

CONFIGURATION STRING OVERVIEW

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

¹If 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.

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

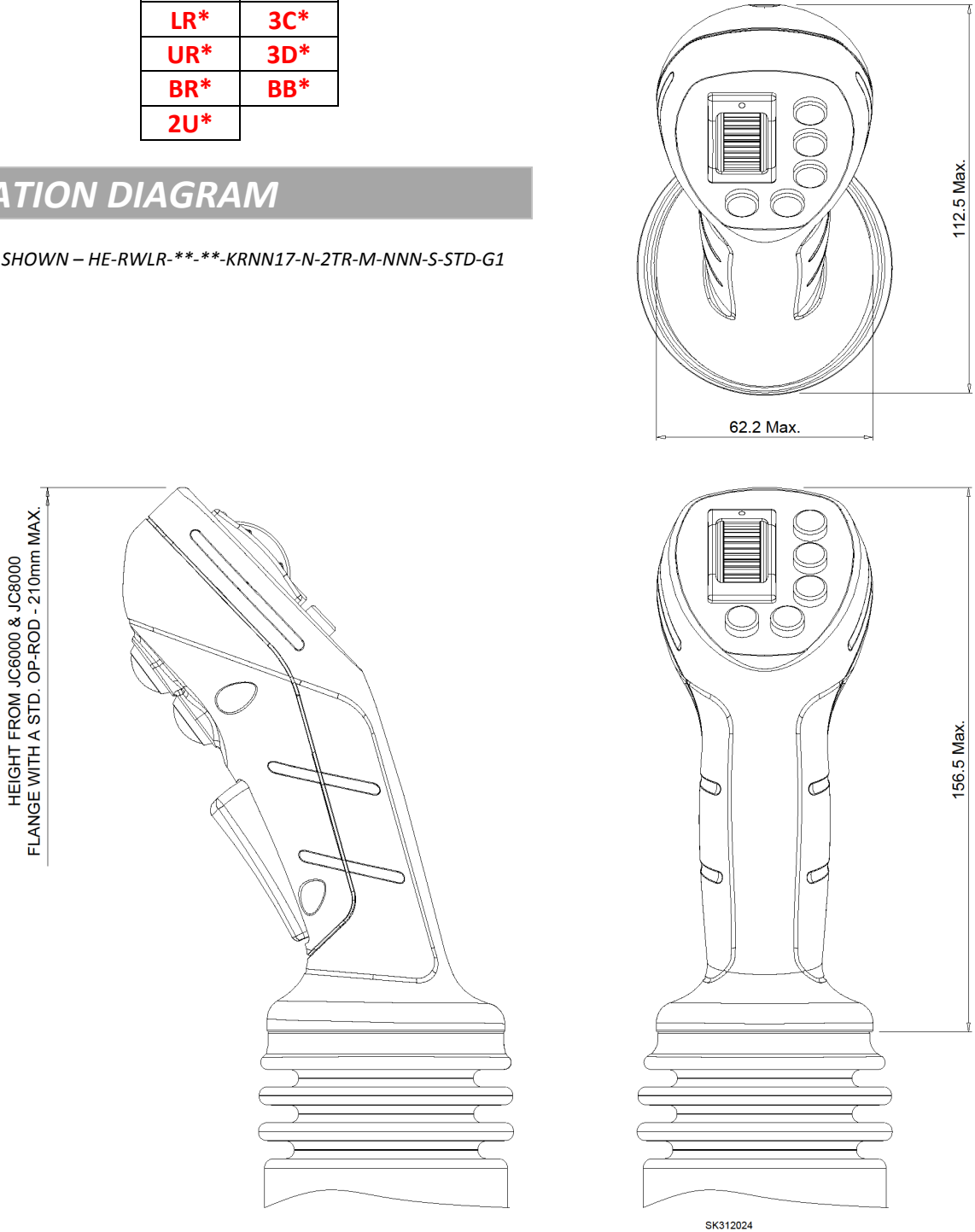
³Side Switches cannot be selected on the same side as a roller or rocker switch. When a trigger switch is selected only the upper side switches can be chosen.

MECHANICAL DATA

Mechanical Strength NOTE: ENSURE THE HANDLE IS ADEQUATELY MOUNTED TO ENSURE OPTIMUM STRENGTH PERFORMANCE	Maximum Overload (Static)	600N
	Maximum Overload (Impact)	10 Joules
	Lever & Trigger Overload	500N
	Maximum Torque	40Nm
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
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



A3	Penny + Giles © COPYRIGHT RESERVED.	METRIC 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 HE-GEN-XXX	
ACAD				YES	X	NO	HE HANDLE					
SHT 1 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	LINEAR (MACHINING) 0. mm +/- 0.5mm 0.0 mm +/- 0.2mm 0.00 mm +/- 0.1mm 0.000 mm +/- 0.01mm	ANGULAR +/-1°	2	4-6-14	MG	SFT ENG' APPROVAL	DA QUAL' APPROVAL	ECR16577		CHANGES
		CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927	UNLESS OTHERWISE STATED	ISSUE								

1		2		3		4		5		6	
ELECTRICAL DATA											
Operating/Switching Voltage & Current		Operating Voltage (Roller)		5VDC ±0.5V							
		Operating Current (Roller)		10mA (max)							
		Switching Voltages		28VDC ±0.5V							
		Switching Currents		100mA (max)							
I Switch, Rear & Side Switches		Contact Resistance		50mΩ (max)							
		Electrical Life		500,000 Cycles @ max. power							
		Manufacturer No.		ITW / 59 Series							
		Contact Type		N.O.							
O Switch		Contact Resistance		-							
		Electrical Life		25,000 Cycles (min)							
		Manufacturer No.		OTTO / P9 Series							
		Contact Type		N.O.							
K Switch & “Person Present” Lever switch		Contact Resistance		50mΩ (max)							
		Electrical Life		1,000,000 Cycles @ max. power							
		Manufacturer No.		K12C Series							
		Contact Type		N.O.							
Rocker Switch		Contact Resistance		-							
		Electrical Life		25,000 Cycles							
		Manufacturer No.		OTTO / K1 series							
Slide Switch		Contact Resistance		10mΩ (max)							
		Electrical Life		100,000 Cycles							
		Manufacturer No.		APEM / MT Series							
Thumb Roller		Electrical Life		3,000,000 cycles							
		Manufacturer		OTTO / HTW Series							
Cable Type		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											
SWITCHES											
FRONT SWITCHES											
PB1 BLUE											
PB2 YELLOW											
PB3 BLUE/WHT											
PB4 WHITE/GREEN											
PB5 RED											
PB6 VIOLET											
PB7 BLUE/ORANGE											
PB8 VIOLET/WHITE											
PB9 YELLOW/WHITE											
PB10 GREEN/YELLOW											
PB11 RED/YELLOW											
BLACK/RED											
I&O OPTIONS LIMITED TO											
REAR SWITCHES											
(UPPER TOP/TRIGGER) PB12 BROWN											
(LOWER TOP) PB13 GREEN											
"PERSON PRESENT" SWITCH (LEVER)											
PB14 RED/GREEN											
BLACK/WHITE											
SIDE SWITCHES											
GREY PB15 (LOWER LEFT)											
YELLOW/RED PB16 (UPPER LEFT)											
BLUE/GREEN PB17 (LOWER/RIGHT)											
BROWN/WHITE PB18 (UPPER RIGHT)											
SLIDE OR ROCKER SWITCH											
PB19 BLU/ORG (FORE)											
PB20 VIOLET/WHITE (AFT)											
SK312024											
HALL ROLLERS											
LEFT & CENTRE POSITION * RIGHT POSITION											
(V+) WHITE/RED											
(V OUT) PINK											
(V/GND) PINK/GREY											
(V OUT) WHITE											
*WHEN ONE ROLLER SELECTED											
NOTE: WHEN MOUNTED TO A P&G JOYSTICK CONTROLLER, CONNECTION DETAIL WILL BE SUPPLIED IN ADDITION TO THE GENERIC SPECIFICATION.											

A3		Penny + Giles		METRIC		ALL SCREW THREADS TO BS 3643 PT. 2		RoHS COMPLIANCE		TITLE		SPECIFICATION NUMBER	
ACAD		©COPYRIGHT RESERVED.		NOT TO SCALE: DO NOT SCALE. IF IN DOUBT, ASK.		EXTERNAL CLASS: 6g INTERNAL CLASS: 6H		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.		THIRD ANGLE PROJECTION TO BS 8888		TOLERANCES IN LINE WITH PENNY & GILES STANDARDS 56-301		2 4-6-14 MG		SFT DA ECR16577			
		CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927				LINEAR (MACHINING) 0. mm +/- 0.5mm 0.0 mm +/- 0.2mm 0.00 mm +/- 0.1mm 0.000 mm +/- 0.01mm		ISSUE DATE DRAWN		ENG' APPROVAL QUAL' APPROVAL CHANGES		HE-GEN-XXX	
1		2		3		4		5		6			

1		2		3		4		5		6	
ENVIRONMENTAL DATA											
Sealing		BS EN 60529		IP66 / IP67 / IP69K*							
NOTE: THE HANDLE HAS A FLOW IN FLOW OUT DESIGN AND THE INTERNAL COMPONENTS ARE SEALED TO MEET THE STATED RATINGS.											
Dry Heat		BS EN 60068-2-2		+85°C							
Cold		BS EN 60068-2-1		-40°C							
Operating Temperature (Cycling)		BS EN 60068-2-14		-40°C to +85°C**							
NOTE: THE HANDLES FUNCTIONAL PARTS WILL NOT OPERATE IN AN ICED CONDITION											
Temperature & Humidity		BS EN 60068-2-38		Pt2.1 Z/AD 65°C for 10 Cycles							
Salt Mist		BS EN 60068-2-11		96 hours							
Vibration											
Sinusoidal		BS EN 60068-2-6		10-200Hz; 3gn; 1hr per axis							
Random		BS EN 60068-2-64		10-200Hz; 3.6gn; 2hr per axis							
Bump		BS EN 60068-2-27		40gn; ½ Sine 6ms; 1350 each axis							
Shock		BS EN 60068-2-27		25gn; 10ms; 500 in 6 directions							
*When the Rocker Switch, Slide Switch or ‘O’ switch are selected the sealing performance will be limited to IP68S (Dust-tight and protected against continuous water immersion, 1 meter > 30 minutes)											
**When the Rocker switch is selected the operating temperature will be limited to -30 °C											

LABELLING DETAIL

Label to Contain:	P&G Controls Ltd. U.K.	
	Specification Type:	HE-GEN-XXXX
	Description:	XXXX-XX-XX-XXXXXX-XX-XXX-X-XXX-X-XXX-XX
	Batch No.:	XXXXXXX
	Issue Status:	X
	Reference:	XXXXXXMMYYYY

IMPORTANT INFORMATION

Servicing:
In the event of the gaiter rupturing, or being removed, it is recommended that immediate replacement of the gaiter is carried out to minimise the effects of particle and water ingress from the surrounding environment.

The flow in, flow out design is achieved by bleed holes and gaps situated at the rear of the handle. Therefore it is recommended that the handle be regularly cleaned to prevent particle buildup so the normal function of the handle is maintained.

PENNY & GILES CONTROLS LTD MAKES NO WARRANTY OR REPRESENTATION IN RESPECT OF PRODUCT FITNESS OR SUITABILITY FOR ANY PARTICULAR DESIGN APPLICATION, ENVIRONMENT, OR OTHERWISE, EXCEPT AS MAY SUBSEQUENTLY BE AGREED IN A CONTRACT FOR THE SALE AND PURCHASE OF PRODUCTS. CUSTOMERS SHOULD THEREFORE SATISFY THEMSELVES OF THE ACTUAL PERFORMANCE REQUIREMENTS AND SUBSEQUENTLY THE PRODUCT’S SUITABILITY FOR ANY PARTICULAR DESIGN APPLICATION AND THE ENVIRONMENT IN WHICH THE PRODUCT IS TO BE USED.

CONTINUAL RESEARCH AND DEVELOPMENT MAY REQUIRE CHANGE TO PRODUCTS AND SPECIFICATION WITHOUT PRIOR NOTIFICATION.
ALL TRADEMARKS ACKNOWLEDGED.

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9 SHTS		CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927	UNLESS OTHERWISE STATED	ISSUE							DATE	
HE-GEN-XXX												

OPTIONS

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

FRONT PROPORTIONALITY	
CONTROLLER	
R	THUMB ROLLER*
N	NOT SELECTED
STYLE	
W	WIDE
N	NOT SELECTED
POSITION	
L	LEFT
R	RIGHT
C	CENTRE
2	LEFT & RIGHT
N	NOT SELECTED
ACTUATOR	
R	KNURLED WHEEL
N	NOT SELECTED



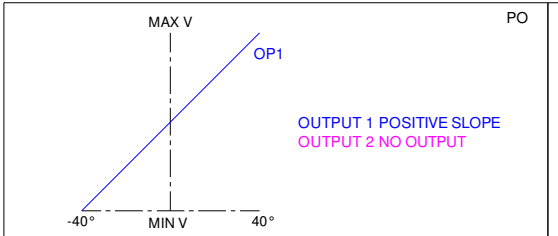
THUMB ROLLER – WIDE

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

OUTPUT SPAN	
40	10% - 50% - 90% (±5%)
NN	NOT SELECTED

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

OUTPUT RAMP	
PO	OUTPUT 1 + SLOPE / NO OUTPUT 2
NN	NOT SELECTED



*REFER TO THE OTTO HTW PRODUCT SPECIFICATION FOR MORE DETAILS

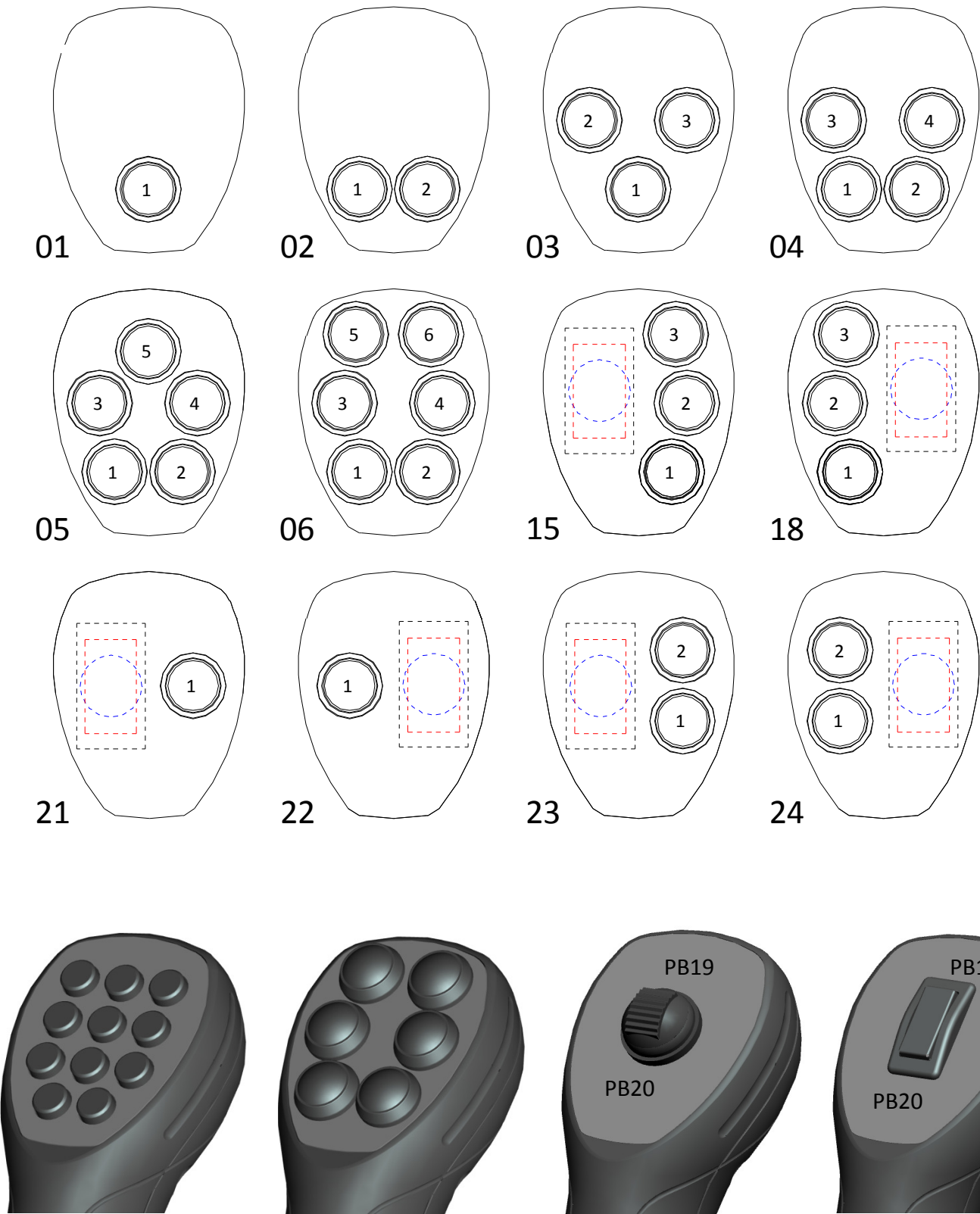
NOTE: WHEN A DUAL ROLLER, or SLIDE/ROCKER SWITCH WITH ROLLER COMBINATION IS CHOSEN WITH PUSHBUTTON SWITCHES THE K SWITCH WILL BECOME THE DEFAULT OPTION.

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

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

I & O SWITCH LAYOUT OPTIONS

SK312024



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

1

2

3

4

5

6

A

B

C

D

E

F

K SWITCH LAYOUT
OPTIONS

SK312024

01

02

03

04

05

06

07

08

09

10

11

12

13

14

15

16

17

18

19

20

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

ROLLER

ROCKER
SWITCH

SLIDE
SWITCH

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SHT 6 OF 9 SHTS						

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

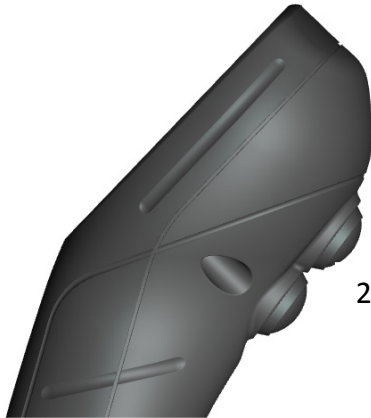
REAR SWITCHES	
1T	1 TOP SWITCH (PB12)
2T	2 TOP SWITCHES (PB12 & PB13)
TR	TRIGGER (PB12)
NN	NOT SELECTED
SWITCH ACTUATOR COLOUR	
R	RED
G	GREEN
Y	YELLOW
B	BLACK
L	BLUE
W	WHITE
N	NOT SELECTED

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



1T (PB12)



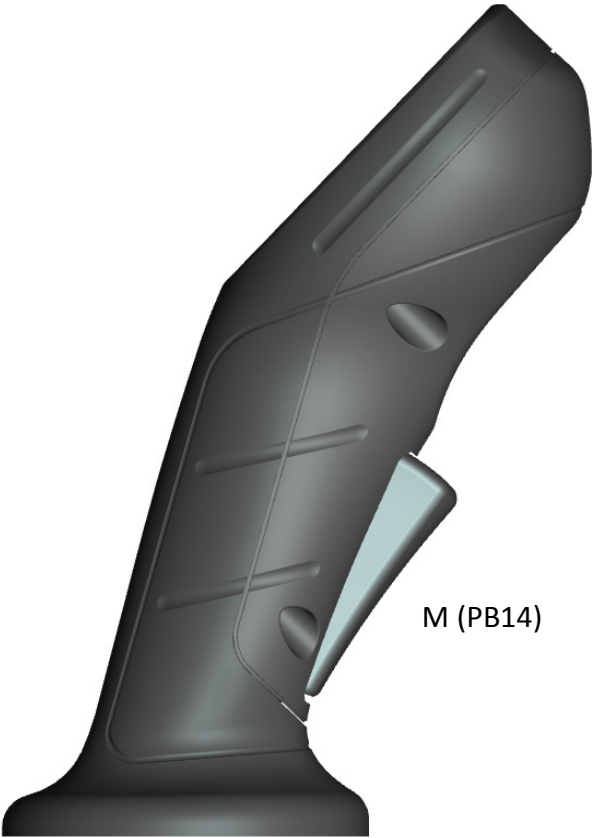
2T (PB12 & 13)



TR (PB12)

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

PERSON PRESENT	
M	MECHANICAL “PERSON PRESENT” LEVER (PB14)
N	NOT SELECTED



M (PB14)

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9 SHTS			0. mm +/- 0.5mm 0.0 mm +/- 0.2mm 0.00 mm +/- 0.1mm 0.000 mm +/- 0.01mm	+/-1°							UNLESS OTHERWISE STATED	
		CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927				ISSUE	DATE	DRAWN	ENG' APPROVAL	QUAL' APPROVAL	CHANGES	
HE-GEN-XXX												

HE-GEN-XXX

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

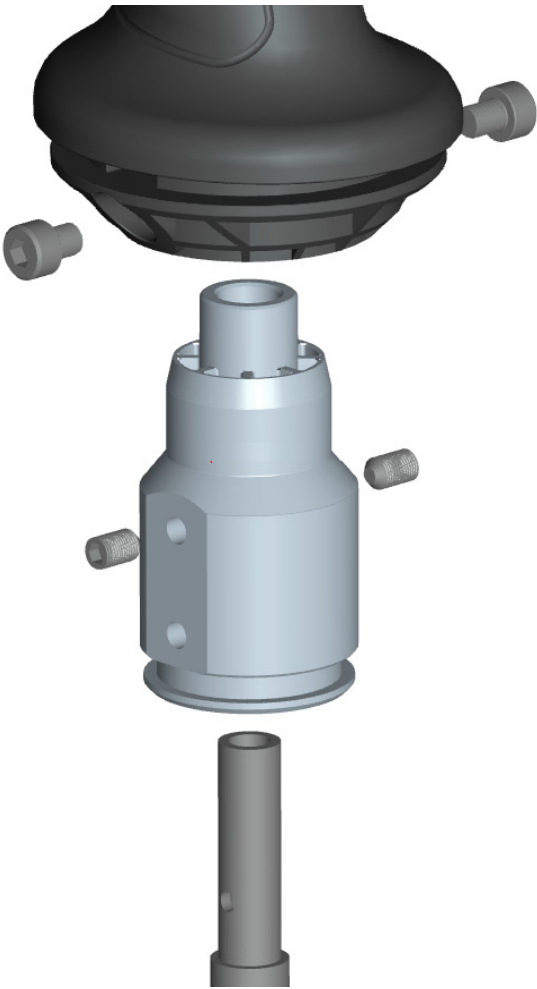
NOTE:
-ALL REAR SWITCHES ARE THE ITW (I) 59 SERIES VERSION
-SIDE SWITCHES ARE NOT AVAILABLE WHEN DUAL ROLLERS or ROLLERS IN COMBINATION WITH
ROCKER/SLIDE SWITCHES ARE CHOSEN IN THE FRONT PLATE. WHEN A SINGLE ROLLER or SINGLE ROCKER
ARE CHOSEN, SIDE SWITCHES ARE ONLY SELECTABLE ON THE OPPOSITE SIDE.
-WHEN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

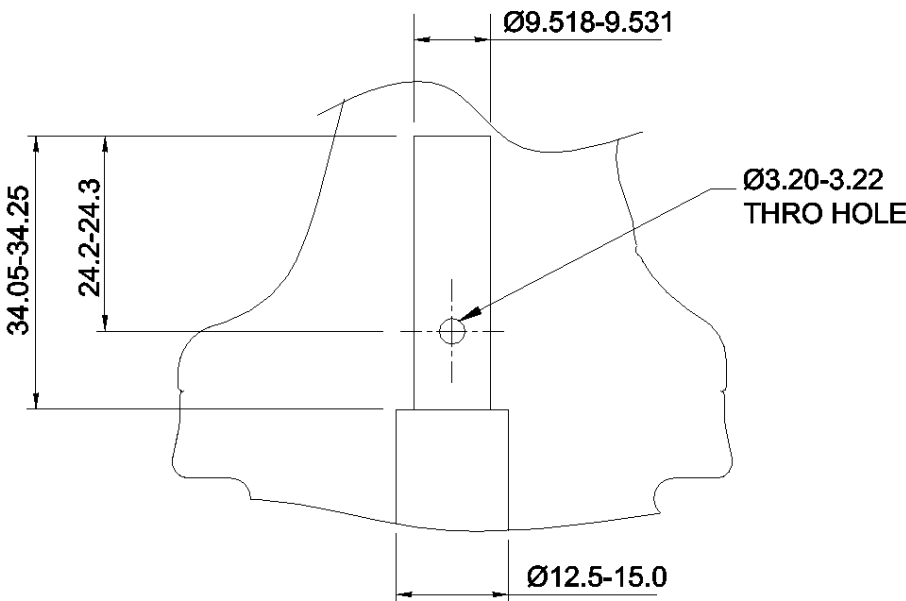
MECHANICAL INTERFACE	
S	SHAFT MOUNTED - UNIT WILL BE SUPPLIED WITH M5 GRUBSCREWS AND CAP HEADS
N	NOT SELECTED

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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9 SHTS		CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927	UNLESS OTHERWISE STATED	ISSUE								

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

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

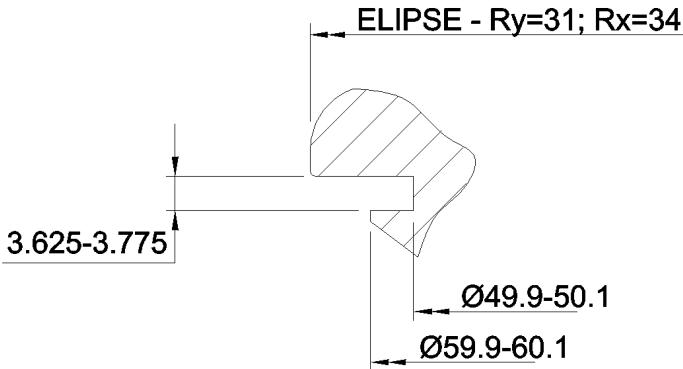
NOTE:
-THE MAXIMUM NUMBER OF WIRES THAT CAN PASS THROUGH THE HANDLE IS 17. WHEN MOUNTED TO A JOYSTICK CONTROLLER THE NUMBER OF WIRES WILL BE LIMITED BY THE JOYSTICKS OPERATING ROD DIAMETER. REFER TO THE 'CONNECTION DATA' SECTION TO DETERMINE THE NUMBER OF WIRES FOR ANY GIVEN CONFIGURATION.
-WHEN SELECTED 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



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ACAD		THIRD ANGLE PROJECTION TO BS 8888 CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927	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 9 OF					2	4-6-14	MG	SFT	DA	ECR16577		HE-GEN-XXX
9 SHTS					ISSUE	DATE	DRAWN	ENG' APPROVAL	QUAL' APPROVAL	CHANGES		

HE-GEN-XXX