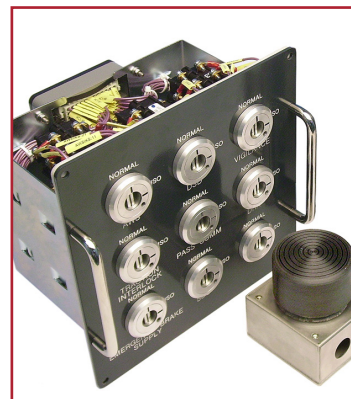
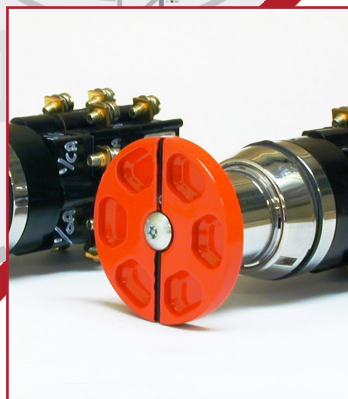
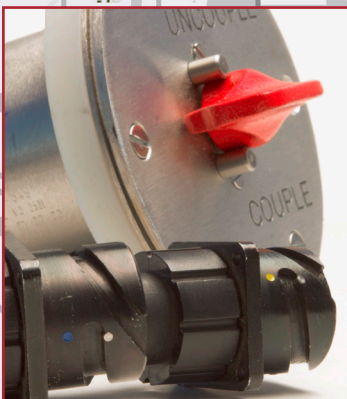
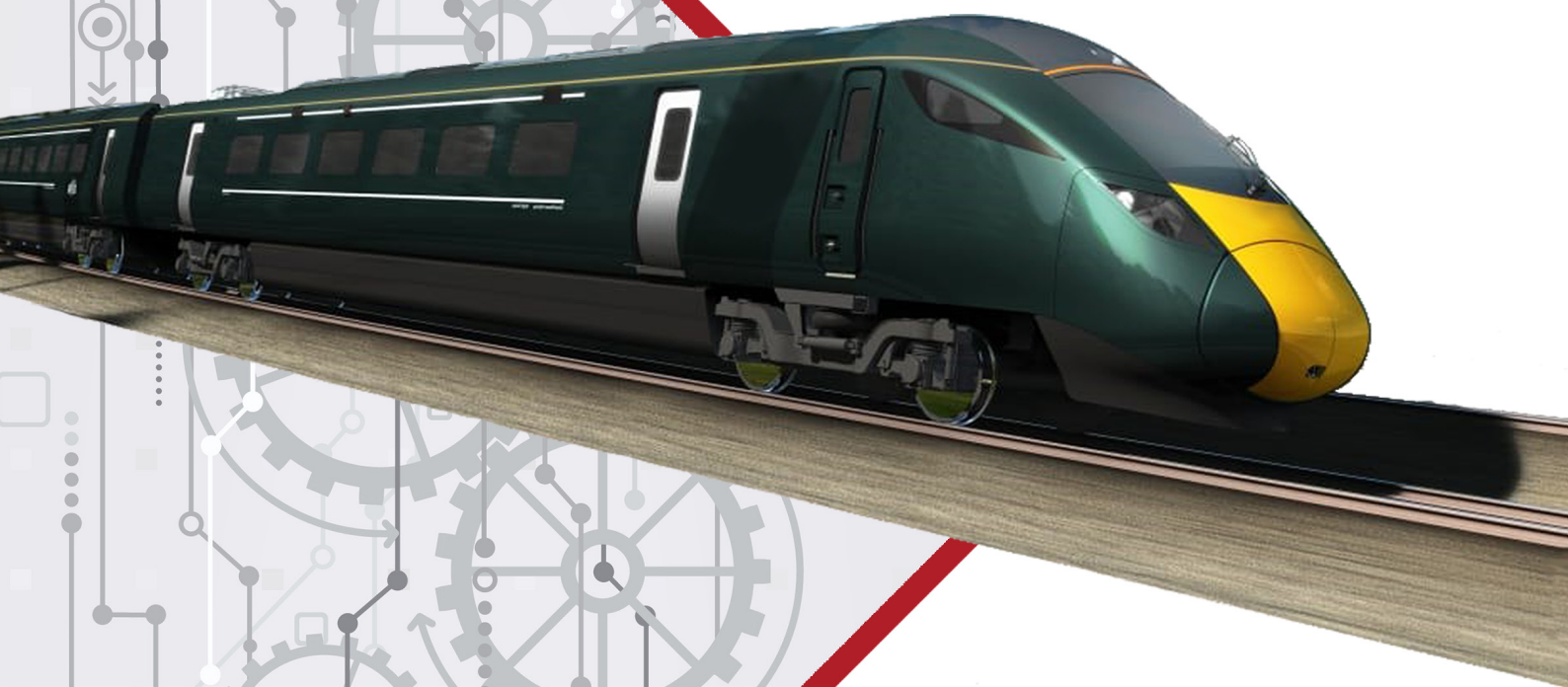


ROLLING STOCK SWITCH & CONTROLGEAR FOR THE RAIL INDUSTRY

BROCHURE 3



CONTENTS

We have a wide variety of products that can cover both rolling stock and infrastructure applications. We can reverse engineer components or equipment to deliver a direct replacement. Working closely with our customers we are able to create innovative products to meet customer specification and fully comply with relevant railways standards.

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MAFELEC

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Photo credit: Hitachi Rail

TRAINCREW OPERATION CONTROLS

R6/R16 AND MINI ROTARY SWITCHES

This range of panel mounted rotary switches cover ratings of 6A, 16A and 20A. They are designed for integration into rolling stock cab desks and control panels.

Craig & Derricott's range of rotary switches have for many years provided the optimal solution for critical electrical switching in rail and rolling stock applications.

The modular contact block design enables a myriad of switching configurations together with the many actuators that features both 'Thumb Knob' and 'Combination Key' actuation with proven reliability. This range of switches remains the first choice for Panel and Cab Desk builders and is integrated into many of the new trains being built in the UK today.



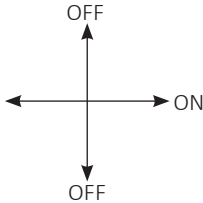
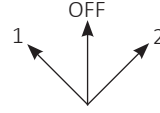

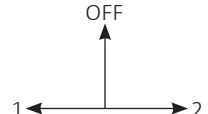
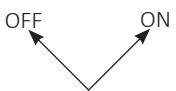
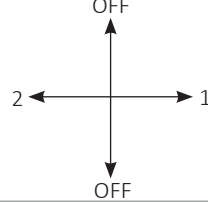
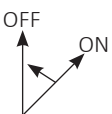
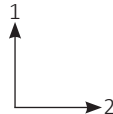

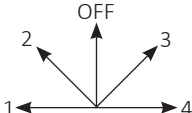
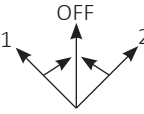
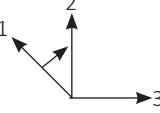
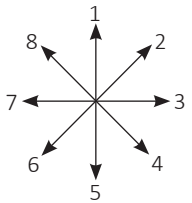
Photo credit: Hitachi Rail

TRAINCREW OPERATION CONTROLS

R6/R16 AND MINI ROTARY SWITCHES

STANDARD INDEXING

The following are examples to show the versatility in combining our contact blocks to precisely give the configuration our customers require; further combinations can be manufactured.

OFF / ON	Seq. No	Position Type	CHANGEOVER	Seq. No	Position Type
	SEQ1	Unrestricted 90° Four Position Stay-Put Off / On / Off / On		SEQ3/3	Restricted 45° Three Position Stay-Put 1 / Off / 2
	SEQ1/1	Unrestricted 90° Two Position Stay-Put Off / On		SEQ 3/4	Restricted 90° Three Position Stay-Put 1 / Off / 2
	SEQ1/2	Restricted 90° / 45° Two Position Stay-Put Off / On		SEQ 3	Unrestricted 90° Four Position Stay-Put Off / 1 / Off / 2
	SEQ1/SR	Restricted 45° Two Position Spring Return Off / On		SEQ 2/1	Restricted 90° Two Position Stay-Put 1 / 2
MULTI-POSITION	Seq. No	Position Type		SEQ 2/SR	Restricted 45° Two Position Spring Return 1 < 2
	SEQ 5/4	Restricted 45° Five Position Stay-Put 1 / 2 / Off / 3 / 4		SEQ 3/SR	Restricted 45° Three Position Spring Return 1 > Off < 2
	SEQ 6/SR	Restricted 45° & 90° Three Position Spring Return 1 > 2 / 3			
	SEQ 1/8	Unrestricted 45° Eight Position Stay-Put 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8			

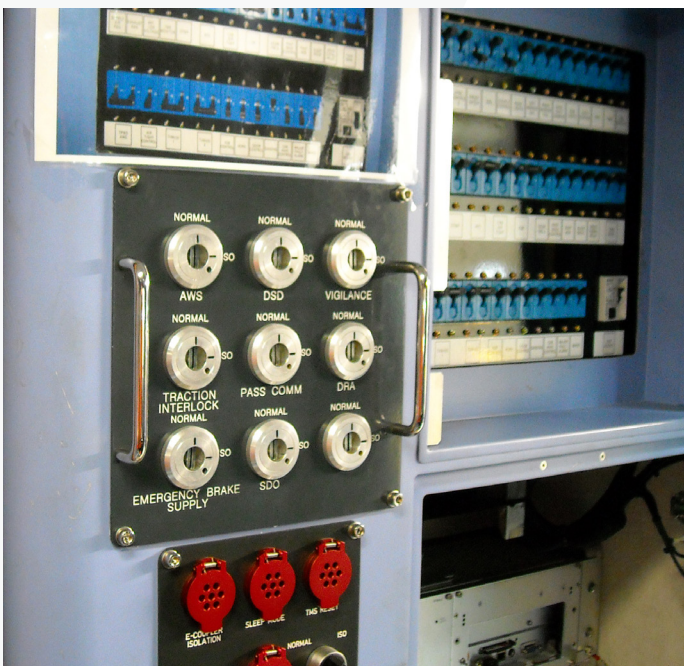
TRAINCREW OPERATION CONTROLS

R6/R16 AND MINI ROTARY SWITCHES

SWITCH TECHNICAL SPECIFICATION

	Unit	Sym.	Category	20A Mini-Rotary	R6	R16
Thermal rating	A	I_{th}		20	6	16
Position indexing options				90° and 45°	90° and 45°	90° and 45°
Rated voltage	V	U_i		690	690	690
Switching characteristics	A	AC20A	250V / 415V	20	6	16
		AC21A	250V / 415V	20	6	16
		AC22A	250V / 415V	20	6	16
		AC23A	250V	20A / 3.75kW	6A / 0.75kW	16A / 2.5kW
			415V	20A / 9.5kW	6A / 2.5kW	16A / 5.5kW
Operational current (DC21)	A	U_e	220V	0.66	-	-
			110V	2.5	-	-
			55V	16.0	-	-
			30V	18.0	-	-
Rated short time withstand	A		1 sec	434	120	240
Max. BS 88 backup fuse	A			32	6	20
Contact material *				Fine Silver	Silver / Nickel	Silver / Nickel
Mechanical cycles			Operational	$> 0.5 \times 10^6$	$> 0.5 \times 10^6$	$> 0.5 \times 10^6$
Terminal size				M4	M3.5	M3.5

* Gold plated contacts available on request



TRAINCREW OPERATION CONTROLS

22 & 30 SERIES ACTUATORS



A range of IP65 robust actuators built to meet the stringent requirements of railway rolling stock standards. Ergonomically designed, this range of actuators gives a clear visual indication of normal and operated status. A robust stainless steel locking cover can be added and of our switches. Switches with gold plated contacts for low current applications can be supplied to special order.

MATERIAL & FINISH

- Zinc die cast body with satin chrome finish
- Aluminium rotary actuator with powder coated paint finish
- N309B1 has a Polyamide Actuator (30mm Ø barrel)

COMPLIANCE

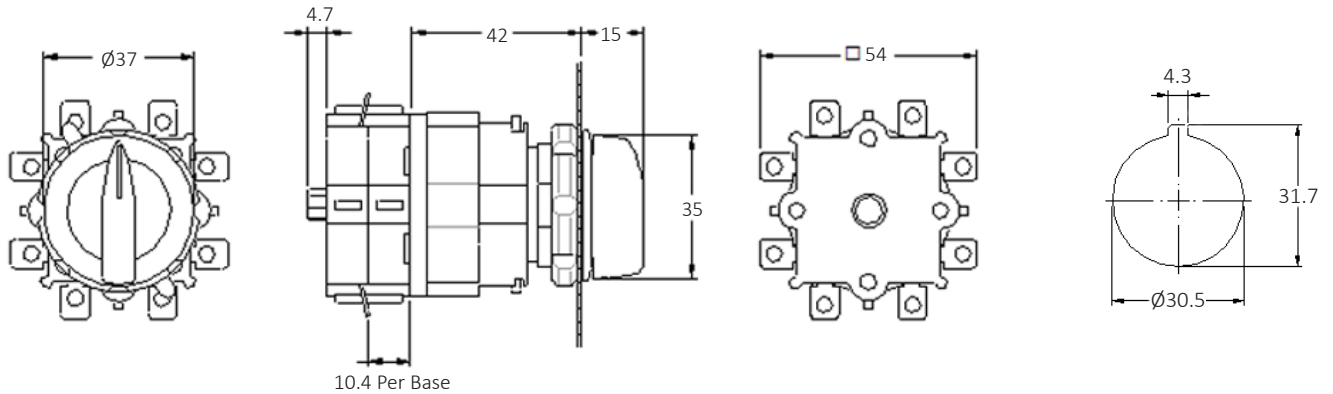
- EN61373 compliant (with rotary switch fitted)
- EN60947-3 compliant (with rotary switch fitted)

	Cat. No.	Description	Barrel	Switch Type
	N309B1	Rotary actuator with an indication line	30mm	20A Mini-Rotary or R6 / R16
	22/ZTF	Full width 'T Bar' knob and line insert switch actuator supplied in a satin black finish with a white indication line	22mm	20A Mini-Rotary
	22/ZT	Full width 'T Bar' knob and half width line insert switch actuator supplied in a satin black finish with a white indication line	22mm	20A Mini-Rotary
	22/ZPL	Extended single sided knob and half width line insert switch actuator supplied in a satin black finish with a white indication line	22mm	20A Mini-Rotary
	22/ZP	Short single sided knob and half width line insert switch actuator supplied in a satin black finish and a white indication line	22mm	20A Mini-Rotary
	TBA 0200	Locking cover for use with N309B1 actuator to prevent unauthorized operation of the switch. Allows for the insertion of two sealing wire/devices. The function of the device can be engraved and specified to the customers requirements. Manufactured from stainless steel.	30mm	-
	MRA 0246	Stainless Steel locking cover for use with 22/Z actuators to prevent unauthorized operation of the switch. Allows for the insertion of two sealing wire/ devices.	22mm	-

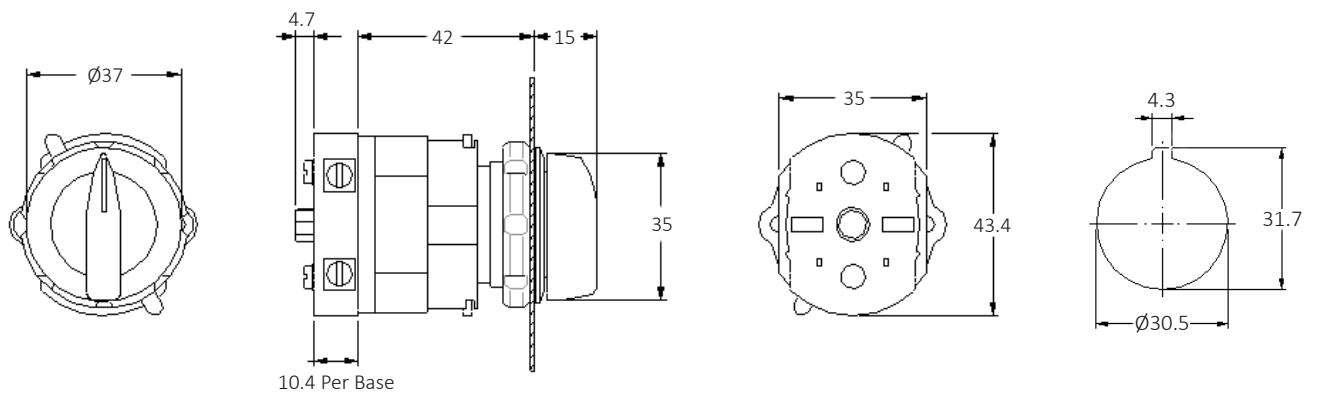
TRAINCREW OPERATION CONTROLS

22 & 30 SERIES ACTUATORS DIMENSIONS

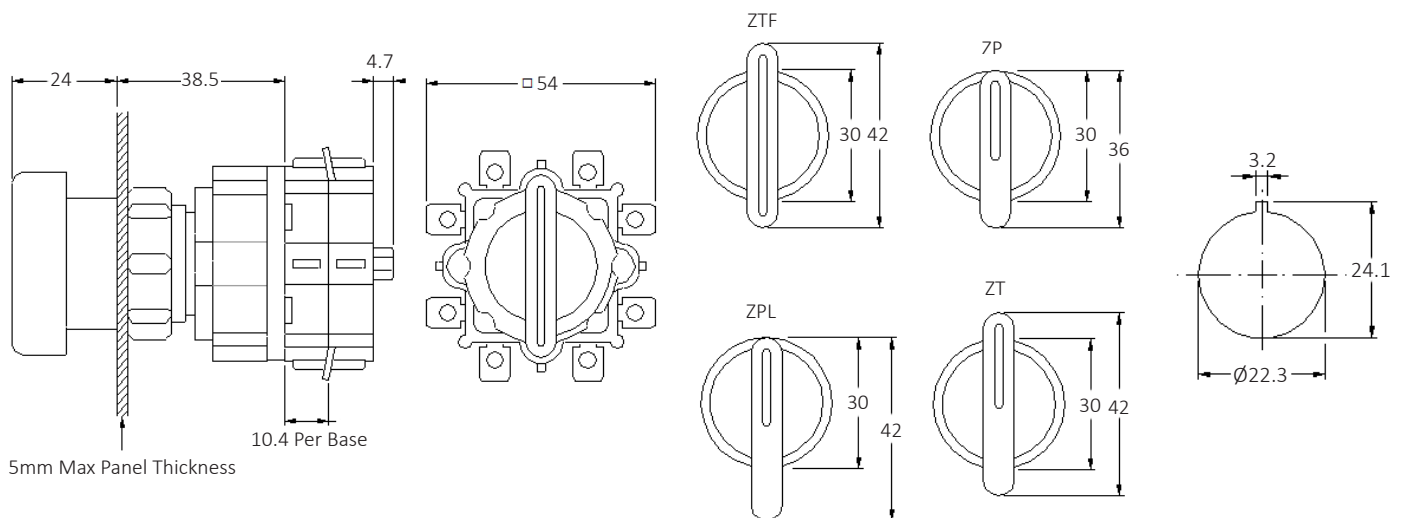
N309B1 WITH 20A MINI-ROTARY



N309B1 WITH R6 / R16 ROTARY SWITCH



ZT / ZP WITH 20A MINI-ROTARY



TRAINCREW OPERATION CONTROLS

300 SERIES SWITCH ACTUATORS

The 300 series switch actuators are designed in both non latching and latching types to prevent resetting without the use of a separate key. These are designed to be used with Mini Rotary and R6/ R16 rotary panel switches and offer options for operations by knob, driver's key or combination key. They are robust to meet the stringent requirements of the Rail Industry.

TYPES

- 331 / 332 knob operated with visual indication of switch position (aluminium barrel)
 - 301 / 302 drivers key operated with visual indication of switch position (aluminium barrel)
 - 303 combination key switch (B key end) with visual indication of switch position (anodised aluminium barrel)
 - 304 combination key switch (A & C key end) with visual indication of switch position (stainless steel barrel)
- *1 When the rotary switch is fitted to the actuator, up to 20 normally open or normally closed contacts or other combinations (10 switch bases) to meet customer applications can be configured, this will also vary the length of the switch.
- Normally Closed *NC
 - Normally Open *NO
 - Normally Closed and Normally Open *NC-*NO


PART NUMBER CONFIGURATION

There are many standard switch sequences available and almost any switching configuration can be accommodated by contacting the Internal Sales team. Switches can be supplied with Gold plated contact for low current applications. Add the number of contacts to the part number to create your switch sequence.

E.g. 331KK3-4NO-4NC | 302DK1-2NO | 304DK1-3NC






COMPLIANCE

- EN61373 Compliant (with Rotary switch fitted)
- EN60947-3 Compliant (with Rotary switch fitted)

	Cat. No.	Description	Latch Type	Panel Fixing
	331KK3- ^{*1}	Non-latching knob operation 2 position switch in a satin chrome finish with a black indication line.	Non-latching	Ø30.5 single hole
	331KK4- ^{*1}	Non-latching knob operation 2 position switch supplied in a matt black anodised finish with a white indication line. (Image shown as satin chrome finish).	Non-latching	Ø30.5 single hole
	332KK3- ^{*1}	Latching knob operation 2 position switch supplied in a satin chrome finish with a black indication line. Resetting is only possible by using the high security key actuator which is inserted from the front of panel.	Latching in operated position	Ø30.5 single hole
	332KK4- ^{*1}	Latching knob operation 2 position switch supplied in a matt black anodised finish with a white indication line. Resetting is only possible by using the high security key actuator which is inserted from the front of panel. (Image shown as satin chrome finish).	Latching in operated position	Ø30.5 single hole
	301DK1- ^{*1}	Non-latching drivers key operation 2 position switch actuator supplied in a satin chrome finish with a black indication line.	Non-latching	Ø30.5 single hole
	301DK2- ^{*1}	Non-latching drivers key operation switch actuator supplied in a matt black anodised finish with a white indication line. (Image shown as satin chrome finish).	Non-latching	Ø30.5 single hole

TRAINCREW OPERATION CONTROLS

300 SERIES SWITCH ACTUATORS

	Cat. No.	Description	Latch Type	Panel Fixing
	302DK1- ^{*1}	Latching drivers key operation switch actuator supplied in a satin chrome finish with a black indication line. Resetting is only possible by using the high security key actuator which is inserted from the front of panel.	Latching in operated position	Ø30.5 single hole
	302DK2- ^{*1}	Latching drivers key operation switch supplied in a matt black anodised finish with a white indication line. Resetting is only possible by using the high security key actuator which is inserted from the front of panel. (Image shown as satin chrome finish).	Latching in operated position	Ø30.5 single hole
	303DK1- ^{*1}	Combination key operated non-latching switch supplied in stainless steel. This switch is operated by the B end of the combination key.	Non-latching	Ø30.5 single hole
	304DK1- ^{*1} /SR	Combination key operated spring return switch supplied in stainless steel. This switch is operated by the Gated key 'A end' of the combination key.	Spring Return	Ø30.5 single hole
	304DK1- ^{*1}	Combination key operated stay-put switch supplied in stainless steel. This switch is operated by the Gated key 'A end' of the combination key.	Stay-Put	Ø30.5 single hole
	304DK2- ^{*1} /SR	Combination key operated spring return switch supplied in stainless steel. This switch is operated by the Carriage key 'C end' of the combination key.	Spring Return	Ø30.5 single hole
	304DK2- ^{*1}	Combination key operated stay-put switch supplied in stainless steel. This switch is operated by the Carriage key 'C end' of the combination key.	Stay-Put	Ø30.5 single hole
	PMLR-U94-M ^{*1}	Aluminium emergency push button actuator supplied with a red painted finish and integral Rotary switch. When the actuator is pushed, the switch contacts change state and the actuator twists to a latched position. A separate anti-clockwise rotation of the actuator resets the switch. The switch can be fitted with a shroud to prevent accidental operation. The actuator features finger dimples to facilitate reset when the shroud is fitted.	Latch Before Break	Ø32 single hole

Combination Key Ends



A End



B End

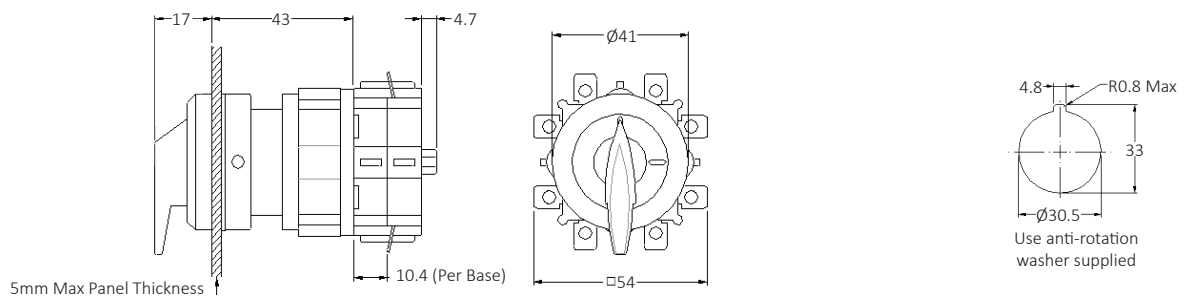


C End

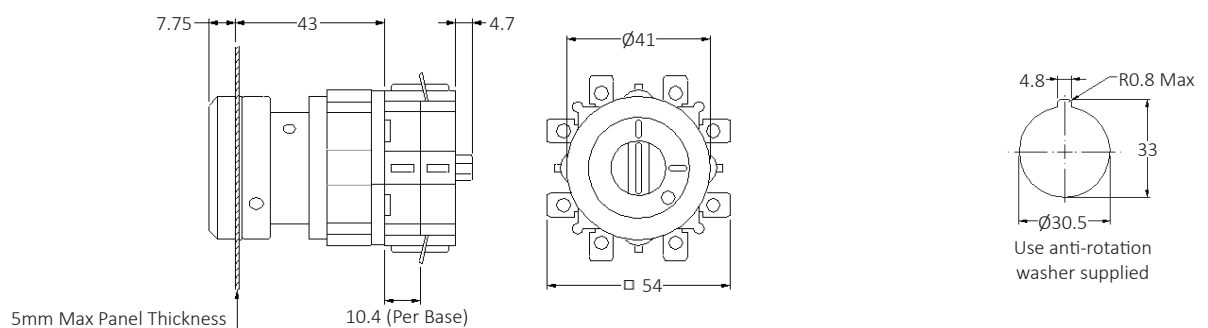
TRAINCREW OPERATION CONTROLS

300 SERIES SWITCH ACTUATORS DIMENSIONS

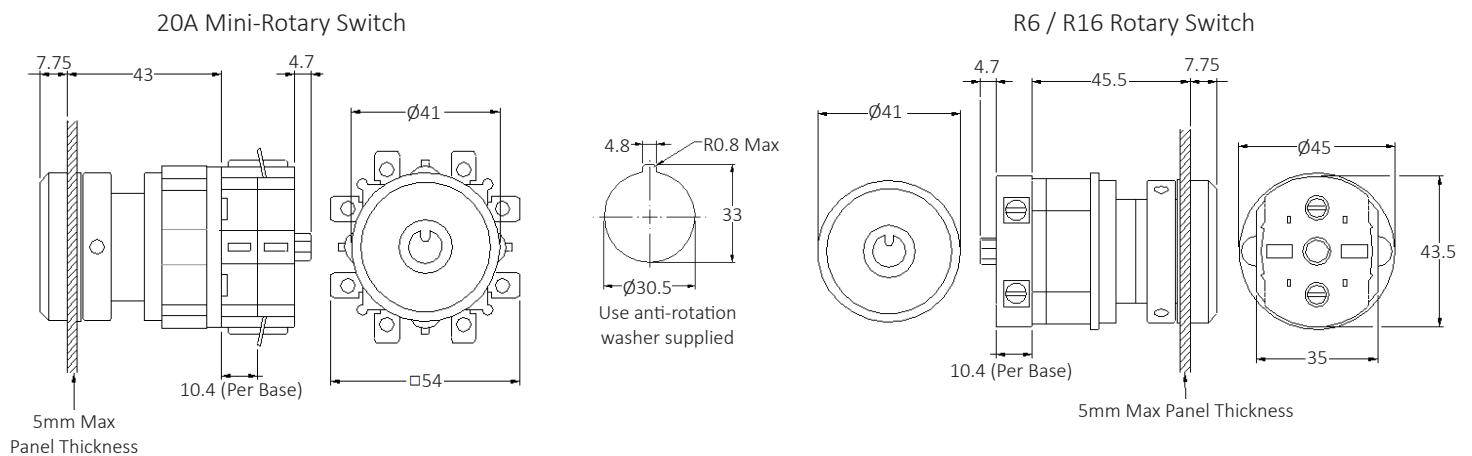
331KK / 331KK DRIVERS KEY SWITCH



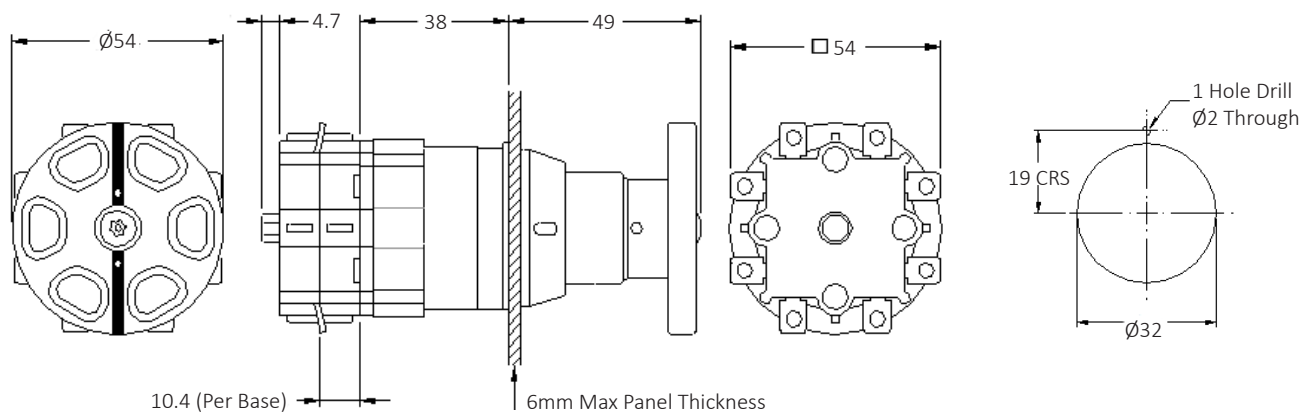
301DK / 302DK DRIVERS KEY SWITCH



303DK / 304DK DRIVERS KEY SWITCH



PMLR EMERGENCY PUSH BUTTON



TRAINCREW OPERATION CONTROLS

CUSTOMER ROTARY SWITCH DESIGN ENQUIRY FORM

Craig & Derricott recognise the bespoke nature of switching requirements within Rail projects and are perfectly set up to respond to its customers need for customisation. The following pages can be used to indicate your switch and configuration requirements. Please email completed forms to sales@craigandderricott.com.

CUSTOMER DETAILS

CONTACT NAME	
COMPANY	
ADDRESS	
TELEPHONE	
EMAIL	
ADDITIONAL NOTES	

ELECTRICAL PARAMETERS

CURRENT RATING	<input type="checkbox"/> R6 / 6A	<input type="checkbox"/> R16 / 16A	<input type="checkbox"/> MR / 20A
CURRENT TYPE	<input type="checkbox"/> A.C.	<input type="checkbox"/> D.C.	
SWITCHING CURRENT			
WORKING VOLTAGE			

MECHANICAL PARAMETERS

IP65 SEALING	<input type="checkbox"/> YES	<input type="checkbox"/> NO		
ACTUATOR	30 SERIES Ø30.5MM PANEL DRILLING	<input type="checkbox"/> N309B1		<input type="checkbox"/> OPTIONAL LATCH COVER TPA0200
	22 SERIES Ø22MM PANEL DRILLING	<input type="checkbox"/> 22/ZT	<input type="checkbox"/> 22/ZTF	<input type="checkbox"/> 22/ZP <input type="checkbox"/> 22/ZPL
				<input type="checkbox"/> OPTIONAL LATCH COVER TPA0246
	300 SERIES Ø30.5MM PANEL DRILLING	<input type="checkbox"/> 331KK	<input type="checkbox"/> 332KK	<input type="checkbox"/> 301DK <input type="checkbox"/> 302DK
		<input type="checkbox"/> 303DK	<input type="checkbox"/> 304DK	
FINISH	<input type="checkbox"/> SATIN CHROME	<input type="checkbox"/> MATT BLK ANODISED	<input type="checkbox"/> OPTIONAL LATCH RESET KEY CDK1	

SWITCH CONFIGURATION

NO OF SWITCH POSITIONS	<input type="checkbox"/> RESTRICTED	<input type="checkbox"/> UNRESTRICTED	
SPRING RETURN?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> 45° SWITCH ONLY

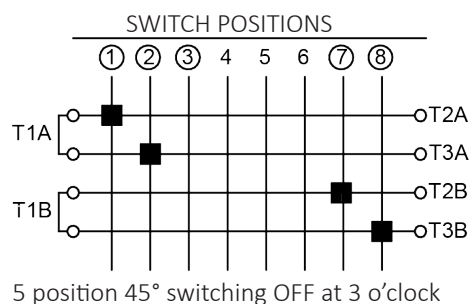
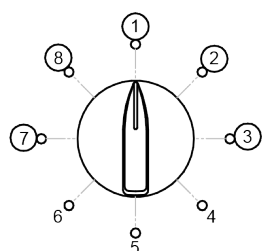
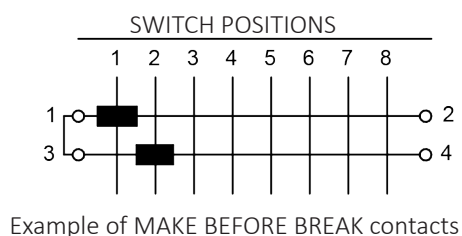
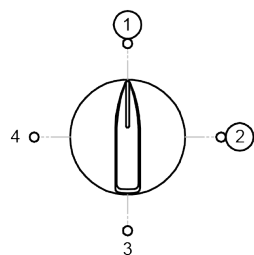
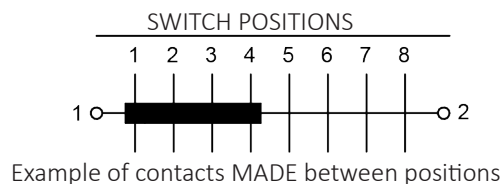
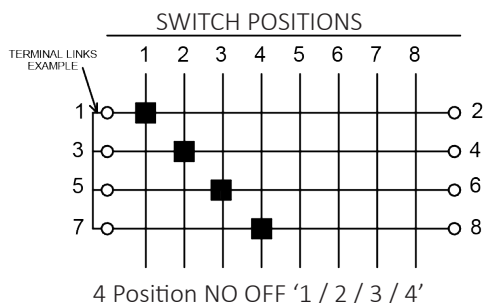
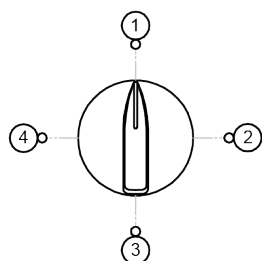
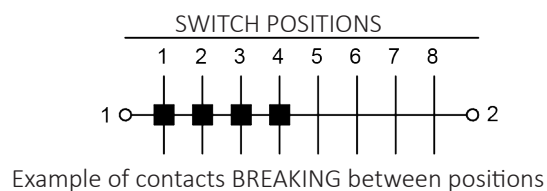
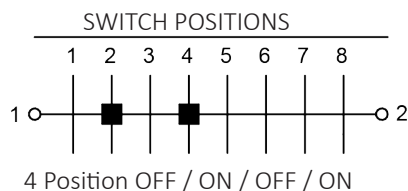
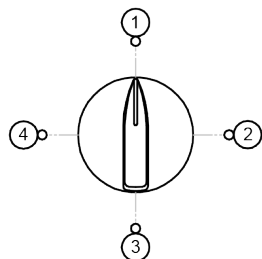
INDICATOR PLATES

INDICATOR PLATE?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
IF YES, PLEASE SHOW THE DETAIL REQUIRED			

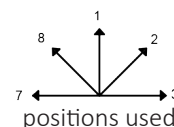
TRAINCREW OPERATION CONTROLS

CUSTOMER ROTARY SWITCH DESIGN ENQUIRY FORM

We have shown some typical arrangements below to help with laying out your requirements. If you feel that your precise requirements cannot be easily depicted this way, then please attach any supporting information that may help.



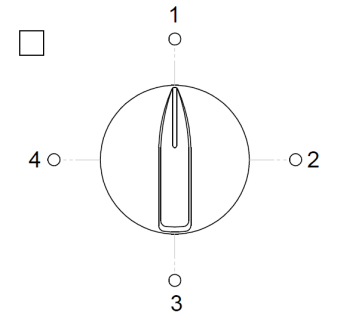
Example indication a restricted five position rotary switch. Unique terminal markings and external links shown.



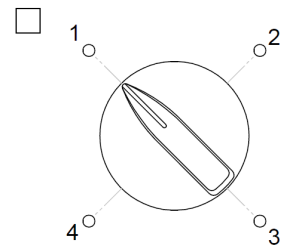
TRAINCREW OPERATION CONTROLS

CUSTOMER ROTARY SWITCH DESIGN ENQUIRY FORM

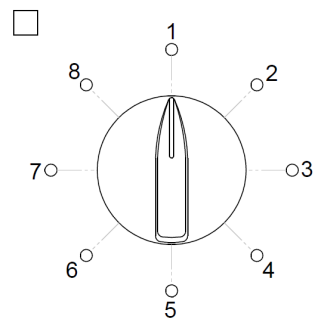
Add your terminal markings here, we will include if possible.
If no markings are shown we will adopt our standard marking system.

[illegible]

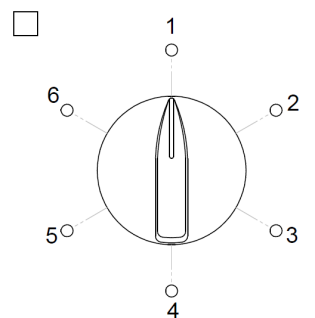
90° upto 4 positions (REF 12 o'clock)



90° upto 4 positions (REF 10.30)



60° upto 6 positions (REF 12 o'clock)



45° upto 8 positions (REF 12 o'clock)

Spring return available Pos. 2 to 1

Spring return available Pos. 8 to 1

TRAINCREW OPERATION CONTROLS






30 SERIES HEAVY DUTY PUSHBUTTON ACTUATORS

These heavy duty low projection actuators are designed specifically for panel or cab desk installation and designed to accept modular contact blocks.

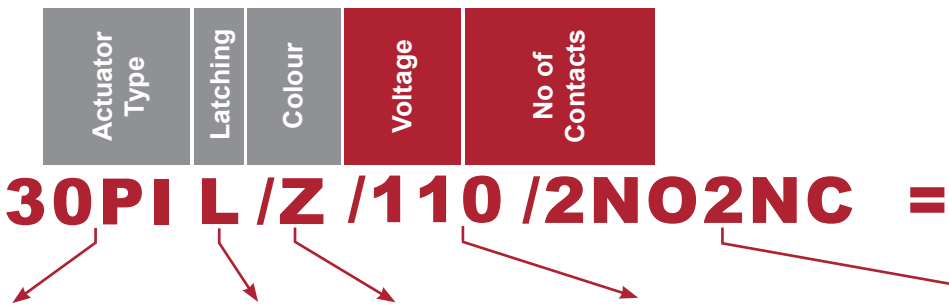
FEATURES AND BENEFITS

- Various AC & DC indicators and illuminated pushbuttons
 - Round low projection bezels
 - Die cast housing and locking rings
 - Quick release contact block adaptor
 - High quality satin finish
- Square low projection bezels available on request
 - Sealing to IP65
 - EN61373 Compliant (with contact blocks fitted)
- See page 16 for contact block options

See page 18 for current rating options

	Cat. No.	Description	No of Contacts
	30P	Pushbutton actuator available in a variety of colours. For your switch to be latching rather than momentary please add 'L' to the part number.	Max 3 NCDT Type or Max 4 M Type
	30PI	Illuminated Pushbutton actuator available in a variety of colours and voltages. For your switch to be latching rather than momentary please add 'L' to the part number.	Max 3 NCDT Type or Max 4 M Type
	30M	Mushroom actuator available in a variety of colours. Textured button surfaces are available to special order	Max 3 NCDT Type
	30I	Indicator available in a variety of colours and voltages.	N/A
	30T	Red Twist-to-Reset actuator.	Max 3 NCDT Type

PART NUMBER CONFIGURATOR



30P — Pushbutton

30PI — Pushbutton Illuminated

30M — Mushroom

30I — Indicator

30T — Twist-to-Reset

For your switch to be maintained rather than momentary please add 'L' to the part number.

R — Red
B — Black
G — Green
W — White
Y — Yellow
Z — Blue

12 — 12VDC
24 — 24VDC
48 — 48VDC
110 — 110VDC
240 — 240VDC

2NO — 2 Normally open
2NC — 2 Normally closed
1NO1NC — 1 Normally open / 1 Normally closed
2NO2NC — 2 Normally open / 2 Normally closed

For AC add 'A' the number e.g. 240A- 240VAC
Applicable for Indicator & illuminated push buttons only. Other voltages available on request.

Up to 3 contact blocks are available on request. Not applicable for Indicators only.

TRAINCREW OPERATION CONTROLS

30 SERIES HEAVY DUTY PUSHBUTTON CONTACT BLOCKS

The contact block is designed to be fitted to the 30 series Heavy Duty pushbutton actuators and are supplied in various formats to suit the rail application.

The NCDT*** Type switch contact blocks are available in various normally open or normally closed configurations and are stackable up to 3 tiers.

The M** latching type switch contact blocks are available in both normally open and normally closed configurations and can be fitted using the MHR_5C holders. Illuminated types are provided using MFL and ML units.

	Cat. No.	Description	Range	No of Contacts
	NCDT1/RT	Contact block with mounting screws	NCDT	1NO/1NC
	NCDT2/RT	Contact block with mounting screws	NCDT	2N/O
	NCDT3/RT	Contact block with mounting screws	NCDT	2N/C
	MTI	Modular Contact Block, Momentary	M Type	1N/O
	MTO	Modular Contact Block, Momentary	M Type	1N/C
	MFL	Latching Lamp Module- BA9s- When used as the centre element in the module holder, it provides a maintained unit with the adjacent momentary type modules. Max. 250V 2W	M Type	-
	MF	Latching Module - When used as the centre element in the module holder, it provides a maintained unit with the adjacent momentary type modules.	M Type	-
	MHR_5C	M Type: Holder for 5 Modules with fitting screws N.B. Not suitable for Emergency Stop use	M Type	-

TRAINCREW OPERATION CONTROLS

30 SERIES HEAVY DUTY PUSHBUTTON ACCESSORIES

Accessories are available for all pushbutton actuators and illuminated push buttons.

	Cat. No.	Description
	TBC 0089	Contact Block Terminal Cover (For all NCDT contact blocks only)
	TBC 0307	Sheet steel panel locking ring tightening tool Side access tool
	TBC 0308	Panel locking ring tightening tool
	TBC 0361	Push button actuator release tool (yellow clip)
	TBC 0260	Stainless steel full shroud (For 30 Series push button actuators)
	TBC 0226	Aluminium half shroud (For 30 Series push button actuators)

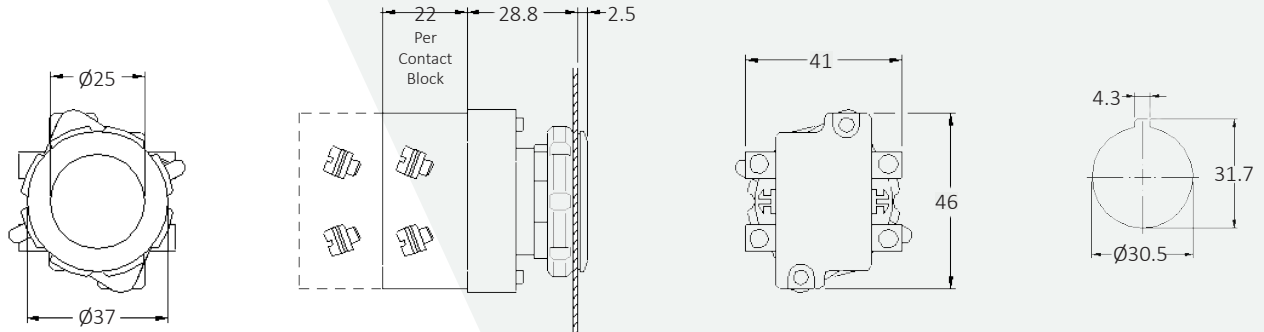
30 SERIES TECHNICAL SPECIFICATION

Application	Unit	Sym	NCDT Type		M Type						
			a.c.	d.c.	a.c.		d.c.				
Utilisation Category			AC15	DC13	AC15		DC13				
Rated Insulation Voltage	U_i	V	660	660	600		600				
Rated Operational Voltage	U_e	V	250	120	250	440	24	60	125	250	440
Rated Operational Current	I_e	A	4	1	3	1.6	2	1	0.4	0.2	0.12
Breaking Capacity	I_e		-	-	10		1.1				
Continuous thermal current	I_{th}	A	10	10	16		16				

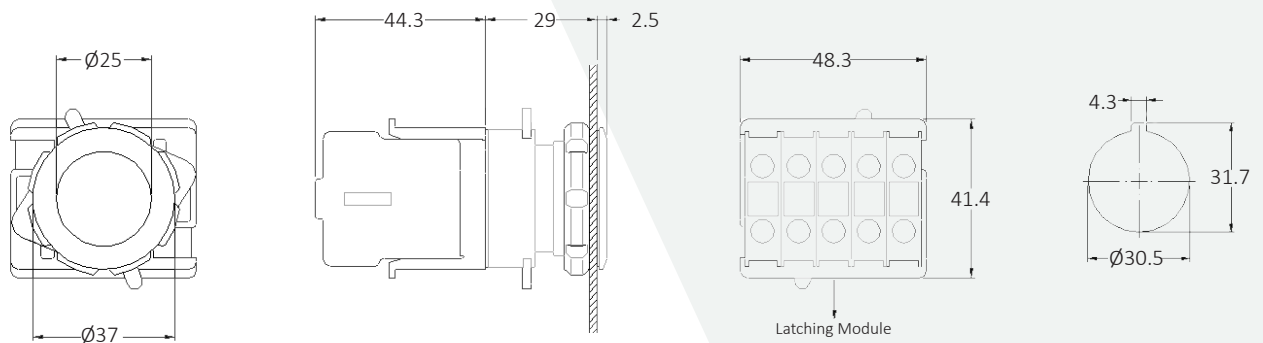
TRAINCREW OPERATION CONTROLS

30 SERIES HEAVY DUTY PUSHBUTTON ACTUATORS DIMENSIONS

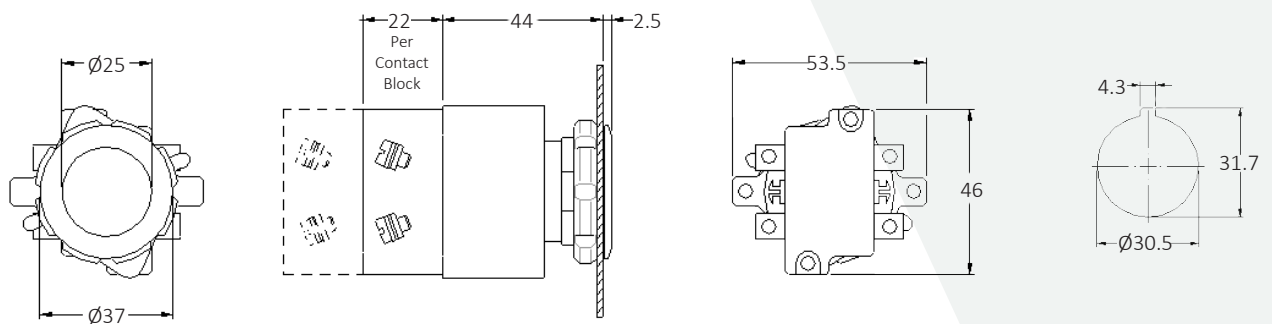
ROUND NON ILLUMINATED PUSHBUTTON ACTUATOR WITH NCDT TYPE CONTACT BLOCKS



ROUND NON ILLUMINATED PUSHBUTTON ACTUATOR WITH LATCHING M TYPE CONTACT BLOCKS



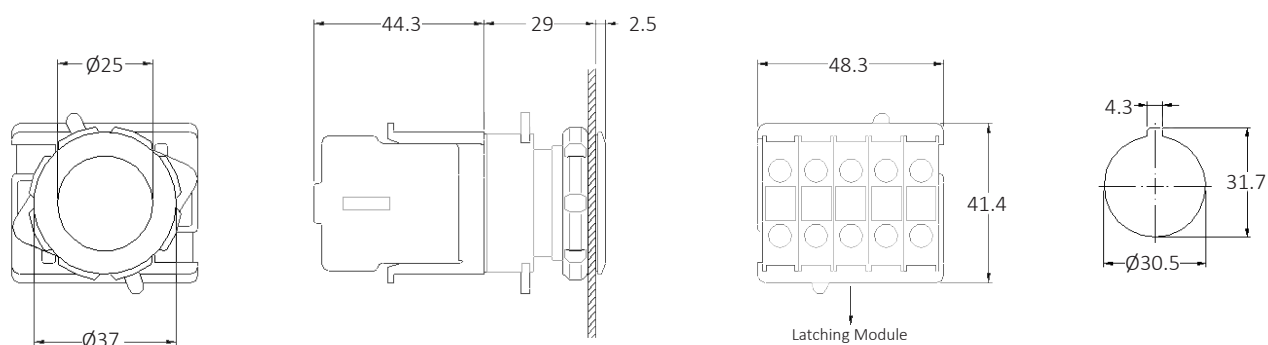
ROUND ILLUMINATED ACTUATOR WITH NCDT TYPE CONTACT BLOCKS



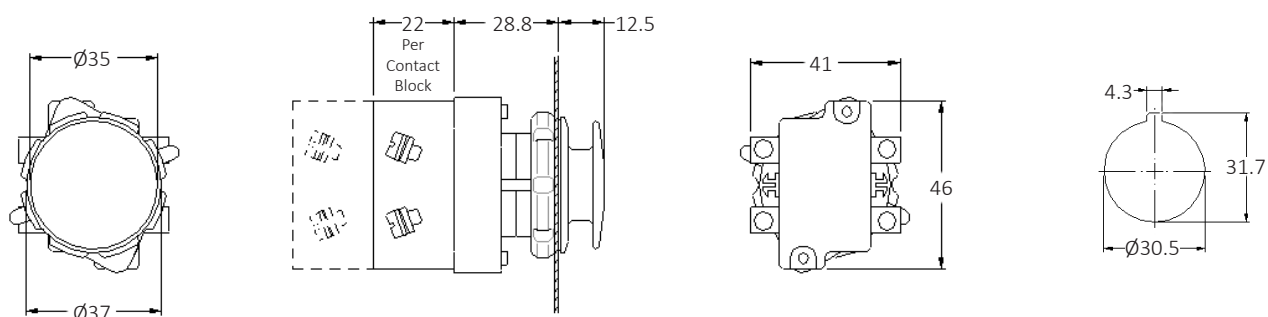
TRAINCREW OPERATION CONTROLS

30 SERIES HEAVY DUTY PUSHBUTTON ACTUATORS DIMENSIONS

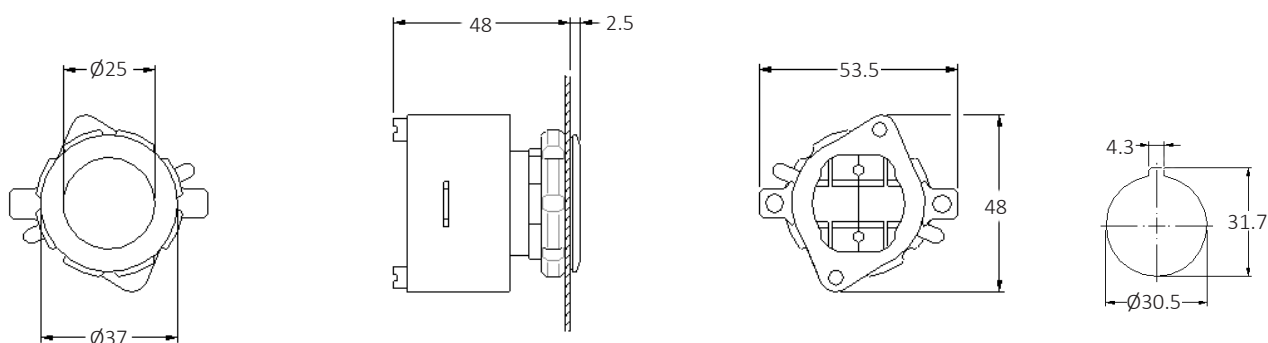
ROUND ILLUMINATED ACTUATOR WITH LATCHING M TYPE CONTACT BLOCKS



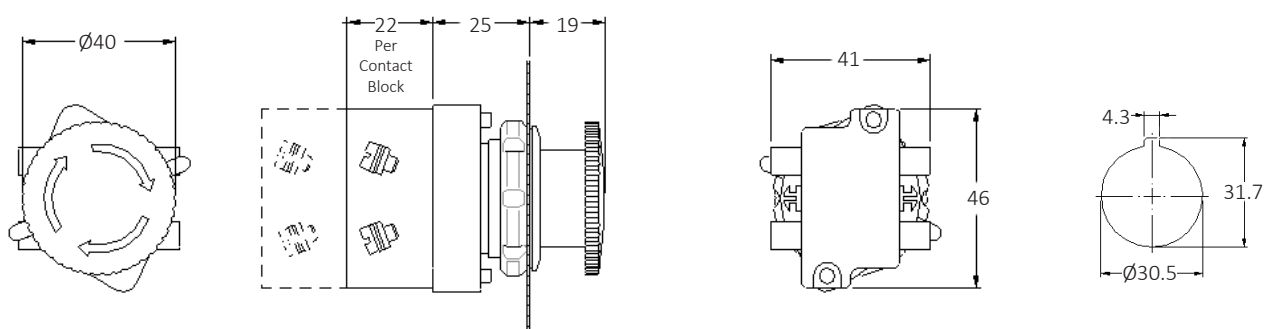
ROUND MUSHROOM PUSHBUTTON ACTUATOR WITH NCDT TYPE CONTACT BLOCKS



ROUND INDICATOR LAMP



TWIST-TO-RESET ACTUATOR WITH NCDT TYPE CONTACT BLOCKS



TRAINCREW OPERATION CONTROLS

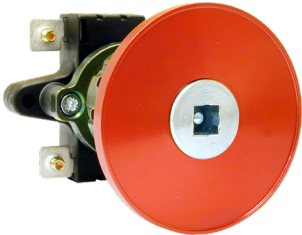
KEY RESET ACTUATOR AND SNAP ACTION SWITCH

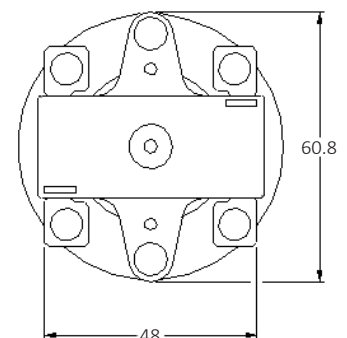
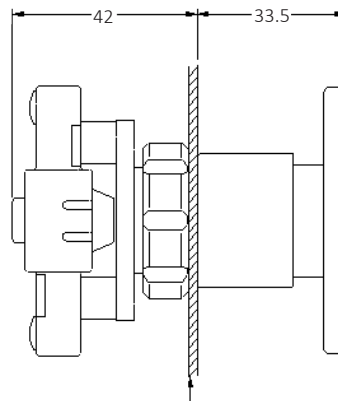
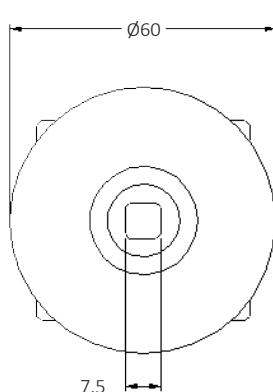
The standard switch is supplied with 1 normally open and 1 normally closed contacts. Other colours, shapes and diameters are available on request. The unit is designed to latch when operated and can be supplied with either 'A' or 'C' end key operation of the drivers combination key to reset / release.

FEATURES AND BENEFITS

- Button material- Aluminium
- Mounting hole- $\varnothing 22.5$
- Contacts- 1 N/O + 1 N/C
- Panel sealing- IP65
- Terminal size- M4
- Mechanical life- Up to 10 x 106 operations

KEY RESET ACTUATOR AND SNAP ACTION SWITCH TECHNICAL SPECIFICATION

	Sym.	Unit	Category		
 <p>Rated operational power (BS EN 60947-3)</p>	A	I_{the}	Pf / T.C.	20	
	AC	V / A	0.75-0.78 lag	24V	20A
				48V	20A
				64V	20A
				110V	20A
				240V	20A
	AC	V / A	Resistive	24V	20A
				48V	20A
				64V	20A
				110V	20A
				240V	20A
	DC	V / A	15mS T.C.	24V	-
				48V	-
				64V	-
				110V	3A
				240V	-
	DC	V / A	Resistive	24V	20A
				48V	20A
				64V	20A
				110V	4A
				240V	0.5A



TRAINCREW OPERATION CONTROLS

DRIVERS REMINDER APPLIANCE (DRA) SWITCH

A driver's reminder appliance (DRA) is a manual switch in the driving cab of a passenger train. When operated it glows bright red and prevents the driver from being able to apply power. Train drivers are required to "set" the DRA when they stop their train either at a red signal or after passing a caution signal. When set, the DRA serves to remind the driver to seek authority proceed or to proceed at caution. The driver must "reset" the DRA to be able to apply traction power.

Many train builders and operators are moving away from push-pull switches and are opting for rotary switches which require a smaller footprint on the driver's desk.

Craig & Derricott offers a range of rotary DRA switches which can be supplied in a wide variety of mechanical and electrical configurations to suit the needs of individual vehicles and operators. They can be provided as switches alone, or pre-wired to a harness and connector and optionally fitted in a bespoke panel to provide a drop-in solution for new build and retrofit applications.

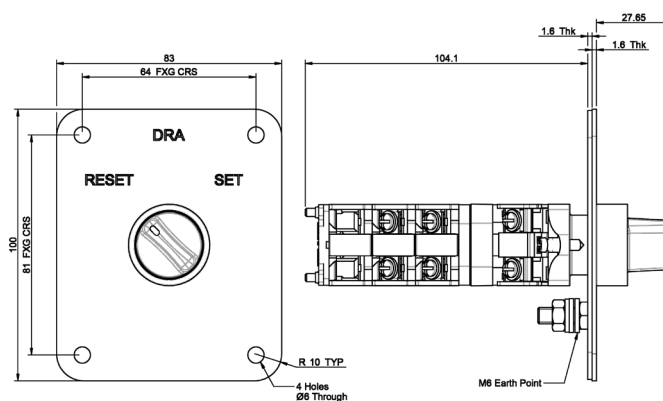
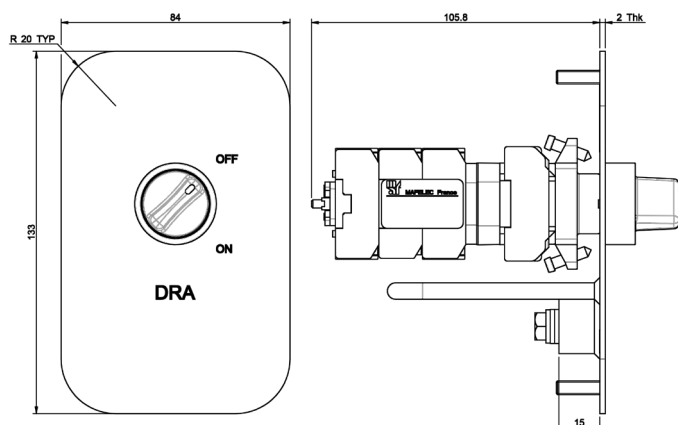
DRA SWITCH TECHNICAL SPECIFICATION

	Sym.	Unit	Category	TPA0431 / TPA0415
Rated thermal current	I_{th}	A		20
Rated insulation voltage	U_i	V		630
Rated surge voltage	U_{im}	kV		6
Operating power			AC-12	230V/15A & 400V/8A
			AC-15	230V/8A & 400V/8A
			DC-12	24V/15A & 110V/8A
			DC-15	24V/4A & 110V/1A
Switch type				Ø22 with illuminated head
Contact operation type				Slow make depending action
Operational voltage of LED circuit		V		24- 48
No of LEDs				2
Max. no of contacts				16 (8 stacks)
Operating temp.		°C		-40°C to +70°C
Service life				300,000 operations
Connection			Screw and bracket	min 1x 0.22 mm ²
			Single or double	max. 2x2.5 mm ²
				6.35 mm clip
				Special connection on request



TPA0431 - DRA SWITCH

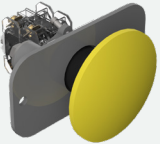


TPA0415 - DRA SWITCH



TRAINCREW OPERATION CONTROLS

FOOTSWITCHES

Craig & Derricott manufacture a wide range of footswitches which typically find applications in the driver's footwell and as door controls. The table below gives some examples of the breadth and versatility of the range, please contact us to discuss your specific requirements.

	Cat. No.	Description
	TPA 0006 + TPA 0007	Passenger emergency footswitch installed in the drivers cab.
	TPA 0407 + TPA0425	Low profile IP65 footswitch installed on the floor outside the Internal Kitchen Door in the First Class Catering Car. They are foot operated to enable handsfree access by the train crew catering service. The press to operate sealed switch is housed in an IP65 grey powder coated mild steel enclosure with an easy fit 4 way Deutsch connector.
	TBA 0261	Robust heavy duty brake override footswitch, supplied in IP65 stainless steel casing.

FOOTSWITCHES TECHNICAL SPECIFICATION

	Unit	TPA0006	TPA0007	TPA0407 / TPA0425	TBA0261
Application		Passenger emergency override with mounting panel	Passenger emergency override with mounting panel- Classes 357, 375, 376, 377, 378, 379, 387	Catering car galley door- Hitachi IEP	Passenger emergency override- Hitachi
Function		1 x N/O, 1 x N/C, 2 x C/O	1 x N/C, 1 x C/O	1 x C/O	2 x N/O, 2 x N/C
Cable length (m)		1.5	1.5	Cable connection is internal	Supplied without wiring.
Cable csa (mm2)		1.5	1	0.5	Supplied without wiring.
Termination		Entrelec 12-way socket	Deutsch 6-way socket	Deutsch 4-way plug and socket	Direct to contact blocks
Maximum voltage (AC, resistive load)	V	600	600	250	See NCDT on pg16
Rated current (thermal)	A	10	10	7.5	See NCDT on pg16
Minimum whetting current	mA	10	10	1 mA @ 4 V	See NCDT on pg16
Utilisation power ratings		AC 15: 230 / 400 V- 8 / 4 A DC 13: 24 V / 10 A	AC 15: 230 / 400 V- 8 / 4 A DC 13: 24 V / 10 A	12 V dc: 6 A resistive / 6 A inductive @ L/R = 5 mS. 24 V dc: 6 A resistive / 5 A inductive @ L/R = 5 mS.	See NCDT on pg16
Contact plating		Ag/Ni, optional gold flash	Ag/Ni, optional gold flash	Gold flash over Ag/Ni	See NCDT on pg16
Minimum mechanical / electrical life (no. of operations)		1 x 10 ⁶ mechanical 1 x 10 ⁵ @ AC 15, DC 13	1 x 10 ⁶ mechanical 1 x 10 ⁵ @ AC 15, DC 13	1 x 10 ⁶ mechanical	See NCDT on pg16
Temperature range (storage)	°C	-40 to +70	-40 to +70	-30 to +50	See NCDT on pg16
Temperature range (operation)	°C	-25 to +70	-25 to +70	-30 to +50	See NCDT on pg16

TRAINCREW OPERATION CONTROLS

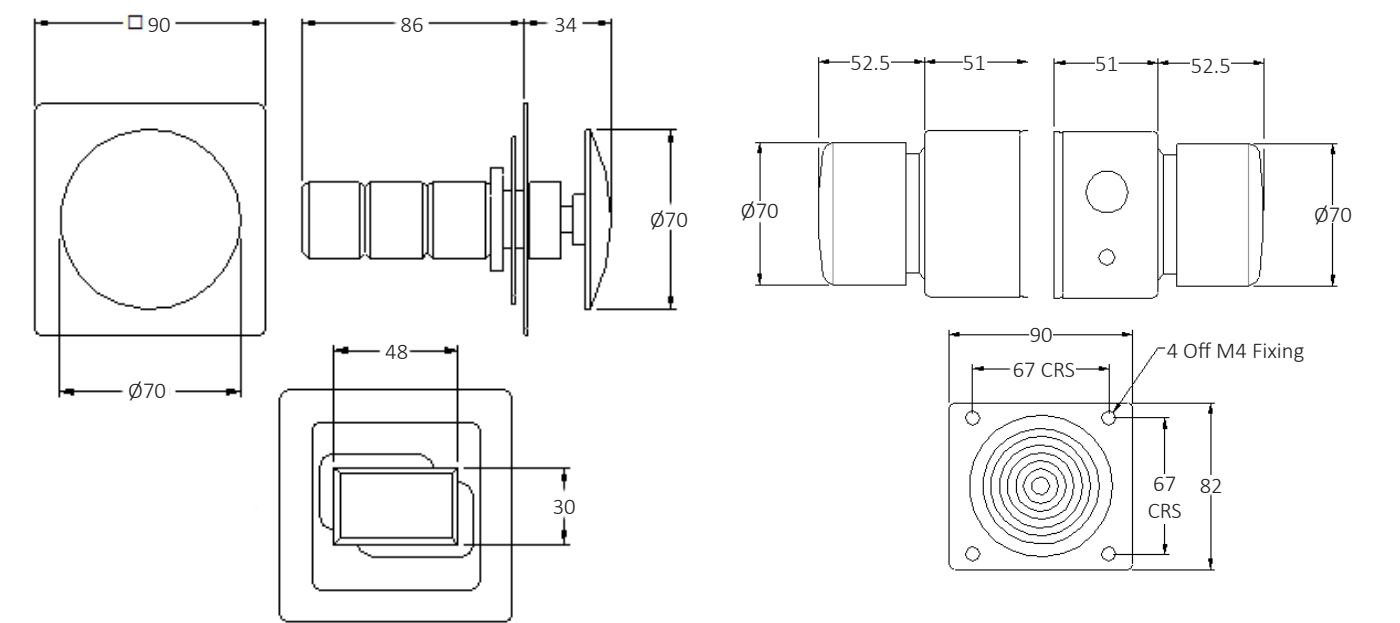
FOOTSWITCHES

FOOTSWITCHES STANDARD COMPLIANCE

	Units	TPA0006	TPA0007	TPA0407 / TPA0425	TBA0261
EN 60529: IP rating when installed in panel / enclosure		IP40 minimum	IP40 minimum	IP65	IP65
EN 45545-2 / NF F 16-101, 102		Yes, NF F 16-102	Yes, NF F 16-102	Yes	Yes
EN 61373		Yes	Yes	-	Yes
EN 60947-3		Yes	Yes	Yes	Yes

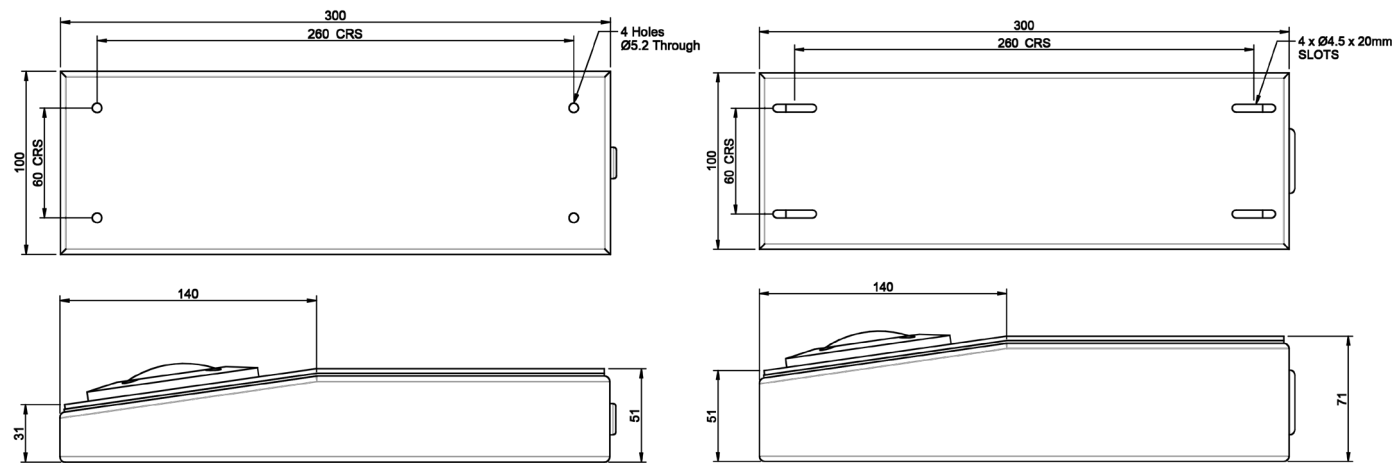
TPA 0006 / TPA 0007 FOOTSWITCH

TPA 0261 FOOTSWITCH



TPA 0407 FOOTSWITCH

TPA 0425 FOOTSWITCH



TRAINCREW OPERATION CONTROLS

CONTROL PANELS

C&D manufacture complete panel assemblies ready to fit into your vehicle. All aspects of panel design are customisable, from the layout and lettering of the panel to the electrical and mechanical interfaces, so as to provide a look and feel that is consistent with the vehicle's concept. We can utilize C&D switches and indicators but also others on request to ensure the customer has the styling they require. Whether you are looking for cab panels, train managers' panels or passenger controls and interfaces, C&D is your one-stop supplier.

Product Range	Description
 <p>Safety System Isolation Panels</p>	<p>C&D's range of assembled Safety System Isolation panels incorporate C&D's latching and non-latching Driver Key operated actuators (page 8-9) and mini-rotary or R6/R16 rotary panel switches, each configured and wired to meet the customer's functional requirements. Electrical interfaces to the vehicle wiring are provided to the customer's specification, and may utilise fixed connectors or flying harnesses.</p>
 <p>Crew Control Panels</p>	<p>Cab desks provide the vehicle designer with many challenges: an uncluttered, ergonomic layout facing the driver often hides complex functionality and inter-connection requirements behind the panel. When it comes to realising your design C&D are there for you. Built for the Tyne and Wear Metro 4000 series Metrocar fleet and forming an integral part of the driver's desk, this simple panel showcases C&D's products, design and workmanship, as well as the use of bespoke connectors and a perfect solution to a tight space constraint.</p>
 <p>Overhaul, Modification, Re-Purposing</p>	<p>Rolling stock represents a major capital commitment, and overhauling and re-purposing are two ways of enhancing asset value and return-on-investment. C&D work with rolling stock operators, maintainers and owners to overhaul, modify and re-purpose existing control panels, regardless of their age, condition and complexity. The illustration shows a TMS panel built over 20 years ago for London Underground's D78 stock. When the fleet was withdrawn from passenger service a few units were re-purposed and reformed for track maintenance duties. Working with the lead project contractor, C&D modified the TMS panels to meet the customer's new functional requirements. Our scope included engineering, initial assessment of the panels, manufacture of new switches, replacing the safety-critical wiring harness and connectors, wiring modifications, provision of new switch labelling, and functional testing. If you are looking to breathe new life into old panels, C&D can help.</p>
 <p>Retrofit</p>	<p>Over the life of a vehicle, many new functions may be added. C&D can offer a complete design and manufacture package to provide panels for retrofit, taking into account existing space constraints, design conventions and aesthetics. The panel illustrated here was supplied as part of a retrofit programme to London Underground rolling stock to prevent un-demanded reverse movements following such an incident on the Northern Line in July 2000. It incorporates C&D's switches and indicators, and the customer's bespoke typeface.</p>
 <p>Call for Aid</p>	<p>C&D designed and manufactured bespoke Call for Aid devices for many fleets, both in the UK and abroad. In the passenger space these can incorporate pull-handles or latching push buttons, as well as indicators and audio facilities. The illustration shows a unit which allows on-board crew to respond to passengers; it was supplied by C&D as part of a retrofit programme for the Tyne and Wear Metro which also included the passenger-operated Call for Aid units. [TPA0090]</p>

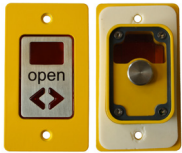

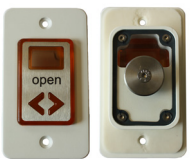
PASSENGER INTERFACE CONTROLS

EXTERNAL DOOR CONTROLS

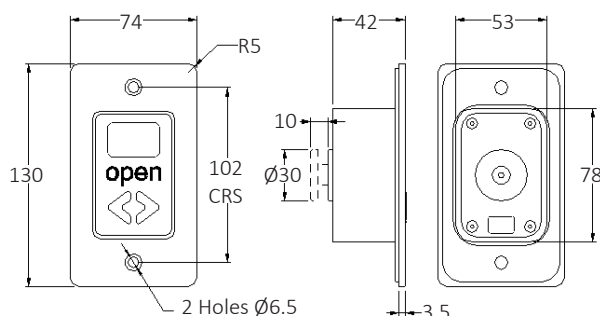
Mechanical 'Pushbutton' style actuators suited for Passenger Doors to replace obsolete & non-compliant actuators. Suitable for Class 165, 166, 323, 365, 465 and 466 vehicles. We can provide a complete service from concept design through to manufacturing, working within Industry Regulatory requirements (RVAR) and the product design aspirations of the customer.

FEATURES AND BENEFITS

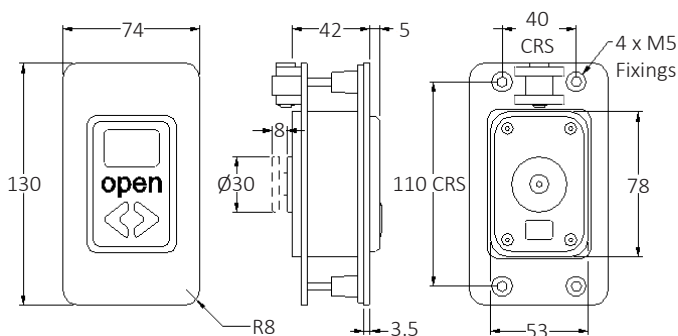
- Suitable with both Inductive Proximity Sensor & Mechanical Pushbutton door operations
- UL 94 Compliant
- PRM TSI Compliant
- Designed for existing Door Systems
- Operating Force <15N
- Contrasting Surface Colour (Optional colours to suit application)
- Visual Indication when Operable
- Tactile function markings
- Palm Operable (Flush or Raised Pressel Options)
- Designed for easy maintenance

	Cat. No.	Description	Train Class
	TBA0348	Yellow mechanical IP65 palm operable flush Pushbutton door pressel.	Class 323 Trains
	TBA0384	Yellow mechanical IP65 palm operable raised Pushbutton door pressel.	Class 165, 166 & 365 Trains
	TBA0407	White mechanical IP65 palm operable raised Pushbutton door pressel.	Class 465/2, 465/9 & 466 Trains

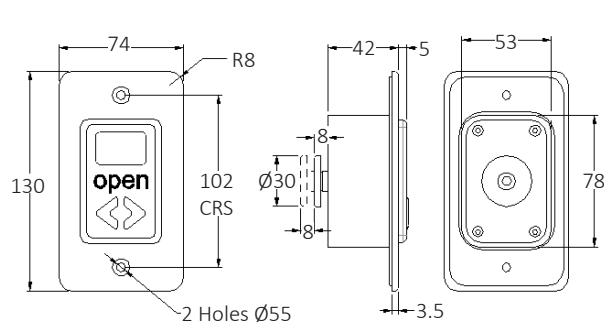
TBA0348



TBA0384



TBA0407



MAFELEC PARTNERSHIP

Craig & Derricott has for many years enjoyed a partnership agreement to solely supply their products to the UK rail industry. Mafelec are a global supplier based in France who design and manufacture complementary products that enhances Craig & Derricott's product portfolio to meet our customer's needs.

Mafelec specialise in the design of electro-mechanical solutions, sub-assemblies and equipment intended to operate in the most stringent environments. Their products are developed according to needs and are suitable for applications in harsh environments such as: sealing, shock/vibration, bad weather and electromagnetic disturbances.

CONTROL PANELS & ELECTRICAL CABINETS

- Multi-technology dashboards
- Control & signalling auxiliaries
- Special crew switches
- Signalling boxes
- Pedal & push button dead man function
- Emergency push buttons
- Circuit Breakers
- Power supply sockets

INFRASTRUCTURE

- Traffic lights
- Signalling boxes
- Power supply boxes
- Control panels
- Controls of bridges, elevators & winches

FRONT & REAR LIGHTING OF THE TRAIN

- Combined headlights
- Headlights
- Marker & Tail lights
- Customized plug and play solutions
- Specific strip lights

POWER & ELECTRICAL DISTRIBUTION

- Power switches (up to 2,000 Amps)
- Cut-off switches
- Terminal blocks
- Isolators and partition bushes
- Sensors- Hall effect

PASSENGERS CARS

Inside

- Push buttons and indicator lights (M-Door range) for:
- Door systems
- Toilet
- Disabled persons space
- Emergency call
- Emergency handles
- Power supply sockets
- USB sockets
- Pictograms & indicator lights
- Buzzers

Outside

- Door indicator lights
- Brake indicators
- Level indicators
- Door opening controls
- Bogie lighting

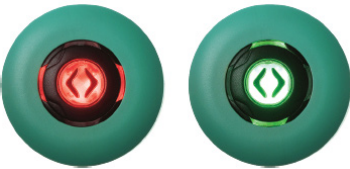
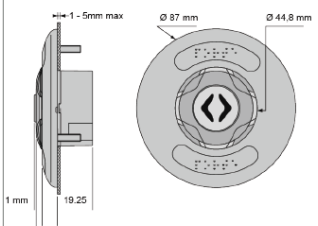

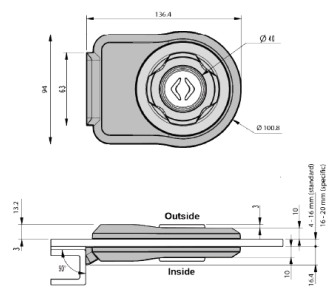

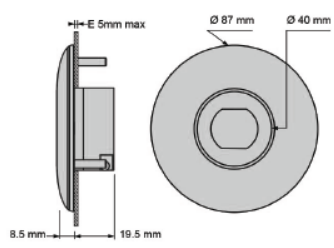

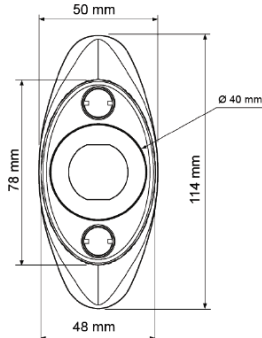


M-DOOR CONTROL BUTTONS

PASSENGER ACCESS & COMFORT: ACCESSIBILITY FOR ALL

Standards: TSI PRM, EN14752, EN16584-2, EN16585-3, EN45545


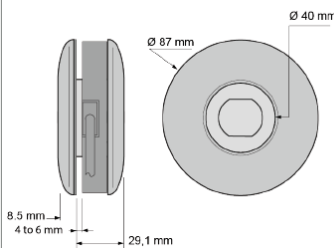

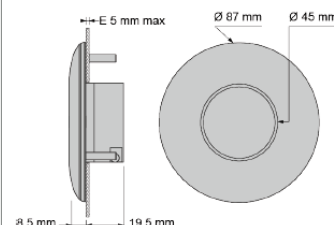

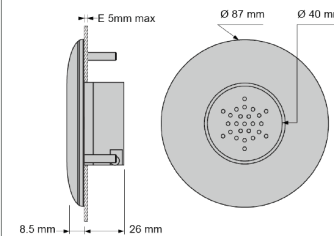


Type	Description	Dimensions
 <p>M-DOOR VG</p>	<p>Pushbutton fully compliant with PRM and door requirement.</p> <p>Applicative standards: TSI PRM, EN1658x series, EN14752, R107</p> <p>Mounting: Front side</p> <p>Nominal voltage: 24VDC - 110VDC</p> <p>Protection: Front - IP65 / IP67 Rear - IP65 / IK07</p> <p>Main applications: Rail vehicles doors, buses & coaches doors</p> <p>Special features: Intuitive colour blind detectable</p>	
 <p>M-DOOR GM</p>	<p>Glass mount pushbutton without drilling (up to 20mm glass thickness)</p> <p>Applicative standards: TSI PRM, EN1658x series, EN14752, R107, ECER10 (10R05/01 18067)</p> <p>Mounting: Glue mounting on glass without drilling</p> <p>Single inside Single outside Double side</p> <p>Nominal voltage: 12VDC - 36VDC</p> <p>Protection: Inside - IP43 Outside - IP65 / IP67 / IK07</p> <p>Main applications: Buses doors, Metro, LRV, external doors, rail vehicles internal doors</p> <p>Special features: Wireless outside pushbutton Auto synchronisation between inside and outside button</p>	
 <p>M-DOOR SIMPLE</p>	<p>Original single M-door pushbutton</p> <p>Applicative standards: TSI PRM, EN1658x series, R107, ECER10 (10R05/01 18088)</p> <p>Mounting: Front side, rear side</p> <p>Nominal voltage: 12VDC - 110VDC</p> <p>Protection: Front - IP65 / IP67 Rear - IP65 / IK07</p> <p>Main applications: Rail vehicles (doors, toilets, help request), buses & coaches doors, transport station information, totem, motorway SOS totem</p> <p>Special features: Plastic or metal actuator, audible signal DIN32981/DIN32974</p>	
 <p>M-DOOR SLIM</p>	<p>Slim shape M door pushbutton for low space panel or pole mounting</p> <p>Applicative standards: TSI PRM, EN1658x series, R107</p> <p>Mounting: Panel (front side), pole</p> <p>Nominal voltage: 12VDC - 110VDC</p> <p>Protection: Front - IP65 / IP67 Rear - IP65 / IK07</p> <p>Main applications: Metro, LRV, EMU/DMU door command on pole, buses stop request on pole or panel</p> <p>Special features: Low space integration, pole mounting</p>	

M-DOOR CONTROL BUTTONS

PASSENGER ACCESS & COMFORT: ACCESSIBILITY FOR ALL

Standards: TSI PRM, EN14752, EN16584-2, EN16585-3, EN45545

Type	Description	Dimensions
 <p>M-DOOR DOUBLE</p>	<p>Double side M-Door glass mount with drilling</p> <p>Applicative standards: TSI PRM, EN1658x series, R107</p> <p>Mounting: Glass mount with drilling</p> <p>Nominal voltage: 12VDC- 36VDC</p> <p>Protection: IP65 / IP67 IK07</p> <p>Main applications: Buses doors, Metro, LRV, external doors, rail vehicles internal doors</p> <p>Special features: Double pushbutton, double indicator, double mix Patented automatic fixing on glass</p>	
 <p>M-DOOR LIGHT INDICATOR</p>	<p>Visual signalling</p> <p>Applicative standards: TSI PRM, EN1658x series, EN14752</p> <p>Mounting: Front side, rear side</p> <p>Nominal voltage: 12VDC- 110VDC</p> <p>Protection: Front- IP65 / IP67 Rear- IP65 / IK07</p> <p>Main applications: Rail vehicles exterior doors, buses & coaches doors</p> <p>Special features: Flat shape with customized pictograms, 2 protruded shapes with fixed or flashing lighting</p>	
 <p>M-DOOR MULTITONE SOUND GENERATOR</p>	<p>Sound signalling</p> <p>Applicative standards: TSI PRM, EN1658x series, EN14752</p> <p>Mounting: Front side, rear side</p> <p>Nominal voltage: 24VDC- 110VDC</p> <p>Protection: Front- IP65 / IP67 Rear- IP65 / IK07</p> <p>Main applications: Rail vehicles exterior doors, toilets, driver desk</p> <p>Special features: Up to 7 sound sequences setup</p> <p>Fixed sound level</p>	

PASSENGER INTERFACE CONTROLS

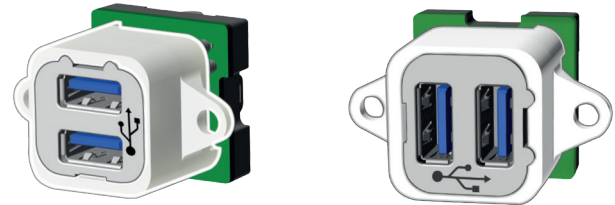
USB SOCKETS

Removable USB module for quick and easy maintenance less than 30 seconds with 5,000 cycles of insertion/extraction. Remote CVS 100-230VAC or 24-110VDC input.



USB-A REAR MOUNTING SOCKET

- Removable USB type A 3.0 socket Module with special tool for quick and easy maintenance
- 5 000 cycles of insertion/extraction
- 0.5A to 2.4A per USB port



MECHANICAL CHARACTERISTICS

- Panel Rear mounting
- Insertion/extraction : 5 000 cycles
- Operating temperature: -25°C (-13°F) to + 55°C (+131°F)
- Vandal proof mounting
- Single or Double, horizontal or vertical USB socket
- Marking of USB logo, voltage and Max current

ELECTRICAL CHARACTERISTICS

- 5VDC output according to USB standard
- Adjustable current limitation from 0.5A to 2.4A
- Railway power converter AC/DC or DC/DC in the range (not integrated in the USB socket)
- Spring terminal connection up to 1.5mm²(AWG16) for flexible conductor with ferrule

STANDARDS

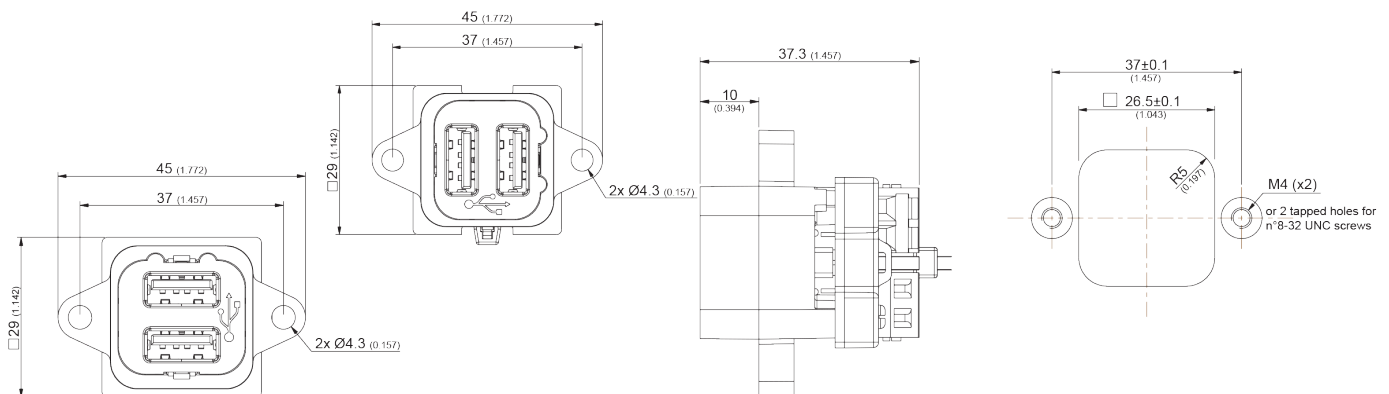
- Product : EN62684, EN62680
- Application : EN50155
- EMC : EN50121-3-2
- Shock and vibration : EN61373
- Fire and Smoke : EN45545-2
- ROHS, REACH

MOUNTING / CONNECTIONS

- Rear mounting with 2 screws M4 or n°8-32 UNC (Stud / nut compatible only for horizontal USB socket)
- Mechanical fixation of wires on the module with hose clamp

OPTIONS

- Power supply indicator
- 2 USB ports with independent power supply
- Marking of voltage, current, power features
- Customization of front side colours



PASSENGER INTERFACE CONTROLS

USB SOCKETS

Removable USB module for quick and easy maintenance less than 30 seconds with 5,000 cycles of insertion/extraction. Remote CVS 100-230VAC or 24-110VDC input.

USB M-DOOR SLIM SOCKET

- Removable USB type A 3.0 socket module with special tool for quick and easy maintenance
- 5 000 cycles of insertion/extraction
- 0.5A to 2.4A per USB port



MECHANICAL CHARACTERISTICS

- Panel Front mounting or Pole mounting
- Insertion/extraction : 5000 cycles
- Operating temperature: -25°C (-13°F) to + 55°C (+131°F)
- Vandal proof mounting
- Single or Double, vertical USB socket
- Marking of USB logo, voltage and Max current

ELECTRICAL CHARACTERISTICS

- 5VDC output according to USB standard
- Adjustable current limitation from 0.5A to 2.4A
- Railway power converter AC/DC or DC/DC in the range (not integrated in the USB socket)

STANDARDS

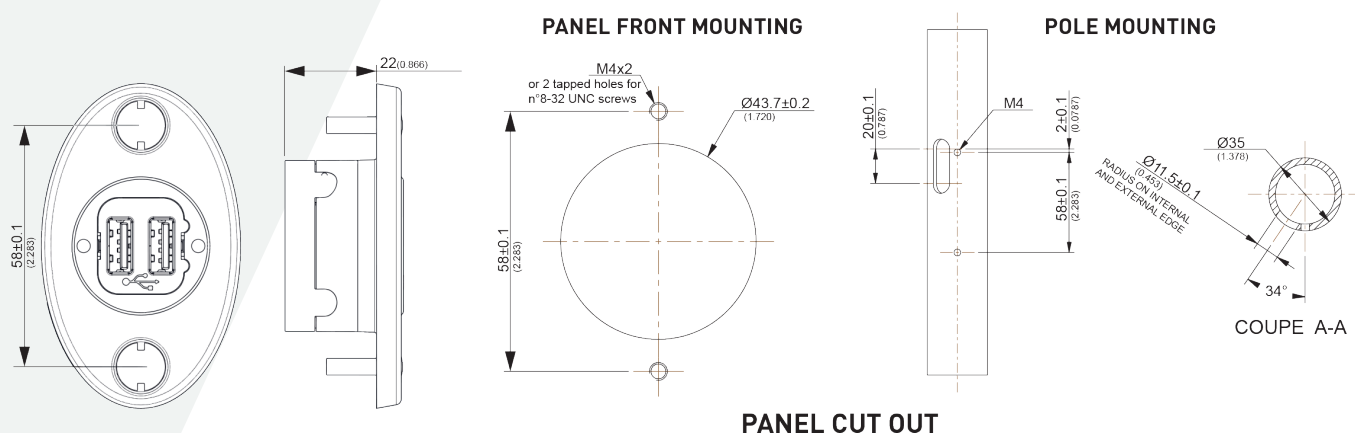
- Product : EN62684, EN62680
- Application : EN50155
- EMC : EN50121-3-2
- Shock and vibration : EN61373
- Fire and Smoke : EN45545-2
- ROHS, REACH

MOUNTING / CONNECTIONS

- Mounting with 2 M4 or n°8-32 UNC screws
- Output: cable 2 or 4 wires EN50306-4

OPTIONS

- Power supply indicator
- 2 USB ports with independent power supply
- Customization of front side colours



PASSENGER INTERFACE CONTROLS

USB SOCKETS

Removable USB module for quick and easy maintenance less than 30 seconds with 5,000 cycles of insertion/extraction. Remote CVS 100-230VAC or 24-110VDC input.



CONVERTERS FOR USB CHARGING

- DC/DC or AC/DC Railway converters
- Input range 24-36VDC, 72-110VDC or 100-230VAC
- Output 5VDC with cable losses compensation
- 2.4A per USB output



MECHANICAL CHARACTERISTICS

- Operating temperature: -25°C (-13°F) to + 55°C (+131°F)
- Cable losses compensation up to 3 m (118.11 in)
- Spring terminal connection up to 1.5mm² (AWG16) for flexible conductor with ferrule
- IP2x
- Dimensions and weight, see table below

STANDARDS

- Product : EN62684, EN62680
- Application : EN50155
- EMC : EN50121-3-2
- Shock and vibration : EN61373
- Fire and Smoke : EN45545-2
- ROHS, REACH

ELECTRICAL CHARACTERISTICS

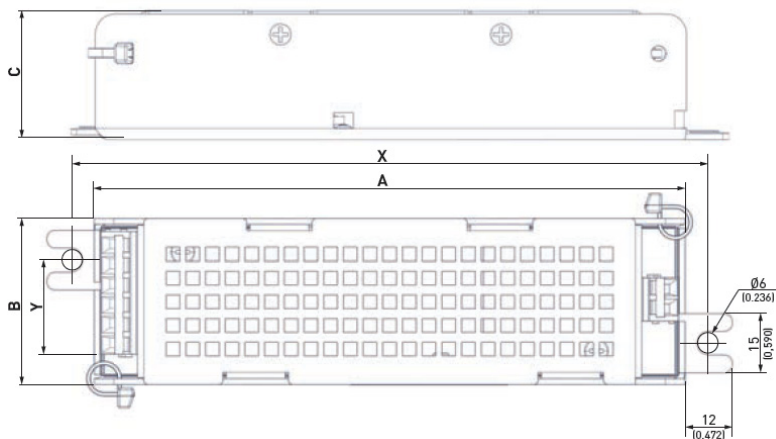
- 3 variant converters (see table below):
 1. 100-230VAC/5VDC – 1 output 2.4A
 2. 24-36VDC/5VDC – 2 outputs 2.4A
 3. 72-110VDC/5VDC – 2 outputs 2.4A
- Galvanic insulation In/Out, In/Frame: 1500V/3mm
- Short-circuit and overload protection
- Inrush current limitation
- MTBF > 500 000 hours

MOUNTING / CONNECTIONS

- Standard fixation by 2 screws or 2 studs with nut, M4 or M5, n°8-32 UNC or n°10-24 UNC
- Alternative fixation with adapted bracket
- Mechanical fixation of wires on the casing with hose clamp

OPTIONS

- Higher IP level study on demand based on mechanical envelope adaptation
- Other connection type on demand



	1	2	3
A	150mm	165mm	165mm
B	42mm	60mm	60mm
C	33mm	33mm	33mm
X*	162-165mm	177-180mm	177-180mm
Y	21mm	39mm	39mm
Weight	210g	350g	350g

* The longer distance X is mandatory for a fixation with stud M5 or n°10-24 UNC

EXTERNAL LED LIGHTING

M-LIGHT RANGE

ML 5-1 /170 Cut off LED Ø 170 mm combined Head, Marker and Tail lights.

HEAD, MARKER AND TAIL LIGHTS

- 5 functions in 1 module
- Compliant with EN 15153-1:2020
- Anti glare system
- Compact solution - depth < 120 mm
- Full LED technology with smart maintenance



MECHANICAL CHARACTERISTICS

- Operating temperatures: - 40°C/+70°C
- Front or rear mounting
- IP66 front and IP65 rear
- Shock resistance: IK05
- Glass cover
- Cable connection
- UV resistant

STANDARDS

- Design EN 15153- 1: 2020 | TSI LOC & PAS 2014
- Application EN 50155
- EMC EN 50121-3-2
- Shock/vibrations EN 61373
- Environment EN 60068 | EN 60529
- Fire/smoke EN 50306-4 | EN 45545-2
- REACH

ELECTRICAL CHARACTERISTICS

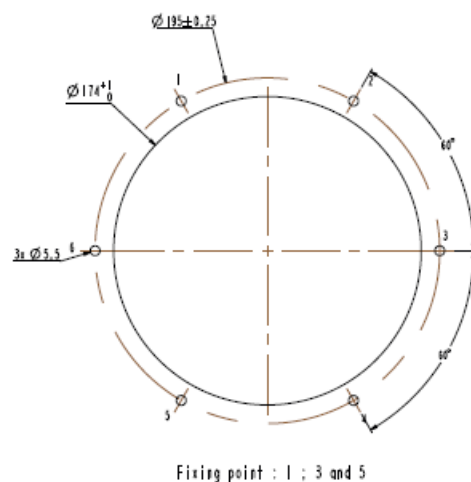
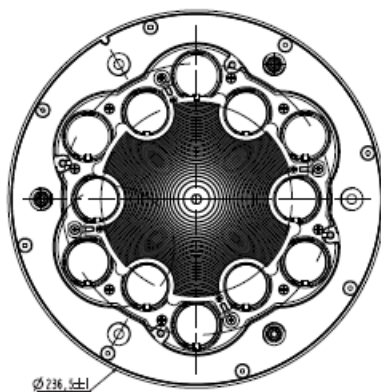
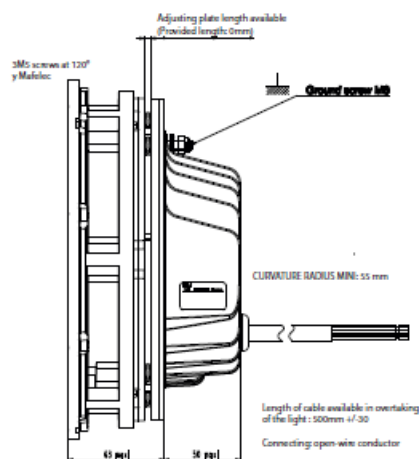
- Power supply: 24-36 or 72-110 Vdc (-30% / +25%)
- Optimized power consumption
- Long service life: 60 000h
- 170mm lit area

OPTIONS

- Bearing angle adjustment at $\pm 1.5^\circ$ on the two axes after mounting
- Light status feedback (potential free contact)
- Customized connector and cable length
- Defrosting
- Optical characteristics adapted for products placed behind customer glass reducing luminous intensity above horizontal axis by as much as 35%
- Mechanical interface mounting plate

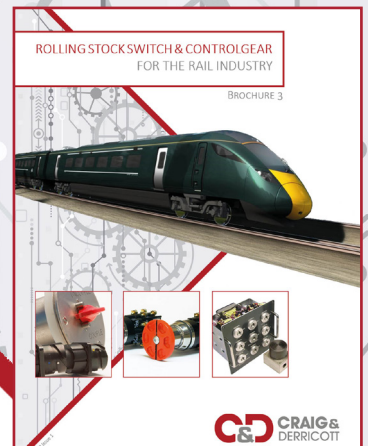
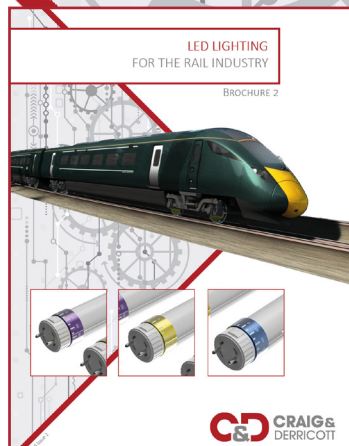
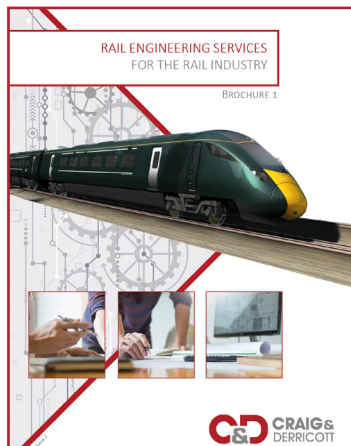
ELECTRICAL CHARACTERISTICS

	EN15153- 1:2020	Mafelec	
	Intensity (Cd)	Intensity (Cd)	Mean consumption (W) $\pm 20\%$
Full Head	40000-70000	≈ 60000	≈ 28
Dimmed Head	12000-16000	≈ 15000	≈ 10
Full Marker	300-700	≈ 600	≈ 8
Full Marker Head	100-300	≈ 200	≈ 4
Tail Light	15-100	≈ 80	≈ 3



CRAIG & DERRICOTT

SUPPLYING THE RAIL INDUSTRY



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