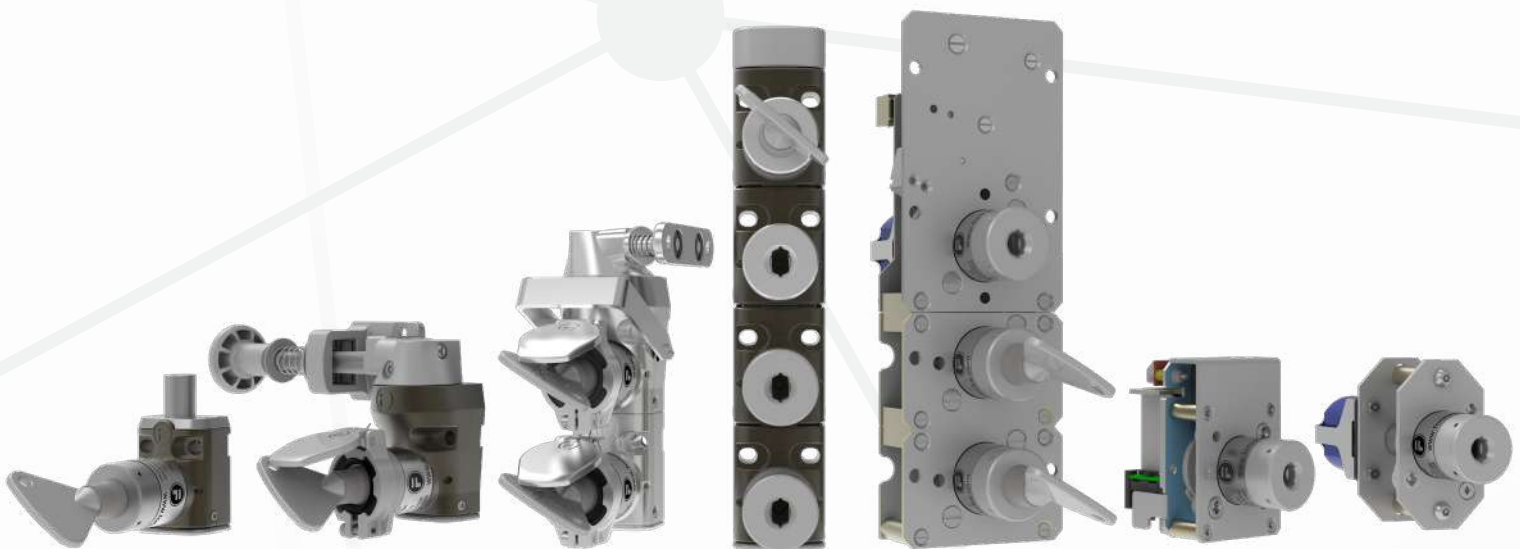


## Protecting People, Protecting Productivity



**The only range of mechanical interlocks independently certified to PLe**



THE QUEEN'S AWARDS  
FOR ENTERPRISE:  
INTERNATIONAL TRADE  
2018



C



US








## Introduction to Fortress:

**Fortress** designs and manufactures customised safety equipment, protecting lives in hazardous workplaces. Our reputation is as a global provider of robust safety specifications for manufacturing environments.

**Why Interlocks?** Interlocking is a method of controlling two or more interdependent operations which must take place in a predetermined sequence, if necessary remotely controlled or time delayed. The need for this sequence may be safety to personnel and equipment, or it may be to control processes and productivity.

Over the last 40 years, Fortress has become well known in the industry for innovative design, robust engineering and reliability. Headquarters are in Wolverhampton (UK), with supporting offices and manufacturing facilities in the USA, Netherlands, Australia and China, further supported by a global network of trusted distributors and channel partners.

## Fortress' current product portfolio includes:

-  **mGard** - The only range of mechanical interlocks independently certified to PLe
-  **amGardpro** - Heavy duty safety gate switches with connectivity and trapped key integration certified to PLe
-  **amGardS40** - Stainless steel IP69K safety gate switches independently certified to PLe
-  **tGard** - Medium duty interlocks with configurable built-in control functionality independently certified to PLd
-  **ncGard** - A range of safety switches with non-contact technology



## Why Interlocks?

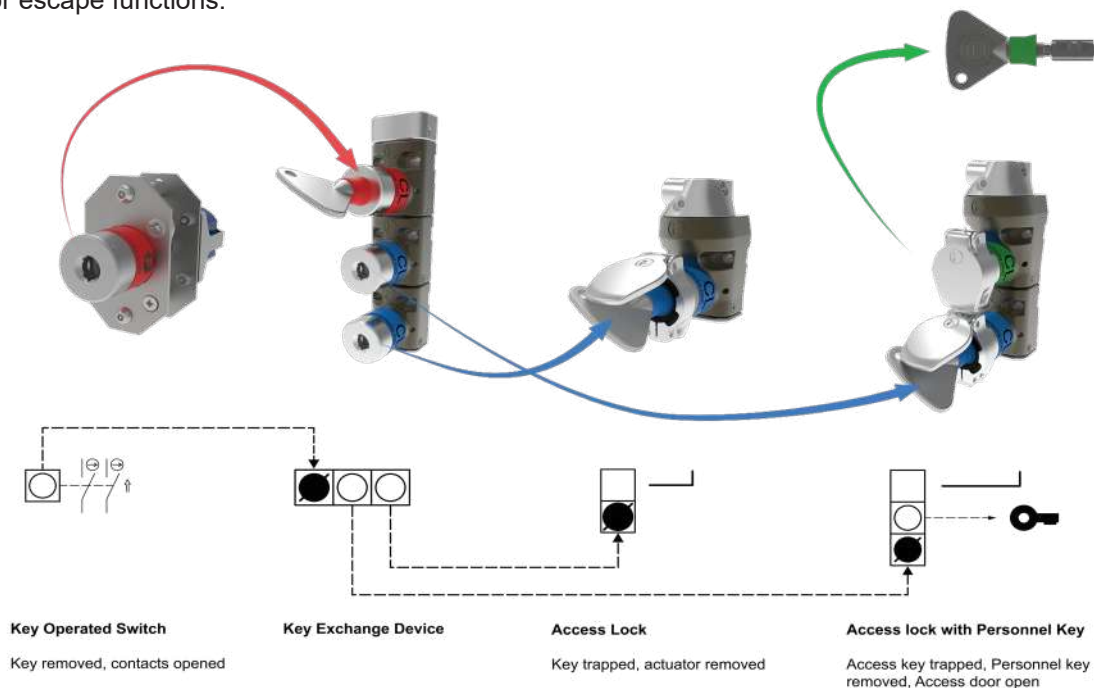
Interlocking is a method of controlling two or more interdependent operations which must take place in a predetermined sequence, if necessary remotely controlled or time delayed. The need for this sequence may be safety to personnel and equipment, or it may be to control processes and productivity.

### For Reference-

- ISO 14119 is the interlocking standard that forms part of the machinery directive.
- ISO/TS 19837:2018 is the technical specification relevant to trapped key interlocking.

## Why Mechanical?

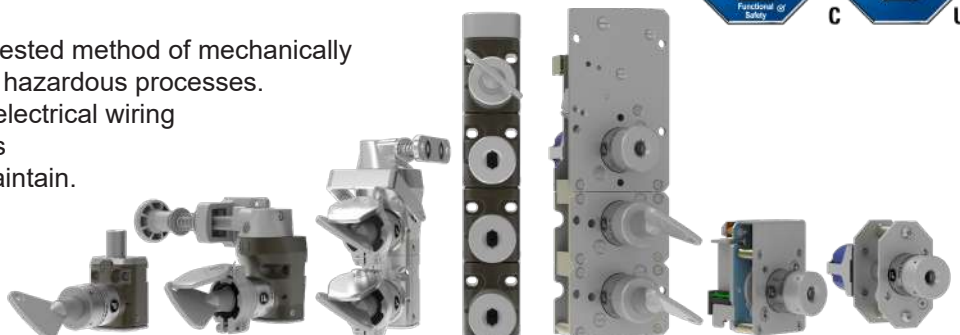
- One power isolator can be used for multiple doors through the use of a key exchange unit.
- This reduces any fault masking risks and wiring installation required.
- In addition mechanical interlocking is the only method of safeguarding solutions for multiple energy sources.
- Personnel keys can be used to prevent unexpected start up of machinery as per ISO 14118, removing the necessity for escape functions.



mGard is the only range of trapped key interlocks 3rd party approved as being capable of meeting PLe and is perfect for heavy duty applications. Fortress' mGard is suitable for use up to SIL3 (EN/IEC 62061), Category 4 and PLe (EN/ISO 13849-1).



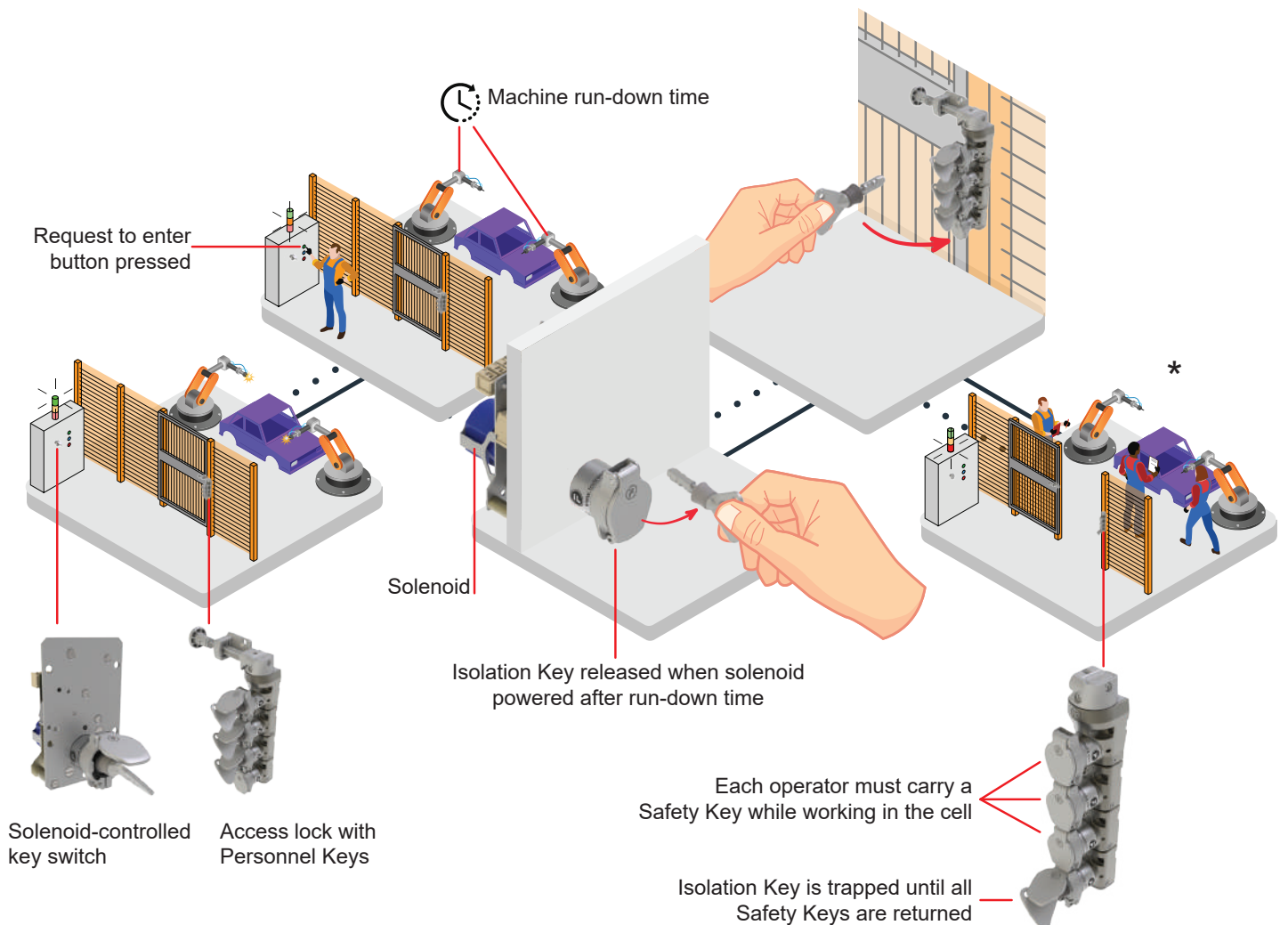
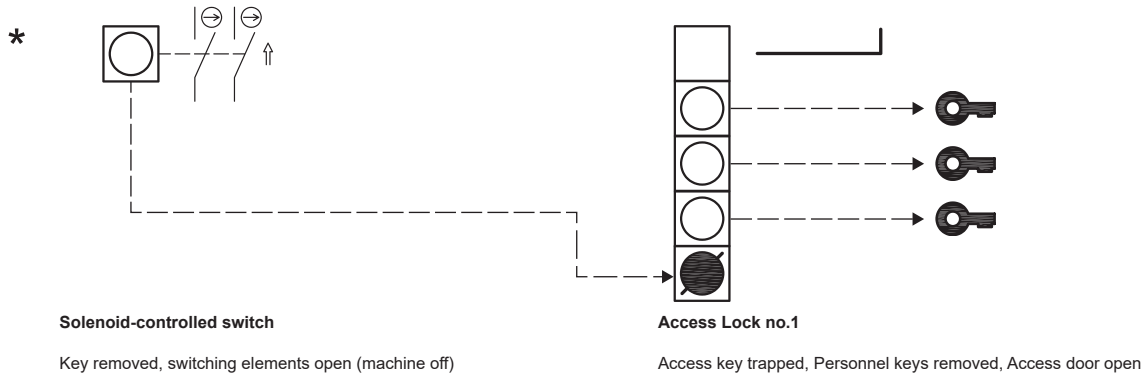
Trapped key interlocking is a tried and tested method of mechanically safeguarding dangerous machines and hazardous processes. Mechanical keys eliminate most of the electrical wiring associated with other types of interlocks making it cost effective to install and maintain.



# Robot Welding Cell

## Application Requirement:

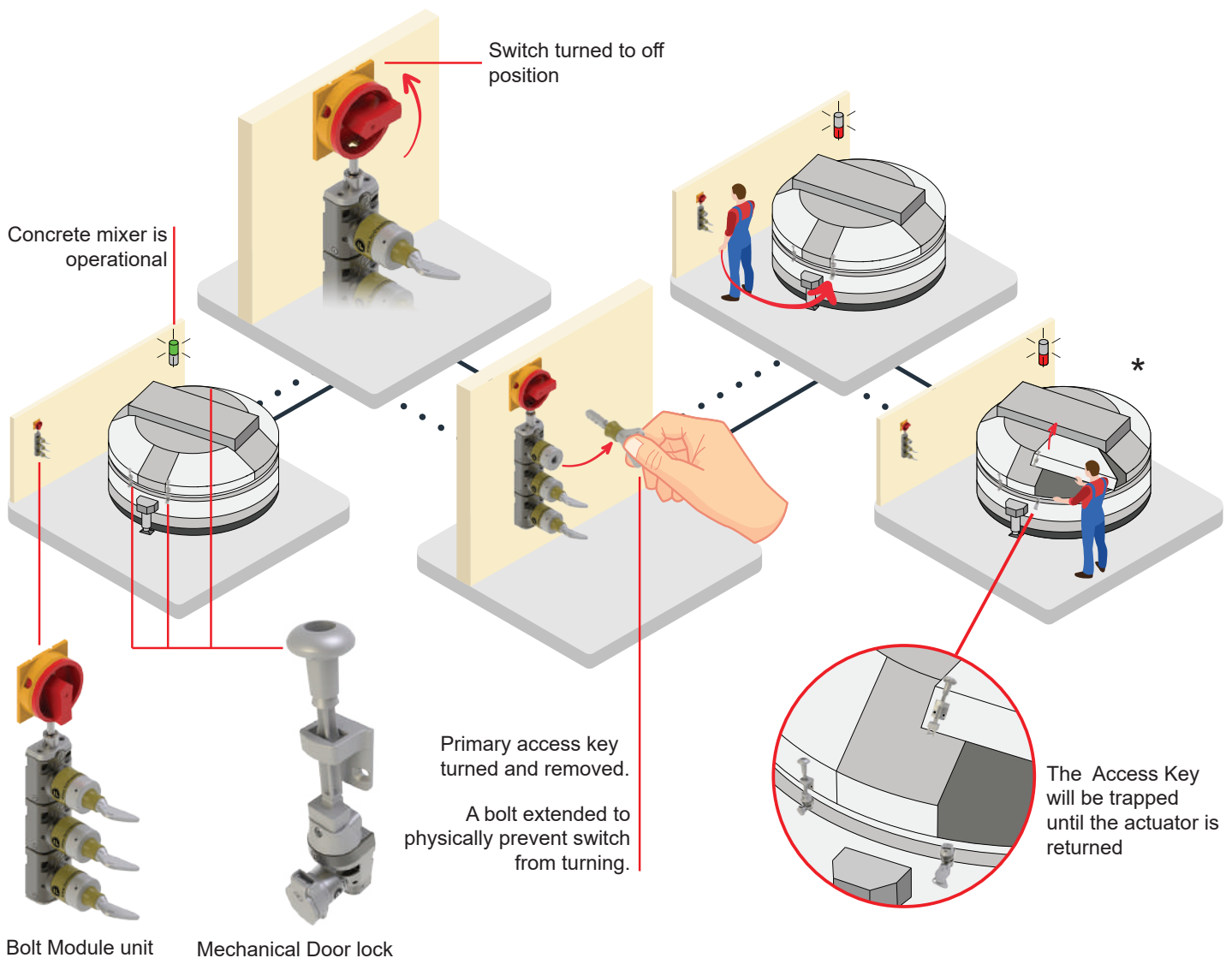
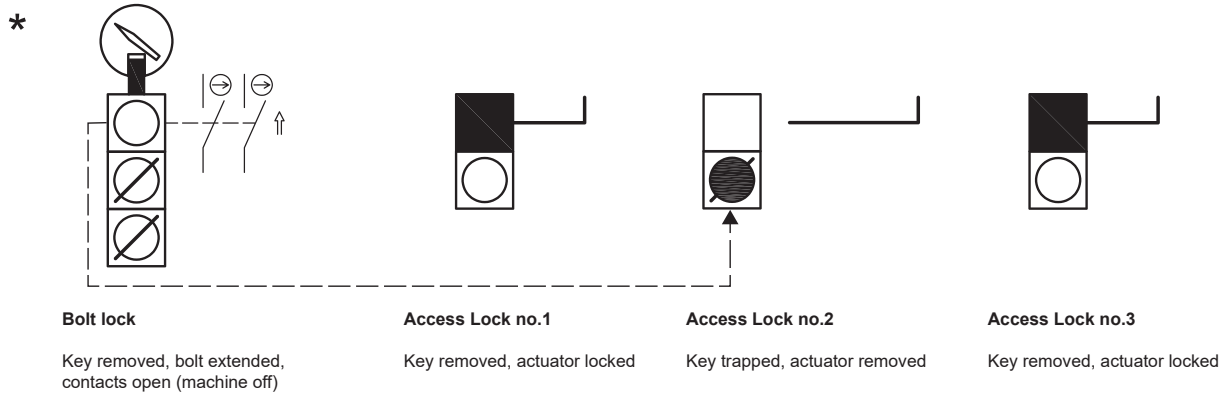
This robot welding cell's safety system must only allow operators to enter the cells when power to the cell has been isolated and the machinery has come to a controlled stop after a defined run-down time. After access, the system prevents unexpected start up when multiple operators are performing maintenance, via Personnel Keys.



# Concrete Mixer

## Application Requirement:

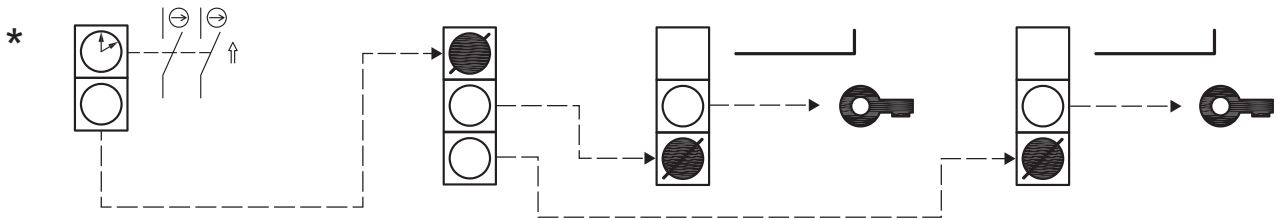
Industrial concrete mixers have multiple access hatches that are safeguarded by mechanical interlocks. These access hatches are opened for scheduled cleaning under the protection of the installed safety system. Access is only allowed once the power switch to the mixer has been mechanically isolated.



# Double Backer

## Application Requirement:

The double backer machines enclosed in two cells requires extensive safeguarding. A safety system for the cells should ensure operators and maintenance personnel can only enter the areas once power to all of the machinery has been isolated and has come to a controlled stop.



**Time delay device**

Key removed, switching elements open (machine off).

**Key exchange device**

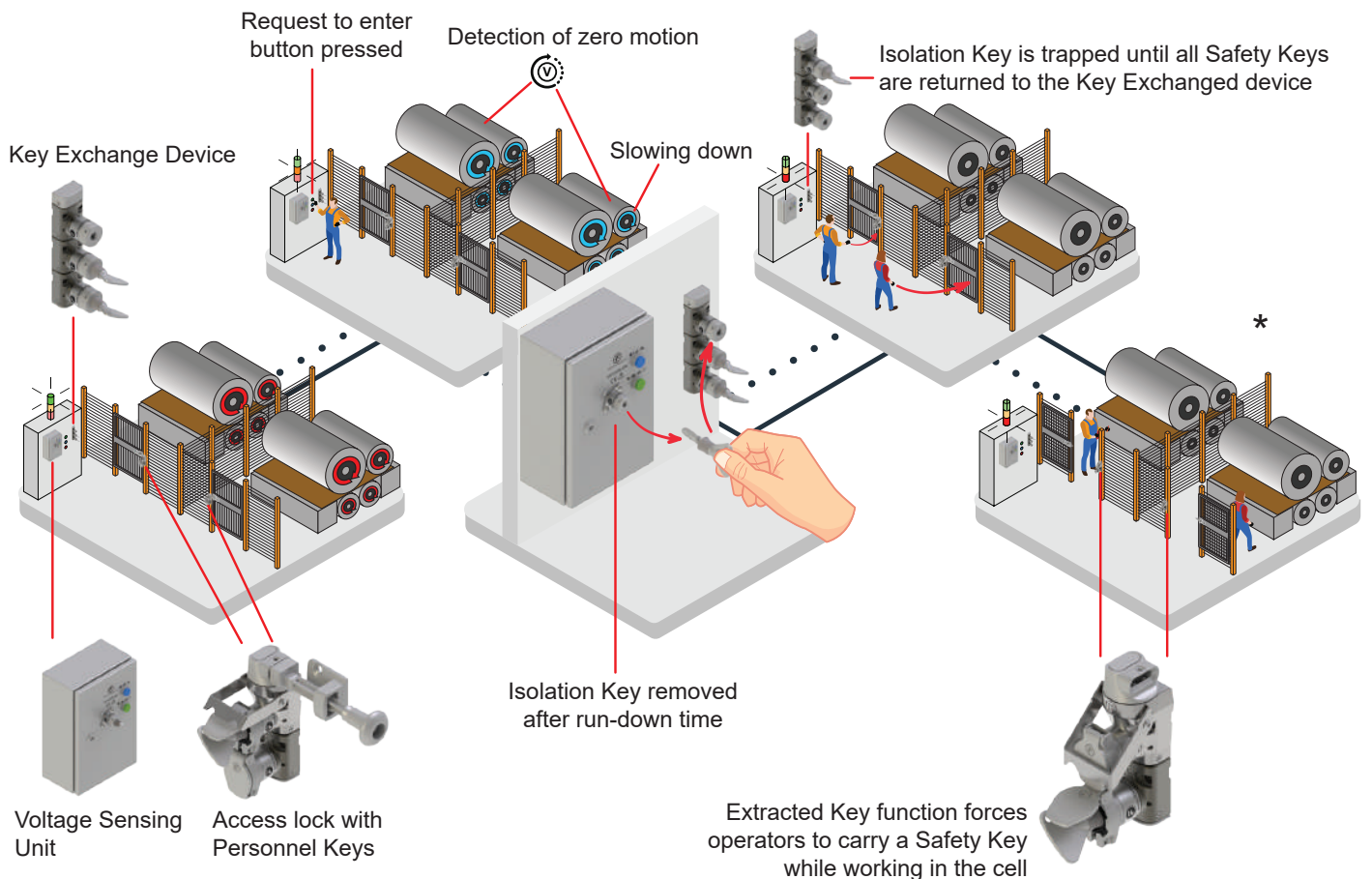
Isolation key trapped, Access keys removed.

**Access Lock with Personnel key no.1**

Access key trapped, Personnel key removed, Access door open.

**Access Lock with Personnel key no.2**

Access key trapped, Personnel key removed, Access door open.



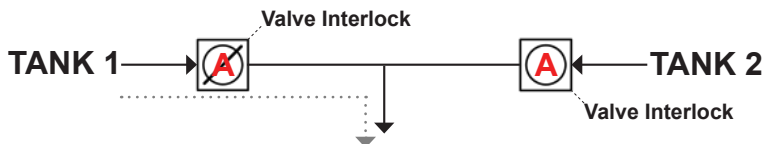
# Valves & Specials

## Valves & Pneumatic Interlocks

Fortress supplies a range of interlocks suitable for valve applications and for pneumatic isolation. With the incorporation of a mechanical module and key to a valve, Fortress has created a simplified solution for controlling the position of the valve and isolating the valve movement without the need of levers or hand-wheels in other forms of valve interlocking/lockout.

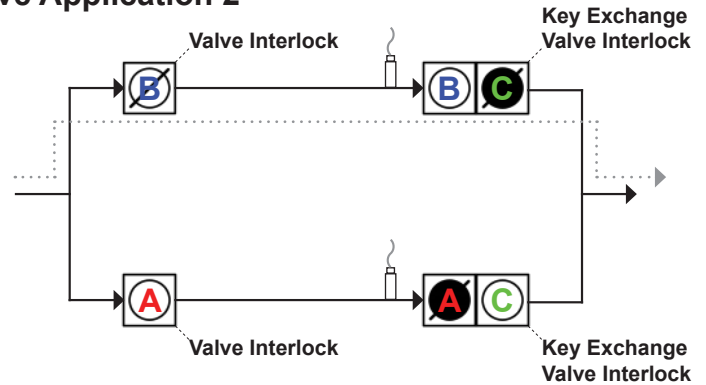


### Valve Application 1



In this application, only one of the tanks can feed into the supply at once. The use of Valve Interlocks insures only one of the lines can be open because the two interlocks share a single key. Each valve can only be opened while a key is trapped to the locked position in the interlock.

### Valve Application 2



In this application, at least one pressure release line must be open at all times. The use of the Valve Interlocks insures at least one line will always be open because the independent interlocks A and B require their corresponding key to be turned to the locked position to close the valve. The two Key Exchange Interlocks share one key for the two locks marked C. The key for the two C locks is transferred between the units to always trap either the A or B key.

## Specials and Custom Units for Applications

Over the years, Fortress has produced many special-purpose units designed to meet the specific needs of its customers and applications within their industries. Some of these units include: standalone time delay/voltage sensing, ATEX rated switches/solenoids and elaborate key sequencing exchange boxes. Some of these units have been added to the mGard range as their popularity in applications has grown throughout the years, but are considered non-standard or specials solutions due to the extended lead time required to design and manufacture.

Fortress has also helped customers create completely custom units that were specific to one individual application. These units were created in collaboration with engineers between both parties to better understand the needs and constraints of the application. Fortress is pleased to offer advice and assist without obligation; although a more simple solution may be proposed through standard mGard units or the other ranges Fortress has to offer.



## Power Isolation

### Control Interlocking

Panel Mounted



Panel Mounted Weatherproof



In Enclosure



### Power Interlocking

Mechanical Bolt Interlock



Knob Operated Switch Control Unit



Bolt Interlock with Limit Switch



Mini Solenoid Controlled Key Switch(es)



Key Operated Switch Control Unit



Bolt Interlock with Switch



Circuit Breakers



Solenoid Controlled Key Switch(es)



Electronic Time Delay Unit



Valve & Pneumatic Interlocks



ATEX Solenoid Controlled Key Switch



ATEX Key Switch



Voltage Sensing Unit





## Key Exchange

### Modular Key Exchange Unit



### Modular Key Unit with Switch(es)



## Keys & Locks

### Standard

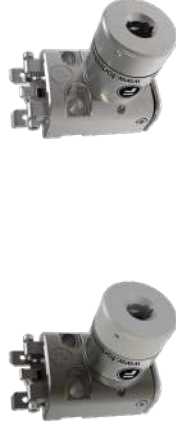


### Masterable



## Accessories

### Extension Module



## Door Locks

### Single Door Interlock



### Multiple Modular Door Interlock



### Forced Safety Key Door Interlock



### All in One Door Interlocks



## Actuators

### Fixed Actuator



### Handle Operated Actuator



### Spring Released Handle Operated Actuator



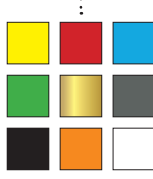
### Compressible Actuator



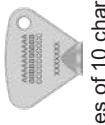
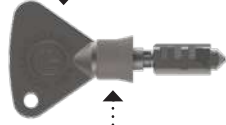
### Self Aligning Actuator



Colours available for key seal and lock label.



Colours available for key bow and dustcovers.



3 lines of 10 characters available for engravings.

### Low Profile



### Dustcovers (Available as Standard & Padlockable)



### Lockout Hasps (For 3x Padlocks)



### Back of Board Mounting Kit



BM1 Unit



XMA Unit



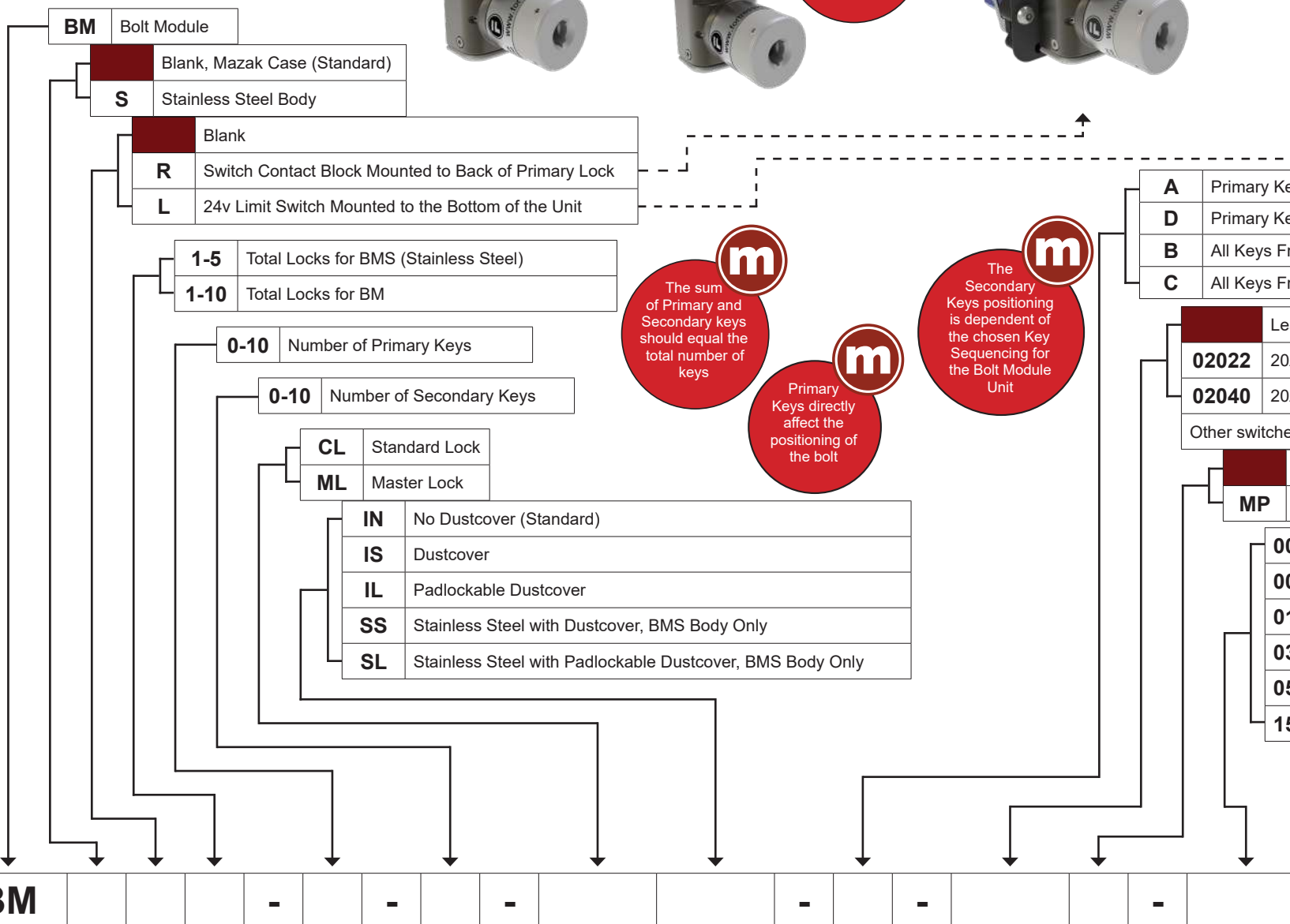
Additional Modules Fitted when multiple locks are selected

BMR1 Unit



For BML2 switch is 2NC 1NO positive break

BML2 Unit



<b>BM</b>	Bolt Module
	Blank, Mazak Case (Standard)
<b>S</b>	Stainless Steel Body

	Blank
<b>R</b>	Switch Contact Block Mounted to Back of Primary Lock
<b>L</b>	24v Limit Switch Mounted to the Bottom of the Unit

<b>1-5</b>	Total Locks for BMS (Stainless Steel)
<b>1-10</b>	Total Locks for BM

<b>0-10</b>	Number of Primary Keys
-------------	------------------------

<b>0-10</b>	Number of Secondary Keys
-------------	--------------------------

<b>CL</b>	Standard Lock
<b>ML</b>	Master Lock

<b>IN</b>	No Dustcover (Standard)
<b>IS</b>	Dustcover
<b>IL</b>	Padlockable Dustcover
<b>SS</b>	Stainless Steel with Dustcover, BMS Body Only
<b>SL</b>	Stainless Steel with Padlockable Dustcover, BMS Body Only

<b>A</b>	Primary Key(s) Free Bolt Shot, Secondary Key(s) Trapped
<b>D</b>	Primary Key(s) Free Bolt Withdrawn, Secondary Key(s) Trapped
<b>B</b>	All Keys Free Bolt Shot (BM2+)
<b>C</b>	All Keys Free Bolt Withdrawn (BM2+)

	Leave Blank for BM, BMS, BML or BMSL
<b>02022</b>	20Amp 2xNO 2xNC Switch, BMR or BMSR Only
<b>02040</b>	20Amp 4xNO Switch, BMR or BMSR Only
Other switches available upon request	

	Blank, No Mounting Plate
<b>MP</b>	Mounting Plate

<b>006-022</b>	Standard, Bolt Length of 6mm (Retracted)
<b>003-019</b>	Bolt Length of 3mm (Retracted)
<b>013-029</b>	Bolt Length of 13mm (Retracted)
<b>030-046</b>	Bolt Length of 30mm (Retracted)
<b>050-066</b>	Bolt Length of 50mm (Retracted)
<b>150-166</b>	Bolt Length of 150mm (Retracted)

The sum of Primary and Secondary keys should equal the total number of keys

Primary Keys directly affect the positioning of the bolt

The Secondary Keys positioning is dependent of the chosen Key Sequencing for the Bolt Module Unit

Blank squares and additional "-" should be removed from the final part number

S Unit



S-WP Unit



S-EM Unit



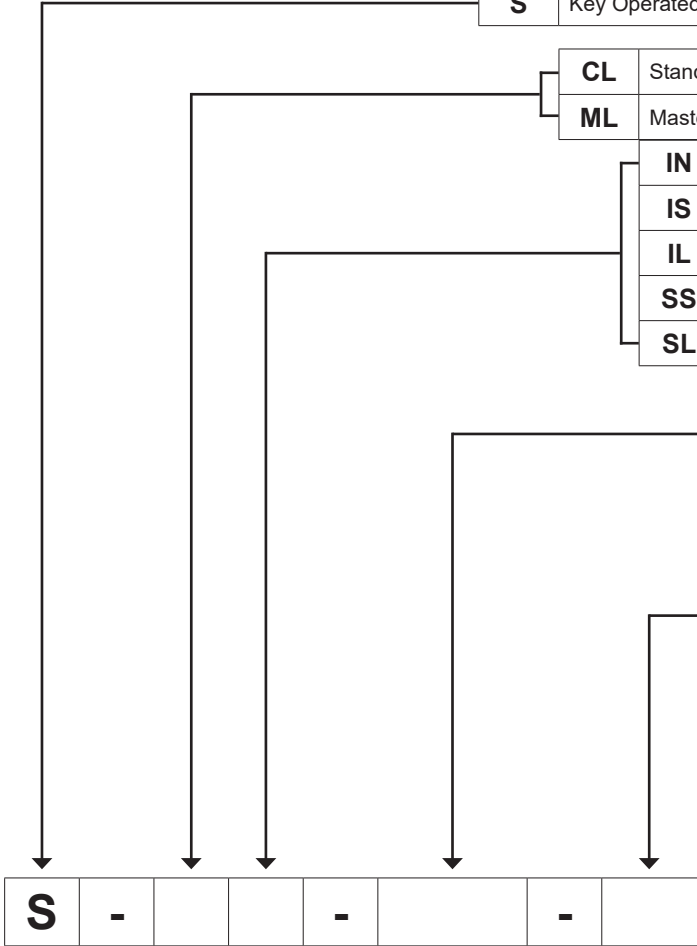
**S** Key Operated Switch

**CL** Standard Lock  
**ML** Master Lock

**IN** No Dustcover (Standard)  
**IS** Dustcover  
**IL** Padlockable Dustcover  
**SS** Stainless Steel with Dustcover  
**SL** Stainless Steel with Padlockable Dustcover

**A02022** 20Amp 2xNO 2xNC Switch  
**A02040** 20Amp 4xNO Switch  
Other switches available upon request

Panel Mounted (Standard)  
**WP** Weather (IP67) Proof Back of Board Mounting  
**EM** Metal Enclosure



Blank squares and additional "-" should be removed from the final part number

The lock on a S-WP must be comprised of either SS or SL

The lock used in the switch determines the enclosure. IN, IS and IL for Zinc Alloy or Mild Steel. SS and SL for Stainless Steel

Larger switches will be in a larger enclosure

SS1-B



Add-on lock modules are fitted to the solenoid if multiple keys are released by the solenoid

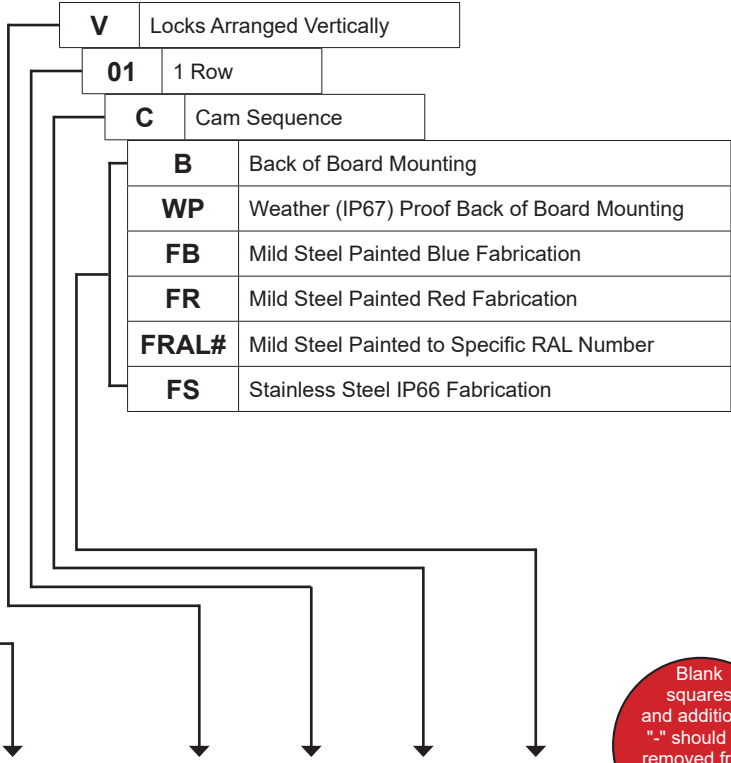
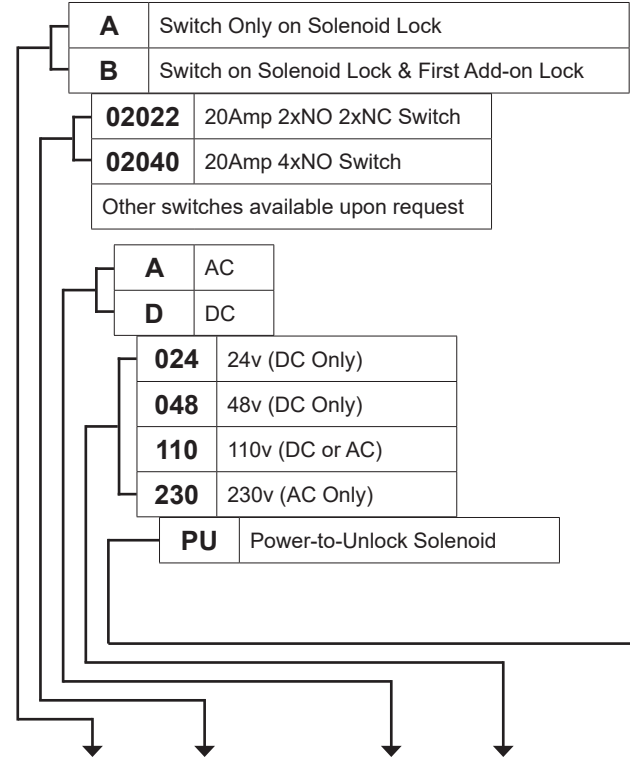
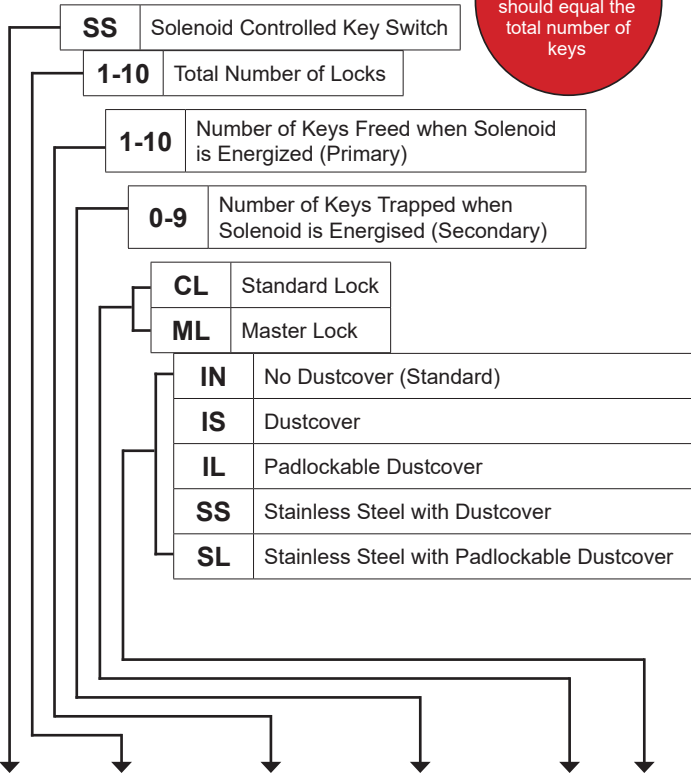
SS1-WP



SS1-F



The sum of Primary and Secondary keys should equal the total number of keys



Blank squares and additional "-" should be removed from the final part number

MSS Unit



MSS-EM Unit



MSS-WP Unit



**MSS** Solenoid Controlled Key Switch

**1** One Key Freed when Solenoid is Energized

**0** Zero Keys Trapped when Solenoid is Energized

**CL** Standard Lock

**ML** Master Lock

**IN** No Dustcover (Standard)

**IS** Dustcover

**IL** Padlockable Dustcover

**SS** Stainless Steel with Dustcover

**SL** Stainless Steel with Padlockable Dustcover

**A00302** 3Amp 2xNC Switch

**A** AC

**D** DC

**024** 24v (DC Only)

**048** 48v (DC Only)

**110** 110v (DC or AC)

**230** 230v (AC Only)

**PU** Power-to-Unlock Solenoid

Panel Mounted (Standard)

**WP** Weather (IP67) Proof Back of Board Mounting

**EM** Metal Enclosure (Option Pod), 24v DC Solenoid Only

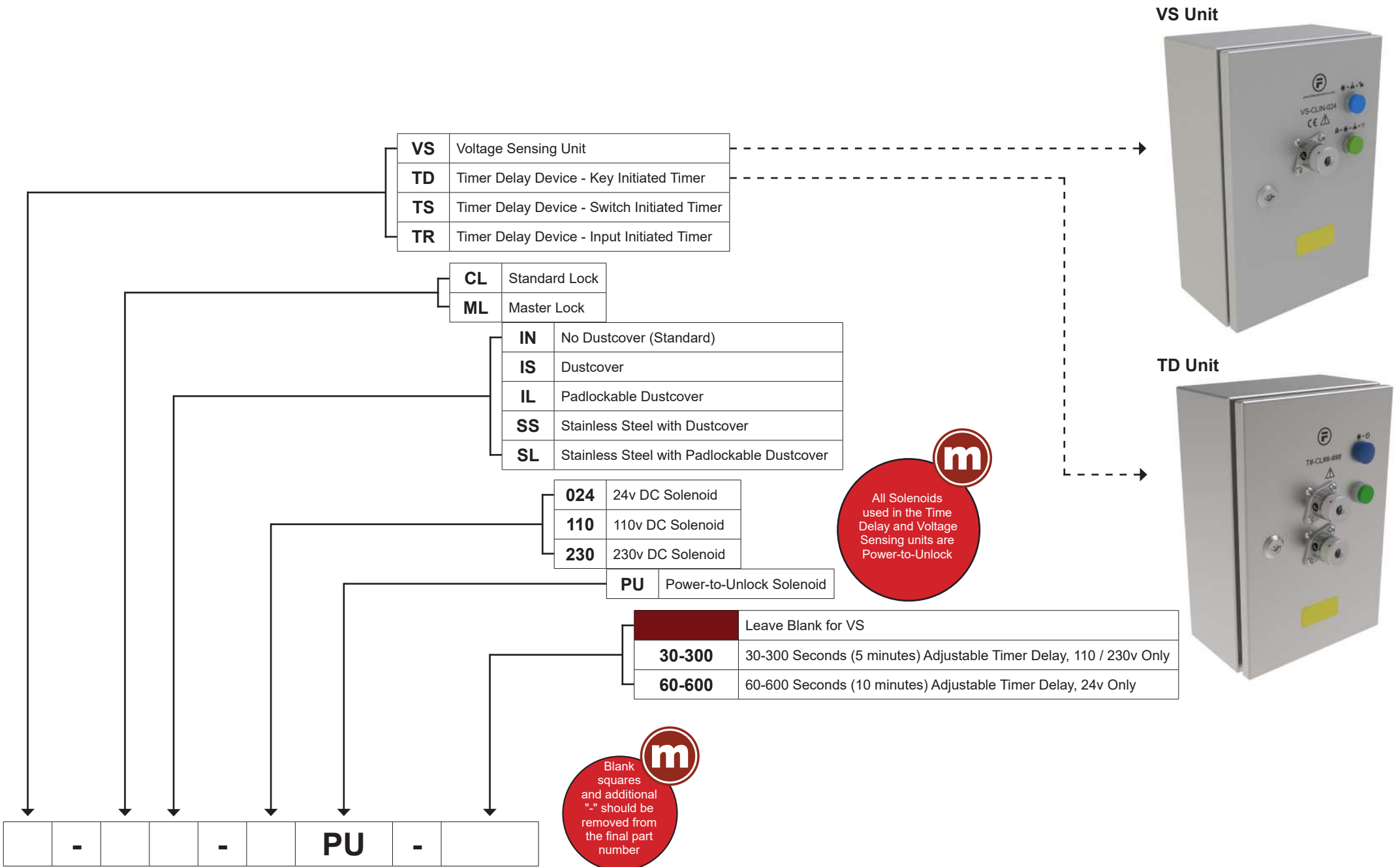
**m**  
The contact block in the Mini Solenoid Controlled Key Switch are only available as a 3Amp 2xNC Switch

**m**  
The Solenoid used in the Mini Solenoid Controlled Key Switch are all Power-to-Unlock

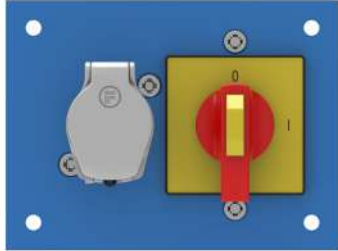
**m**  
MSS-WP Panel thickness must be 1.5 - 3.5 mm

**m**  
Blank squares and additional "-" should be removed from the final part number

**MSS - 1 - 0 - - - A00302 - - - PU - -**




SCU1-B Unit



LCU4-B Unit



The sum of Primary and Secondary keys should equal the total number of keys



<b>SCU</b>	Knob Operated Switch Control
<b>LCU</b>	Lock Operated Switch Control

<b>1-7</b>	Total Number of Locks for SCU
<b>2-8</b>	Total Number of Locks for LCU

<b>0</b>	Number of Keys Trapped in a SCU (Control)
<b>1-7</b>	Number of Keys Trapped in a LCU (Control)

<b>1-7</b>	Number of Keys Freed in a SCU/LCU (Access)
------------	--

<b>CL</b>	Standard Lock
<b>ML</b>	Master Lock
<b>IN</b>	No Dustcover (Standard)
<b>IS</b>	Dustcover
<b>IL</b>	Padlockable Dustcover
<b>SS</b>	Stainless Steel with Dustcover
<b>SL</b>	Stainless Steel with Padlockable Dustcover

<b>A</b>	Switch Only on Control Lock/Knob
<b>B</b>	Switch on Control Lock/Knob and First Access Locks

<b>02022</b>	20Amp 2xNO 2xNC Switch
<b>02040</b>	20Amp 4xNO Switch
Other switches available upon request	

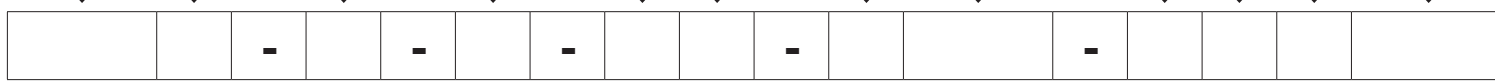
<b>H</b>	Locks Arranged Horizontally
<b>V</b>	Locks Arranged Vertically

<b>01</b>	1 Row (Standard)
-----------	------------------

<b>C</b>	Cam Sequence, Not Available on 2 Row Units
<b>R</b>	Runner Bar Sequence

<b>B</b>	Back of Board Mounting
<b>FB</b>	Mild Steel Painted Blue Fabrication
<b>FR</b>	Mild Steel Painted Red Fabrication
<b>FRAL#</b>	Mild Steel Painted to Specific RAL Number
<b>FS</b>	Stainless Steel IP66 Fabrication

Blank squares and additional "-" should be removed from the final part number

**XM2 Unit**



**XMR2 Unit**



**XML2 Unit**

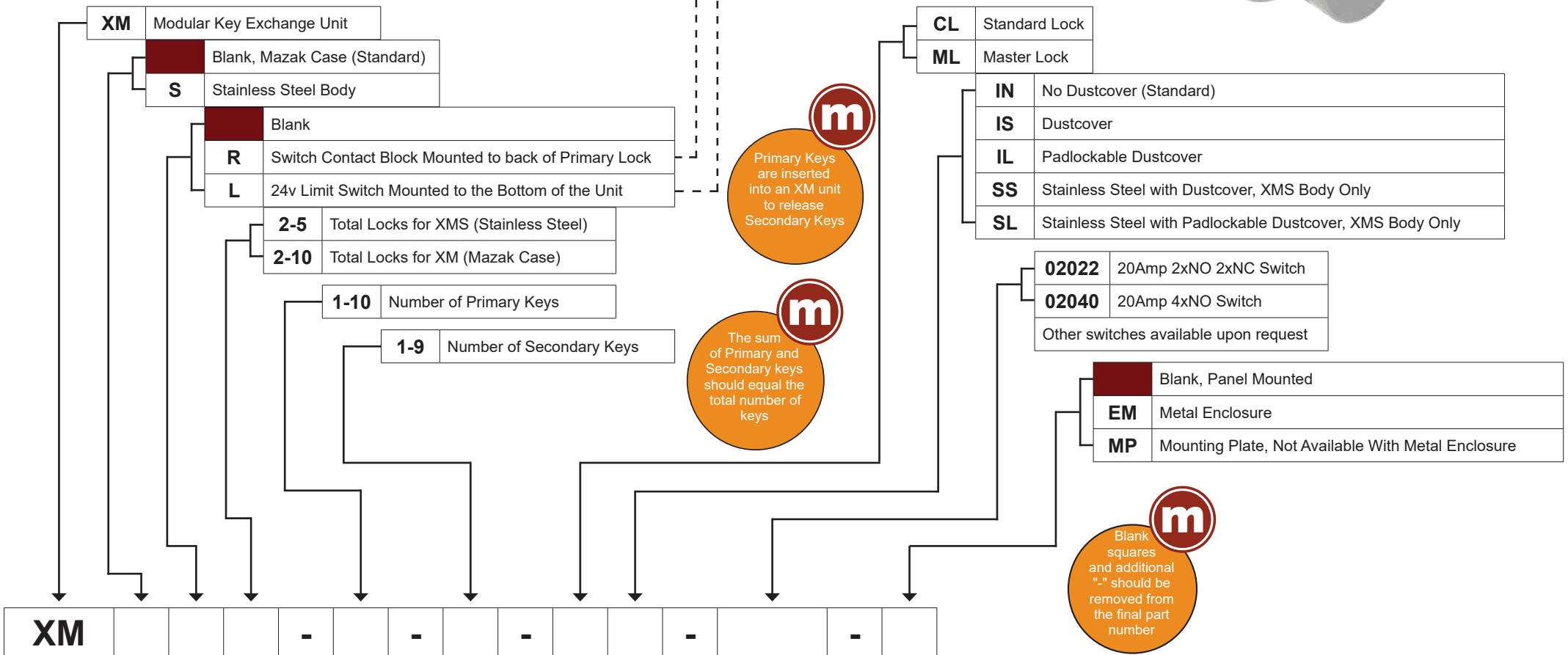


On L versions the switch is 2NC 1NO positive break

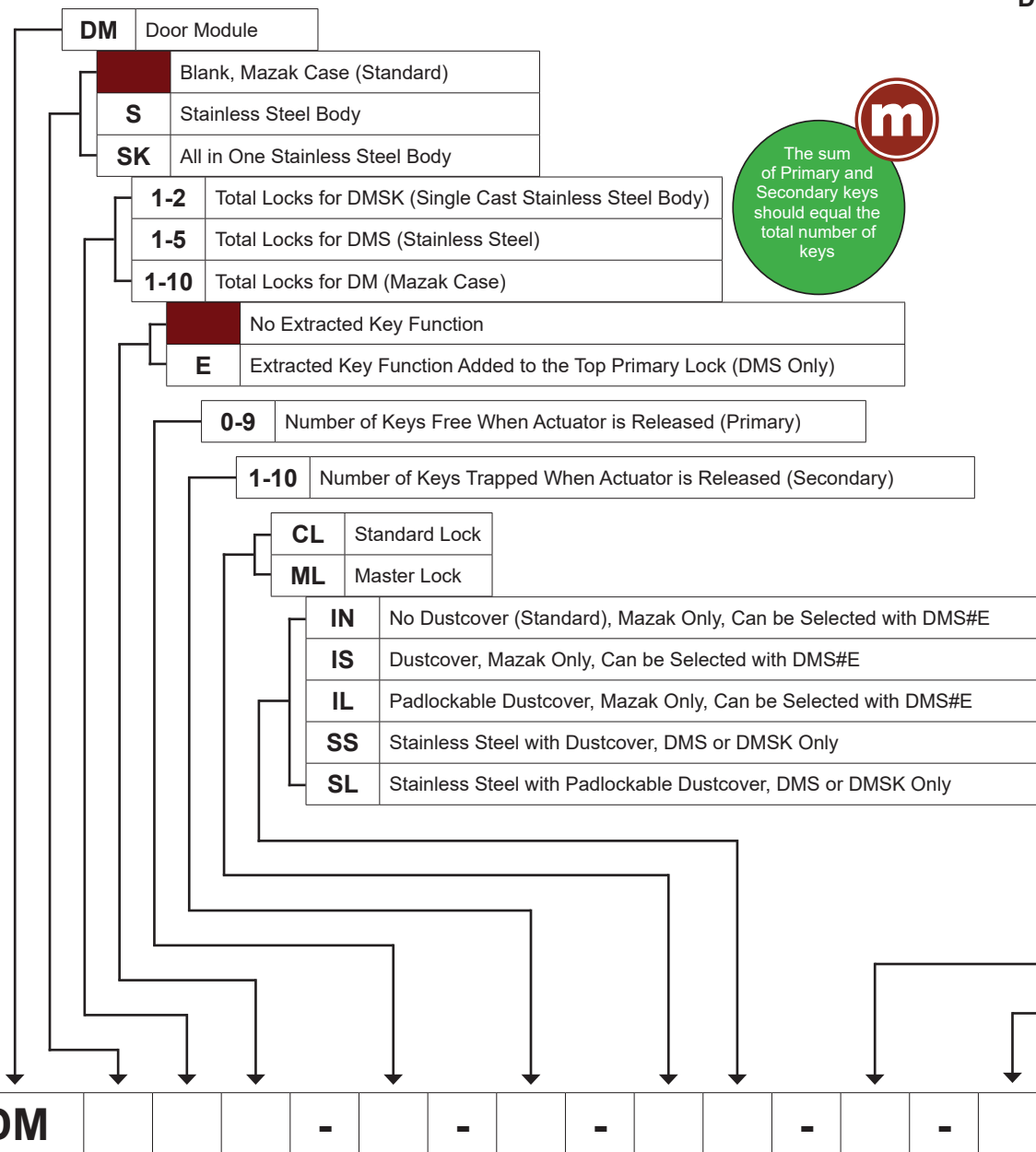
**XMA Unit**



Additional Modules Fitted when multiple locks are selected







**m**  
The sum of Primary and Secondary keys should equal the total number of keys

DM1



DMS1



DMSK1



	Blank, No Actuator
H	DM Hand Actuator
A	DM Hand Actuator with Spring Return
C	DM Compressible Actuator
F	DM Fixed Actuator
S	DM Self-Aligning Actuator

XMA Unit



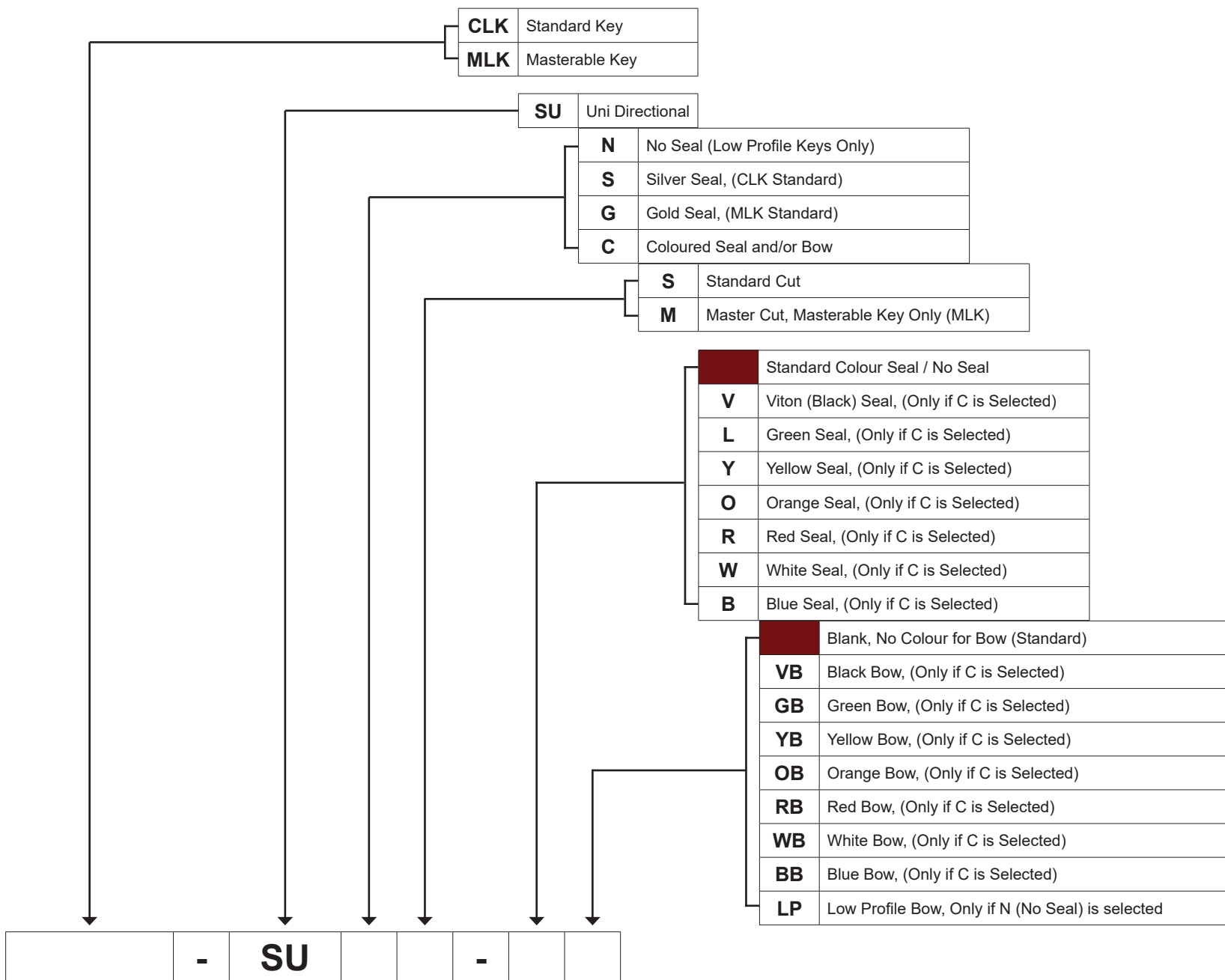
**m**  
Additional Modules Fitted when multiple locks are selected

	Blank, No Actuator
LE	Actuator Left Entry
TE	Actuator Top Entry, Default for A and H actuators
BE	Actuator Rear Entry, Default for C, F, and S actuators
FE	Actuator Front Entry
RE	Actuator Right Entry

**m**  
The head unit on the Door Lock Modules have two access holes, and can rotate 360° at 90° intervals.

	Blank, No Mounting Plate
MP	Mounting Plate

**m**  
Blank squares and additional "-" should be removed from the final part number



**CLK-SUSS**



**MLK-SUGS**



**MLK-SUCS-VYB**



**CLK-SUNS-LP**



**m**  
Blank squares and additional "-" should be removed from the final part number

# Keys and Accessories

Stainless Steel Dust Cover



Part Number

**CLDC**

Stainless Steel Padlockable Dust Cover



Part Number

**PLDC**

Lockout Scissor Hasp



Part Number

**LOS3**

Lockout Scissor Hasp with Cable



Part Number

**LOS3C**

Back of Board Adaptor



Part Number

**M-BOB**

Add-On Lock Module



Part Number

**XMA-CLIN:** Mazak Body, No Dustcover

**XMA-CLIS:** Mazak Body, Dustcover

**XMA-CLIL:** Mazak Body, Padlockable Dustcover

Stainless Steel Add-On Lock Module



Part Number

**XMSA-CLSS:** Stainless Steel Body, Dustcover

**XMSA-CLSL:** Stainless Steel Body, Padlockable Dustcover

## Protecting People, Protecting Productivity



A **Halma** company

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