an economical wedge clamp retainer for high efficiency heat transfer from Board Module Assembly to Cold Wall.

FEATURES

- Maximum Reliability – Screw-actuated wedge action locks Board Module Assembly in place
- Maximum Thermal Transfer – Wedge action design provides maximum contact between thermal paths on Board Module Assembly and the heat sinking surface
- Maximum Resistance to Shock & Vibration – Wedge action design locks Board Module Assembly in place to provide maximum resistance to shock and vibration
- Zero Insertion & Extraction Forces – Screw actuation provides zero insertion and extraction force on Board Module Assembly
- Design Flexibility – Special lengths, finishes or other design variations available on request

WEDGES

Material:

Aluminum Alloy
6061-T6 QQ-A-200/8

Finish:

See finish table on opposite page

SCREW

.093 in or 2.5 mm hex. drive socket head cap screw

Material:

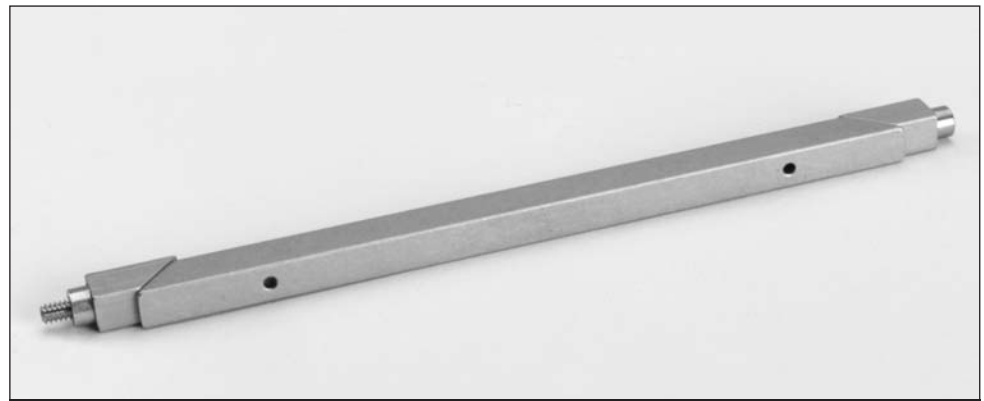
Stainless Steel
QQ-S-763, ASTM A 582

Finish:

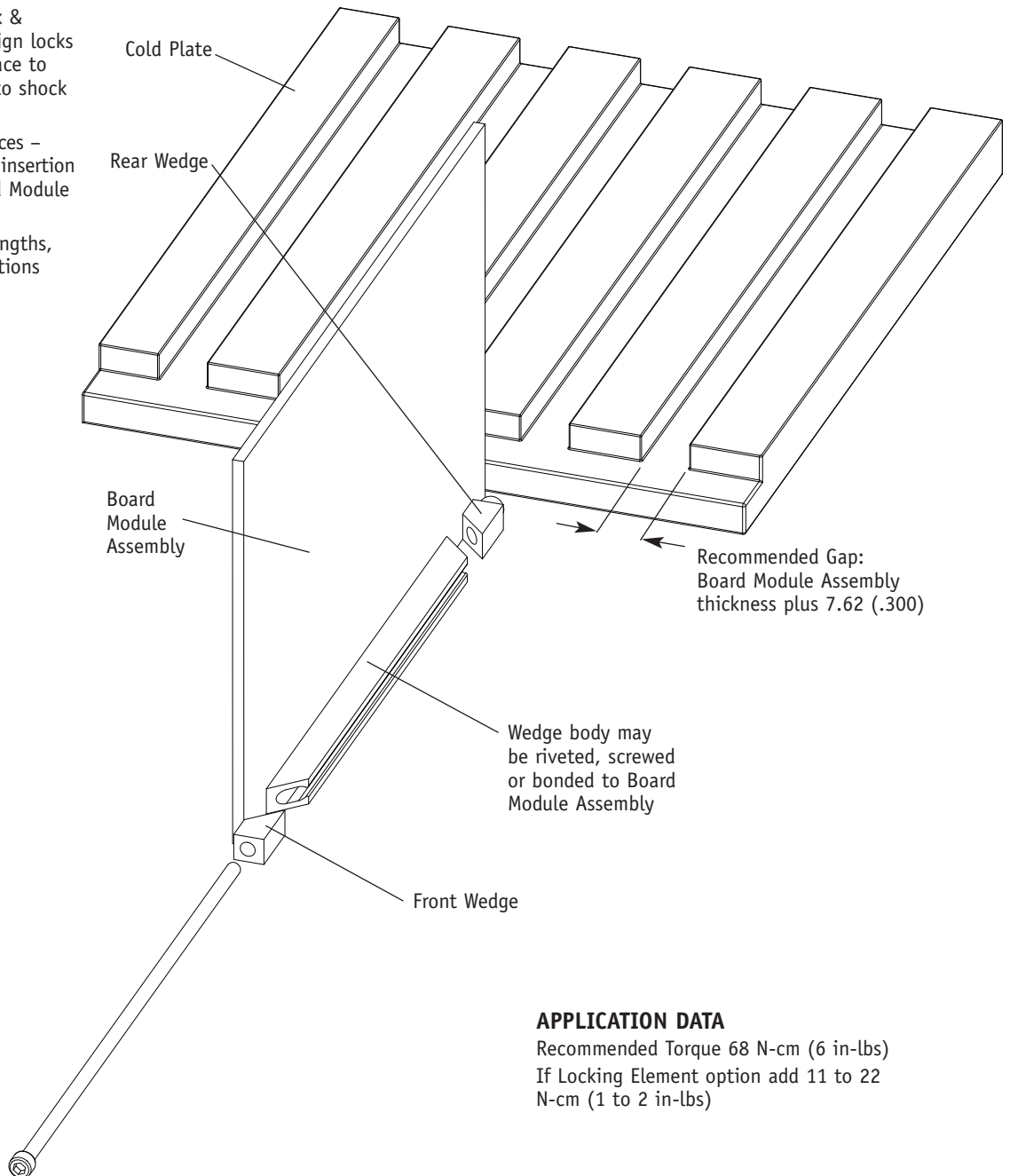
Passivate per MIL-S-5002

WEIGHT

1.34 g/cm (.120 oz/in)



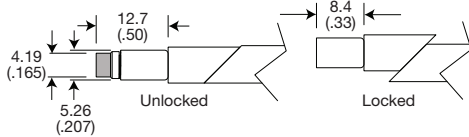
Series 225 - "Card-Lok" Retainer (cold plate)



OPTION PREFIX

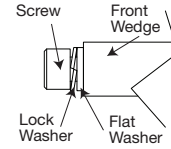
Detail "V"

Provides visual lock indication.



Detail "W"

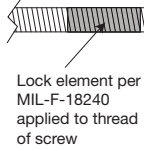
Provides added resistance to loosening from shock and vibration. This option adds 2.5 (.10) to the screw length unless combined with the "R" suffix option, then adds 5.1 (.20) total.



OPTION SUFFIX

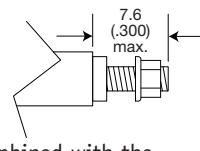
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.



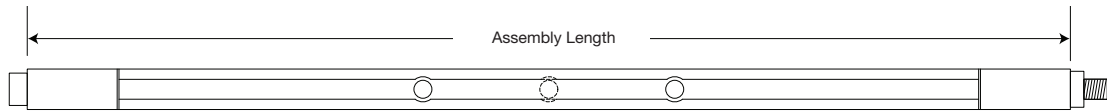
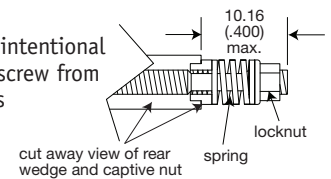
Detail "R"

Reduces the possibility of unintentional disassembly of the screw from rear wedge. This option adds 2.5 (.10) to the screw length unless combined with the "W" suffix option, then 5.1 (.20) total.

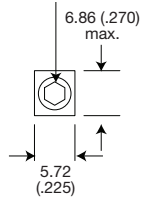


Detail "K"

Prevents the unintentional disassembly of screw from rear wedge. This option adds 5.1 (.20) to the screw length.

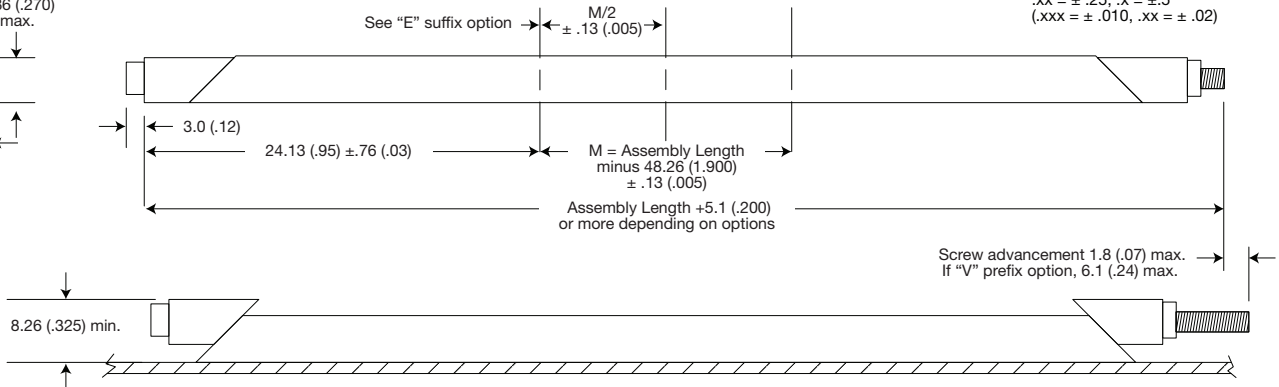


2.38 (.094) Hex Socket Cap
Per ANSI/ASME B18.3



Mounting holes shown in wedge body -
Screw hidden for clarity

Units: mm (in)
Unless specified otherwise,
.xx = ± .25, .x = ± .5
(.xxx = ± .010, .xx = ± .02)



Part Number Code

Series 225 Card-Lok Three Piece

Prefix options

Metric Screw Head M2.5 Hex Drive M
Standard Screw Head 3/32 [blank]
Lock and Flat Washer W
None [blank]
Visual Indicator V
No Visual Indicator [blank]
Black Anodize A
or choose from Finish Table see table

Suffix options

Stainless Steel Captive (and Lock Nut if "R" option is also selected) CR
Standard Plated Steel "-"
Assembly length in inches. Standard lengths range from 71.12 (2.80), 96.52 (3.80) and 121.9 (4.80) length.xx
Other lengths available upon request
Additional Center Mounting Hole E
None [blank]
Mounting Options - holes for rivet mounting or choose from Mounting Option Table H
 see table
Lock Element L
None [blank]
Lock Nut R
Captive Screw K
None [blank]

Part Number Code Example:

VA225CR4.80HR

Series 225 Card-Lok three piece 121.9 (4.80) long with Visual Indicator, Black Anodized Finish, standard rivet mounting hole and stainless steel captive nut and lock nut option.

FINISH TABLE

Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 1A, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE

Code Letter	Method
[blank]	No mounting holes
"H"	Rivet Mounting Ø1.70 (.067) hole with 3.96 (.156) counterbore x 5.08 (.200) deep and 100° x 3.56 (.140) countersink.
"T0"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the feature of Ejection of the Board Module Assembly with its Series E225 "Card-Lok" Retainer. The Series E225 provides initial ejection of the Board Module Assembly without damaging circuits, components or bending connector pins.

FEATURES

- Safe and Easy Ejection of Board Module Assembly – Screw actuation produces a jacking force that disengages the Board Module Assembly from its mating connector
- Maximum Reliability – Screw-actuated wedge action locks Board Module Assembly in place
- Maximum Thermal Transfer – Wedge-action design provides maximum contact between thermal path on Board Module Assembly and the heat sink surface
- Maximum Resistance to Shock & Vibration – Wedge action design locks Board Module Assembly in place to provide maximum resistance to shock and vibration
- Zero Insertion & Extraction Forces – Screw actuation provides zero insertion and extraction force on Board Module Assembly
- Design Flexibility – Special lengths, finishes or other design variations available on request

MATERIALS & FINISHES

BODY & WEDGES

Aluminum Alloy 6061-T6 per ASTM-B221 (See P/N Code for finish options)

SCREW

Stainless Steel per ASTM-A582 or QQ-S-763. Passivate per MIL-S-5002

RETAINER RING & THREADED INSERT

Stainless Steel per ASTM-A582 or QQ-S-763. Passivate per MIL-S-5002

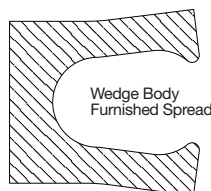
APPLICATION DATA

All mounting options except for "H" (rivet mouting), parts are completely assembled for shipping.

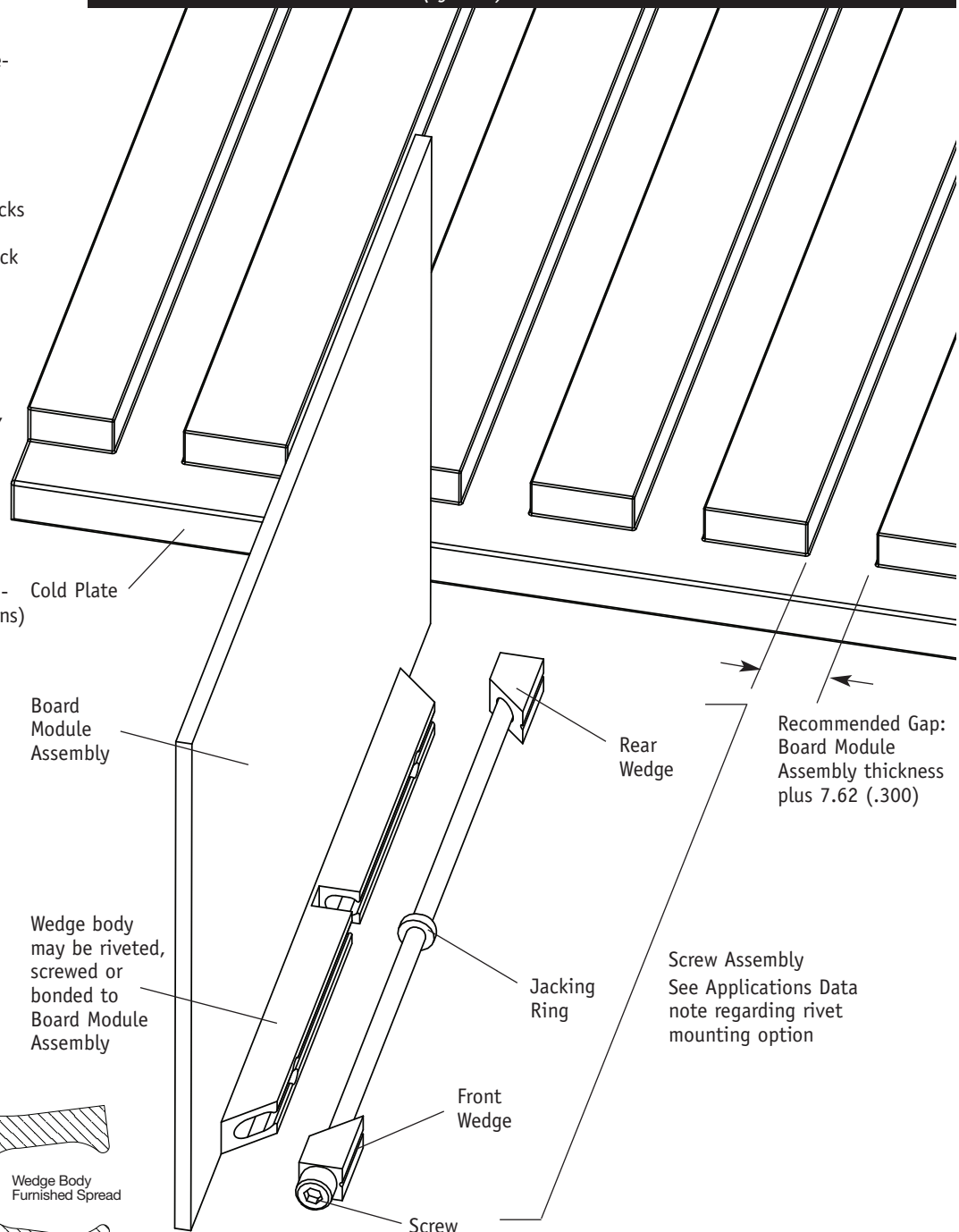
For "H" (rivet) Mounting Option, the screw assembly and wedge body are shipped unassembled.

Assemble parts as follows:

1. Rivet Wedge Body to Printed Circuit Board
2. Insert Screw Assembly into Wedge Body
3. Collapse Wedge Body to captivate screw assembly



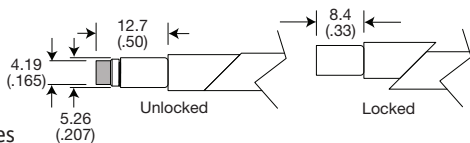
Series E225 - "Card-Lok" Retainer (ejector)



OPTION PREFIX

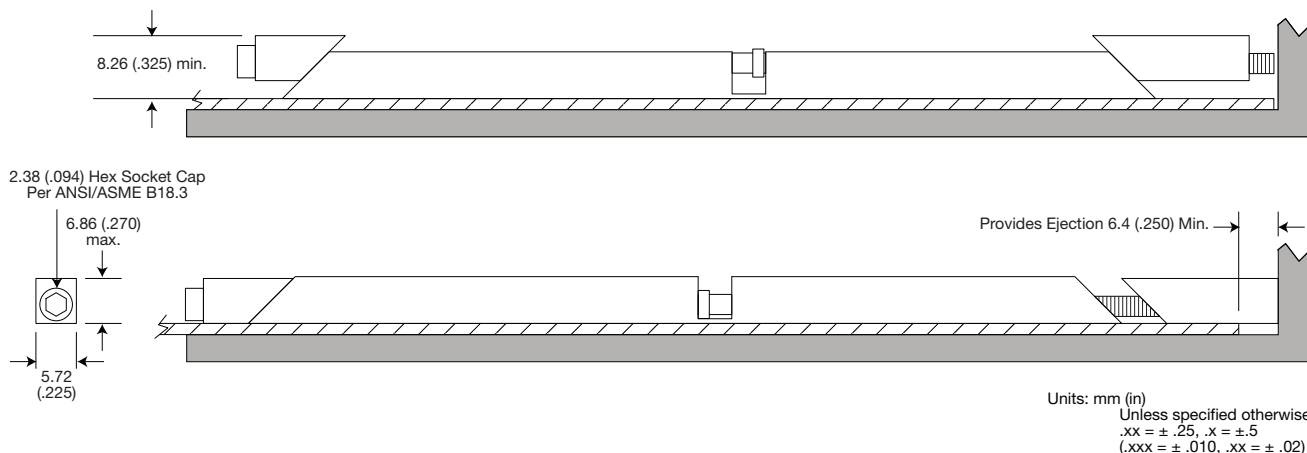
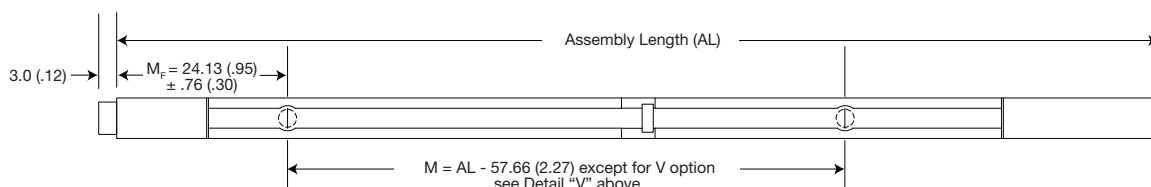
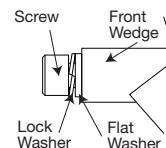
Detail "V"

Provides visual lock indicator. This option changes M_F to 15.5 (.61) and M to equal AL - 45.72 (1.80)



Detail "W"

Provides added resistance to loosening from shock and vibration.



Part Number Code Series E225 Card-Lok Three Piece

Prefix options

Metric Screw Head M2.5 Hex Drive _____ **M**
 Standard Screw Head 3/32 Hex Drive _____ [blank]
 Lock and Flat Washer _____ **W**
 None _____ [blank]
 Visual Indicator _____ **V**
 No Visual Indicator _____ [blank]
 Black Anodize _____ **A**
 or choose from Finish Table _____ see table

Suffix options

Assembly length in inches. Standard lengths _____ length.xx
 range from 71.12 (2.80) to 329.9 (12.99).
 Other lengths available upon request
 Mounting Options - holes for rivet mounting _____ **H**
 or choose from Mounting Method Table _____ see table

Part Number Code Example:

WVE225-4.80T2

Series E225 Ejecting Card-Lok three piece 121.9 (4.80) long with Lock and Flat Washer, Visual Indicator, Gold Chemical Film Finish, mounting holes drilled and tapped for 2-56 screw.

FINISH TABLE	
Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 1A, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE	
Code Letter	Method
[blank]	No mounting holes
"H"	Rivet Mounting \varnothing 1.70 (.067) hole with 3.96 (.156) counterbore x 5.08 (.200) deep and 100° x 3.56 (.140) countersink.
"T0"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers Series L225 Lever-Lok ("Card-Lok") Retainer which provides tool free, lever action locking on the Series 225 configuration "Card-Lok."

FEATURES

- High Reliability – Lever-actuated wedge action locks Board Module Assembly in place
- High Thermal Transfer – Wedge action design provides maximum contact between thermal path on Board Module Assembly and heat sink
- High Resistance to Shock & Vibration – Wedge action design locks Board Module Assembly in place to provide excellent protection against severe shock and vibration
- Zero Insertion & Extraction Forces – Lever actuation provides zero insertion and extraction force on Board Module Assembly
- Design Flexibility – Special lengths, finishes or other design variations available on request

MATERIALS & FINISHES

BODY & WEDGES

Aluminum Alloy. 6061-T6, ASTM-B221. Black Anodize per MIL-A-8625, Type II, Class 2.

SCREW

Stainless Steel per QQ-S-763 or ASTM-A582. Passivate per MIL-S-5002.

LEVER ARM

Aluminum Alloy. 6061-T6, ASTM-B221. Black Hard Anodize per MIL-A-8625, Type III Class 2.

FLATWASHER & SPRING WASHERS

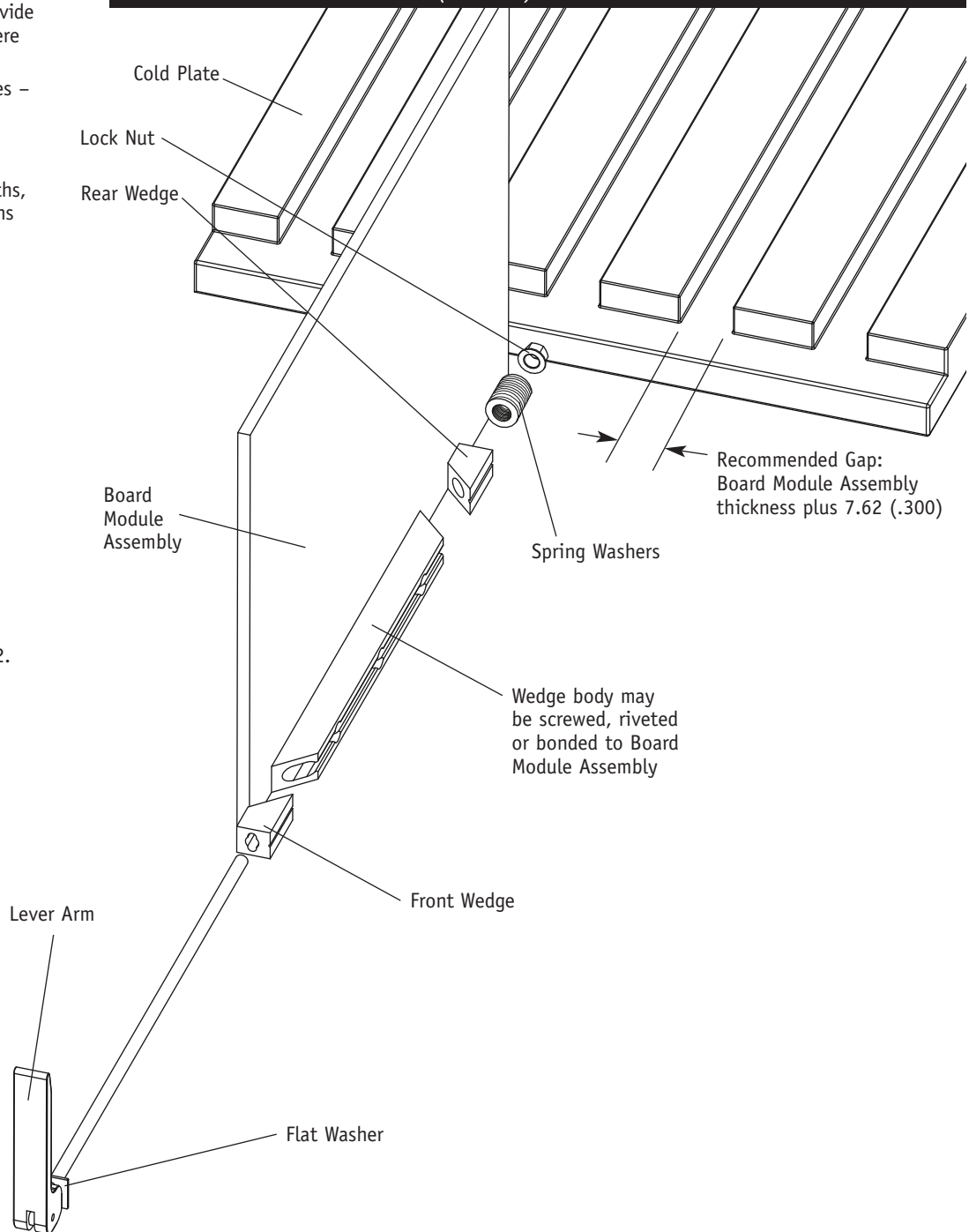
Stainless Steel. QQ-S-763. Passivate per MIL-S-5002.

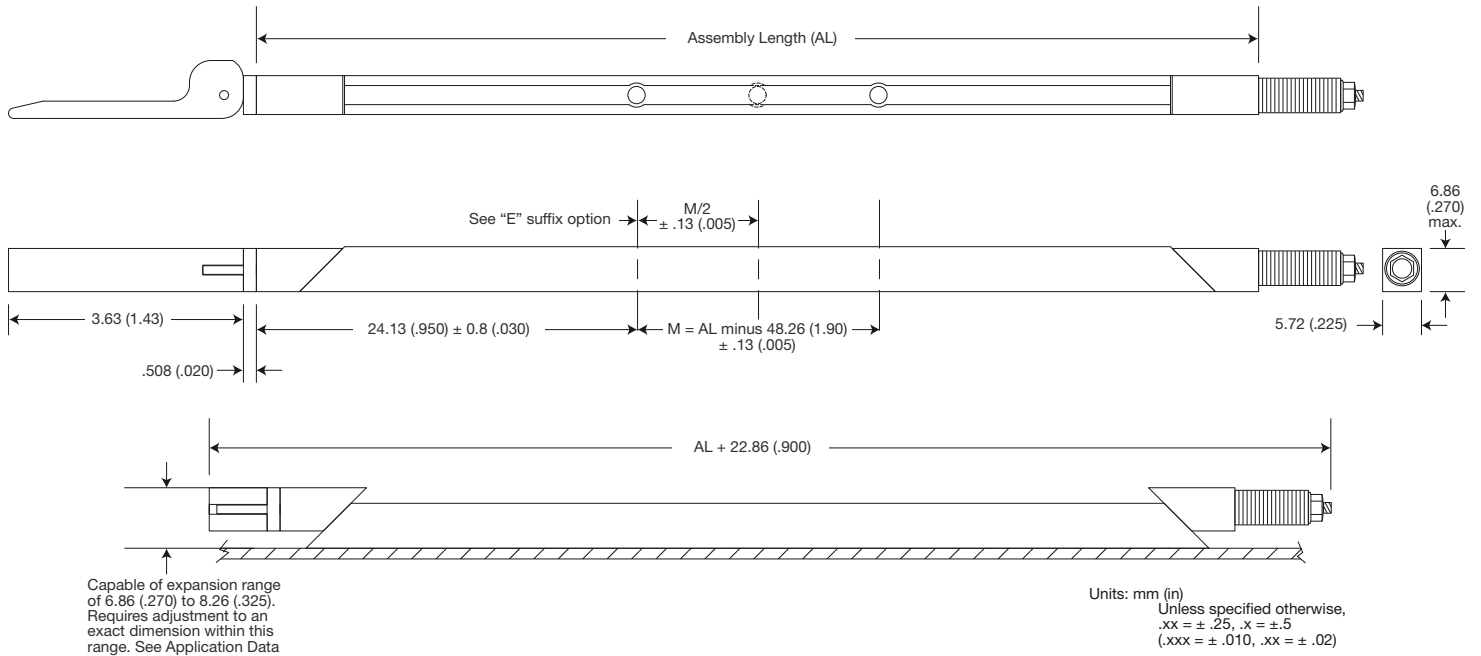
WEIGHT

1.65g/cm (.15oz/in)



Series L225 - "Card-Lok" Retainer (Lever-Lok)





APPLICATION DATA

CLAMPING FORCE ADJUSTMENT PROCEDURE

- NOTE: Lever-Lok furnished assembled but not adjusted.
1. Fasten Lever-Lok to Board Module Assembly.
 2. Insert Board Module Assembly into slot in cold plate.
 3. Actuate lever to locked/closed position.
 4. Tighten locknut on end of screw until wedges initially contact wall of cold plate slot, or slight insertion/extraction drag is felt.
 5. Additionally tighten locknut two (2) full turns. DO NOT EXCEED TWO (2) TURNS.
 6. Lever-Lok is now ready for use.

NOTE: Factory adjustment of clamping force available on request.

CLAMPING FORCE DATA

Direct force of assembly is approximately 534N (120lbs), when adjusted per recommended procedure.

Direct force of assembly is affected as follows:
8N (1.8lbs) per each .025 (.001) variation of cold plate slot width, or 200N (45lbs) per each full turn of locknut.

Part Number Code
Series L225 Card-Lok Three Piece _____

L225 - 3.80 E TO

Suffix options
Assembly length in inches. Standard lengths range from 54.6 (2.15) to 329.9 (12.99). _____ length.xx
Other lengths available upon request _____

Additional Center Mounting Hole _____ E
No additional center mounting hole _____ [blank]

Mounting Options - 0-80 tapped holes _____ TO
or choose from Mounting Option Table

Part Number Code Example:

L225-2.80
Series L225 Ejecting Card-Lok three piece 71.12 (2.80) long with black anodize finish and 2-56 tapped holes.

MOUNTING METHOD TABLE

Code Letter	Method
[blank]	2-56 tapped hole
"TO"	0-80 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the Series 226 "Card-Lok" retainer for cold plate-heat exchanger applications. A maximum efficiency heat sinking Board Module Assembly retainer designed specifically for part length of 4.80 (121.9) inches or longer with five or more wedge and body segments. The Series 226 design incorporates a Self-Positioning feature which minimizes wedge and body misalignment and provides easy insertion.

FEATURES

- Self-positioning design minimizes wedge and body misalignment providing easy insertion
- Positive locking provides maximum reliability
- Maximum thermal transfer
- Maximum resistance to shock and vibration
- Zero insertion and extraction forces
- Special lengths, finishes or other design variations available on request

BODIES & WEDGES

Material:

Aluminum Alloy 6061-T6,
ASTM-B221

Finish:

See Part No. Code

SCREW

Material:

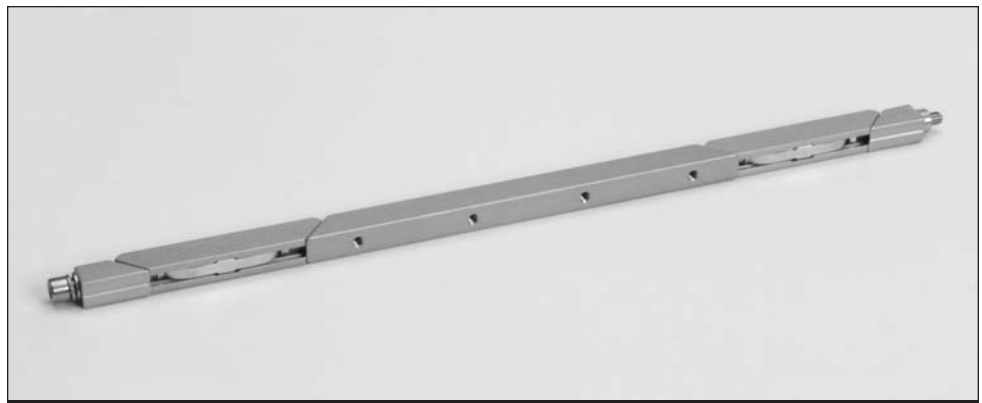
Stainless Steel
QQ-S-763 or ASTM-A582

Finish:

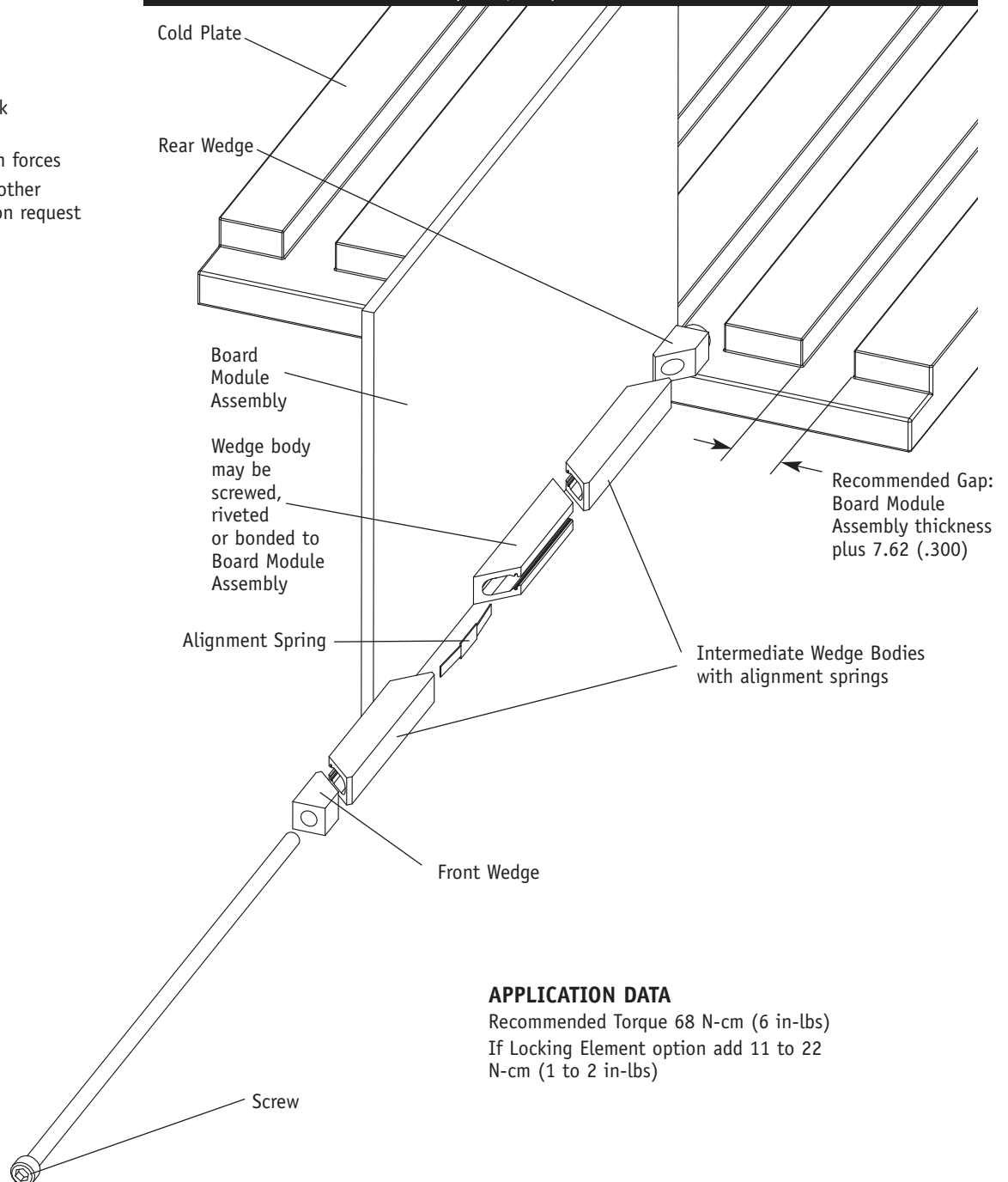
Passivate per MIL-S-5002

WEIGHT

1.34 g/cm (.120 oz/in)



Series 226 - "Card-Lok" Retainer (cold plate)



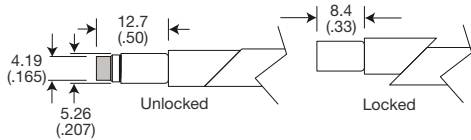
APPLICATION DATA

Recommended Torque 68 N-cm (6 in-lbs)
If Locking Element option add 11 to 22
N-cm (1 to 2 in-lbs)

OPTION PREFIX

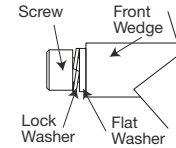
Detail "V"

Provides visual lock indication.



Detail "W"

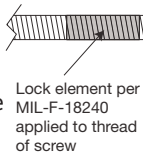
Provides added resistance to loosening from shock and vibration. This option adds 2.5 (.10) to the screw length unless combined with the "R" suffix option, then adds 5.1 (.20) total.



OPTION SUFFIX

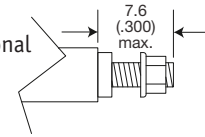
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.



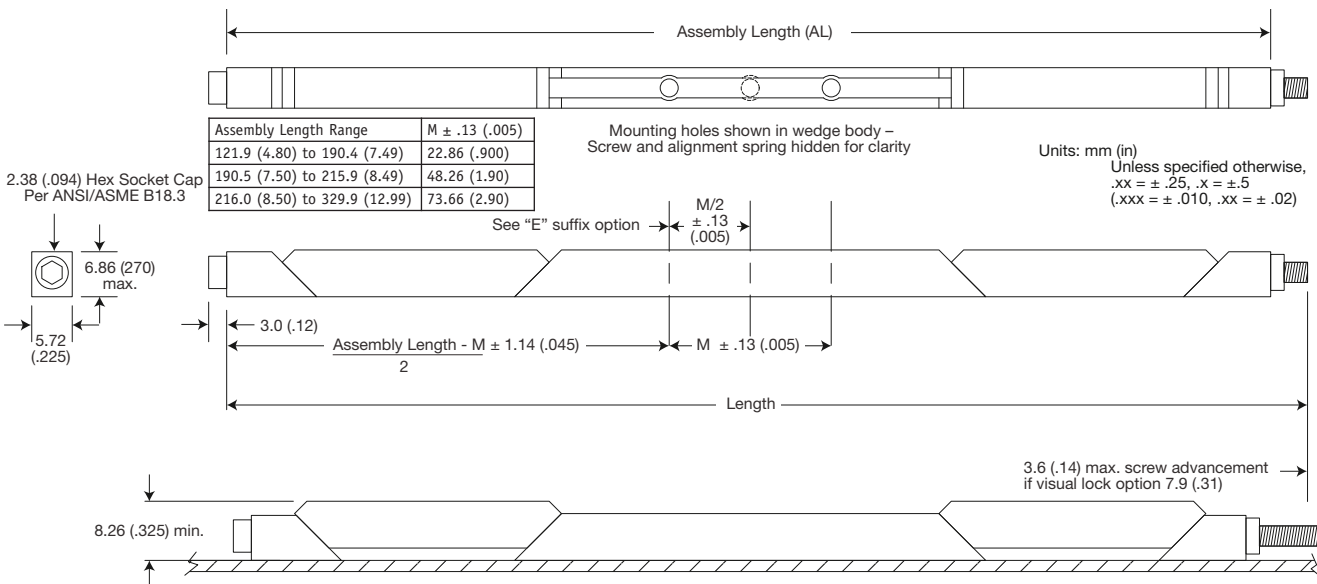
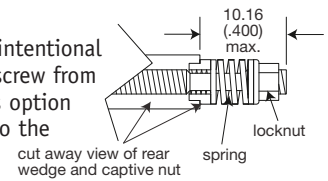
Detail "R"

Reduces the possibility of unintentional disassembly of the screw from rear wedge. This option adds 2.5 (.10) to the screw length unless combined with the "W" suffix option, then 5.1 (.20) total.



Detail "K"

Prevents the unintentional disassembly of screw from rear wedge. This option adds 5.1 (.20) to the screw length.



Part Number Code Series 226 Card-Lok Five Piece

Prefix options

Metric Screw Head M2.5 Hex Drive M
Standard Screw Head 3/32 Hex Drive [blank]
Lock and Flat Washer W
None [blank]
Visual Indicator V
No Visual Indicator [blank]
Black Anodize A
or choose from Finish Table see table

Suffix options

Stainless Steel Captive (and Lock Nut if "R" option is also selected) CR
Standard Plated Steel "-"
Assembly length in inches. Standard lengths range from 121.9 (4.80) to 329.9 (12.99). Preferred lengths are 121.9 (4.80), 147.3 (5.80) and 172.72 (6.80) length.xx
Other lengths available upon request
Additional Center Mounting Hole E
None [blank]
Mounting Options - holes for rivet mounting H
or choose from Mounting Option Table see table
Lock Element L
None [blank]
Lock Nut R
Captive Screw K
None [blank]

Part Number Code Example:

MWA226-4.80HK

Series 226 Card-Lok five piece 121.9 (4.80) long with M2.5 hex drive, lock and flat washer, black anodize finish, holes for rivet mounting and captive screw feature.

FINISH TABLE

Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 1A, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE

Code Letter	Method
[blank]	No mounting holes
"H"	Rivet Mounting Ø1.70 (.067) hole with 3.96 (.156) counterbore x 5.08 (.200) deep and 100° x 3.56 (.140) countersink.
"TO"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the Series 230 "Card-Lok" retainer for cold plate-heat exchanger applications. A mid-width configuration, to meet Board Module Assembly retainer expansion requirements between the Series 225 and 240.

FEATURES

- Maximum Reliability – Screw-actuated wedge action locks Board Module Assembly in place
- Maximum Thermal Transfer – Wedge action design provides maximum contact between thermal paths on Board Module Assembly and the heat sinking surface
- Maximum Resistance to Shock & Vibration – Wedge action design locks Board Module Assembly in place to provide maximum resistance to shock and vibration
- Zero Insertion & Extraction Forces – Screw actuation provides zero insertion and extraction force on Board Module Assembly
- Design Flexibility – Special lengths, finishes or other design variations available on request

BODIES & WEDGES

Material:

Aluminum Alloy 6061-T6,
ASTM-B221

Finish:

See Part No. Code

SCREW

Material:

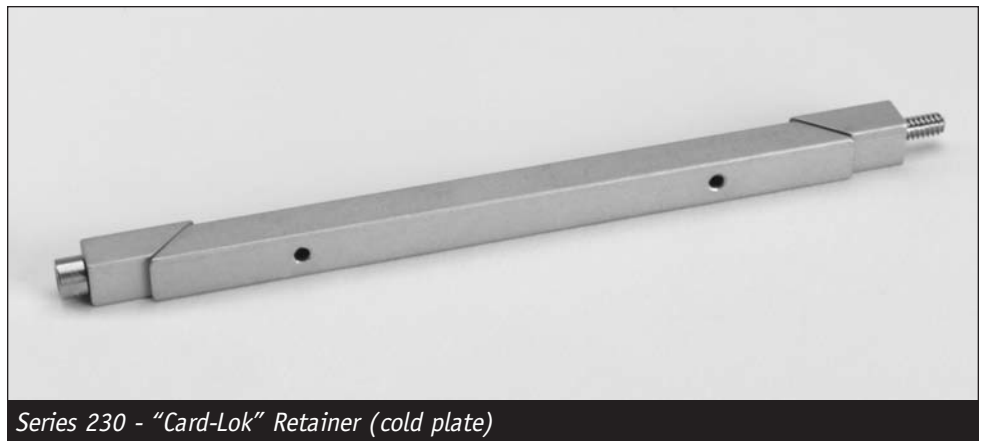
Stainless Steel
QQ-S-763 or ASTM-A582

Finish:

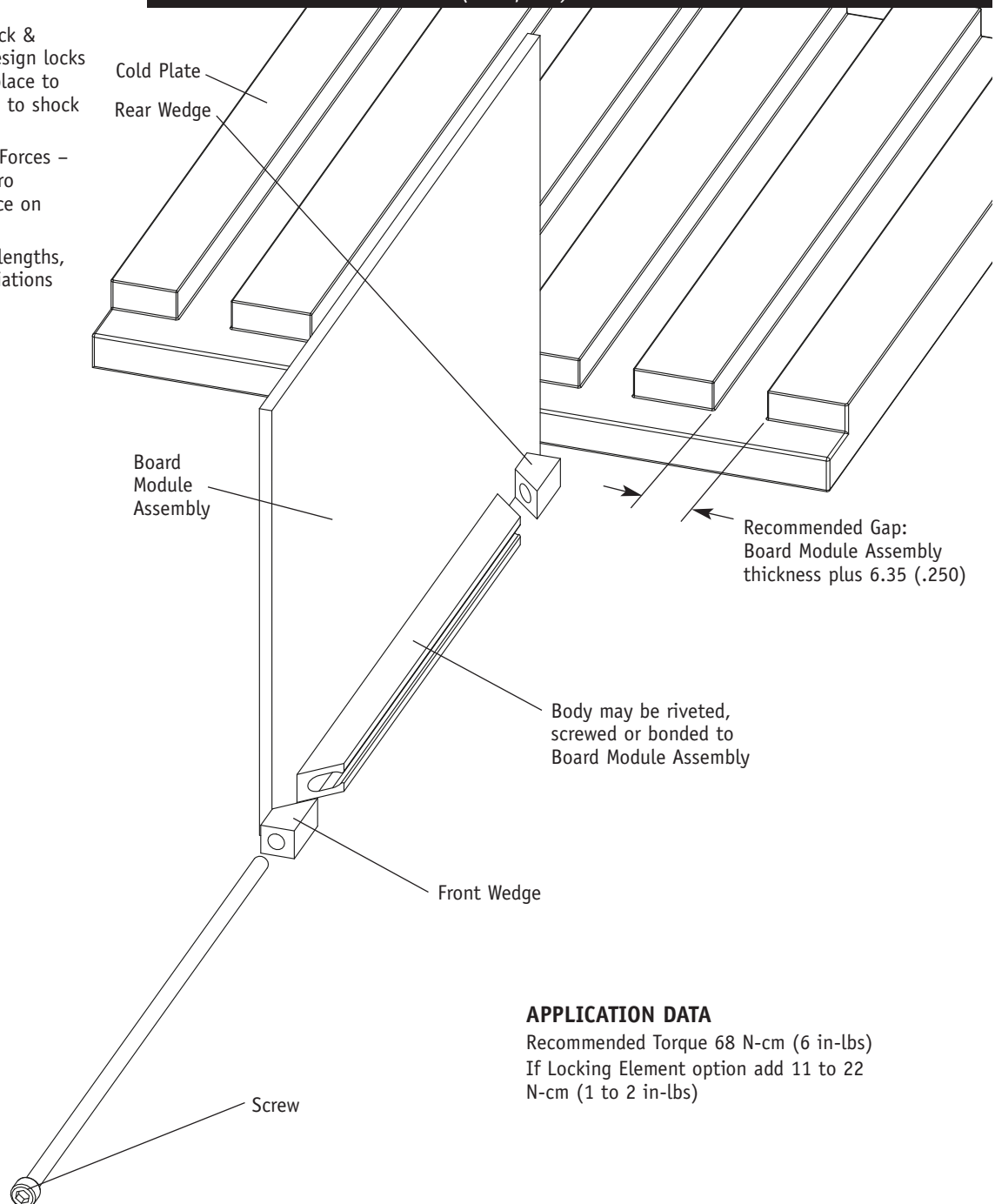
Passivate per MIL-S-5002

WEIGHT

1.34 g/cm (.120 oz/in)



Series 230 - "Card-Lok" Retainer (cold plate)



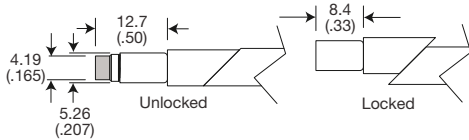
APPLICATION DATA

Recommended Torque 68 N-cm (6 in-lbs)
If Locking Element option add 11 to 22
N-cm (1 to 2 in-lbs)

OPTION PREFIX

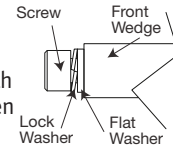
Detail "V"

Provides visual lock indication.



Detail "W"

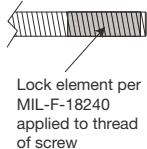
Provides added resistance to loosening from shock and vibration. This option adds no additional screw length unless included with "CR" then 1.5 (.06) or with "R" option, then 4 (.16) total.



OPTION SUFFIX

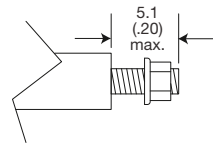
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.



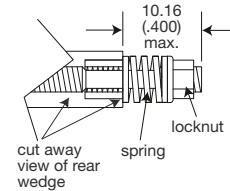
Detail "R"

Reduces the possibility of unintentional disassembly of the screw from rear wedge. This option adds no additional screw length unless included with "CR" then 2.5 (.10) or with "W" option, then 4 (.16) total.



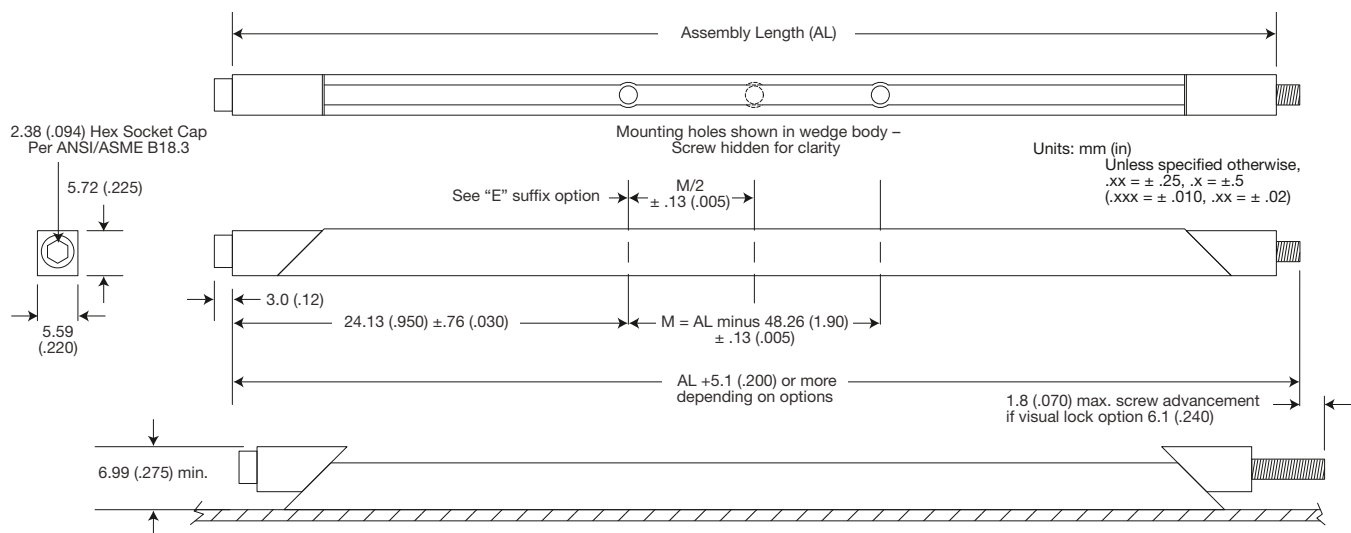
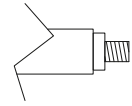
Detail "K"

Prevents the unintentional disassembly of screw from rear wedge. This option adds 5.1 (.20) to the screw length.



Detail "CR"

Includes a stainless steel captive nut on the rear wedge. If the "R" option is included with this "CR" option, then the locknut is also stainless steel.



Part Number Code Series 230 Card-Lok Three Piece

M	W	V	A	230	-	3.80	E	H	L	R
Prefix options Metric Screw Head M2.5 Hex Drive _____ M Standard Screw Head 3/32 Hex Drive [blank] Lock and Flat Washer _____ W None _____ [blank] Visual Indicator _____ V No Visual Indicator _____ [blank] Black Anodize _____ A or choose from Finish Table _____ <i>see table</i>										
Suffix options Stainless Steel Lock Nut if "R" option is selected _____ CR Standard Steel Lock Nut _____ "_" Assembly length in inches. Standard lengths range from 54.6 (2.15) to 329.9 (12.99) _____ length.xx Preferred lengths are 71.1 (2.80), 96.5 (3.80) and 121.9 (4.80) Other lengths available upon request Additional Center Mounting Hole _____ E None _____ [blank] Mounting Options - holes for rivet mounting or choose from Mounting Option Table _____ <i>see table</i> H Lock Element _____ L None _____ [blank] Lock Nut _____ R Captive Screw _____ K None _____ [blank]										

Part Number Code Example:

VA230CR4.80HR

Series 230 Card-Lok three piece 121.9 (4.80) long with visual indicator, black anodize finish, standard rivet mounting holes and stainless steel lock nut option.

FINISH TABLE

Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 1A, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE

Code Letter	Method
[blank]	No mounting holes
"H"	Rivet Mounting Ø1.70 (.067) hole with 3.96 (.156) counterbore x 4.19 (.165) deep and 100° x 3.56 (.140) countersink.
"T0"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the 5 piece Series 236 metric "Card-Lok" retainer for cold plate-heat exchanger applications. Closed shape segments provide maximum rigidity and resistance to distortion under load. Closed shape segments provide maximum rigidity and resistance to distortion under load. Dual front and rear threads accomplishes rapid clamp and release action. Enclosed springs maintain alignment of segments providing easy insertion.

FEATURES

- Closed shape segments provide maximum rigidity and resistance to distortion under load
- Dual threads provide rapid clamp and release action
- Enclosed springs maintain alignment of segments providing easy insertion
- Maximum resistance to shock and vibration
- Zero insertion and extraction forces
- Special lengths, finishes or other design variations available on request

WEDGES

Material:

Aluminum Alloy 6061-T6,
ASTM-B221

Finish:

See Part No. Code

SCREW

Material:

Stainless Steel
QQ-S-763 or ASTM-A582

Finish:

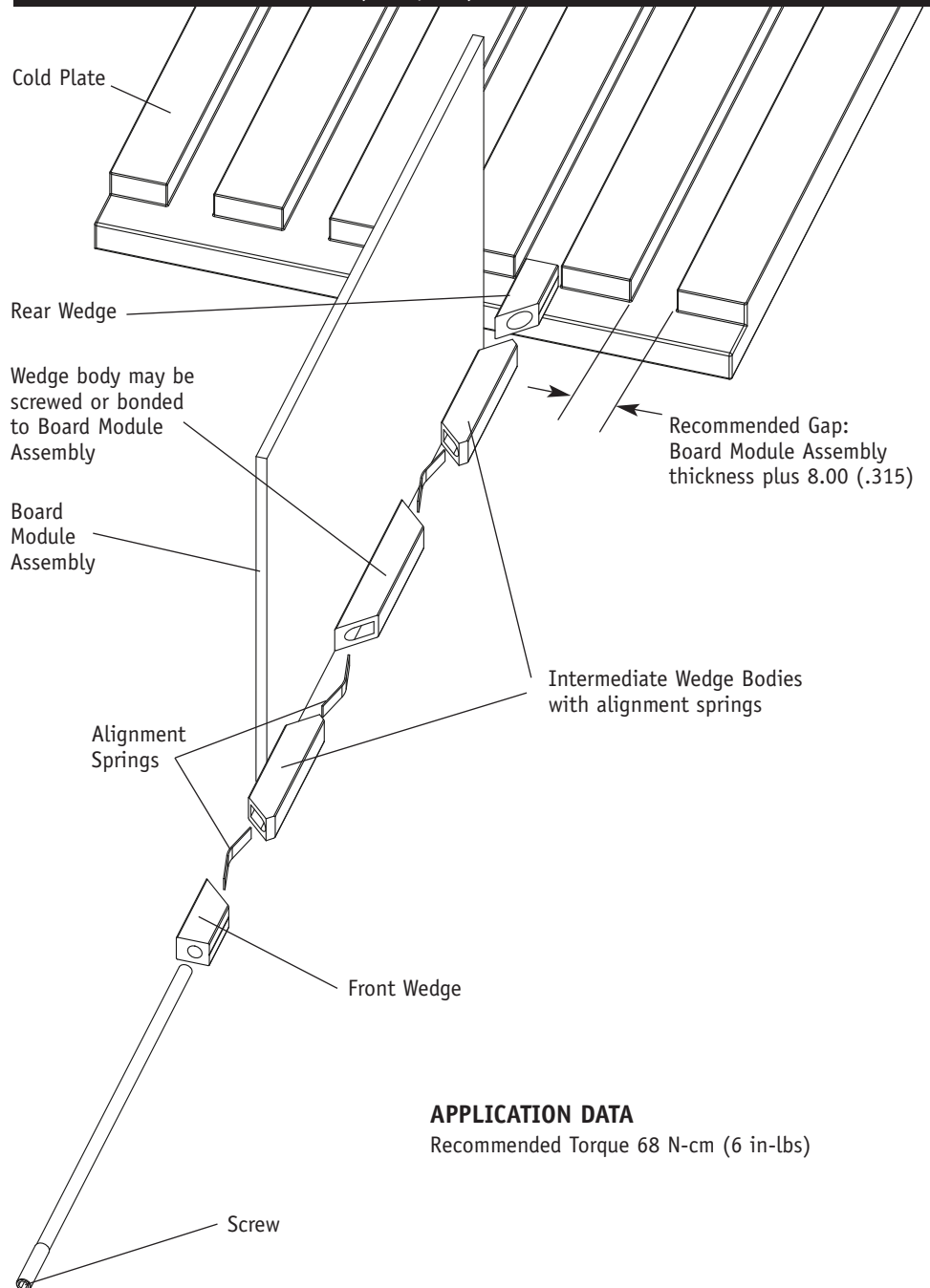
Passivate per MIL-S-5002

WEIGHT

1.34 g/cm (.120 oz/in)

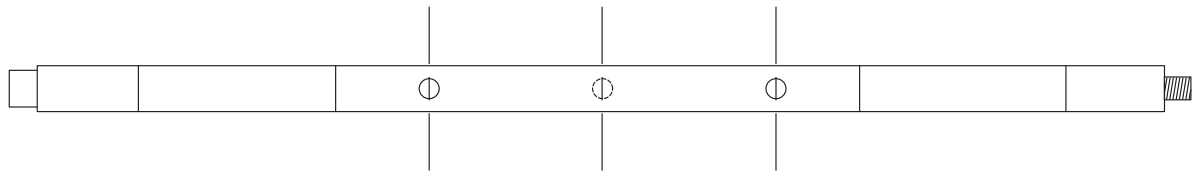
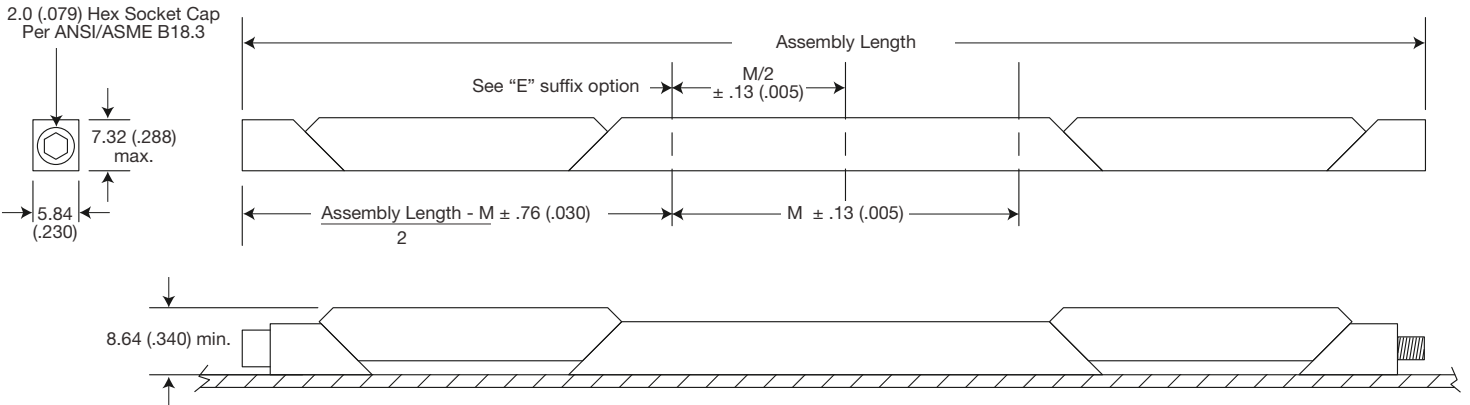


Series 236 - "Card-Lok" Retainer (cold plate)



APPLICATION DATA

Recommended Torque 68 N-cm (6 in-lbs)



Units: mm (in)
 Unless specified otherwise,
 .xx = ± .25, .x = ± .5
 (.xxx = ± .010, .xx = ± .02)

Part Number Code
Series 236 Card-Lok Five Piece

Prefix options

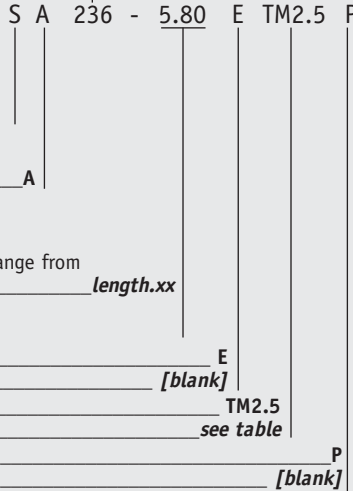
- Slotted Drive _____ S
- 2.5mm Hex Drive _____ X
- 2mm Hex Drive _____ [blank]

Finish options

- Black Anodize _____ A
- or choose from Finish Table

Suffix options

- Assembly lengths in inches. Standard lengths range from 121.9 (4.80) to 329.9 (12.99) _____ length.xx
- Preferred lengths are 4.80, 5.80 and 6.80
- Other lengths available upon request
- Additional Center Mounting Hole _____ E
- None _____ [blank]
- Mounting Options - M2.5 tapped hole _____ TM2.5
- or choose from Mounting Option Table _____ see table
- Locking Insert Option _____ P
- None _____ [blank]



Part Number Code Example:

XA236-2.80ETM2.5

Series 236 Card-Lok five piece, black anodized, 71.12 (2.80) assembly length, with three M2.5 tapped mounting holes and 2.5mm Hex Drive Screw Head.

FINISH TABLE

Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 1A, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE

Code Letter	Method
[blank]	No mounting holes
"T0"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the Series 240 "Card-Lok" retainer for cold plate-heat exchanger applications. A narrow configuration Board Module Assembly retainer that provides maximum heat sinking efficiency for high density card spacing.

FEATURES

- Narrow width allows minimum card spacing
- Positive locking provides maximum reliability
- Maximum thermal transfer
- Maximum resistance to shock and vibration
- Zero insertion and extraction forces
- Special lengths, finishes or other design variations available on request

BODY & WEDGES

Material:

Aluminum Alloy 6061-T6,
ASTM-B221

Finish:

See Part No. Code

SCREW

Material:

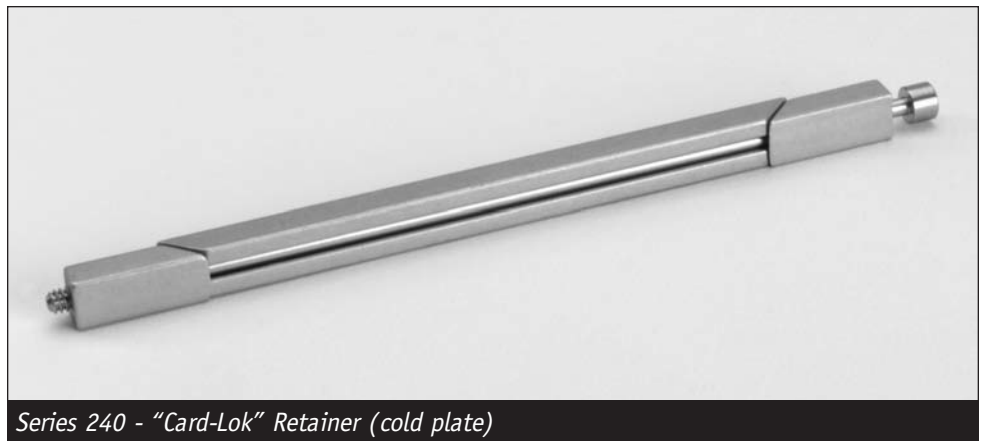
Stainless Steel
QQ-S-763 or ASTM-A582

Finish:

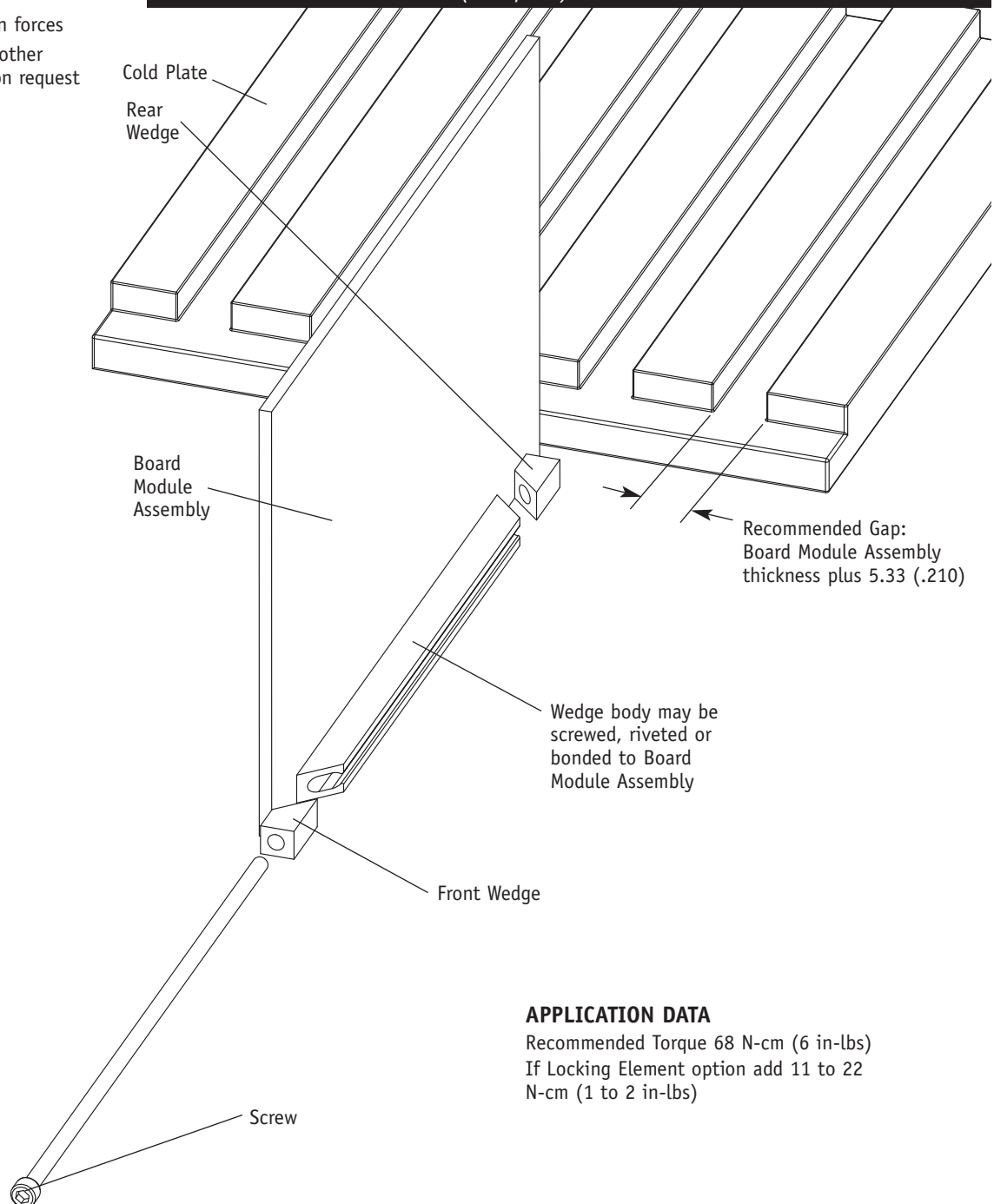
Passivate per MIL-S-5002

WEIGHT

.86 g/cm (.077 oz/in)



Series 240 - "Card-Lok" Retainer (cold plate)



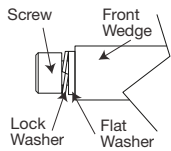
APPLICATION DATA

Recommended Torque 68 N-cm (6 in-lbs)
If Locking Element option add 11 to 22
N-cm (1 to 2 in-lbs)

OPTION PREFIX

Detail "W"

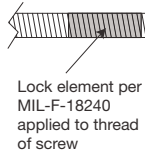
Provides added resistance to loosening from shock and vibration. This option adds 2.54 (.100) to the screw length when combined with the "R" option.



OPTION SUFFIX

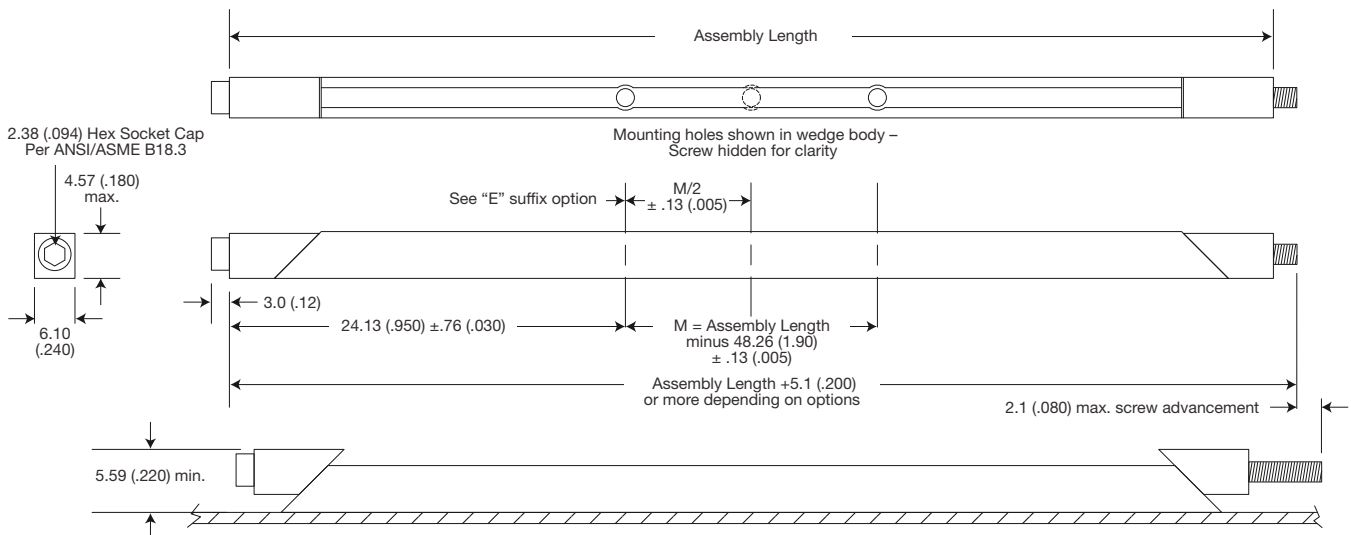
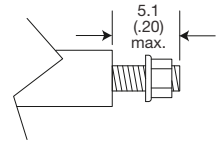
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.



Detail "R"

Reduces the possibility of unintentional disassembly of the screw from rear wedge. This option adds 2.54 (.100) to the screw length when combined with the "W" option.



Units: mm (in)
Unless specified otherwise,
.xx = ± .25, .x = ± .5
(.xxx = ± .010, .xx = ± .02)

Part Number Code

Series 240 Card-Lok Three Piece

Prefix options

Metric Screw Head M2.5 Hex Drive M
Standard Screw Head 3/32 Hex Drive [blank]
Lock and Flat Washer W
None [blank]
Black Anodize A
or choose from Finish Table see table

Suffix options

Stainless Steel Lock Nut if "R" option is selected CR
Standard Plated Steel Lock Nut "-"
Assembly length in inches. Standard lengths range from 54.6 (2.15) to 329.9 (12.99) length.xx
Preferred lengths are 71.1 (2.80), 96.5 (3.80) and 121.9 (4.80)
Other lengths available upon request
Additional Center Mounting Hole E
None [blank]
Mounting Options - holes for rivet mounting H
or choose from Mounting Option Table see table
Lock Element L
None [blank]
Lock Nut R
None [blank]

Part Number Code Example:

A240CR3.80EHLR

Series 240 three piece Card-Lok, black anodized finish, 96.52 (3.80) long, holes for rivet mounting including an extra center mounting hole, with locking element on the screw thread and a stainless steel locknut.

Code Letter	FINISH TABLE
[blank]	Chemical Film per Mil-C-5541 Class 1A, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

Code Letter	MOUNTING METHOD TABLE
[blank]	No mounting holes
"H"	Rivet Mounting Ø1.70 (.067) hole with 3.96 (.156) counterbore x 5.08 (.200) deep and 100° x 3.56 (.140) countersink.
"TO"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the Series 245 "Card-Lok" retainer for cold plate-heat exchanger applications. A maximum efficiency heat sinking Board Module Assembly retainer offered to retrofit the Series 225 but uses a 6-32 screw to provide greater clamping force and load capacity.

FEATURES

- Maximum Reliability – Screw-actuated wedge action locks Board Module Assembly in place
- Maximum Thermal Transfer – Wedge action design provides maximum contact between thermal paths on Board Module Assembly and the heat sinking surface
- Maximum Resistance to Shock & Vibration – Wedge action design locks Board Module Assembly in place to provide maximum resistance to shock and vibration
- Zero Insertion & Extraction Forces – Screw actuation provides zero insertion and extraction force on Board Module Assembly
- Design Flexibility – Special lengths, finishes or other design variations available on request

WEDGES

Material:

Aluminum Alloy 6061-T6,
ASTM-B221

Finish:

See Part No. Code

SCREW

Material:

Stainless Steel
QQ-S-763 or ASTM-A582

Finish:

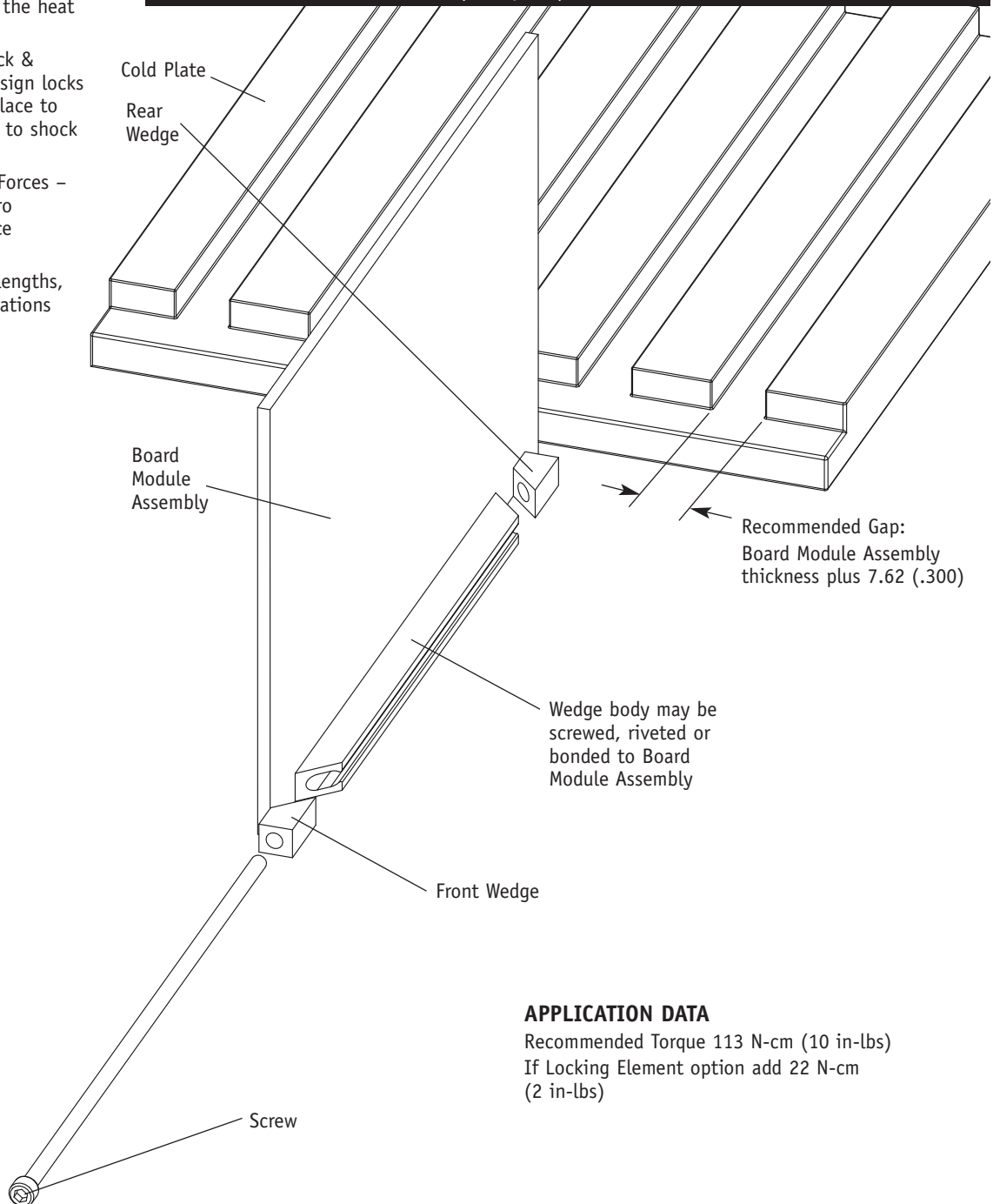
Passivate per MIL-S-5002

WEIGHT

1.77 g/cm (.159 oz/in)



Series 245 - "Card-Lok" Retainer (cold plate)



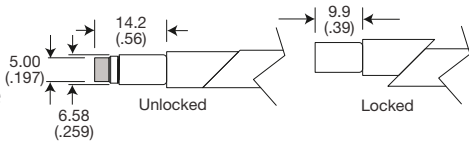
APPLICATION DATA

Recommended Torque 113 N-cm (10 in-lbs)
If Locking Element option add 22 N-cm
(2 in-lbs)

OPTION PREFIX

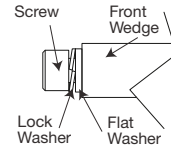
Detail "V"

Provides visual lock indication. Changes hex drive to 2.38 (.094).



Detail "W"

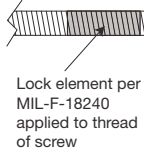
Provides added resistance to loosening from shock and vibration. This option adds 10.2 (.40) to the screw length when combined with the "R" suffix option.



OPTION SUFFIX

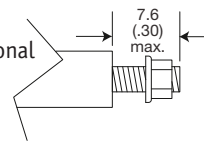
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.



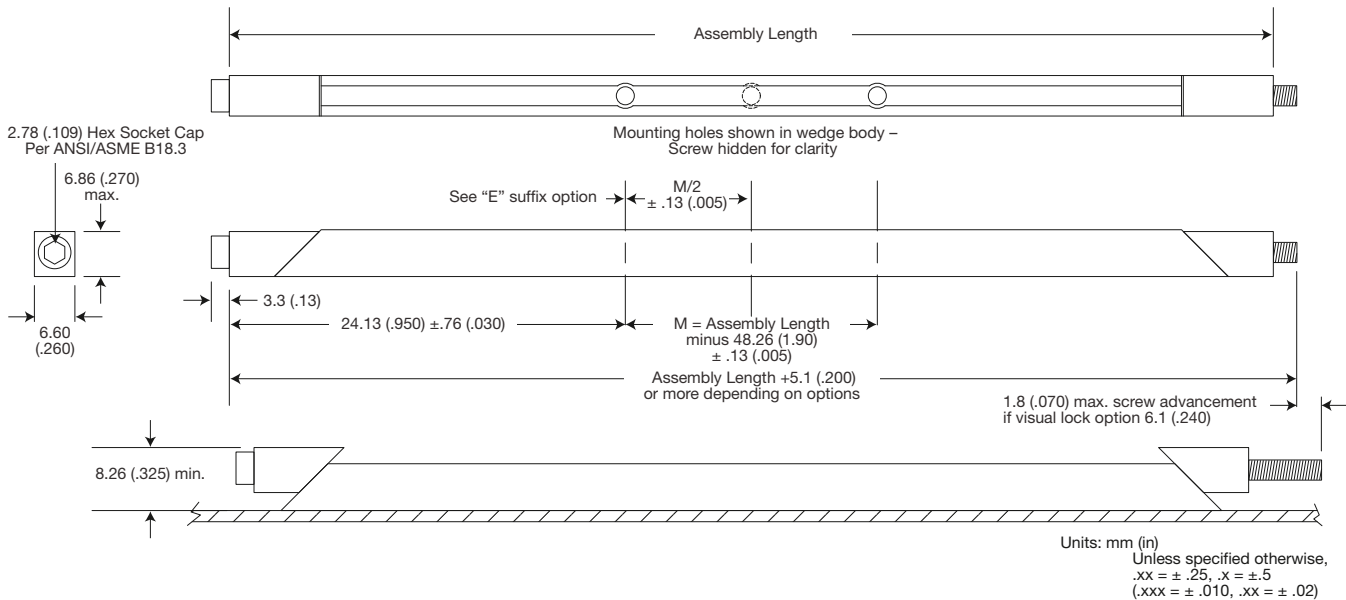
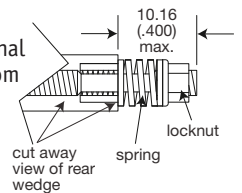
Detail "R"

Reduces the possibility of unintentional disassembly of the screw from rear wedge. This option adds 7.6 (.30) to the screw length unless when combined with the "W" suffix option, then it adds 10.2 (.40).



Detail "K"

Prevents the unintentional disassembly of screw from rear wedge. This option adds 5.08 (.200) to the screw length.



Part Number Code

Series 245 Card-Lok Three Piece

Prefix options

Metric Screw Head M2.5 M
 Standard Screw Head 7/64 [blank]
 Lock and Flat Washer W
 None [blank]
 Visual Indicator (changes hex drive to 3/32) V
 No Visual Indicator [blank]
 Black Anodize A
 or choose from Finish Table see table

Suffix options

Stainless Steel Lock Nut if "R" option is selected CR
 Standard Plated Steel "-"
 Assembly length in inches. Standard lengths range from 54.6 (2.15) to 329.9 (12.99) length.xx
 Preferred lengths are 71.1 (2.80), 96.5 (3.80) and 121.9 (4.80)
 Other lengths available upon request
 Additional Center Mounting Hole E
 None [blank]
 Mounting Options - holes for rivet mounting H
 or choose from Mounting Option Table see table
 Lock Element L
 None [blank]
 Lock Nut R
 Captive Screw K
 None [blank]

Part Number Code Example:

245-3.80H

Series 245 three piece Card-Lok, 96.52 (3.80) long, gold chemical film finish with holes for rivet mounting.

FINISH TABLE

Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 1A, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE

Code Letter	Method
[blank]	No mounting holes
"H"	Rivet Mounting Ø1.70 (.067) hole with 3.96 (.156) counterbore x 5.08 (.200) deep and 100° x 3.56 (.140) countersink.
"T0"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the Series 250 "Card-Lok" Retainer for cold plate-heat exchanger applications. A maximum efficiency heat sinking Board Module Assembly retainer offered to provide greater clamping force and load capacity for Board Module Assembly of greater weight and mass.

FEATURES

- Maximum Reliability – Screw-actuated wedge action locks Board Module Assembly in place
- Maximum Thermal Transfer – Wedge action design provides maximum contact between thermal paths on Board Module Assembly and the heat sinking surface
- Maximum Resistance to Shock & Vibration – Wedge action design locks Board Module Assembly in place to provide maximum resistance to shock and vibration
- Zero Insertion & Extraction Forces – Screw actuation provides zero insertion and extraction force on Board Module Assembly
- Design Flexibility – Special lengths, finishes or other design variations available on request

WEDGES

Material:

Aluminum Alloy 6061-T6,
ASTM-B221

Finish:

See Part No. Code

SCREW

Material:

Stainless Steel
QQ-S-763 or ASTM-A582

Finish:

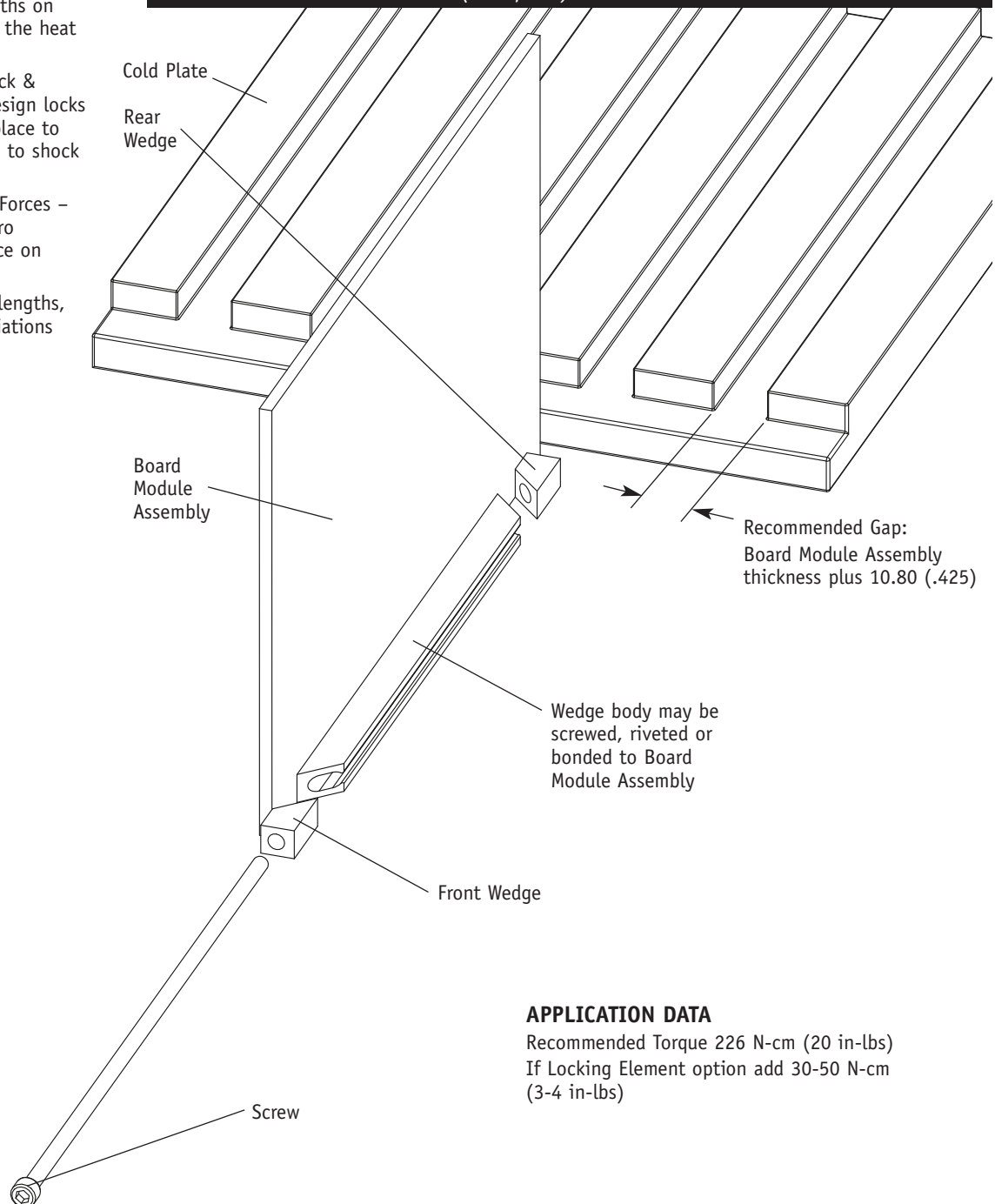
Passivate per MIL-S-5002

WEIGHT

3.63 g/cm (.325 oz/in)



Series 250 - "Card-Lok" Retainer (cold plate)



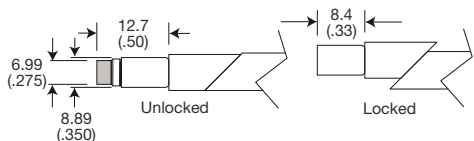
APPLICATION DATA

Recommended Torque 226 N-cm (20 in-lbs)
If Locking Element option add 30-50 N-cm
(3-4 in-lbs)

OPTION PREFIX

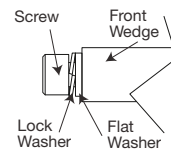
Detail "V"

Provides visual lock indication.



Detail "W"

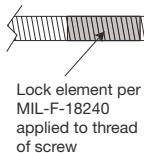
Provides added resistance to loosening from shock and vibration. This option adds 10.2 (.40) to the screw length when combined with the "R" suffix option.



OPTION SUFFIX

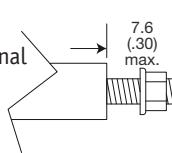
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.



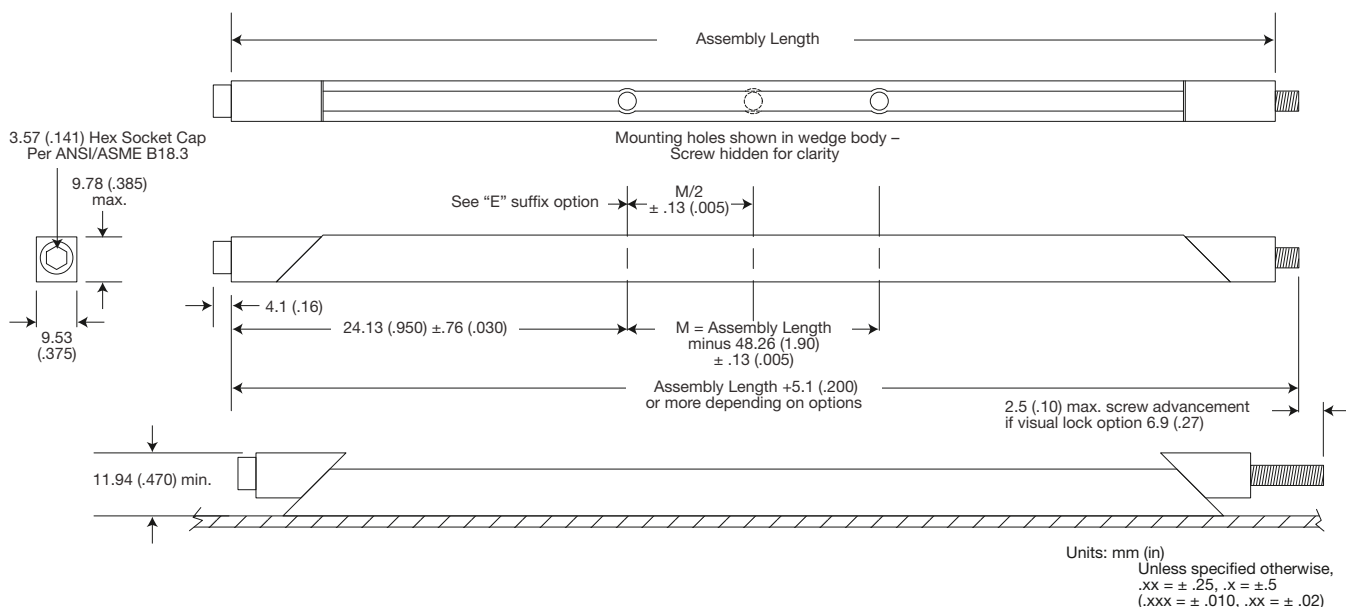
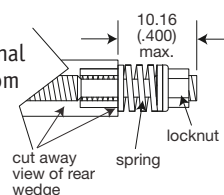
Detail "R"

Reduces the possibility of unintentional disassembly of the screw from rear wedge. This option adds 7.6 (.30) to the screw length unless when combined with the "W" suffix option, then it adds 10.2 (.40).



Detail "K"

Prevents the unintentional disassembly of screw from rear wedge. This option adds 5.08 (.200) to the screw length.



Part Number Code Series 250 Card-Lok Three Piece

Prefix options

Metric Screw Head M3 Hex Drive M
Standard Screw Head 9/64 Hex Drive [blank]
Lock and Flat Washer W
None [blank]
Visual Indicator V
No Visual Indicator [blank]
Black Anodize A
or choose from Finish Table see table

Suffix options

Stainless Steel Lock Nut if "R" option is selected CR
Standard Plated Steel Lock Nut "-"
Assembly length in inches. Standard lengths range from 54.6 (2.15) to 329.9 (12.99) length.xx
Preferred lengths are 71.1 (2.80), 96.5 (3.80) and 121.9 (4.80)
Other lengths available upon request
Additional Center Mounting Hole E
None [blank]
Mounting Options - holes for rivet mounting H
or choose from Mounting Option Table see table
Lock Element L
None [blank]
Lock Nut R
Captive Screw K
None [blank]

Part Number Code Example:

V250CR4.80HR

Series 250 Card-Lok three piece 121.9 (4.80) long with Visual Indicator, gold chemical film finish, standard rivet mounting hole and stainless steel lock nut option.

FINISH TABLE

Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 1A, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE

Code Letter	Method
[blank]	No mounting holes
"H"	Rivet Mounting Ø3.45 (.136) hole with 4.95 (.195) counterbore x 7.62 (.300) deep and 100° x 4.95 (.195) countersink.
"T0"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the Series 255 "Card-Lok" Retainer for cold plate-heat exchanger applications. A maximum efficiency heat sinking Board Module Assembly retainer offered to provide greater clamping force and load capacity for Board Module Assembly of greater weight and mass.

FEATURES

- Maximum Reliability – Screw-actuated wedge action locks Board Module Assembly in place
- Maximum Thermal Transfer – Wedge action design provides maximum contact between thermal paths on Board Module Assembly and the heat sinking surface
- Maximum Resistance to Shock & Vibration – Wedge action design locks Board Module Assembly in place to provide maximum resistance to shock and vibration
- Zero Insertion & Extraction Forces – Screw actuation provides zero insertion and extraction force on Board Module Assembly
- Design Flexibility – Special lengths, finishes or other design variations available on request

BODY & WEDGES

Material:

Aluminum Alloy 6061-T6,
ASTM-B221

Finish:

See Part No. Code

SCREW

Material:

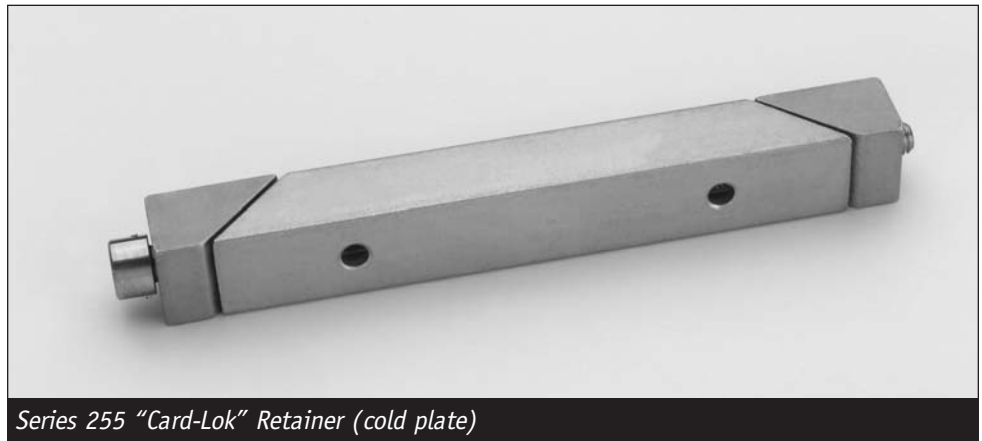
Stainless Steel
QQ-S-763 or ASTM-A582

Finish:

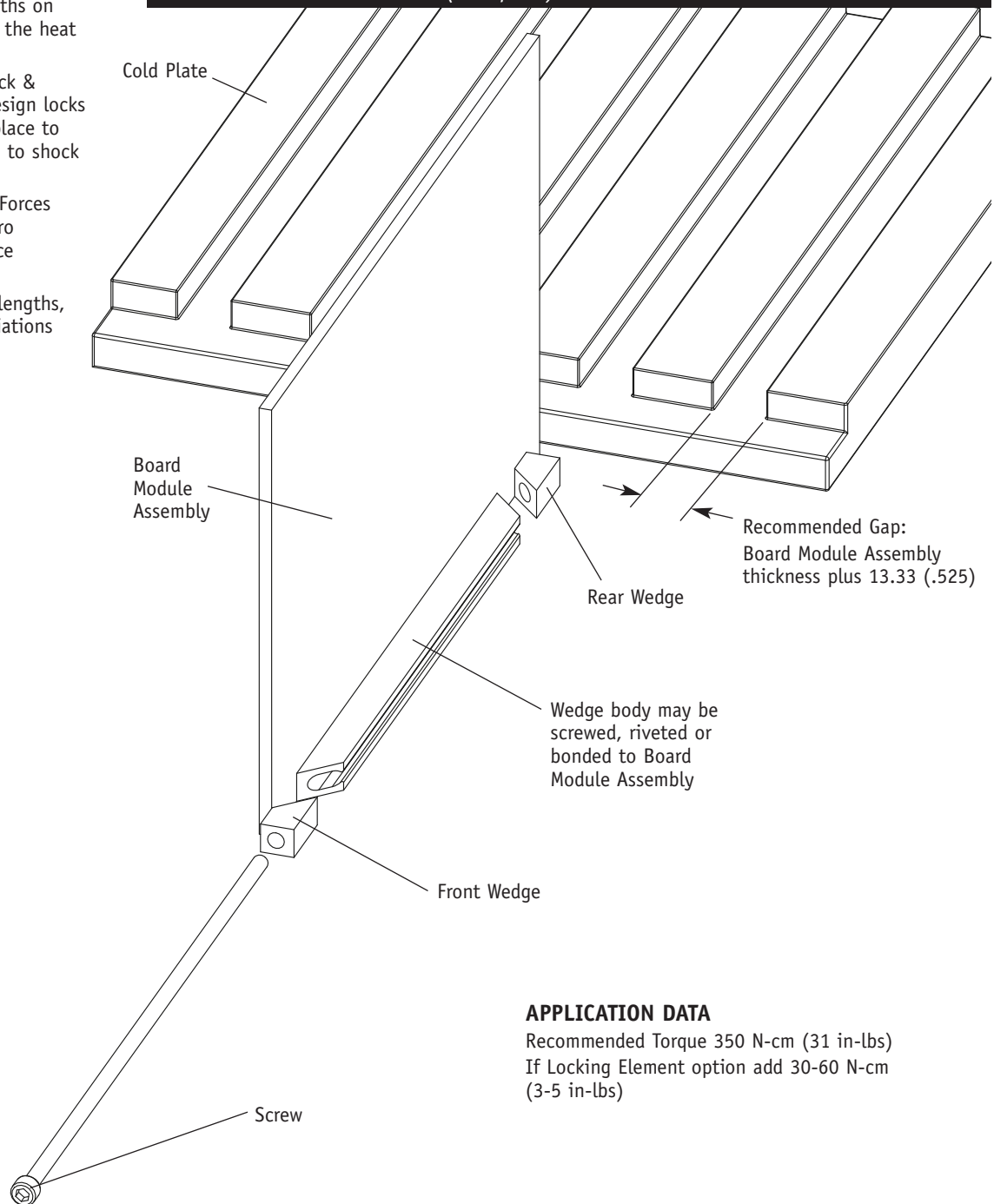
Passivate per MIL-S-5002

WEIGHT

4.74 g/cm (.425 oz/in)



Series 255 "Card-Lok" Retainer (cold plate)



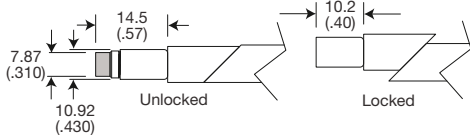
APPLICATION DATA

Recommended Torque 350 N-cm (31 in-lbs)
If Locking Element option add 30-60 N-cm
(3-5 in-lbs)

OPTION PREFIX

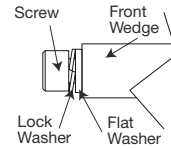
Detail "V"

Provides visual lock indication.



Detail "W"

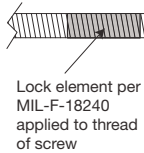
Provides added resistance to loosening from shock and vibration. This option adds 10.2 (.40) to the screw length when combined with the "R" suffix option.



OPTION SUFFIX

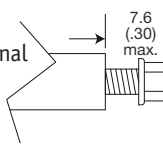
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.



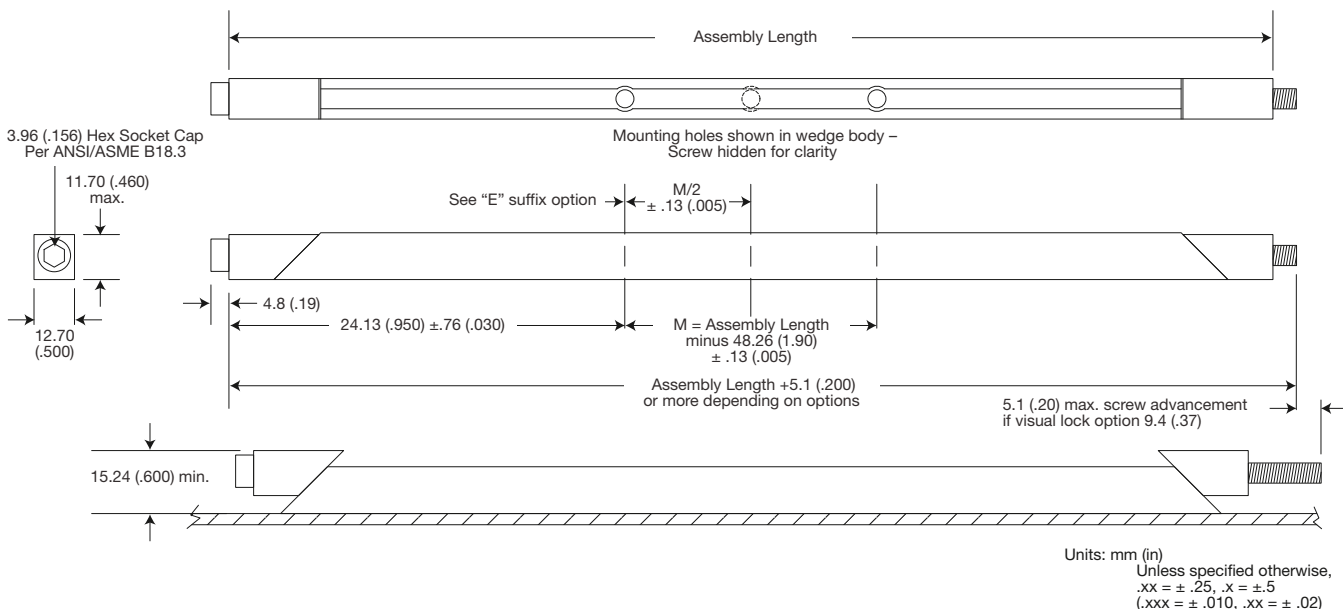
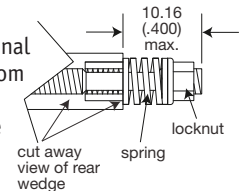
Detail "R"

Reduces the possibility of unintentional disassembly of the screw from rear wedge. This option adds 7.6 (.30) to the screw length unless when combined with the "W" suffix option, then it adds 10.2 (.40).



Detail "K"

Prevents the unintentional disassembly of screw from rear wedge. This option adds 5.08 (.200) to the screw length.



Units: mm (in)
Unless specified otherwise,
.xx = ± .25, .x = ± .5
(.xxx = ± .010, .xx = ± .02)

Part Number Code Series 255 Card-Lok Three Piece

Prefix options

Metric Screw Head M2.5 Hex Drive M
Standard Screw Head 5/32 Hex Drive [blank]
Lock and Flat Washer W
None [blank]
Visual Indicator V
No Visual Indicator [blank]
Black Anodize A
or choose from Finish Table see table

Suffix options

Stainless Steel Lock Nut if "R" option is selected CR
Standard Plated Steel Lock Nut "-"
Assembly length in inches. Standard lengths range from 54.6 (2.15) to 329.9 (12.99) length.xx
Preferred lengths are 71.1 (2.80), 96.5 (3.80) and 121.9 (4.80)
Other lengths available upon request
Additional Center Mounting Hole E
None [blank]
Mounting Options - holes for rivet mounting H
or choose from Mounting Option Table see table
Lock Element L
None [blank]
Lock Nut R
Captive Screw K
None [blank]

Part Number Code Example:

VA255CR4.80HR

Series 255 Card-Lok three piece 121.9 (4.80) long with Visual Indicator, black anodized finish, standard rivet mounting hole and stainless steel lock nut option.

FINISH TABLE

Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 1A, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE

Code Letter	Method
[blank]	No mounting holes
"H"	Rivet Mounting Ø3.45 (.136) hole with 4.95 (.195) counterbore x 7.62 (.300) deep and 100° x 4.95 (.195) countersink.
"T0"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the advance design Series 260 "Card-Lok" retainer for cold plate/heat exchanger applications. This totally unique design incorporates design advancements that provide increased thermal transfer, easy insertion and lighter weight. Conforms to DSCC 89024.

FEATURES

- Maximum uniform clamping force
- Increased thermal transfer
- Maintains wedge and body alignment for easy insertion
- Captivated rear wedge
- Choice of screw head style
- Dimensionally compatible with Series 225 & 245
- Lighter weight
- Special lengths, finishes or other design options available on request

WEDGES & SHAFT

Material:

Aluminum Alloy 6061-T6, ASTM-B221

Finish:

See Part Number Code

SCREW, LOCK & FLAT WASHER

Material:

300 Series Stainless Steel

Finish:

Passivate per Mil-S-5002

ROLL PIN

Material:

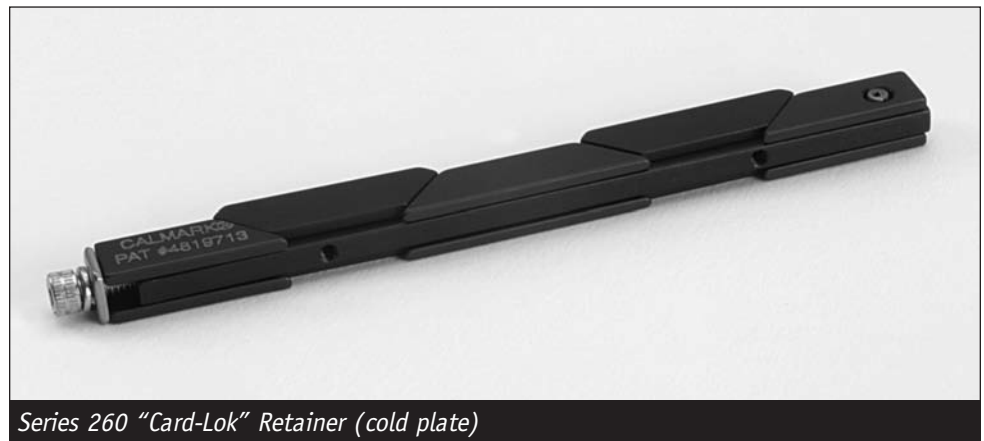
400 Series Stainless Steel

Finish:

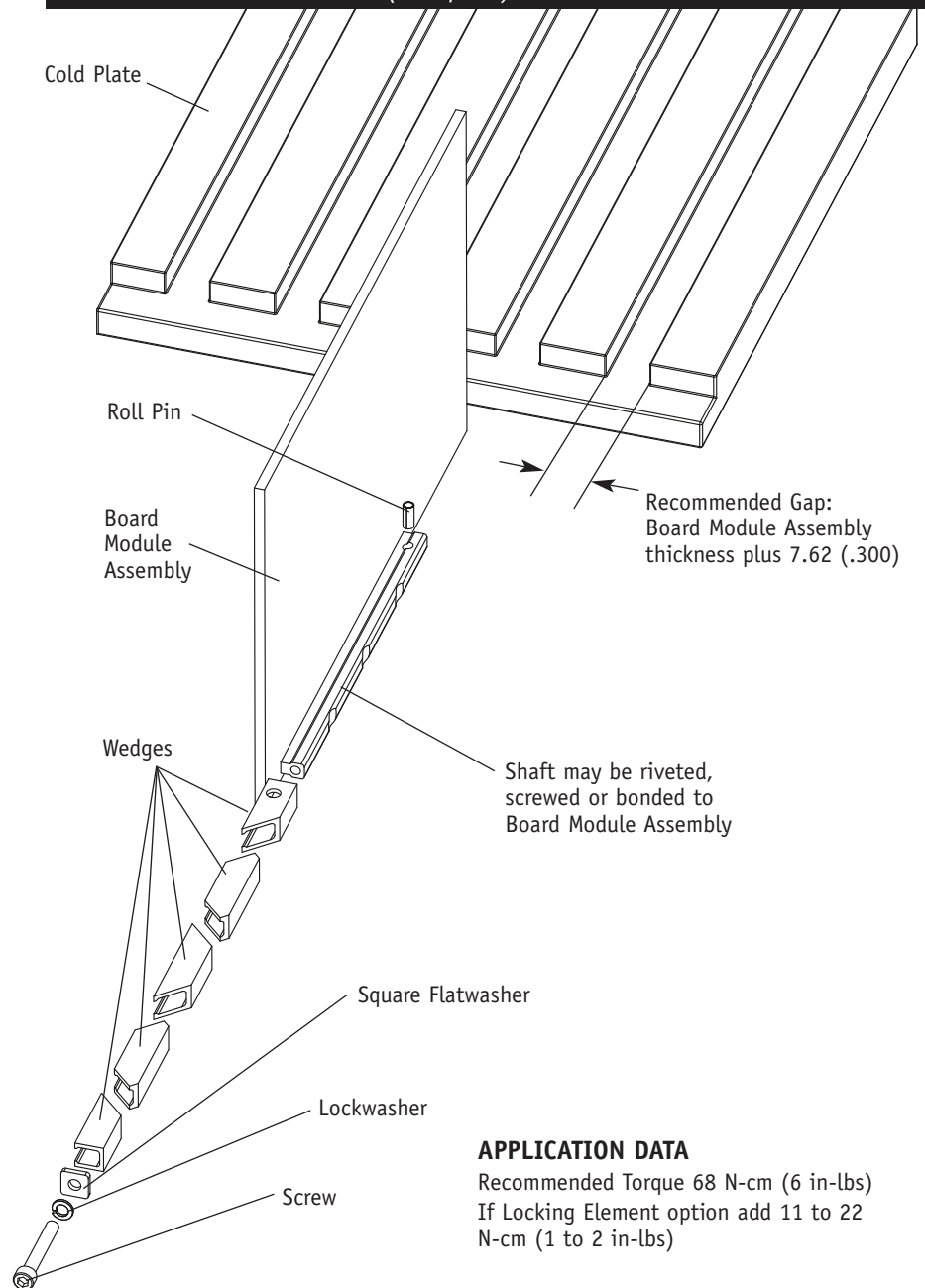
Passivate per Mil-S-5002

WEIGHT

.95 g/cm (.085 oz/in)



Series 260 "Card-Lok" Retainer (cold plate)



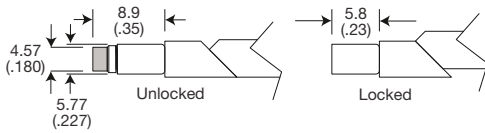
APPLICATION DATA

Recommended Torque 68 N-cm (6 in-lbs)
 If Locking Element option add 11 to 22
 N-cm (1 to 2 in-lbs)

OPTION PREFIX

Detail "V"

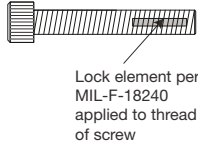
Provides visual lock indication.



OPTION SUFFIX

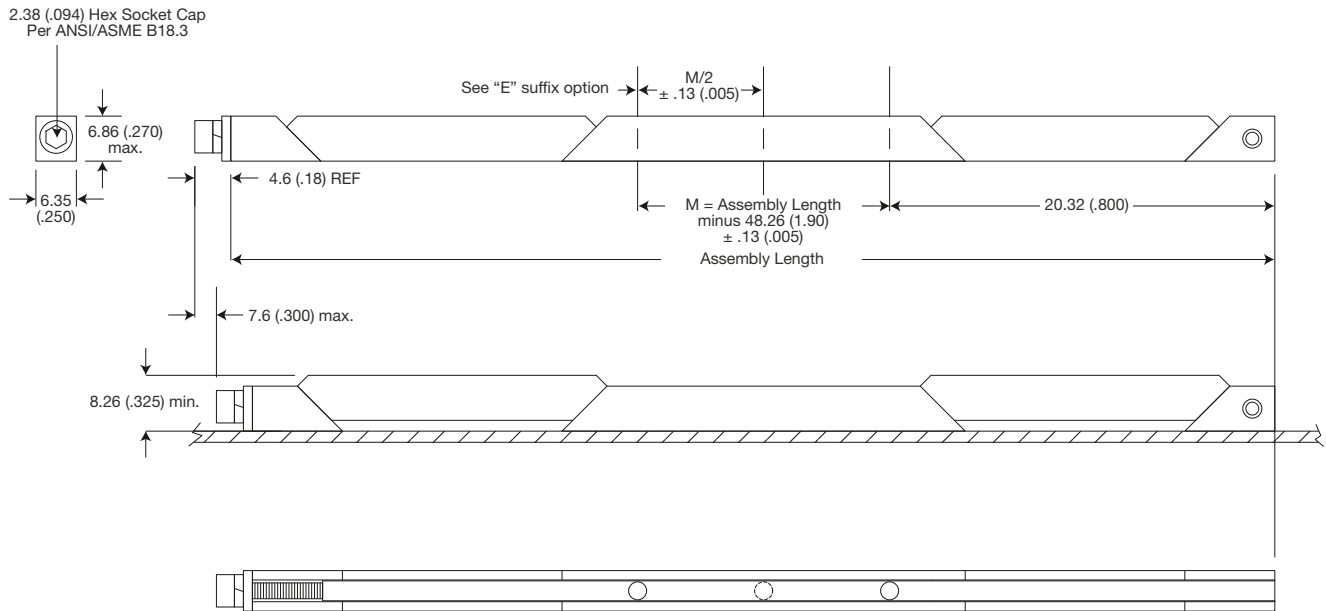
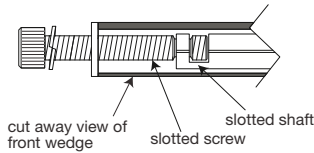
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.



Detail "K"

Prevents the unintentional disassembly of screw from front wedge.



Units: mm (in)
Unless specified otherwise,
.xx = ± .25, .x = ± .5
(.xxx = ± .010, .xx = ± .02)

Part Number Code Series 260 Card-Lok Five Piece

Prefix options

Metric Screw Head M2.5 Hex Drive M
Standard Screw Head 3/32 Hex Drive [blank]
Visual Indicator V
No Visual Indicator [blank]
Black Anodize A
or choose from Finish Table see table

Suffix options

Assembly length from 54.6 (2.15) to 329.9 (12.99) length.xx
Preferred lengths are 71.12 (2.80), 96.52 (3.80) and 121.9 (4.80)
Other lengths available upon request
Additional Center Mounting Hole E
None [blank]
Mounting Options - through mounting holes H
or choose from Mounting Option Table see table
Lock Element L
None [blank]
Captive Screw K
None [blank]

Part Number Code Example:

MVA260-3.80ET2LK

Series 260 Card-Lok five piece 96.52 (3.80) long black anodized with M2.5 hex drive, visual indicator, three mounting holes tapped for 2-56 thread, locking element and captive screw feature.

Code

Letter Finish

Code	Finish
[blank]	Chemical Film per Mil-C-5541 Class 3, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

Code

Letter Method

Code	Method
"H"	Ø1.73/1.85 (.068/.073) dia. through holes countersink 100° x 1.50 (.060) deep
"TO"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the Series L260 Lever-Lok "Card-Lok" retainer for cold plate/heat exchanger applications. This totally unique design provides tool free, lever action locking on the advance design Series 260 Card-Lok. The Series L260 provides visual indication of accurate, repeatable locking to a preset clamping force.

FEATURES

- Tool free actuation
- Visual indication of locked or unlocked status
- Preset and adjustable clamping force
- Clamping force consistently repeated
- Maintained wedge and body alignment for easy installation
- Special lengths, finishes, or other design options available on request

MATERIALS & FINISHES

WEDGES, SHAFT AND LEVER

Material:

Aluminum Alloy 6061-T6, ASTM-B221

Finish:

Wedge & Shaft: Black Anodize per Mil-A-8625 Type II, Class 2

Wedges: also have Dry Film Lube per Mil-L-46010 Type 1

Lever: Hard Black anodize per Mil-A-8625 Type III, Class 2

ADJUSTMENT SCREW

Material:

Stainless Steel per ASTM-A582\QQ-S-763

Finish:

Passivate per Mil-S-5002

Locking element per Mil-F-18240

HARDWARE

Material:

Front Washer: MPlF Standard 25

Rear Washer: ASTM-A240

Spring Washers: ASTM-A266

Finish:

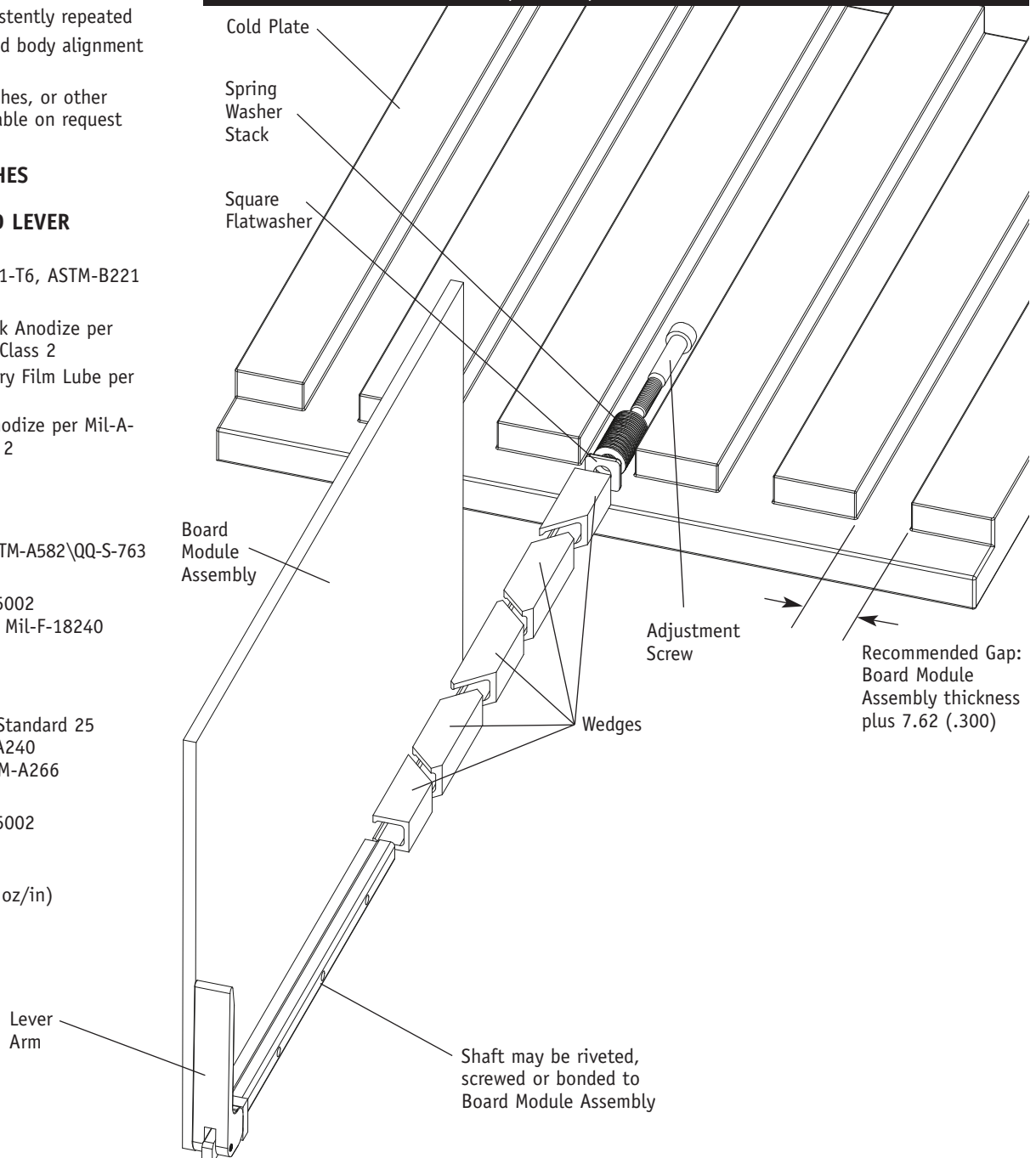
Passivate per Mil-S-5002

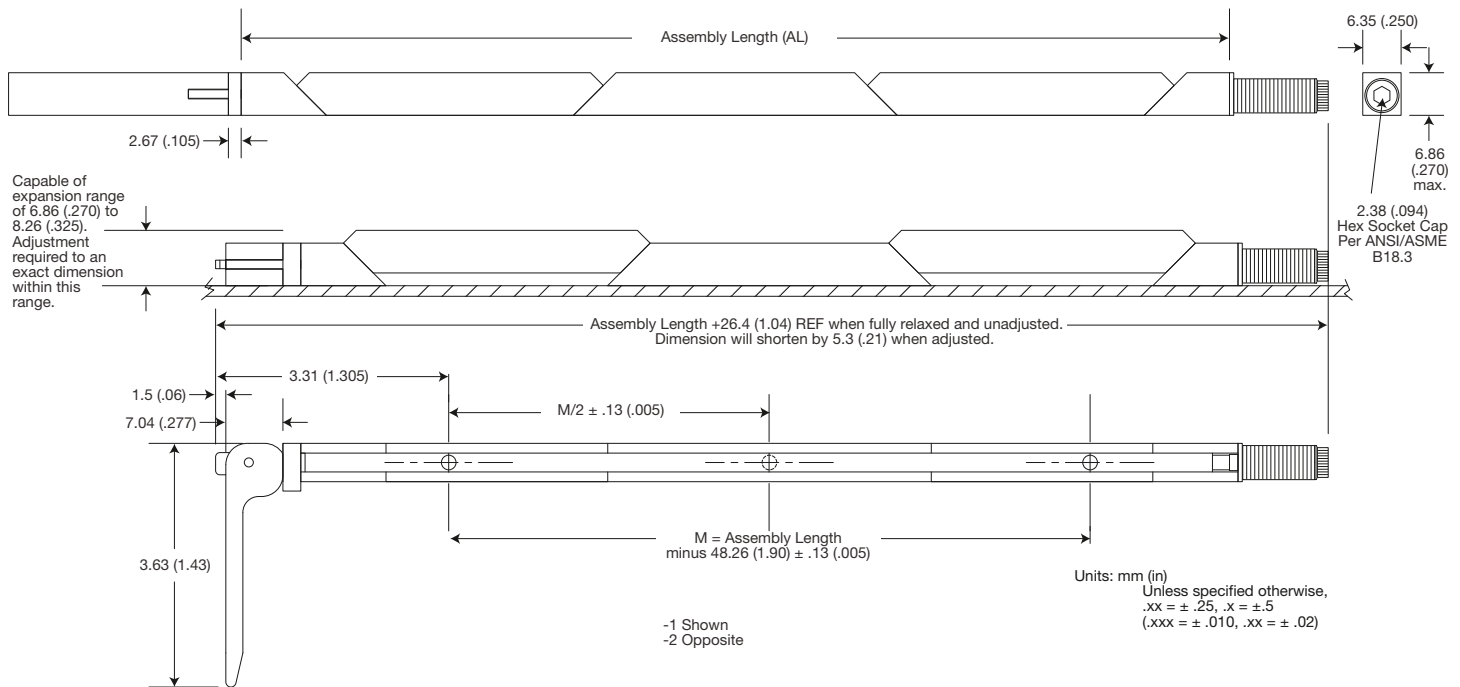
WEIGHT

1.17 g/cm (.105 oz/in)



Series L260 "Card-Lok" Retainer (lever-lok)





CLAMPING FORCE ADJUSTMENT PROCEDURE

Lever-Lok is furnished unadjusted and will require the use of the following procedure to achieve proper clamping.

NOTE: Factory preset adjustment available on request.

(See part number code)

1. Fasten Lever-Lok to Board Module Assembly
2. Insert Board Module Assembly into slot in cold plate
3. Actuate lever to locked/closed position
4. Tighten screw on end of shaft until wedges initially contact wall of cold plate slot, or slight insertion extraction drag is felt
5. Additionally tighten locknut 2 full turns. DO NOT EXCEED TWO (2) TURNS
6. Lever-Lok is now ready to use

CLAMPING FORCE DATA

Direct force of assembly is approximately 556N (125lbs), when adjusted per recommended procedure.

Direct force of assembly is affected approximately as follows:

26.7N (6lbs) per each .025 (.001) variation of cold plate slot width, or 169N (38lbs) per each full turn of screw.

Part Number Code

Series L260 Card-Lok Five Piece

L260 - 3.80 TM2 -1 P

Suffix options

Assembly length from 2.50 (63.5) to 12.99 (329.9) length.xx

Preferred lengths are 71.12 (2.80), 96.52 (3.80) and 121.9 (4.80)

Other lengths available upon request

Mounting Options - M2 x 0.40 tapped holes TM2
or choose from Mounting Option Table see table

Lever Direction -1

-2

Factory Preset clamping force when expanded to 7.63 (.300)

556N (125lbs) P

645N (145lbs) P1

None [blank]

Part Number Code Example:

L260-3.80TM2-1

Series L260 five piece lever actuated Card-Lok 96.52 (3.80) long with black anodized finish, -1 lever direction and no factory preset clamping load.

MOUNTING METHOD TABLE

Code Letter	Method
[blank]	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the Series LE260 Extracting/Lever-Lok ("Card-Lok") retainer for cold plate/heat-exchanger applications. This totally unique design provides the significant feature of Board Module Assembly extraction in addition to tool free lever action locking. The Series LE260 provides visual indication of accurate, repeatable locking to a preset clamping force.

FEATURES

- Safe and easy Board Module Assembly extraction with 4:1 mechanical advantage
- Tool free actuation
- Visual indication of locked or unlocked status
- Preset and adjustable clamping force
- Maintained wedge and body alignment for easy installation
- Special lengths, finishes, or other design options available on request

MATERIALS & FINISHES

WEDGES, SHAFT AND LEVER

Material:

Aluminum Alloy 6061-T6, ASTM-B221

Finish:

Wedge & Shaft: Black Anodize per Mil-A-8625 Type II, Class 2

Wedges: also have Dry Film Lube per Mil-L-46010 Type 1

Lever: Hard Black anodize per Mil-A-8625 Type III, Class 2

ADJUSTMENT SCREW

Material:

Stainless Steel per ASTM-A582\QQ-S-763

Finish:

Passivate per Mil-S-5002

Locking element per Mil-F-18240

HARDWARE

Material:

Front Washer: MPIF Standard 25

Rear Washer: ASTM-A240

Spring Washers: ASTM-A266

Finish:

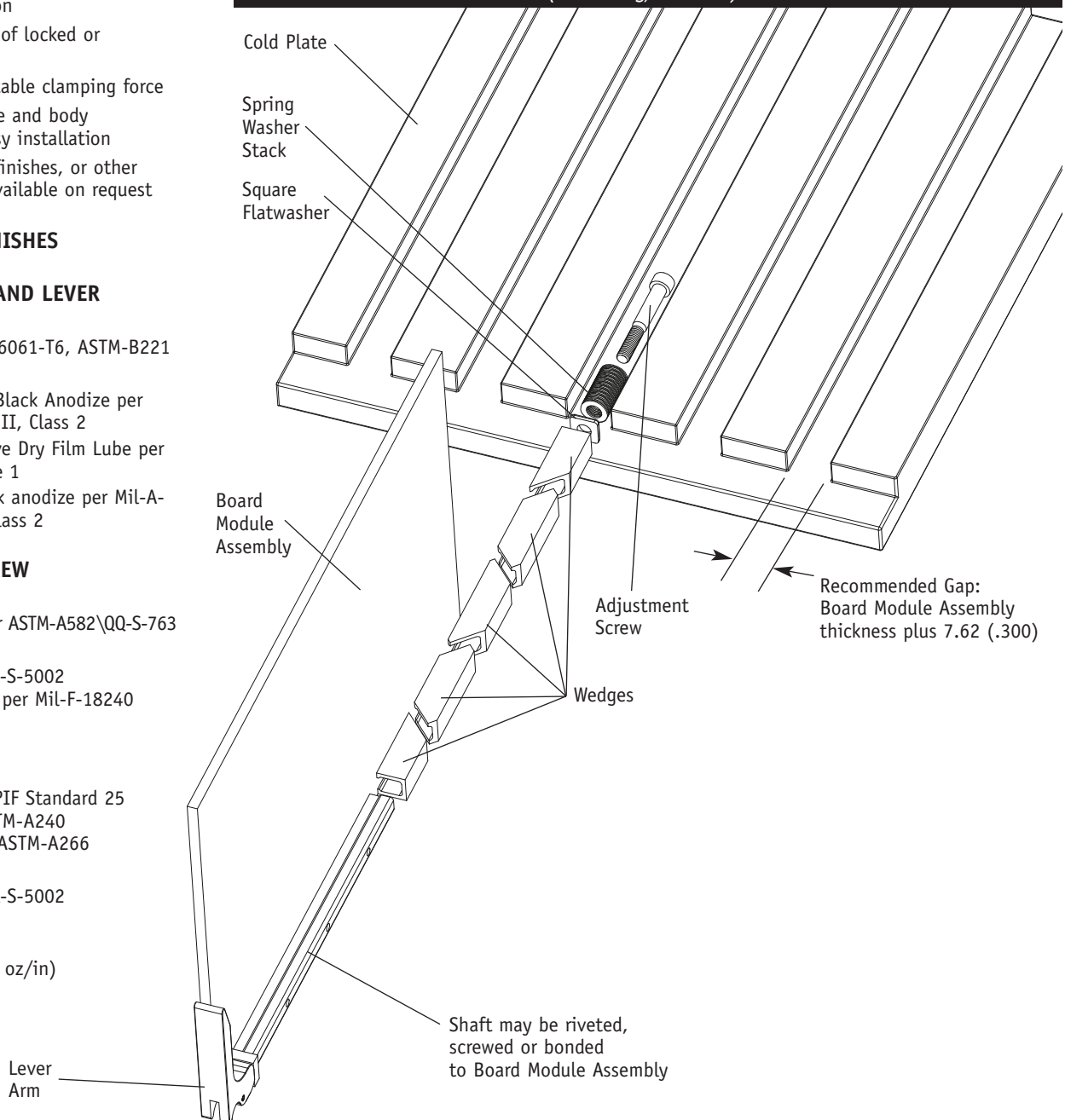
Passivate per Mil-S-5002

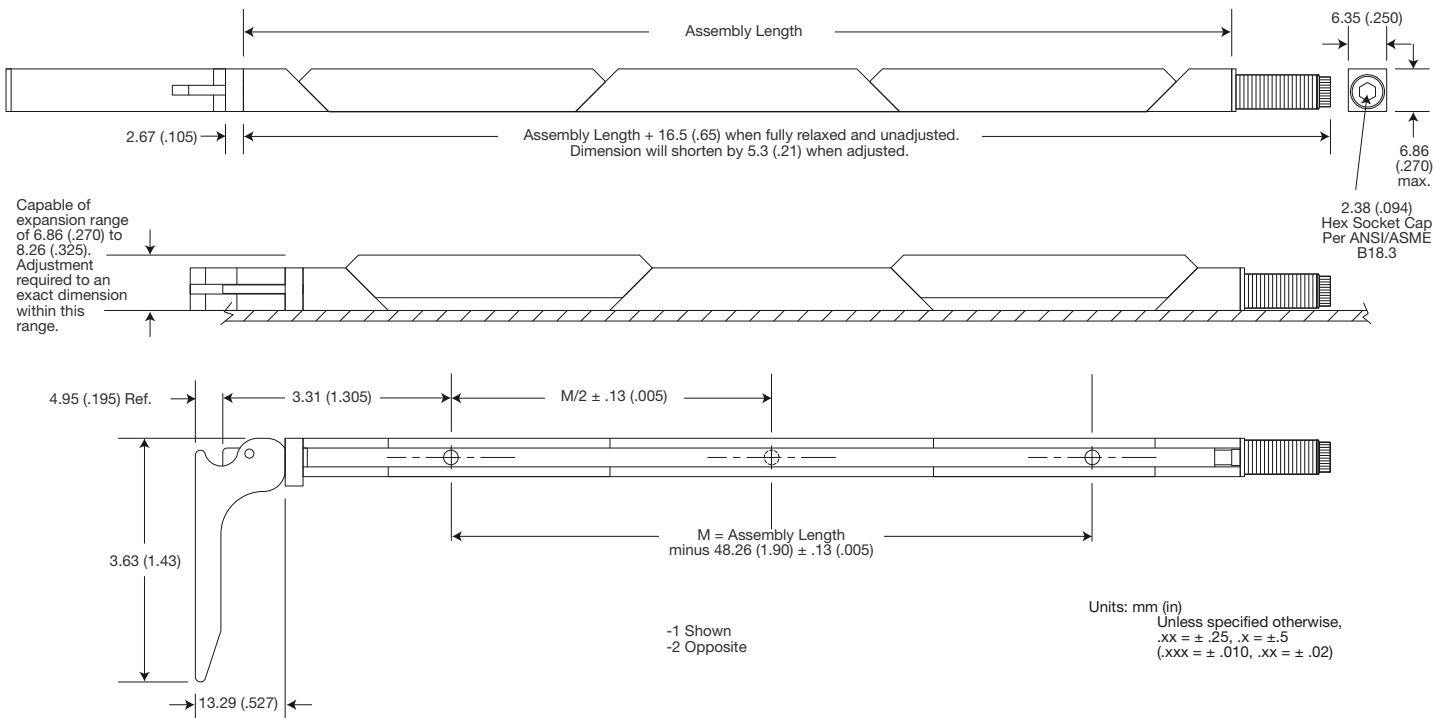
WEIGHT

1.17 g/cm (.105 oz/in)



Series LE260 "Card-Lok" Retainer (extracting/lever-lok)





CLAMPING FORCE ADJUSTMENT PROCEDURE

Lever-Lok furnished assembled with spring stack preloaded but not adjusted.

1. Fasten Lever-Lok to Board Module Assembly
2. Insert Board Module Assembly into slot in cold plate
3. Actuate lever to locked/closed position
4. Tighten screw on end of shaft until wedges initially contact wall of cold plate slot, or slight insertion extraction drag is felt
5. Additionally tighten locknut two full turns. **DO NOT EXCEED TWO (2) TURNS.**
6. Lever-Lok is now ready to use

NOTE: Factory adjustment of clamping force available on request. See part number code.

CLAMPING FORCE DATA

Direct force of assembly is approximately 556N (125lbs), when adjusted per recommended procedure.

Direct force of assembly is affected approximately as follows:
26.7N (6lbs) per each .025 (.001) variation of cold plate slot width, or 169N (38lbs) per each full turn of screw.

Part Number Code

Series LE260 Card-Lok Five Piece

LE260 - 3.80 TO -1 P

Suffix options

Assembly length from 2.50 (63.5) to 12.99 (329.9) length.xx
Preferred lengths are 71.12 (2.80), 96.52 (3.80) and 121.9 (4.80)
Other lengths available upon request

Mounting Options - 0-80 tapped holes TO
or choose from Mounting Option Table see table

Lever Direction -1
-2

Factory Preset clamping force when expanded to 7.62 (.300)

556N (125lbs) P
645N (145lbs) P1
None [blank]

Part Number Code Example:

LE260-2.80TM2-1P1

Series LE260 five piece lever actuated Card-Lok with extractor feature, 71.12 (2.80) long with M2 x .40 tapped mounting holes, -1 lever direction and factory preset for 645N (145lbs) clamping force when expanded to .300 DIM.

MOUNTING METHOD TABLE

Code Letter	Method
[blank]	2-56 tapped hole
"TO"	0-80 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the Series 263 "Card-Lok" Retainer for cold-plate, heat exchanger applications. This "Card-Lok" configuration offers a larger cross sectional profile for increased clamping force and thermal transfer.

FEATURES

- Maximum uniform clamping force
- Increased thermal transfer
- Maintains wedge and body alignment for easy insertion
- Captivated rear wedge
- Choice of screw head style
- Lighter weight
- Lower cost – Faster delivery
- Special lengths, finishes or other design options available on request

WEDGES & SHAFT

Material:

Aluminum Alloy 6061-T6, ASTM-B221

Finish:

See Part Number Code

SCREW, LOCK & FLAT WASHER

Material:

300 Series Stainless Steel

Finish:

Passivate per Mil-S-5002

ROLL PIN

Material:

400 Series Stainless Steel

Finish:

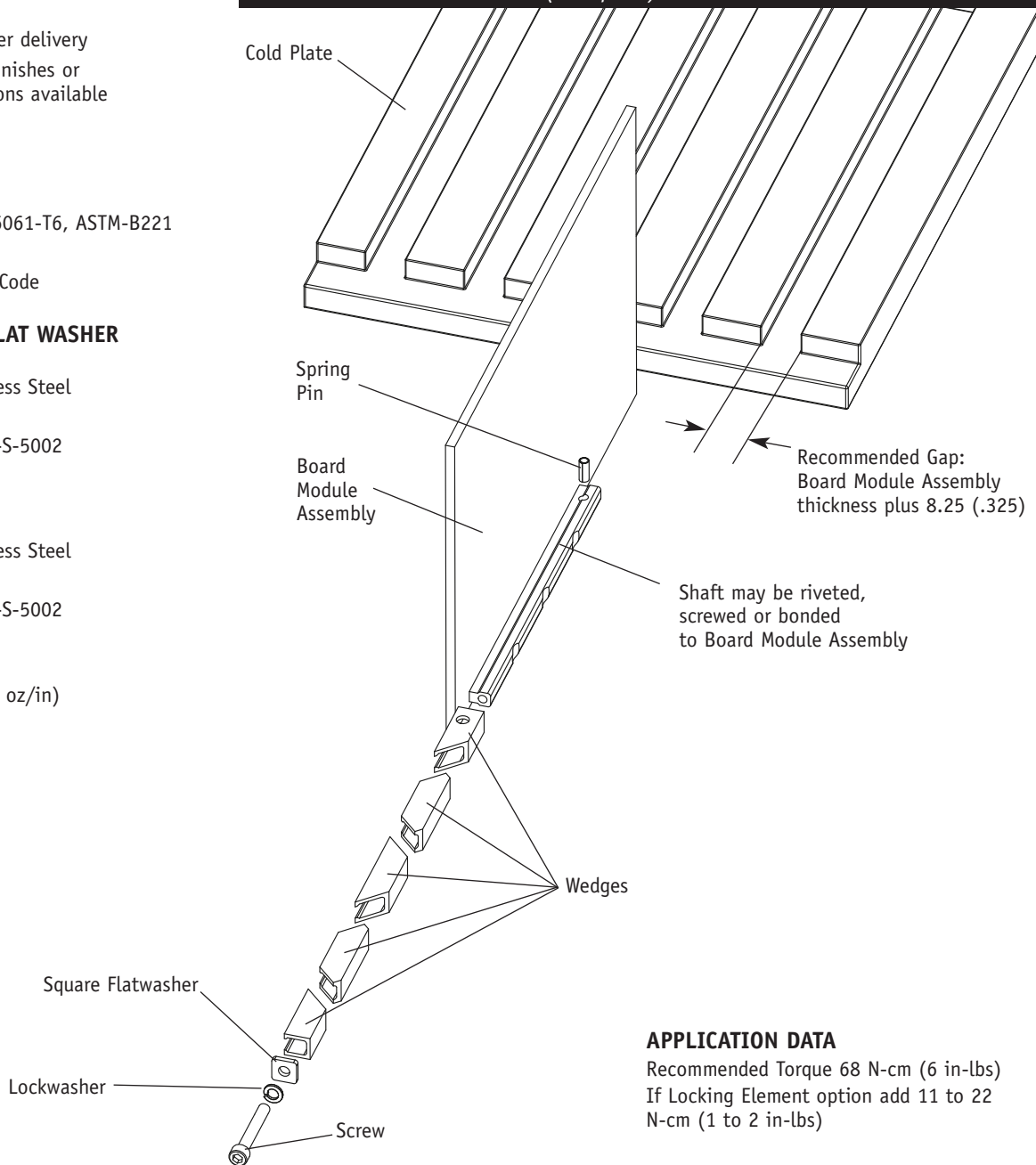
Passivate per Mil-S-5002

WEIGHT

1.07 g/cm (.096 oz/in)



Series 263 "Card-Lok" Retainer (cold plate)



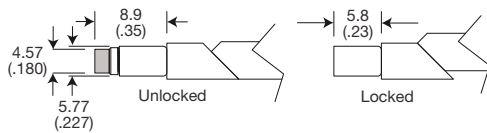
APPLICATION DATA

Recommended Torque 68 N-cm (6 in-lbs)
 If Locking Element option add 11 to 22
 N-cm (1 to 2 in-lbs)

OPTION PREFIX

Detail "V"

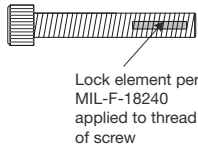
Provides visual lock indication.



OPTION SUFFIX

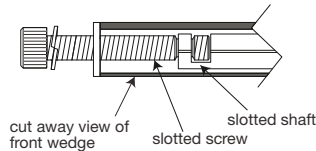
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.

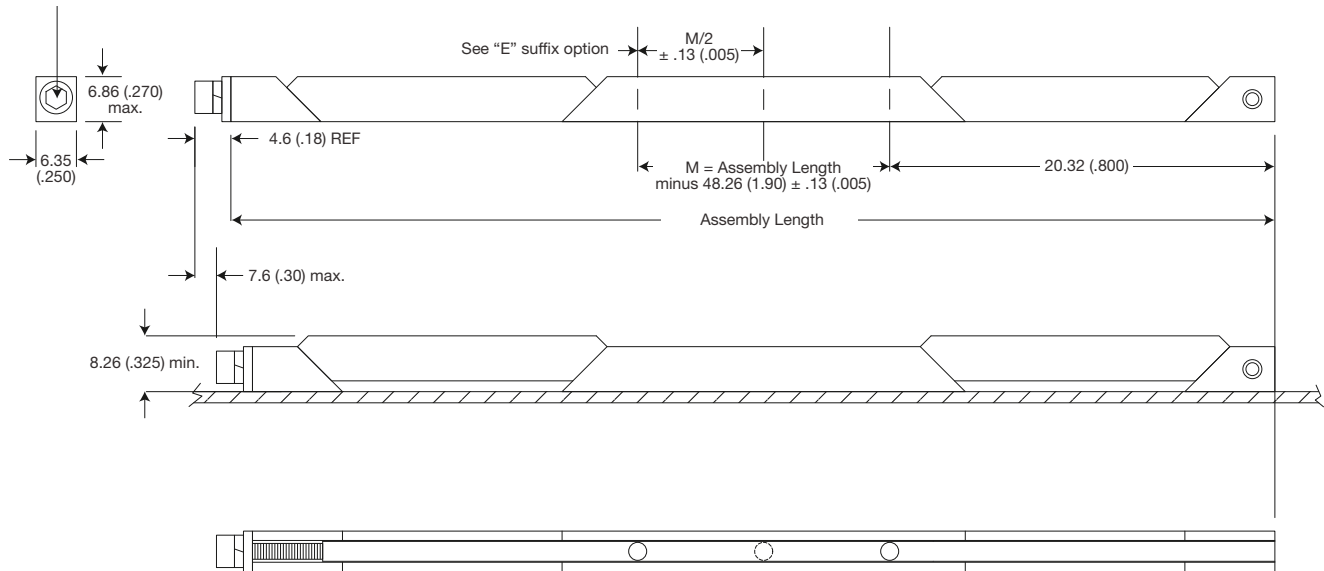


Detail "K"

Prevents the unintentional disassembly of screw from front wedge.



2.38 (.094) Hex Socket Cap
Per ANSI/ASME B18.3



Units: mm (in)
Unless specified otherwise,
.xx = ± .25, .x = ± .5
(.xxx = ± .010, .xx = ± .02)

Part Number Code Series 263 Card-Lok Five Piece

	M	V	A	263	-	3.80	E	H	L	K
Prefix options										
Metric Screw Head M2.5 Hex Drive	M									
Standard Screw Head 3/32 Hex Drive	[blank]									
Visual Indicator		V								
No Visual Indicator		[blank]								
Black Anodize			A							
or choose from Finish Table			see table							
Suffix options										
Assembly length from 54.6 (2.15) to 329.9 (12.99)						length.xx				
Preferred lengths are 71.12 (2.80), 96.52 (3.80) and 121.9 (4.80)										
Other lengths available upon request										
Additional Center Mounting Hole							E			
None							[blank]			
Mounting Options - through mounting holes								H		
or choose from Mounting Option Table								see table		
Lock Element									L	
None									[blank]	
Captive Screw										K
None										[blank]

Part Number Code Example:

V263-3.80ETOK

Series 263 Card-Lok five piece 96.52 (3.80) long with M3 socket head screw, visual indicator, gold chemical finish, 0-80 tapped mounting holes with an additional center mounting hole and a captive screw option.

FINISH TABLE

Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 3, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE

Code Letter	Method
"H"	Ø1.73/1.85 (.068/.073) dia. through holes countersink 100° x 1.50 (.060) deep
"T0"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the narrow, advance design Series 265 "Card-Lok" retainer for cold plate/heat exchanger applications. This totally unique design incorporates design advancements that provide increased thermal transfer, easy insertion, lighter weight and now closer center to center board spacing.

FEATURES

- Narrow design permits closer board spacing
- Maximum uniform clamping force
- Increased thermal transfer
- Maintains wedge and body alignment for easy insertion
- Captivated rear wedge
- Choice of screw head style
- Lighter weight
- Lower cost - Faster delivery
- Special lengths, finishes, or other design options available on request

WEDGES & SHAFT

Material:

Wedges: Aluminum Alloy 6061-T6,
ASTM-B221
Shaft: Aluminum Alloy 7075-T,
ASTM-B221

Finish:

See Part Number Code

SCREW, LOCK & FLAT WASHER

Material:

300 Series Stainless Steel

Finish:

Passivate per Mil-S-5002

ROLL PIN

Material:

400 Series Stainless Steel

Finish:

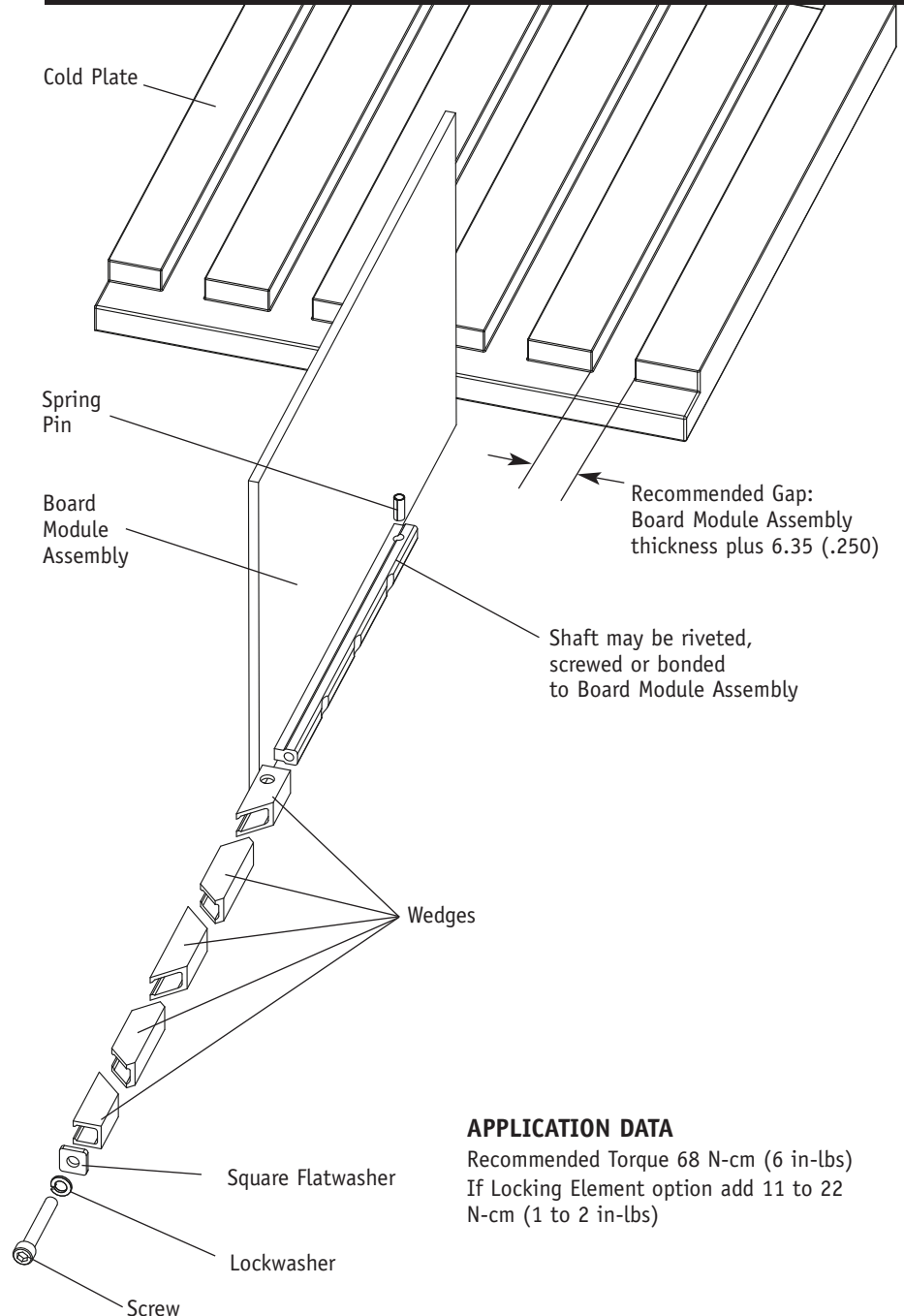
Passivate per Mil-S-5002

WEIGHT

.89 g/cm (.080 oz/in)



Series 265 "Card-Lok" Retainer (cold plate)



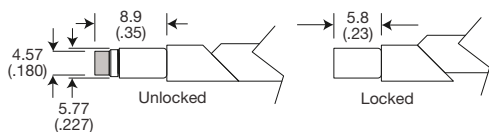
APPLICATION DATA

Recommended Torque 68 N-cm (6 in-lbs)
If Locking Element option add 11 to 22
N-cm (1 to 2 in-lbs)

OPTION PREFIX

Detail "V"

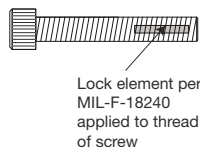
Provides visual lock indication.



OPTION SUFFIX

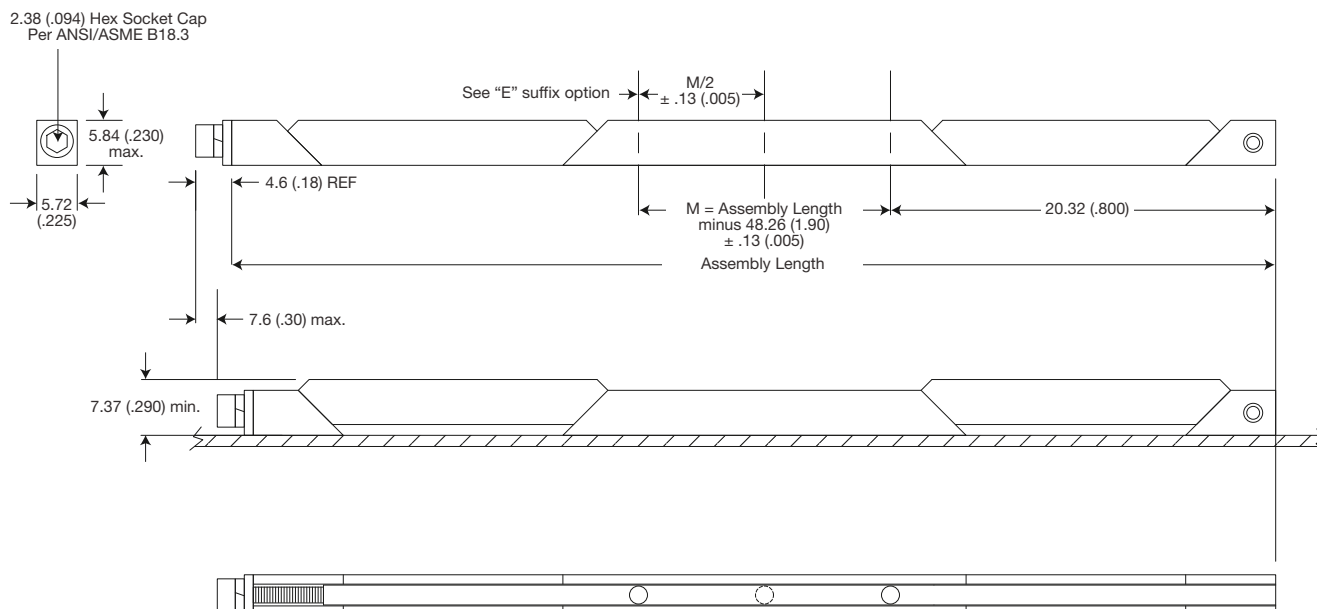
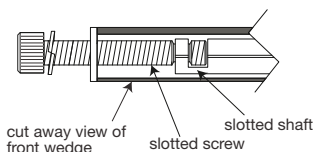
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.



Detail "K"

Prevents the unintentional disassembly of screw from front wedge.



Units: mm (in)
Unless specified otherwise,
.xx = ± .25, .x = ± .5
(.xxx = ± .010, .xx = ± .02)

Part Number Code

Series 265 Card-Lok Five Piece

Prefix options

Metric Screw Head M2.5 Hex Drive M
Standard Screw Head 3/32 Hex Drive [blank]
Visual Indicator V
No Visual Indicator [blank]
Black Anodize A
or choose from Finish Table see table

Suffix options

Assembly length from 54.6 (2.15) to 329.9 (12.99) length.xx
Preferred lengths are 71.12 (2.80), 96.52 (3.80) and 121.9 (4.80)
Other lengths available upon request
Additional Center Mounting Hole E
None [blank]
Mounting Options - through mounting holes H
or choose from Mounting Option Table see table
Lock Element L
None [blank]
Captive Screw K
None [blank]

Part Number Code Example:

M265-4.80H

Series 265 Card-Lok five piece 121.9 (4.80) long with metric screw head, gold chemical film finish and standard rivet hole mounting.

FINISH TABLE

Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 3, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE

Code Letter	Method
"H"	Ø1.73/1.85 (.068/.073) dia. through holes countersink 100° x 1.52 (.060) deep
"T0"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the narrow configuration Series 267 "Card-Lok" Retainer for cold-plate, heat exchanger applications. This design features narrowest cross sectional size in addition to optimum thermal transfer, easy insertion, lighter weight and now closer center to center board spacing.

FEATURES

- Narrow design permits closer board spacing
- Maximum uniform clamping force
- Increased thermal transfer
- Maintains wedge and body alignment for easy insertion
- Captivated rear wedge
- Choice of screw head style
- Lighter weight
- Lower cost - Faster delivery
- Special lengths, finishes, or other design option available on request

WEDGES & SHAFT

Material:

Wedges: Aluminum Alloy 6061-T6, ASTM-B221
 Shaft: Aluminum Alloy 7075-T, ASTM-B221

Finish:

See Part Number Code

SCREW, LOCK & FLAT WASHER

Material:

300 Series Stainless Steel

Finish:

Passivate per Mil-S-5002

ROLL PIN

Material:

400 Series Stainless Steel

Finish:

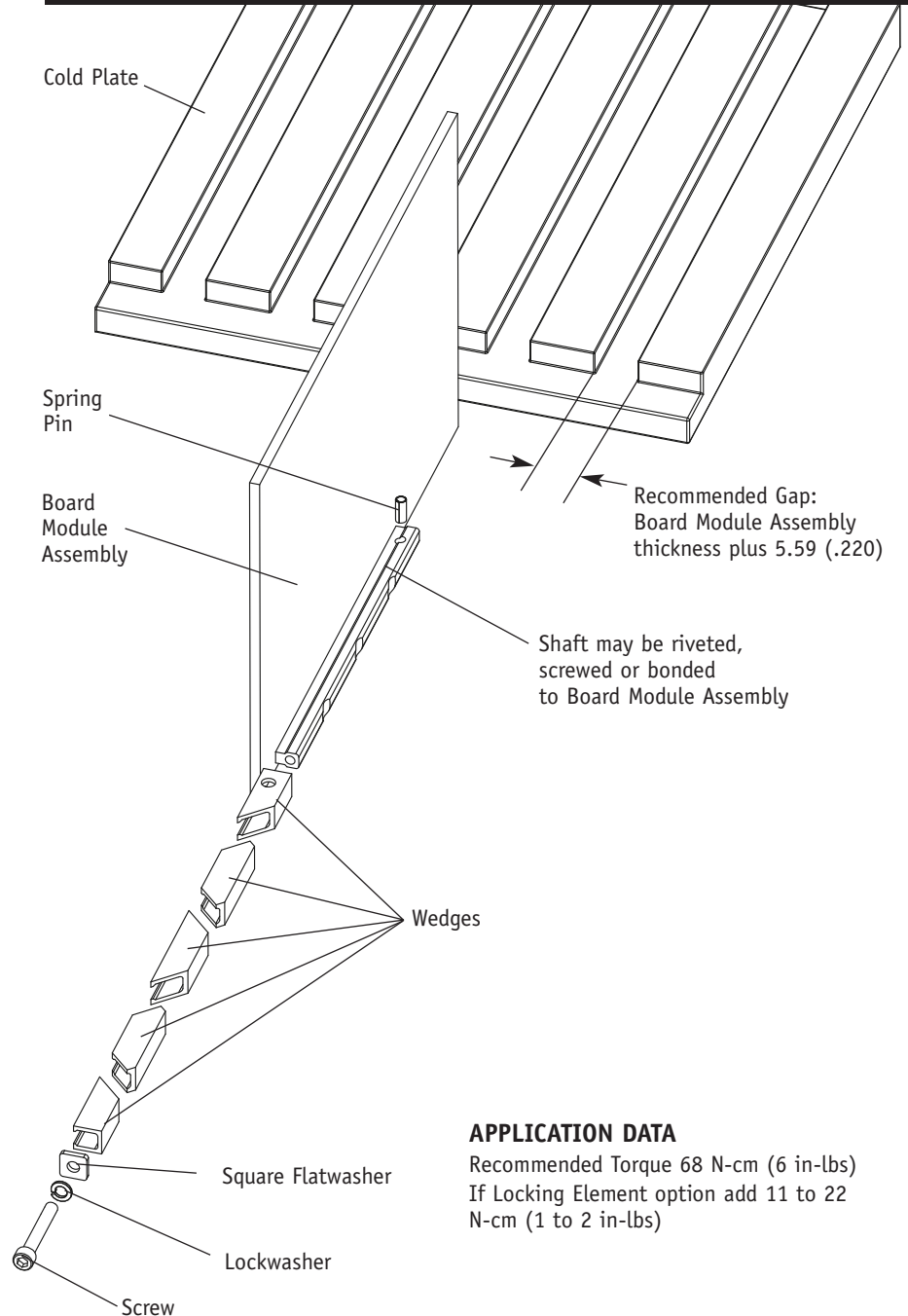
Passivate per Mil-S-5002

WEIGHT

.75 g/cm (.067 oz/in)



Series 267 - "Card-Lok" Retainer (narrow)



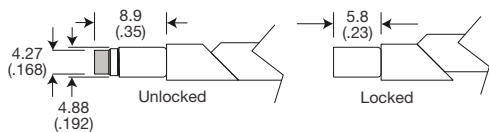
APPLICATION DATA

Recommended Torque 68 N-cm (6 in-lbs)
 If Locking Element option add 11 to 22 N-cm (1 to 2 in-lbs)

OPTION PREFIX

Detail "V"

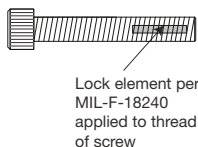
Provides visual lock indication.



OPTION SUFFIX

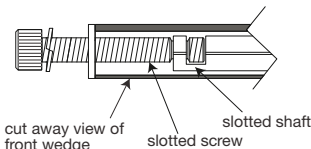
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.

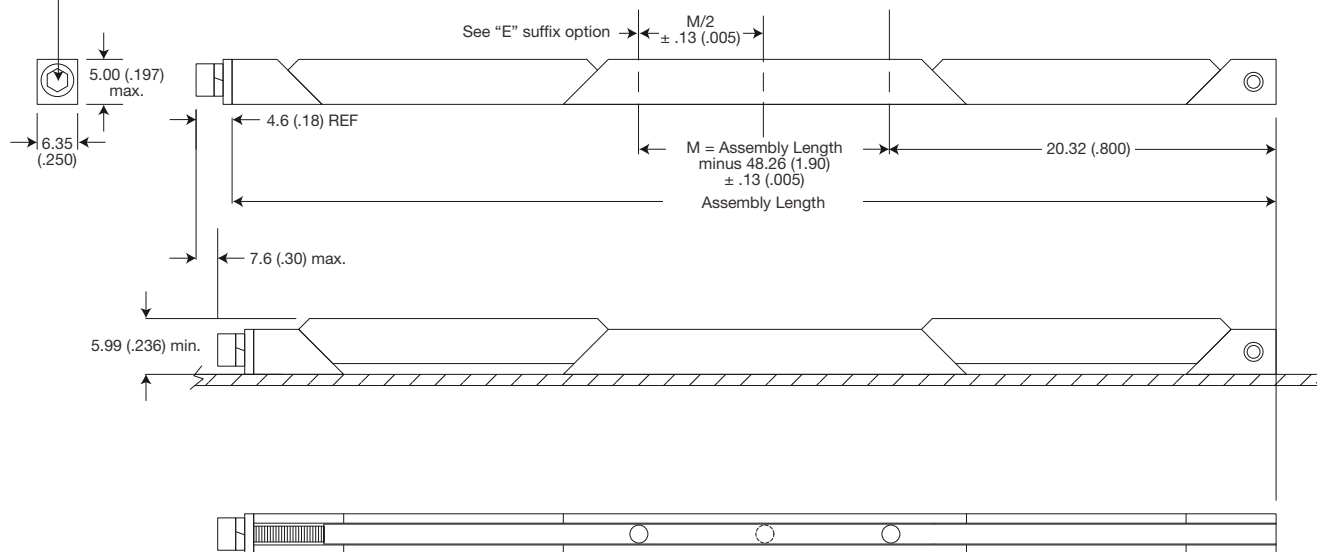


Detail "K"

Prevents the unintentional disassembly of screw from front wedge.



2.38 (.094) Hex Socket Cap
Per ANSI/ASME B18.3



Units: mm (in)
Unless specified otherwise,
.xx = ± .25, .x = ± .5
(.xxx = ± .010, .xx = ± .02)

Part Number Code Series 267 Card-Lok Five Piece

Prefix options

Metric Screw Head M2.5 Hex Drive M
Standard Screw Head 3/32 Hex Drive [blank]
Visual Indicator V
No Visual Indicator [blank]
Black Anodize A
or choose from Finish Table see table

Suffix options

Assembly length from 54.6 (2.15) to 329.9 (12.99) length.xx
Preferred lengths are 71.12 (2.80), 96.52 (3.80) and 121.9 (4.80)
Other lengths available upon request
Additional Center Mounting Hole E
None [blank]
Mounting Options - through mounting holes H
or choose from Mounting Option Table see table
Lock Element L
None [blank]
Captive Screw K
None [blank]

Part Number Code Example:

267-2.80T2K

Series 267 five piece Card-Lok gold chemical film finish, 71.12 (2.80) long with 2-56 tapped mounting holes and captive screw feature.

FINISH TABLE

Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 3, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE

Code Letter	Method
"H"	Ø1.73/1.85 (.068/.073) dia. through holes countersink 100° x 1.52 (.060) deep
"T0"	0-80 tapped hole
"T2"	2-56 tapped hole
"TM2"	M2 x 0.40 tapped hole
"TM2.5"	M2.5 x 0.45 tapped hole

Calmark offers the advance design Series 280 "Card-Lok" Retainer for cold plate-heat exchanger applications. This totally unique design incorporates design advancements that provide increased thermal transfer, easy insertion, lighter weight and lower cost. The Series 280 specifically provides greater clamping force and load capacity for Board Module Assembly of higher weight and mass.

FEATURES

- Greater clamping force and load capacity for Board Modul Assembly with higher weight and mass
- Maximum uniform clamping force
- Increased thermal transfer
- Maintains wedge and body alignment for easy insertion
- Captive rear wedge
- Choice of screw head style
- Dimensionally compatible with Series 250
- Lighter weight
- Lower cost
- Special lengths, finishes, or other design options available on request

WEDGES & SHAFT

Material:

Wedges: Aluminum Alloy 6061-T6, ASTM-B221
 Shaft: Aluminum Alloy 7075-T, ASTM-B221

Finish:

See Part Number Code

SCREW, LOCK & FLAT WASHER

Material:

300 Series Stainless Steel

Finish:

Passivate per Mil-S-5002

ROLL PIN

Material:

400 Series Stainless Steel

Finish:

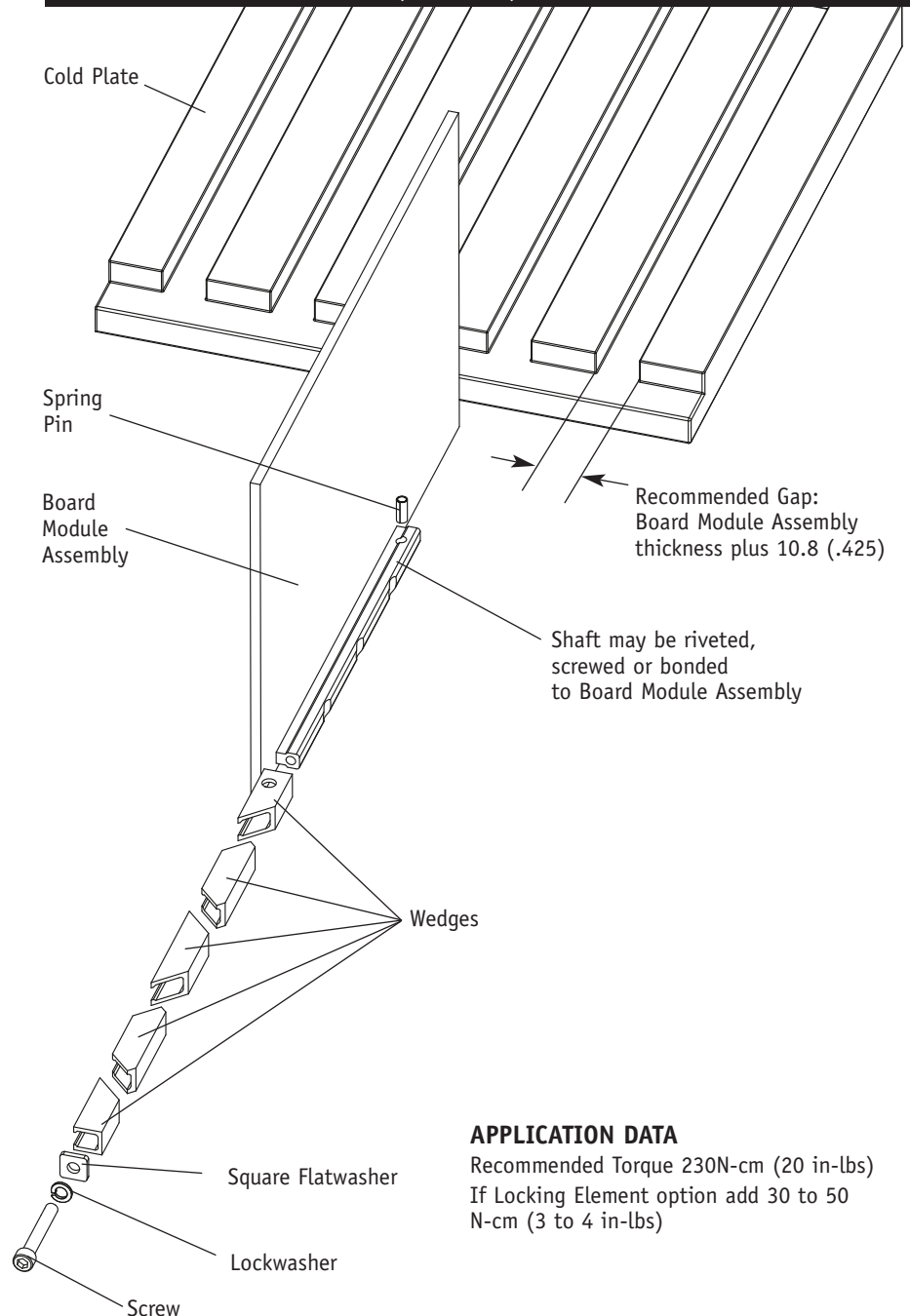
Passivate per Mil-S-5002

WEIGHT

2.18 g/cm (.195 oz/in)



Series 280 - "Card-Lok" Retainer (Cold Plate)



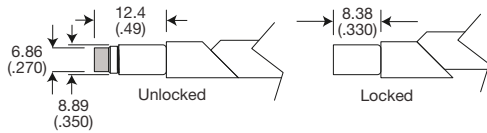
APPLICATION DATA

Recommended Torque 230N-cm (20 in-lbs)
 If Locking Element option add 30 to 50 N-cm (3 to 4 in-lbs)

OPTION PREFIX

Detail "V"

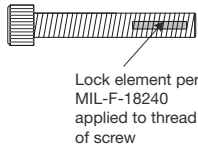
Provides visual lock indication.



OPTION SUFFIX

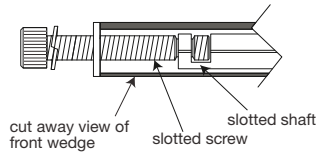
Detail "L"

Provides prevailing torque for resistance to loosening from shock and vibration.

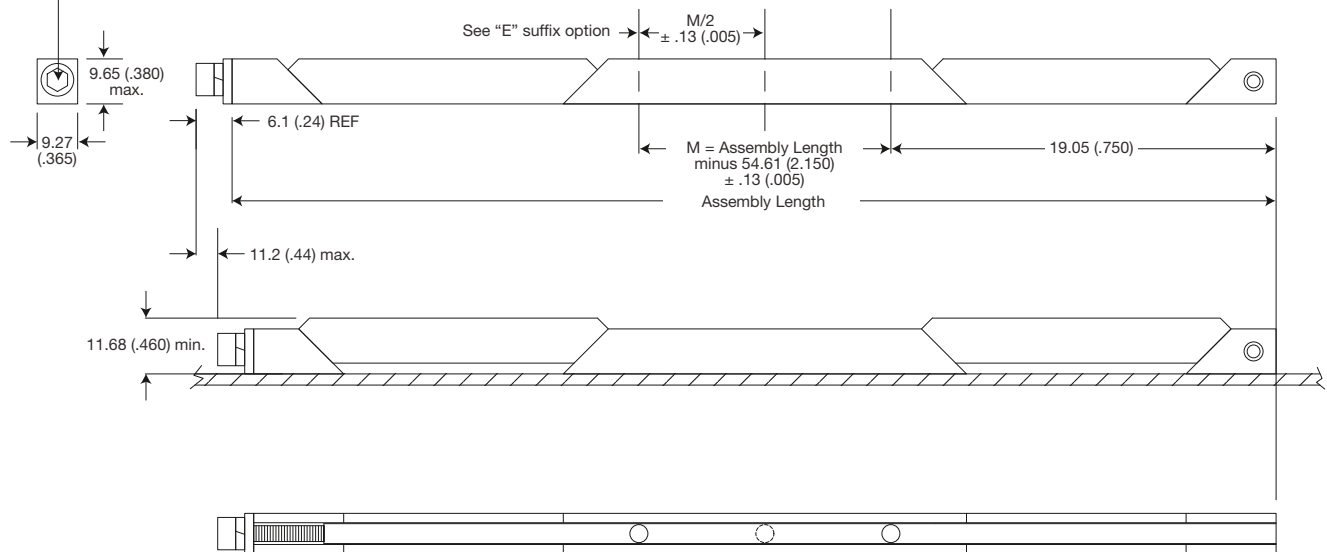


Detail "K"

Prevents the unintentional disassembly of screw from front wedge.



3.57 (.140) Hex Socket Cap
Per ANSI/ASME B18.3



Units: mm (in)
Unless specified otherwise,
.xx = ± .25, .x = ± .5
(.xxx = ± .010, .xx = ± .02)

Part Number Code Series 280 Card-Lok Five Piece

Prefix options

Metric Screw Head M3 Hex Drive M
Standard Screw Head 9/64 Hex Drive [blank]
Visual Indicator V
No Visual Indicator [blank]
Black Anodize A
or choose from Finish Table see table

Suffix options

Assembly length from 60.96 (2.40) to 329.9 (12.99) length.xx
Preferred lengths are 71.12 (2.80), 96.52 (3.80) and 121.9 (4.80)
Other lengths available upon request
Additional Center Mounting Hole E
None [blank]
Mounting Options - holes for rivet mounting H
or choose from Mounting Option Table see table
Lock Element L
None [blank]
Captive Screw K
None [blank]

Part Number Code Example:

A280-4.80HK

Series 280 Card-Lok five piece 121.9 (4.80) long with chemical film finish, standard rivet mounting hole and captive screw option.

FINISH TABLE

Code Letter	Finish
[blank]	Chemical Film per Mil-C-5541 Class 3, Gold
"R"	Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
"A"	Black Anodize per Mil-A-8625 Type II, Class 2
"HA"	Hard Black Anodize per Mil-A-8625 Type III, Class 2
"EN"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

MOUNTING METHOD TABLE

Code Letter	Method
"H"	Ø3.40/3.53 (.0134/.139) dia. through holes countersink 60° x 3.81 (.150) deep
"T4"	4-40 tapped hole
"TM3"	M3 x 0.50 tapped hole

The clamping outputs indicated in the table below are the results of averaged data. Within each series numerous Card-Loks of various lengths, finishes, and configurations were cycle tested. The accumulated data verified the following:

- Clamping output is not dependent on length
- Clamping output is greatly affected by choice of finish
- Clamping output is greatly improved when washers are used

Customized Card-Lok variations for specific applications are available on request

Product Series	Screw Size	Torque Setting N-cm (in-lbs)	Clamping Force			
			Chem Film Finish N (lbs)	Chem Film Finish With Washers N (lbs)	Black Anodize N (lbs)	Black Anodize With Washers N (lbs)
223	4-40	N/A	<i>tbd</i>	N/A	<i>tbd</i>	N/A
224	4-40	N/A	<i>tbd</i>	N/A	<i>tbd</i>	N/A
225	4-40	68 (6)	445 (100)	778 (175)	1223 (275)	1423 (320)
E225	4-40	68 (6)	445 (100)	778 (175)	1223 (275)	1423 (320)
L225	4-40	N/A	N/A	N/A	533 (120)	N/A
226	4-40	68 (6)	801 (180)	1402 (315)	2224 (500)	2755 (615)
227	4-40	68 (6)	N/A	778 (175)	N/A	1423 (320)
228	4-40	68 (6)	N/A	1402 (315)	N/A	2775 (615)
230	4-40	68 (6)	489 (110)	890 (200)	3334 (300)	1512 (340)
231	4-40	68 (6)	801 (180)	1402 (315)	2224 (500)	2755 (615)
235	M3	68 (6)	445 (100)	N/A	1223 (275)	N/A
236	M4	68 (6)	801 (150)	N/A	2224 (500)	N/A
240	4-40	68 (6)	489 (110)	623 (140)	1446 (325)	1490 (335)
245	6-32	110 (10)	623 (140)	1023 (230)	1779 (400)	1779 (400)
250	8-32	220 (20)	1112 (250)	1779 (400)	2958 (665)	3114 (700)
255	10-32	350 (31)	1779 (400)	2669 (600)	3336 (750)	3670 (825)
260	4-40	68 (6)	N/A	1779 (400)	N/A	2224 (500)
261	4-40	68 (6)	N/A	667 (150)	N/A	1223 (275)
L260	4-40	N/A	N/A	N/A	556 (125)*	N/A
LE260	4-40	N/A	N/A	N/A	556 (125)*	N/A
263	4-40	68 (6)	N/A	1779 (400)	N/A	2224 (500)
264	4-40	68 (6)	N/A	667 (150)	N/A	1223 (275)
265	4-40	68 (6)	N/A	1557 (350)	N/A	2113 (475)
266	4-40	68 (6)	N/A	600 (135)	N/A	801 (180)
267	4-40	68 (6)	N/A	1557 (350)	N/A	2113 (475)
280	8-32	68 (6)	N/A	3336 (750)	N/A	4003 (900)
281	8-32	68 (6)	N/A	1245 (280)	N/A	2224 (500)

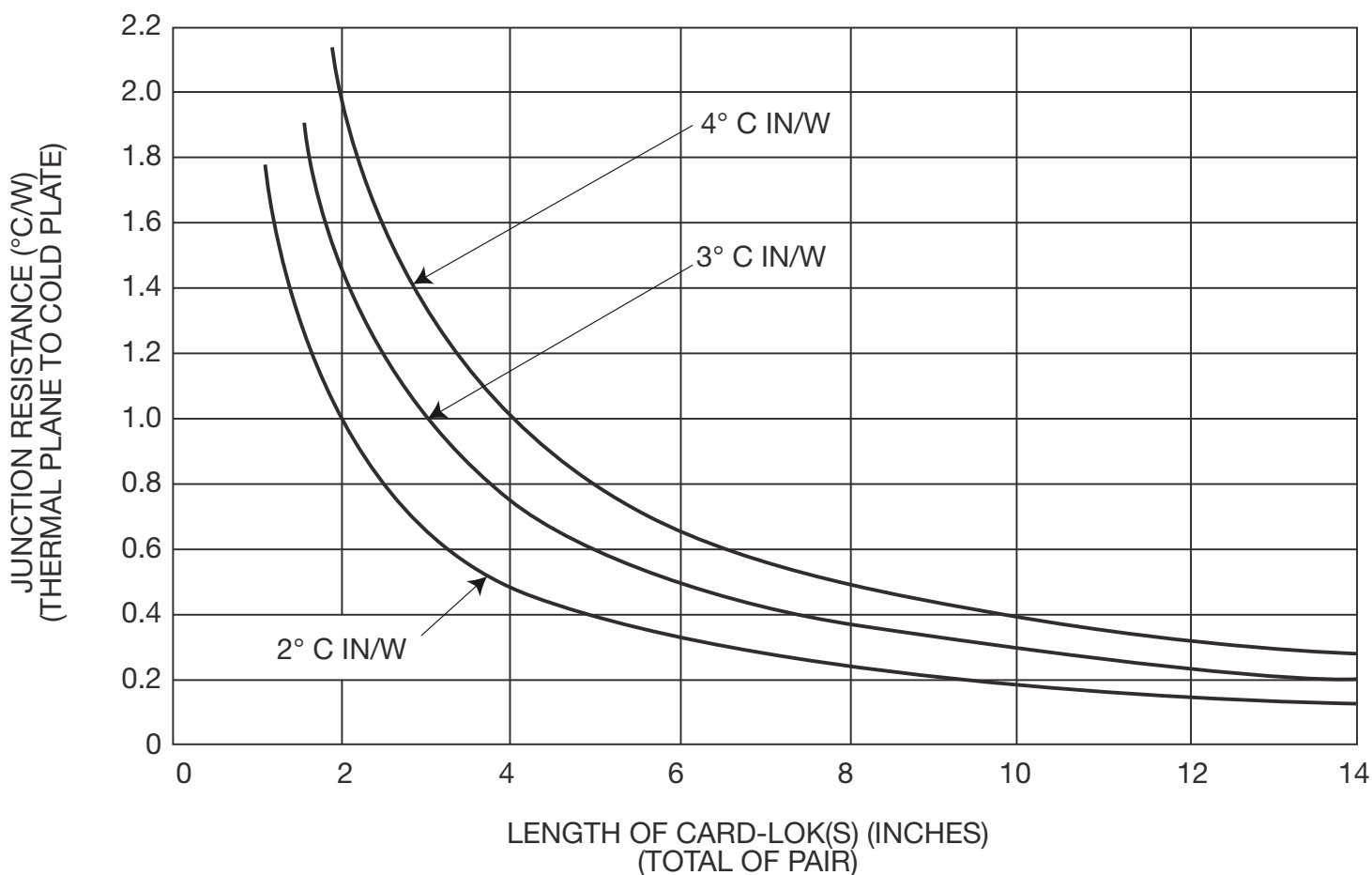
* Finish is dry film lube over black anodize

Testing performed by numerous users of Calmark's Series 225 and similar size Card-Loks (approx. 6.35 [.25] high) has shown that the thermal resistance across the interface of a card which is clamped to a cold plate will usually fall within the range of 2° to 4°C inch/watt. Three piece Card-Loks of shorter lengths will usually provide results close to the 2, while longer Card-Loks (over 6 inches) may fall closer to the 4.

These thermal resistance numbers apply when testing is performed at or near sea level. When the same testing is performed at high altitude or near vacuum conditions the results can be significantly affected. Increases of from 10 to 40 percent would not be unusual, especially with the longer three piece Card-Loks.

Five piece Card-Loks, such as the Series 260 or 265, with their greater and more evenly distributed clamping force, will greatly reduce these potential gradients.

The following chart provides an easy method of estimating the temperature rise across the interface (junction) of the card and cold plate when thermal conductivity is the only means of heat transfer considered (heat loss due to radiation and convection minimized).



Example: A card using a pair of 127mm (5.00 inch) long Card-Loks is clamped to a pair of cold plates and is dissipating 50 watts of power:

Total length of Card-Loks is 254 (10), [127 (5) x 2]

Junction resistance is shown as between 0.2° and 0.4°C/W

Therefore, at their junction, card temperature will rise between 10° and 20°C above the cold plate. [0.2°C/W x 50(W) = 10°C]