

## CONFIGURATION STRING OVERVIEW

TYPE	FRONT PROPORTIONALITY	OUTPUT SPAN	OUTPUT RAMP	FRONT <sup>1</sup> SWITCHES	FUTURE OPTION	REAR <sup>2</sup> SWITCHES	PERSON PRESENT	SIDE <sup>3</sup> SWITCHES		MECHANICAL INTERFACE	ELECTRICAL INTERFACE	GAITER
	HE	XXXX	XX	XX	XXXXXX	X	XXX	X	XXX	X	XXX	XX
	<b>R***</b>	<b>40</b>	<b>PO</b>	<b>K*****</b>	<b>N</b>	<b>*T*</b>	<b>M</b>	<b>LL*</b>	<b>2L*</b>	<b>S</b>	<b>STD</b>	<b>G1</b>
				<b>I*****</b>		<b>TR*</b>		<b>UL*</b>	<b>3A*</b>			
				<b>O*****</b>				<b>BL*</b>	<b>3B*</b>			
				<b>**S***</b>				<b>LR*</b>	<b>3C*</b>			
				<b>**R***</b>				<b>UR*</b>	<b>3D*</b>			
								<b>BR*</b>	<b>BB*</b>			
								<b>2U*</b>				

<sup>1</sup>If Dual Rollers or a Single Roller with either a Rocker or Slide switch are chosen then the 'K' switch is the only front switch option available.

<sup>2</sup>The rear trigger switch cannot be selected when a rocker switch is selected as a front switch option.

<sup>3</sup>Side Switches cannot be selected on the same side as a roller or rocker switch. When a trigger switch is selected only the upper side switches can be chosen.

## MECHANICAL DATA

Mechanical Strength	Maximum Overload (Static)	600N
	Maximum Overload (Impact)	10 Joules
	Lever & Trigger Overload	500N
	Maximum Torque	40Nm

NOTE: ENSURE THE HANDLE IS ADEQUATELY MOUNTED TO ENSURE OPTIMUM STRENGTH PERFORMANCE

Switches (Momentary)	Mechanical Life	1,000,000 Cycles
	Operating Force (K Switch)	5N
	Operating Force (I Switch)	3N
	Operating Force (O Switch)	7.5N
	Operating Force (Top & Side Switches)	3N
	Operating Force (Trigger)	7.5N
	Operating Force (Lever)	5N

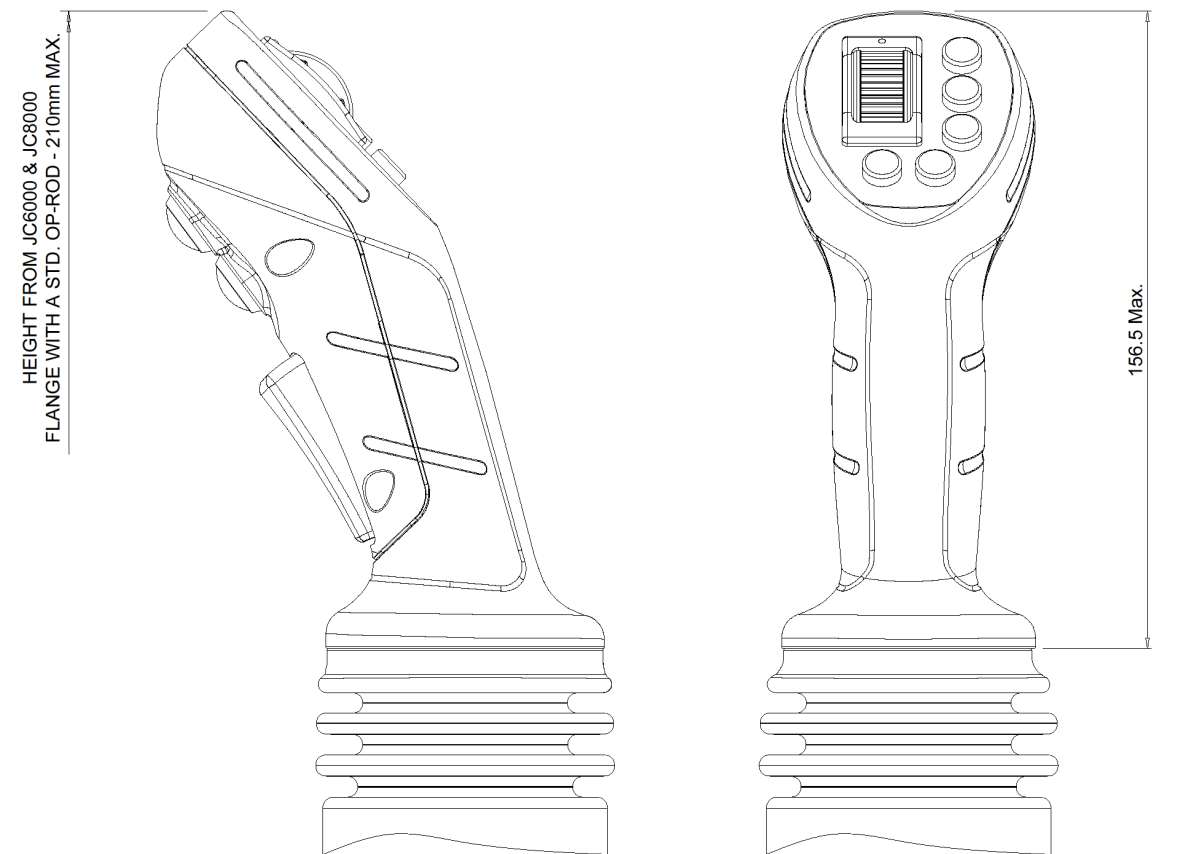
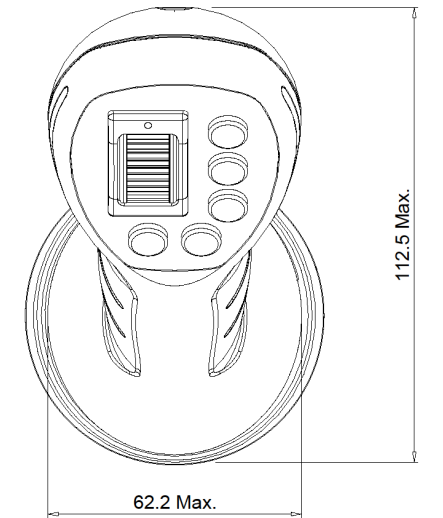
Slide & Rocker Switches (Latching)	Life	100,000 Cycles
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Thumb Roller	Life	3,000,000 Cycles
	Operating Force	3.3N Breakout/130N Max.

Materials	Gaiter	Silicone
	Main Grip	Zytel 70G30HSL (Nylon66)
	Closing Plate	Zytel 70G33L (Nylon66)
	Switch Plate	Zytel 70G33L (Nylon66)
	K Switch Actuator	Delrin 500P (Acetal)
	Lever & Trigger	Delrin 500P (Acetal)
	Mass	300g (Configuration HE-NNNN-**-**-KRNN11-N-TR*-M-NNN-S-STD-G1)
	Refer to the data sheets of the handles functional components for their material information.	

## INSTALLATION DIAGRAM

CONFIGURATION SHOWN – HE-RWLR-\*\*-\*\*-KRNN17-N-2TR-M-NNN-S-STD-G1

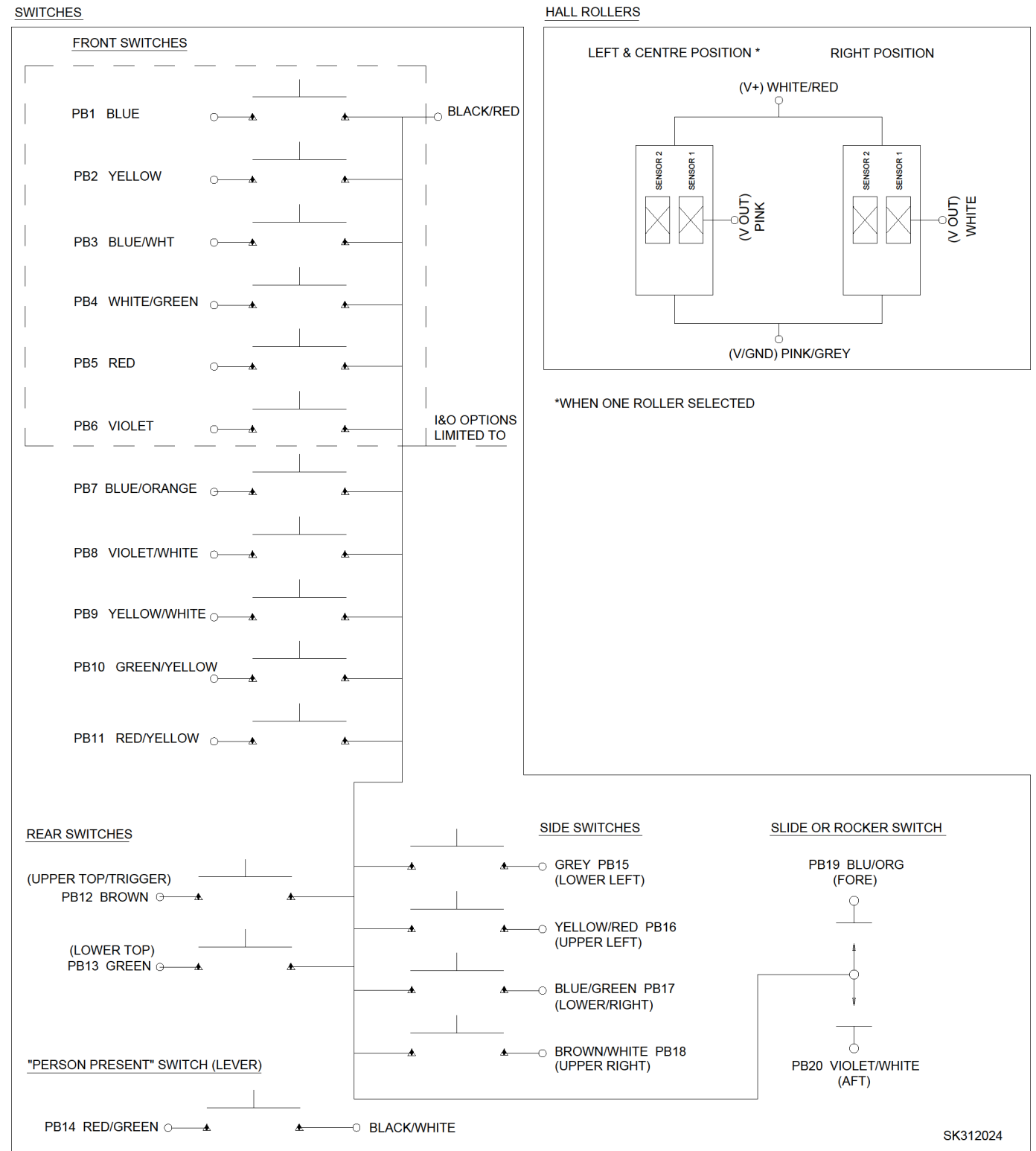


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				YES	X	NO	HE HANDLE			HE-GEN-XXX		
SHT 1 OF 9 SHTS				2	4-6-14	MG	SFT	DA	ECR16577			
				ISSUE	DATE	DRAWN	ENG APPROVAL	QUAL APPROVAL	CHANGES			

# ELECTRICAL DATA

<b>Operating/Switching Voltage &amp; Current</b>	Operating Voltage (Roller)	5VDC ±0.5V
	Operating Current (Roller)	10mA (max)
	Switching Voltages	28VDC ±0.5V
	Switching Currents	100mA (max)
<b>I Switch, Rear &amp; Side Switches</b>	Contact Resistance	50mΩ (max)
	Electrical Life	500,000 Cycles @ max. power
	Manufacturer No.	ITW / 59 Series
	Contact Type	N.O.
<b>O Switch</b>	Contact Resistance	-
	Electrical Life	25,000 Cycles (min)
	Manufacturer No.	OTTO / P9 Series
	Contact Type	N.O.
<b>K Switch &amp; "Person Present" Lever switch</b>	Contact Resistance	50mΩ (max)
	Electrical Life	1,000,000 Cycles @ max. power
	Manufacturer No.	K12C Series
	Contact Type	N.O.
<b>Rocker Switch</b>	Contact Resistance	-
	Electrical Life	25,000 Cycles
	Manufacturer No.	OTTO / K1 series
<b>Slide Switch</b>	Contact Resistance	10mΩ (max)
	Electrical Life	100,000 Cycles
	Manufacturer No.	APEM / MT Series
<b>Thumb Roller</b>	Electrical Life	3,000,000 cycles
	Manufacturer	OTTO / HTW Series
<b>Cable Type</b>	PTFE Cable 30AWG (19/0.06mm) Nominal Conductor Dia. – 0.32mm / Insulation Dia. 0.60-0.65mm 300mm Flying Leads (from exit point of adaptor)	

# CONNECTION DATA



NOTE: WHEN MOUNTED TO A P&G JOYSTICK CONTROLLER, CONNECTION DETAIL WILL BE SUPPLIED IN ADDITION TO THE GENERIC SPECIFICATION.

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	ACAD			© COPYRIGHT RESERVED.	THIRD ANGLE PROJECTION TO BS 8888	LINEAR (MACHINING) 0. mm +/- 0.5mm 0.0 mm +/- 0.2mm 0.00 mm +/- 0.1mm 0.000 mm +/- 0.01mm	ANGULAR +/-1° UNLESS OTHERWISE STATED	YES	X	NO	HE HANDLE	
SHT 2 OF 9 SHTS	THIS DOCUMENT CONTAINS CONFIDENTIAL AND/OR PROPRIETARY INFORMATION AND MAY NOT BE REPRODUCED IN ANY FORM WHATSOEVER. NOR MAY ITS CONTENTS BE DIVULGED TO THIRD PARTIES WITHOUT THE WRITTEN PERMISSION OF THE OWNER. ALL RIGHTS RESERVED.	CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927		2	4-6-14	MG	SFT	DA	ECR16577	HE-GEN-XXX		
				ISSUE	DATE	DRAWN	ENG' APPROVAL	QUAL' APPROVAL	CHANGES			



**OPTIONS**

HE-GEN-**XXXX**-XX-XX-XXXXXX-X-XXX-X-XXX-X-XXX-XX

**FRONT PROPORTIONALITY**

<b>CONTROLLER</b>	
<b>R</b>	THUMB ROLLER*
<b>N</b>	NOT SELECTED
<b>STYLE</b>	
<b>W</b>	WIDE
<b>N</b>	NOT SELECTED
<b>POSITION</b>	
<b>L</b>	LEFT
<b>R</b>	RIGHT
<b>C</b>	CENTRE
<b>2</b>	LEFT & RIGHT
<b>N</b>	NOT SELECTED
<b>ACTUATOR</b>	
<b>R</b>	KNURLED WHEEL
<b>N</b>	NOT SELECTED



THUMB ROLLER – WIDE

HE-GEN-XXXX-**XX**-XX-XXXXXX-X-XXX-X-XXX-X-XXX-XX

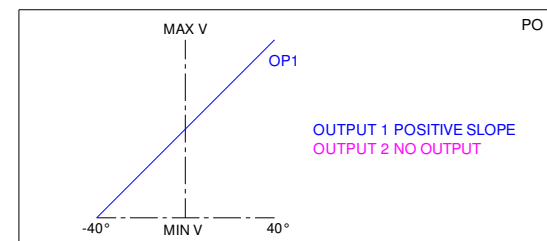
**OUTPUT SPAN**

<b>40</b>	10% - 50% - 90% (±5%)
<b>NN</b>	NOT SELECTED

HE-GEN-XXXX-XX-**XX**-XXXXXX-X-XXX-X-XXX-X-XXX-XX

**OUTPUT RAMP**

<b>PO</b>	OUTPUT 1 + SLOPE / NO OUTPUT 2
<b>NN</b>	NOT SELECTED



\*REFER TO THE OTTO HTW PRODUCT SPECIFICATION FOR MORE DETAILS

NOTE: WHEN A DUAL ROLLER, or SLIDE/ROCKER SWITCH WITH ROLLER COMBINATION IS CHOSEN WITH PUSHBUTTON SWITCHES THE K SWITCH WILL BECOME THE DEFAULT OPTION.

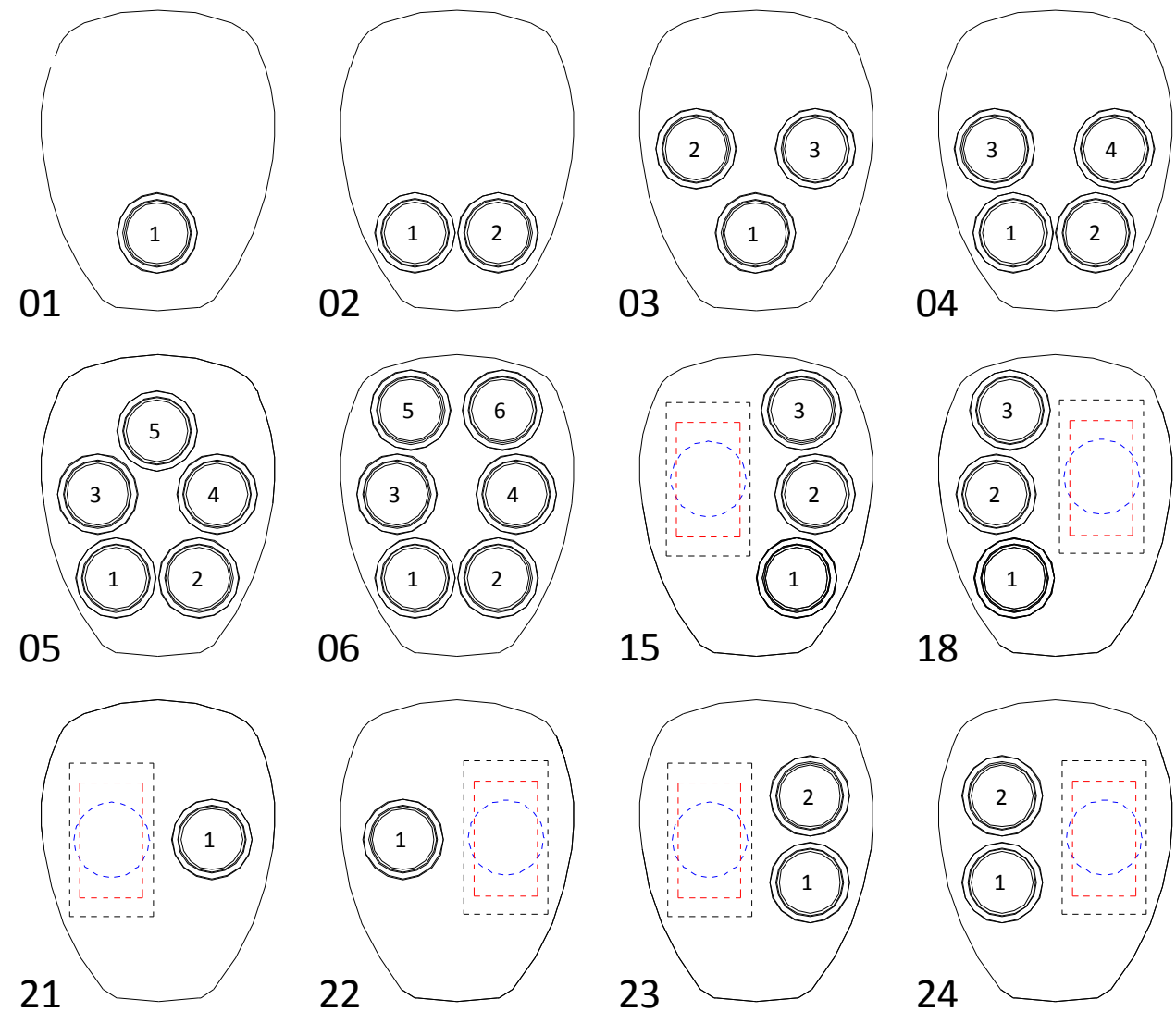
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				YES	X	NO	HE HANDLE			HE-GEN-XXX		
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					ISSUE	DATE	DRAWN	ENG' APPROVAL	QUAL' APPROVAL			

HE-GEN-XXXX-XX-XX-~~XXXXXX~~-X-XXX-X-XXX-X-XXX-XX

I & O SWITCH LAYOUT OPTIONS

SK312024

FRONT SWITCHES	
<b>PUSHBUTTON SWITCH</b>	
<b>I</b>	ITW / 59 SERIES
<b>O</b>	OTTO / P9 SERIES
<b>K</b>	K12 SERIES
<b>N</b>	NOT SELECTED
<b>SWITCH ACTUATOR COLOUR</b>	
<b>R</b>	RED
<b>G</b>	GREEN
<b>Y</b>	YELLOW
<b>B</b>	BLACK
<b>L</b>	BLUE
<b>W</b>	WHITE
<b>N</b>	NOT SELECTED
<b>SLIDE OR ROCKER SWITCH</b>	
<b>SL</b>	SLIDE SWITCH (LEFT POSITION) PB19&20
<b>SR</b>	SLIDE SWITCH (RIGHT POSITION) PB19&20
<b>SC</b>	SLIDE SWITCH (CENTRE POSITION) PB19&20
<b>RL</b>	ROCKER SWITCH (LEFT POSITION) PB19&20
<b>RR</b>	ROCKER SWITCH (RIGHT POSITION) PB19&20
<b>RC</b>	ROCKER SWITCH (CENTRE POSITION) PB19&20
<b>NN</b>	NOT SELECTED
<b>LAYOUT</b>	
<b>01</b>	POSITION 1 – APPLICABLE FOR ALL SWITCH TYPES
<b>02</b>	POSITION 2 – APPLICABLE FOR ALL SWITCH TYPES
<b>03</b>	POSITION 3 – APPLICABLE FOR ALL SWITCH TYPES
<b>04</b>	POSITION 4 – APPLICABLE FOR ALL SWITCH TYPES
<b>05</b>	POSITION 5 – APPLICABLE FOR ALL SWITCH TYPES
<b>06</b>	POSITION 6 – APPLICABLE FOR ALL SWITCH TYPES
<b>07</b>	POSITION 7 – K SWITCH TYPE ONLY
<b>08</b>	POSITION 8 – K SWITCH TYPE ONLY
<b>09</b>	POSITION 9 – K SWITCH TYPE ONLY
<b>10</b>	POSITION 10 – K SWITCH TYPE ONLY
<b>11</b>	POSITION 11 – K SWITCH TYPE ONLY
<b>12</b>	POSITION 12 – K SWITCH TYPE ONLY
<b>13</b>	POSITION 13 – K SWITCH TYPE ONLY
<b>14</b>	POSITION 14 – K SWITCH TYPE ONLY
<b>15</b>	POSITION 15 – APPLICABLE FOR ALL SWITCH TYPES
<b>16</b>	POSITION 16 – K SWITCH TYPE ONLY
<b>17</b>	POSITION 17 – K SWITCH TYPE ONLY
<b>18</b>	POSITION 18 – APPLICABLE FOR ALL SWITCH TYPES
<b>19</b>	POSITION 19 – K SWITCH TYPE ONLY
<b>20</b>	POSITION 20 – K SWITCH TYPE ONLY
<b>21</b>	POSITION 21 – I&O SWITCH TYPE ONLY
<b>22</b>	POSITION 22 – I&O SWITCH TYPE ONLY
<b>23</b>	POSITION 23 – I&O SWITCH TYPE ONLY
<b>24</b>	POSITION 24 – I&O SWITCH TYPE ONLY
<b>NN</b>	NOT SELECTED



K SWITCH TYPE      I&O SWITCH TYPE      SLIDE SWITCH TYPE      ROCKER SWITCH TYPE

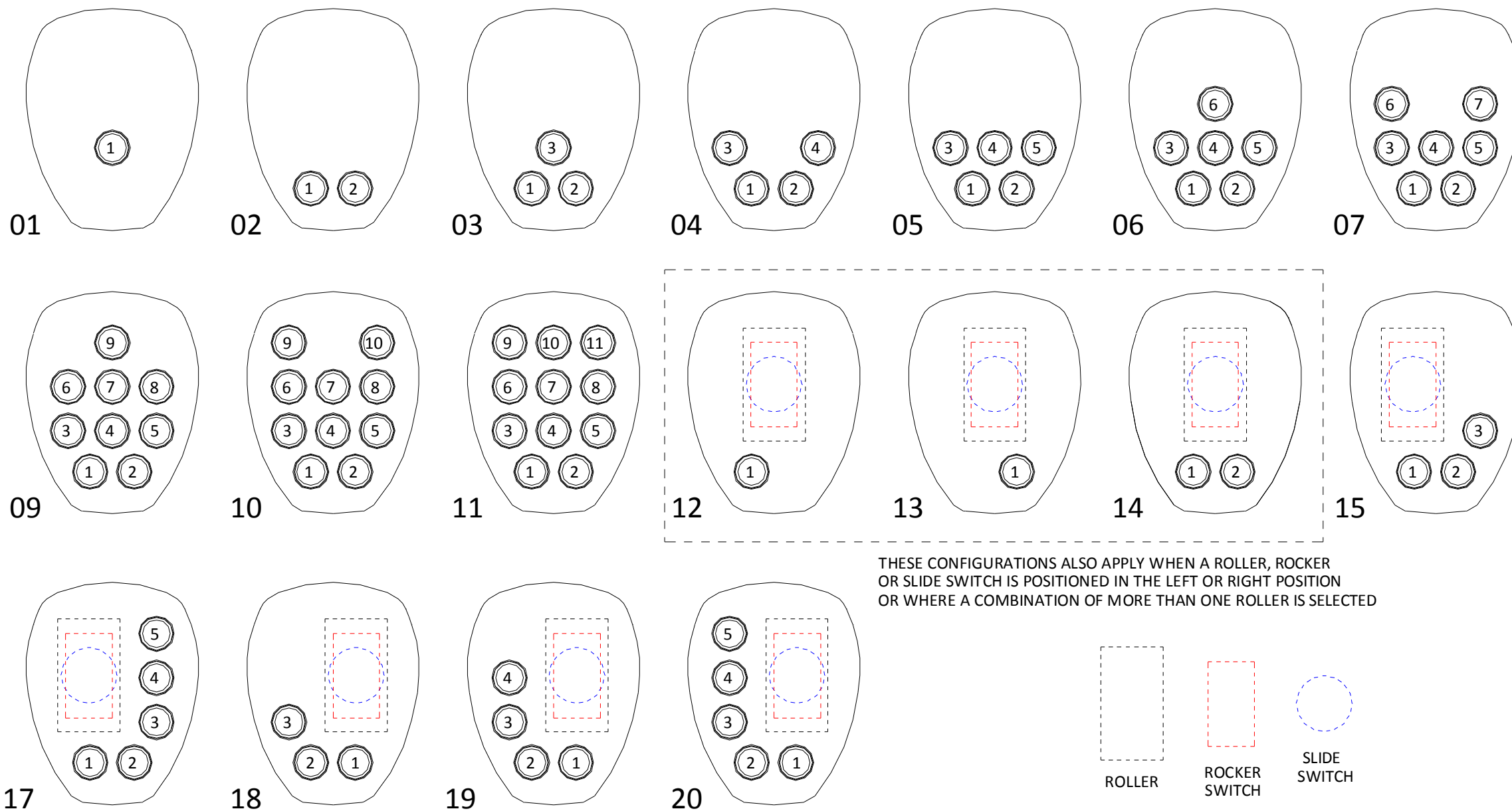
NOTE: WHERE MULTIPLE COLOURS ARE REQUIRED IN VARIOUS SWITCH POSITIONS PLEASE CONTACT THE SALES TEAM

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					ISSUE	DATE	DRAWN	ENG' APPROVAL	QUAL' APPROVAL			

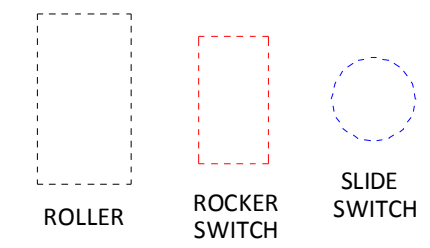


**K SWITCH LAYOUT  
OPTIONS**

SK312024



THESE CONFIGURATIONS ALSO APPLY WHEN A ROLLER, ROCKER OR SLIDE SWITCH IS POSITIONED IN THE LEFT OR RIGHT POSITION OR WHERE A COMBINATION OF MORE THAN ONE ROLLER IS SELECTED



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SHT 6 OF 9 SHTS			0.0 mm +/- 0.2mm	+/- 1°	ISSUE	DATE	DRAWN	ENG APPROVAL	QUAL APPROVAL	SFT DA ECR16577		
			CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927	UNLESS OTHERWISE STATED	0.00 mm +/- 0.1mm	0.000 mm +/- 0.01mm	CHANGES					

HE-GEN-XXXX-XX-XX-XXXXXX-X-~~XXX~~-X-XXX-X-XXX-XX

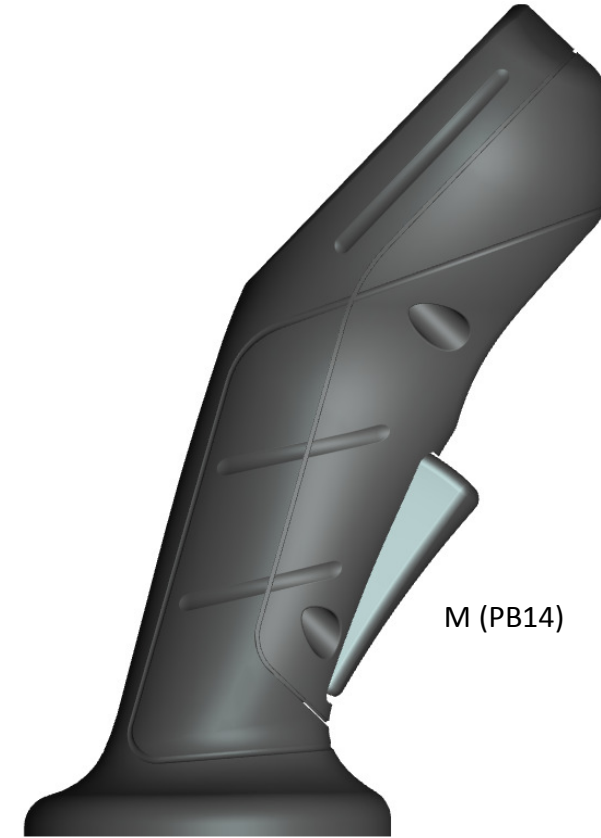
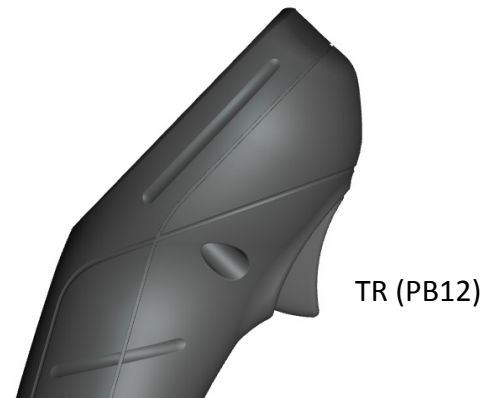
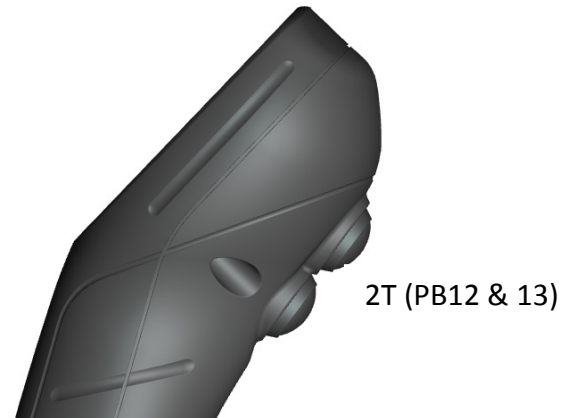
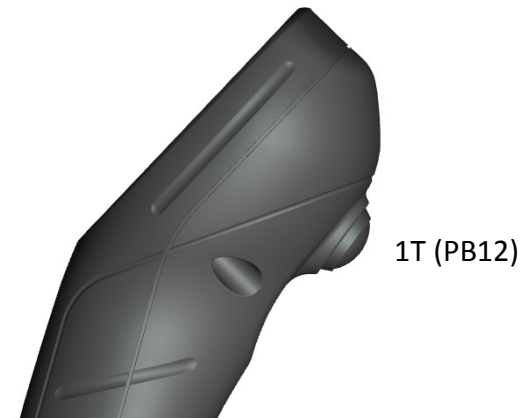
REAR SWITCHES	
<b>1T</b>	1 TOP SWITCH (PB12)
<b>2T</b>	2 TOP SWITCHES (PB12 & PB13)
<b>TR</b>	TRIGGER (PB12)
<b>NN</b>	NOT SELECTED
SWITCH ACTUATOR COLOUR	
<b>R</b>	RED
<b>G</b>	GREEN
<b>Y</b>	YELLOW
<b>B</b>	BLACK
<b>L</b>	BLUE
<b>W</b>	WHITE
<b>N</b>	NOT SELECTED

HE-GEN-XXXX-XX-XX-XXXXXX-X-XXX-~~X~~-XXX-X-XXX-XX

PERSON PRESENT	
<b>M</b>	MECHANICAL "PERSON PRESENT" LEVER (PB14)
<b>N</b>	NOT SELECTED

NOTE: -THE TRIGGER IS ONLY AVAILABLE IN BLACK.

-ALL REAR SWITCHES ARE OF THE ITW (I) 59 SERIES RANGE WITH THE EXCEPTION OF THE TRIGGER WHICH ACTUATES A (K) K12C SWITCH.  
 -THE TRIGGER IS NOT SELECTABLE WITH THE ROCKER SWITCH FROM THE FRONT SWITCH OPTIONS



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0.0 mm +/- 0.2mm			0.00 mm +/- 0.1mm	0.000 mm +/- 0.01mm	UNLESS OTHERWISE STATED	ISSUE	DATE	DRAWN	ENG' APPROVAL	QUAL' APPROVAL	CHANGES		

HE-GEN-XXXX-XX-XX-XXXXXX-X-XXX-X-~~XXX~~-X-XXX-XX

SIDE SWITCHES	
LL	LOWER LEFT SIDE (PB15)
UL	UPPER LEFT SIDE (PB16)
BL	BOTH UPPER & LOWER LEFT SIDE (PB15&16)
LR	LOWER RIGHT SIDE (PB17)
UR	UPPER RIGHT SIDE (PB18)
BR	BOTH UPPER & LOWER RIGHT SIDE (PB17&18)
2U	BOTH UPPER LEFT & RIGHT (PB16&PB18)
2L	BOTH LOWER LEFT & RIGHT (PB15&PB17)
3A	3 SWITCH COMBINATION (PB15,16,18)
3B	3 SWITCH COMBINATION (PB15,17,18)
3C	3 SWITCH COMBINATION (PB16,17,18)
3D	3 SWITCH COMBINATION (PB15,16,17)
BB	ALL SIDE SWITCHES (PB15-18)
NN	NOT SELECTED
SWITCH ACTUATOR COLOUR	
R	RED
G	GREEN
Y	YELLOW
B	BLACK
L	BLUE
W	WHITE
N	NOT SELECTED

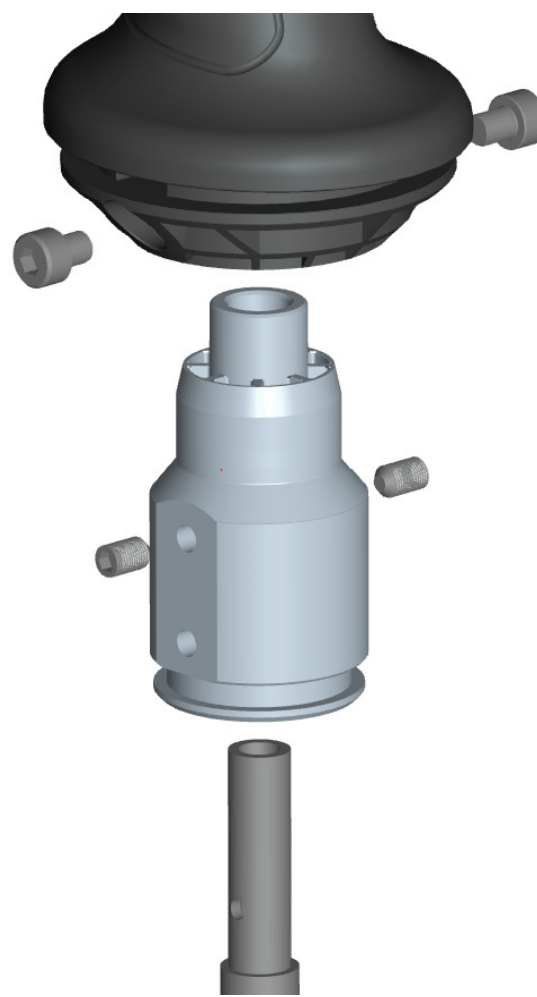
NOTE:  
 -ALL REAR SWITCHES ARE THE ITW (I) 59 SERIES VERSION  
 -SIDE SWITCHES ARE NOT AVAILABLE WHEN DUAL ROLLERS or ROLLERS IN COMBINATION WITH  
 ROCKER/SLIDE SWITCHES ARE CHOSEN IN THE FRONT PLATE. WHEN A SINGLE ROLLER or SINGLE ROCKER  
 ARE CHOSEN, SIDE SWITCHES ARE ONLY SELECTABLE ON THE OPPOSITE SIDE.  
 -WHEN SELECTED WITH A TRIGGER THE UPPER SWITCH POSITION/S ARE THE ONLY OPTIONAL SIDE SWITCHES



HE-GEN-XXXX-XX-XX-XXXXXX-X-XXX-X-XXX-~~X~~-XXX-XX

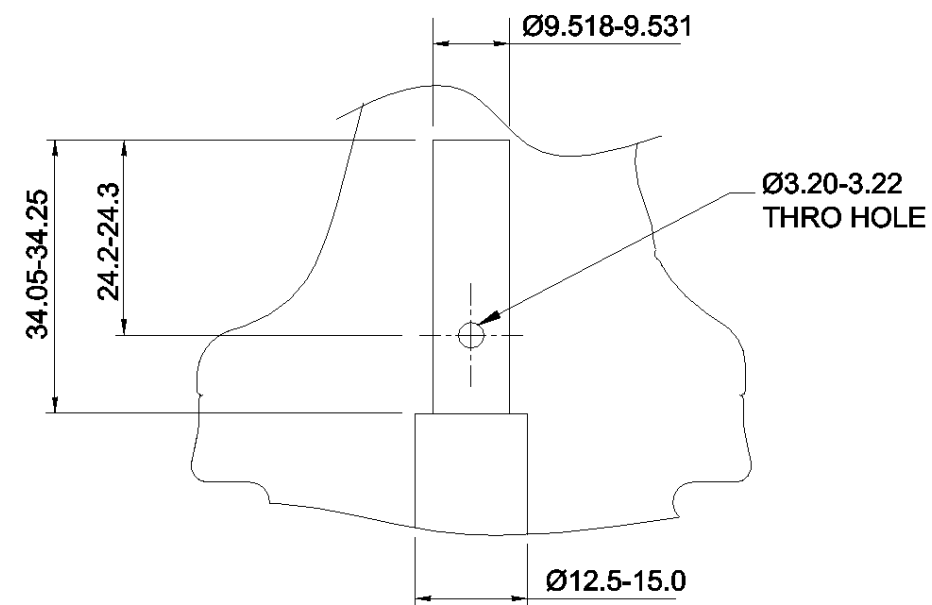
MECHANICAL INTERFACE	
S	SHAFT MOUNTED - UNIT WILL BE SUPPLIED WITH M5 GRUBSCREWS AND CAP HEADS
N	NOT SELECTED

NOTE:  
 -WHEN SELECTED WITH A JOYSTICK CONTROLLER THE MECHANICAL INTERFACE REQUIRED FOR THE JOYSTICK BECOMES THE DEFAULT INTERFACE. THIS SECTION OF THE CODE WILL NOT APPEAR IN THE MERGED STRING



NOTE: THREAD LOCKING  
 ADHESIVE/COMPOUND TO BE APPLIED

FIXING TORQUE – 1.3Nm



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					ISSUE	DATE	DRAWN	ENG APPROVAL	QUAL APPROVAL			



HE-GEN-XXXX-XX-XX-XXXXXX-X-XXX-X-XXX-X-XXX-XX

ELECTRICAL INTERFACE	
STD	DIRECT OUPUT FROM INTERNAL COMPONENTS / FLYING LEADS +
NNN	NO INTERFACE

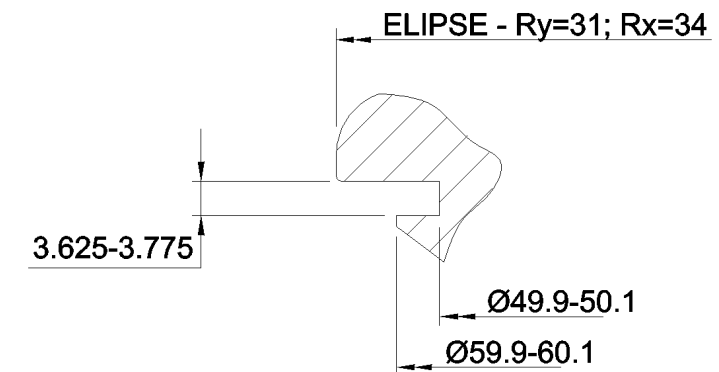
NOTE:  
 -THE MAXIMUM NUMBER OF WIRES THAT CAN PASS THROUGH THE HANDLE IS 17. WHEN MOUNTED TO A JOYSTICK CONTROLLER THE NUMBER OF WIRES WILL BE LIMITED BY THE JOYSTICKS OPERATING ROD DIAMETER. REFER TO THE 'CONNECTION DATA' SECTION TO DETERMINE THE NUMBER OF WIRES FOR ANY GIVEN CONFIGURATION.  
 -WHEN SELECTED WITH A JOYSTICK CONTROLLER THE ELECTRICALINTERFACE REQUIRED FOR THE JOYSTICK BECOMES THE DEFAULT INTERFACE. THIS SECTION OF THE CODE WILL NOT APPEAR IN THE MERGED STRING

HE-GEN-XXXX-XX-XX-XXXXXX-X-XXX-X-XXX-X-XXX-XX

GAITER	
NN	NO GAITER
G1	OUTER GAITER

NOTE:  
 -WHEN SELECTED WITH A JOYSTICK CONTROLLER THE GAITER REQUIRED FOR THE JOYSTICK BECOMES THE DEFAULT GAITER. THIS SECTION OF THE CODE WILL NOT APPEAR IN THE MERGED STRING

GAITER INTERFACE



A3	<b>Penny + Giles</b> © COPYRIGHT RESERVED.	<b>METRIC</b> NOT TO SCALE: DO NOT SCALE. IF IN DOUBT, ASK.	ALL SCREW THREADS TO BS 3643 PT. 2 EXTERNAL CLASS: 6g INTERNAL CLASS: 6H TOLERANCES IN LINE WITH PENNY & GILES STANDARDS 56-301	RoHS COMPLIANCE			TITLE			SPECIFICATION NUMBER
				YES	X	NO	HE HANDLE			
SHT 9 OF 9 SHTS	THIS DOCUMENT CONTAINS CONFIDENTIAL AND/OR PROPRIETARY INFORMATION AND MAY NOT BE REPRODUCED IN ANY FORM WHATSOEVER. NOR MAY ITS CONTENTS BE DIVULGED TO THIRD PARTIES WITHOUT THE WRITTEN PERMISSION OF THE OWNER. ALL RIGHTS RESERVED.	THIRD ANGLE PROJECTION TO BS 8888 CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927	LINEAR (MACHINING)	ANGULAR	2	4-6-14	MG	SFT	DA	ECR16577
0. mm +/- 0.5mm 0.0 mm +/- 0.2mm 0.00 mm +/- 0.1mm 0.000 mm +/- 0.01mm			UNLESS OTHERWISE STATED	ISSUE	DATE	DRAWN	ENG' APPROVAL	QUAL' APPROVAL	CHANGES	