

- Designed primarily for Telehandlers
- Ergonomic grips
- Stand-alone or fitted to a JC6000 or JC8100 joystick
- Hall-effect sensor technology
- Choice of CAN or voltage outputs
- Optional left and right roller overpress
- Center-reference signal
- Switches rated for 1 million cycles and rollers for 2 million cycles
- Enclosure sealing to IP67
- EMC performance to 100V/m
- Integrated connector (CAN) or flying-lead termination (Analogue)
- Customizable face plate colors and logo option
- Backlit option



The HM Grip, which is available as a right-hand option, offers a wide range of non-contacting rollers and push-button switch combinations along with an FNR option in the rear panel.

A contoured front panel means the rollers are within an easy sweep of an operator's thumb, while the switch arrays are angled to allow for similarly convenient actuation. Further customization is possible with OEM logo/text embossed on front panel with an additional choice of 32 logos which can be printed on each of the switches, with or without a backlit option.

The controls on the rear panel are situated to provide comfortable operation with a first finger. To further enhance operator comfort, the grip is oriented to lean forward and inwards.

Non-contacting, Hall-effect roller sensing technology ensures smooth operation and a long life, while a center-reference signal, enhance overall system safety.

The stand-alone grip is available as CAN Open, CAN J1939 (both fitted with Deutsch connector) or on request a 5V analogue electrical interface supplied with a flying lead to enable a customer to choose their preferred connector.

In addition, the HM Grip can be supplied fitted to a JC6000 or JC8100 joystick

Careful material selection ensures maximum robustness to impact, liquids, and dust, with the enclosure being sealed to IP67 and an EMC performance level of 100V/m.



CONTENTS

Configuration & Ordering Codes 3

- Handed Version 3
- Front plate layout 3
- Left roller overpress..... 4
- Right roller overpress 4
- Front plate color 4
- Backlighting 4
- Front button options 5
- Left roller color 9
- Right roller color 9
- Rear layout..... 9
- Rear function colors 10
- Mechanical interface 10
- Electrical interface 10
- example of populated configuration string 11
- custom logo/name plate 12

Installation..... 13

- Right hand FNR grip..... 13
- Right hand Roller grip..... 14
- Electrical Connections..... 15

Specifications 16

- Electrical – Analogue Stand-alone grip..... 16
- Electrical – Analogue FNR switch..... 16
- Electrical – CAN Stand-alone Grip 16
- Electrical – Backlighting 17
- Mechanical 17
- EMC and Magnetic field 18
- Environmental and Legislative..... 19



CONFIGURATION & ORDERING CODES

HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-X-XX-X-XXX

Type	Version	Front Plate Layout	Left Roller Overpress	Right Roller Overpress	Front Plate Color	Backlit	Front Button Options	Left Roller Color	Right Roller Color	Rear Layout	Rear Function Colors	Mechanical Interface	Electrical Interface
HM-GEN	X	XX	XX	XX	X	X	XXXXXXXXXX	X	X	X	XX	X	XX
	R	2A	LD	RD	B	W	B	B	B	A	B	A	CO
		2B	LF	RF	G	N	Y	Y	Y	B	Y	B	C1
		2C	LB	RB	R		L	L	L	C	L	C	5V
		2D	LN	RN			O	O	O	D	O	D	
		2E					R	R	R	E	R	E	
		2F					/			F	/		
							Logo			G			
									H				
									I				
									/				

Note: Button logos are available on request, please contact the sales office to confirm availability and lead-time

HANDED VERSION

HM-GEN-~~X~~-XX-XX-XX-X-X-XXXXXXXXXX-X-X-X-XX-X-XX

Code	Description
R	Right

FRONT PLATE LAYOUT

HM-GEN-X-~~XX~~-XX-XX-X-X-XXXXXXXXXX-X-X-X-XX-X-XX

Code	Description	Roller Slope Inward	Roller Slope Outward
2A	2 Lower Switches / 2 Rollers (<i>Slope inwards</i>)		
2B	3 Upper Switches / 2 Rollers (<i>Slope inwards</i>)		
2C	5 Switches / 2 Rollers (<i>Slope inwards</i>)		
2D	2 Lower Switches / 2 Rollers (<i>Slope outwards</i>)		
2E	3 Upper Switches / 2 Rollers (<i>Slope outwards</i>)		
2F	5 Switches / 2 Rollers (<i>Slope outwards</i>)		

2 Lower Switch front plate



3 Upper Switch front plate



5 Switch front plate





LEFT ROLLER OVERPRESS

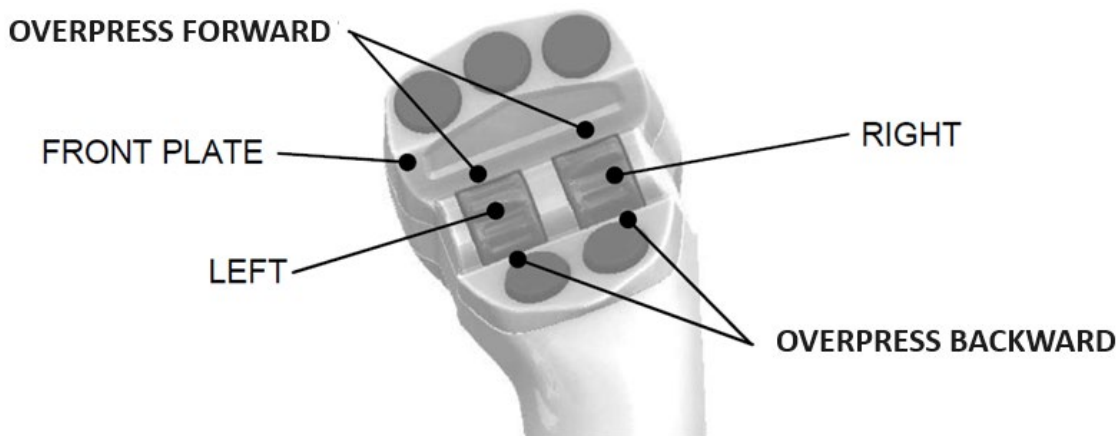
HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-X-XX-X-XX

Code	Description	
LD	Left, Dual	Rollers are available with an overpress function at the ends of travel.
LF	Left, Forward	The selection can be made as both ends or either end or not at all.
LB	Left, Backward	
LN	Not Selected	

RIGHT ROLLER OVERPRESS

HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-X-XX-X-XX

Code	Description	
RD	Right, Dual	Rollers are available with an overpress function at the ends of travel. This function gives an increase in force to reach the end of travel but does not lock the roller in this position
RF	Right, Forward	The selection can be made as both ends or either end or not at all.
RB	Right, Backward	
RN	Not Selected	



FRONT PLATE COLOR

HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-X-XX-X-XX

Code	Description	
B	Black	RAL 9005
G	Grey	RAL 7042
R	Red	RAL 3020

BACKLIGHTING

HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-X-XX-X-XX

Code	Description	Color
W	Backlight	White
N	Not Selected	

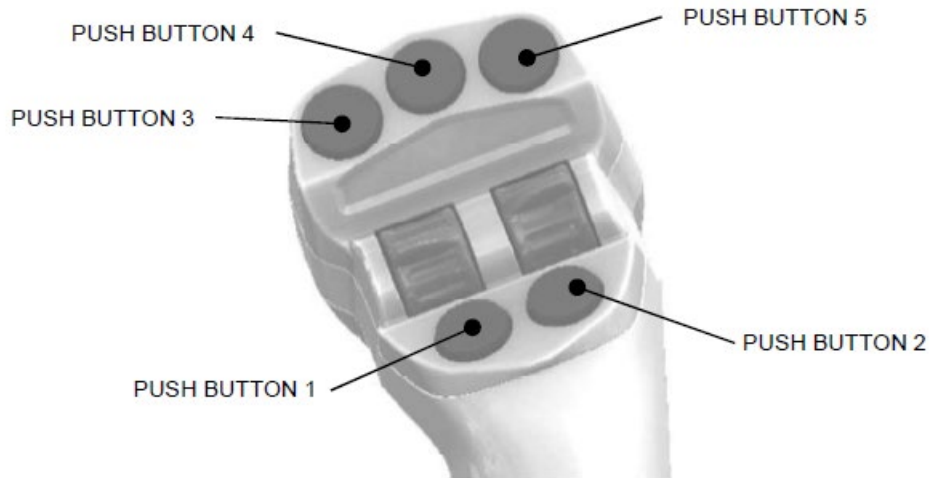


FRONT BUTTON OPTIONS

HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-X-XX-X-XX

Button options are selected as a button color and button logo for each button location:

Button 1	Button 2	Button 3	Button 4	Button 5
XX	XX	XX	XX	XX




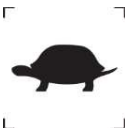



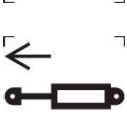
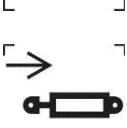
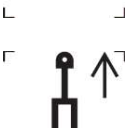
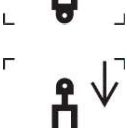

Code	Button Color	Logo Color	
B	Black RAL 9005	White	Contact the Curtiss-Wright sales team to check on the lead-time for buttons with a logo and if you require alternative color/logo combinations
Y	Yellow RAL 1023	Black	
L	Blue RAL 5010	White	
O	Orange RAL 2009	White	
R	Red RAL 3020	White	
/	Not Selected		

Code	Description	Logo
A	Start	<div style="text-align: center;"> START </div>
B	Stop	<div style="text-align: center;"> STOP </div>
C	Off	<div style="text-align: center;"> OFF </div>


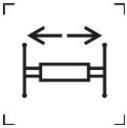
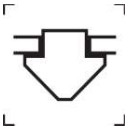
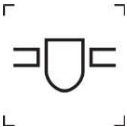
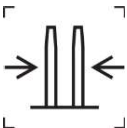
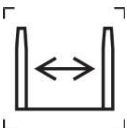
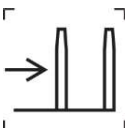
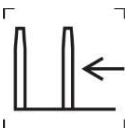



D	OK		
E	Neutral		
F	Arrow Right		ISO 7000-0251
G	Arrow Up		ISO 7000-1861
H	Arrow Left		
I	Arrow Down		
J	Horn		ISO 7000-0244
K	Padlock		ISO 7000-1656
L	Plus		ISO 7000-5005
M	Minus		ISO 7000-5006



N	Hare		ISO 7000-2810
O	Tortoise		ISO 7000-2811
P	Snail		ISO 7000-2812
Q	Differential Lock		ISO 7000-1662
R	Float		ISO 7000-1441
S	Remote Hydraulic Cylinder, Extend		ISO 7000-1570
T	Remote Hydraulic Cylinder, Retract		ISO 7000-1571
U	Remote Hydraulic Cylinder, Extend		
V	Remote Hydraulic Cylinder, Retract		
W	Custom Fast/Slow		ISO 7000-2811/2810



X	Top Lift, Retract Laterally		ISO 7000-2375
Y	Top Lift, Extend Laterally		ISO 7000-2372
Z	Twist Lock, Lock		ISO 7000-2370
2	Twist Lock, Unlock		ISO 7000-2369
3	Fork Spread, Close		ISO 7000-1192
4	Fork Spread, Open		
6	Side Shift, Right		ISO 7000-1190
7	Side Shift, Left		ISO 7000-1189
8	Custom Shake		
/	Not Selected		

Note: Logo's will be white except when an un-lit yellow button is selected when it will be black
When illumination is selected the logo's will be white
Contact the sales team if you require alternative combinations



LEFT ROLLER COLOR

HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-XX-X-XX

Code	Color	
B	Black	RAL 9005
Y	Yellow	RAL 1023
L	Blue	RAL 5010
O	Orange	RAL 2009
R	Red	RAL 3020

RIGHT ROLLER COLOR

HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-XX-X-XX

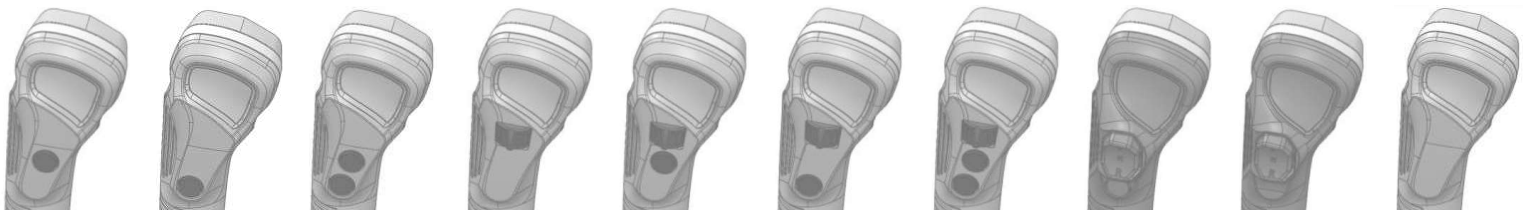
Code	Color	
B	Black	RAL 9005
Y	Yellow	RAL 1023
L	Blue	RAL 5010
O	Orange	RAL 2009
R	Red	RAL 3020

REAR LAYOUT

HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-XX-X-XX

Code	Description
A	1 Switch (<i>upper</i>)
B	1 Switch (<i>lower</i>)
C	2 Switches
D	1 Roller
E	1 Roller / 1 Switch (<i>upper</i>)
F	1 Roller / 1 Switch (<i>lower</i>)
G	1 Roller / 2 Switches
H	1 FNR / 1 Switch
I	1 FNR
N	No Rear Function

1 switch upper	1 switch lower	2 switches	1 roller	1 roller and 1 upper switch	1 roller and 1 lower switch	1 roller and 2 switches	FNR and 1 lower switch	FNR	No rear function
----------------	----------------	------------	----------	-----------------------------	-----------------------------	-------------------------	------------------------	-----	------------------





REAR FUNCTION COLORS

HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-X-XX-X-XX

Roller and FNR Color XX

Code	Description	Color
B (Roller Only)	Black	Black RAL 9005
Y (Roller Only)	Yellow	Yellow RAL 1023
L (Roller Only)	Blue	Blue RAL 5010
O	Orange	Orange RAL 2009
R (Roller Only)	Red	Red RAL 3020
/	Not Selected	

Button Color XX

Code	Description	Color
B	Black	Black RAL 9005
Y	Yellow	Yellow RAL 1023
L	Blue	Blue RAL 5010
O	Orange	Orange RAL 2009
R	Red	Red RAL 3020
/	Not Selected	

Notes: The FNR Logo is not illuminated
The FNR actuator is only available in Orange and has FNR lettering
If two rear buttons are selected, they must both be the same color



MECHANICAL INTERFACE

HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-X-X-XX

Code	Description
A	Fitted to JC6000
B	Fitted to JC8100
C	M12 x 1.75 (Internal) Thread depth in adaptor is 24mm
D	M14 x 1.5 (External) Thread depth in adaptor is 26mm
E	M12 x 1.75 (External) Thread depth in adaptor is 26mm

ELECTRICAL INTERFACE

HM-GEN-X-XX-XX-XX-X-X-XXXXXXXXXX-X-X-X-XX-X-XX

Code	Description	Default Source Address
CO	CAN Open	0x48
C1	CAN - J1939	0x33
5V	*5V Analogue	

*Available upon request



EXAMPLE OF POPULTATED CONFIGURATION STRING

HM-GEN-R-2A-LN-RD-R-N-LLYM/////O-B-G-YB-A-5V

- HM generic grip
- Right-Handed
- 2 switches and 2 rollers slope inwards
- No left roller overpress
- Dual right roller overpress
- Front plate color Red
- No back lighting on the buttons
- Button 1 Blue with white minus logo
- Button 2 Yellow with Black plus logo
- Button 3 not required
- Button 4 not required
- Button 5 not required
- Left roller Orange
- Right roller Black
- Rear layout 1 roller and 2 buttons
- Rear roller Yellow
- Button 6 Blue
- Button 7 Blue
- Mated to a JC6000 unit
- Electrical interface 5V analogue

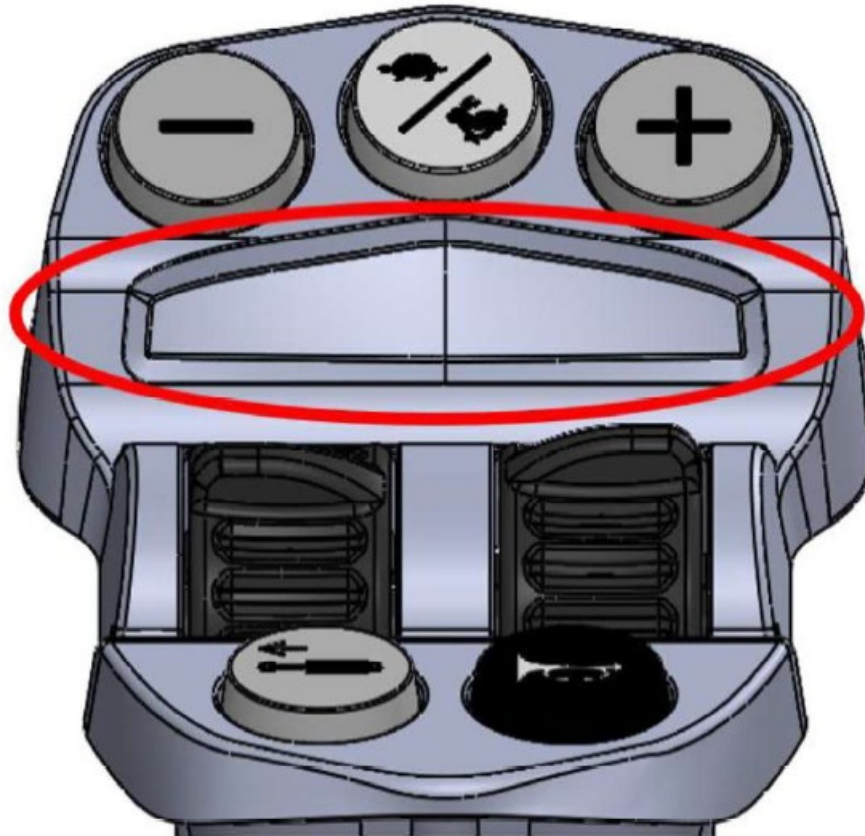




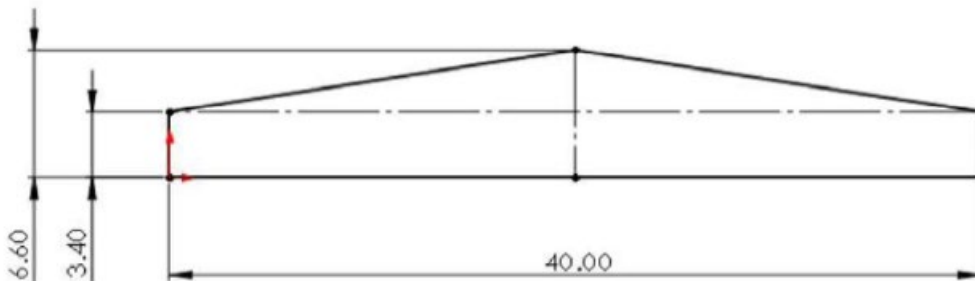
CUSTOM LOGO/NAME PLATE

A custom logo, company logo or text can be embossed into the area highlighted below.

Please discuss your needs with the sales team as this option requires tooling charge and minimum order quantity



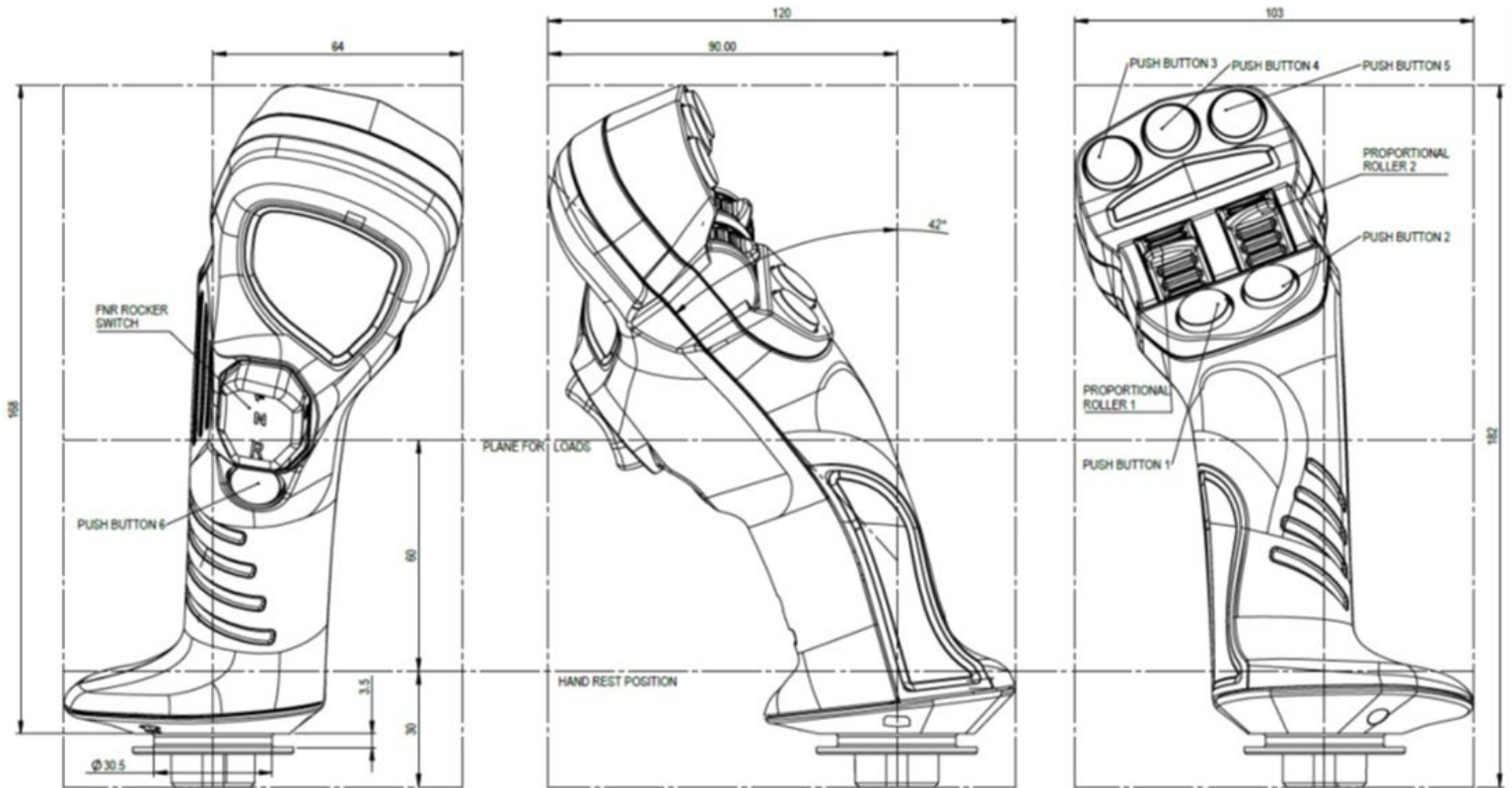
The size of the available space is detailed below





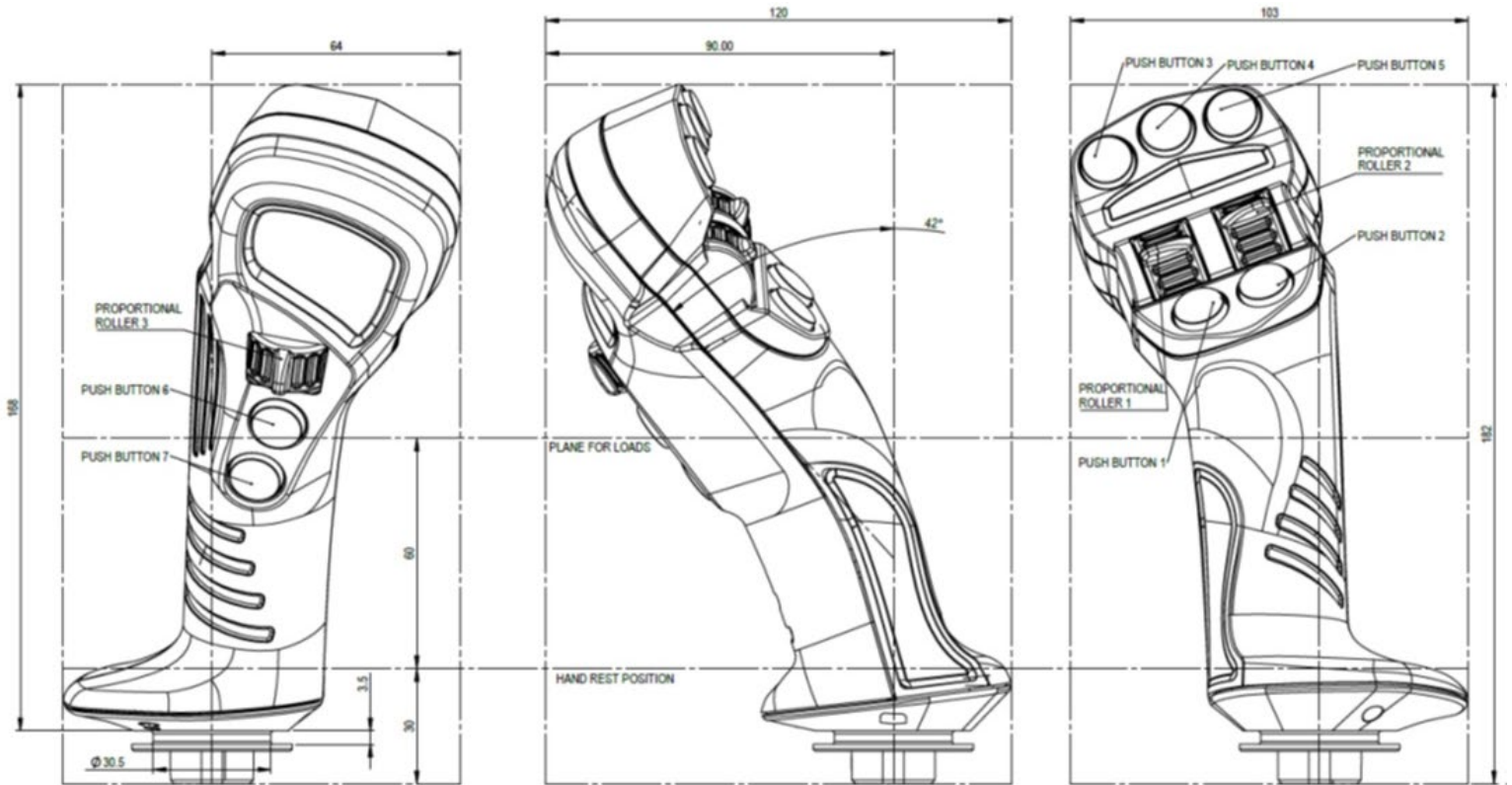
INSTALLATION

RIGHT HAND FNR GRIP





RIGHT HAND ROLLER GRIP





ELECTRICAL CONNECTIONS

Termination: Analogue Wire Colors

20 AWG PTFE insulated 16/0.2 wires, 350 mm long with protective braid

Function	Common	Output
Push Button 1	Black/Red	Blue
Push Button 2	Black/Red	Yellow
Push Button 3	Black/Red	Blue/White
Push Button 4	Black/Red	White/Green
Push Button 5	Black/Red	Red
Push Button 6	Black/Red	Violet
Push Button 7	Black/Red	Blue/Orange

Function	Common (5V)	Ground (0V)	Output
Roller 1	White/Red	Pink/Grey	Pink
Roller 2	White/Red	Pink/Grey	White
Roller 3/FNR	White/Red	Pink/Grey	Green/Yellow

Function	Common (5V)	Ground (0V)
LED Backlighting	Red/Yellow	Black

Note: The maximum number of wires that can be routed from the stand-alone analogue grip is 14
 The maximum number of wires when the grip is fitted to a Curtiss-Wright joystick is limited by the joystick selected (JC6000 or JC8100)

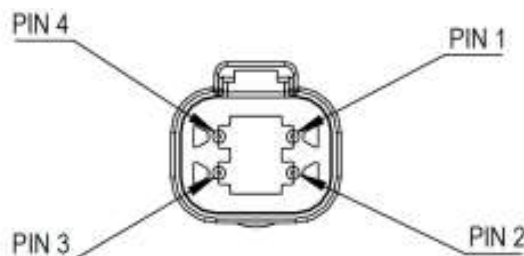
Termination: CAN

20 AWG PTFE insulated 16/0.2 wires, 300 mm long with protective braid

Deutsch DT04-4P connector with Gold-plated contacts

Note: the mating connector must be fitted with Gold-plated pins to ensure stable output from the joystick

Pin Number	Function
1	Power
2	Ground
3	CAN High
4	CAN Low

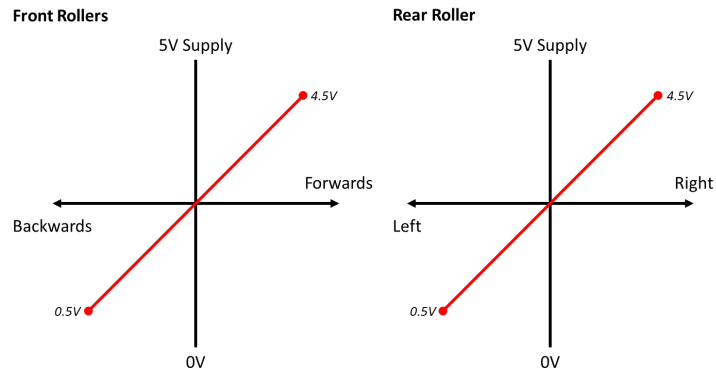




SPECIFICATIONS

ELECTRICAL – ANALOGUE STAND-ALONE GRIP

SUPPLY VOLTAGE – ANALOGUE	5Vdc \pm 0.5V to the rollers 5V to 24Vdc to the pushbutton common
OUTPUT VOLTAGE - ROLLERS	10% to 90% of the supply voltage
CENTERING ACCURACY – ROLLERS	50% \pm 5.5% of supply voltage (as supplied)
END VOLTAGE ACCURACY - ROLLERS	10% (+4%/-2%) Low end, 90% (+2%/-4%) High end of the output span
OUTPUT IMPEDANCE - ROLLERS	100 Ω (nominal)
OVERPRESS ACTUATION VOLTAGE	20% \pm 5% (Low end) and 80% \pm 5% (High end) of supply voltage
ROLLER OUTPUT SENSE	



SWITCH CURENT RATING	The pushbutton switches operate via a MOSFET (open drain) and can accommodate a current up to 100mA @ 24Vdc (maximum)
SHORT CIRCUIT PROTECTION	5V Rollers; 24V Switches (VFET)
REVERSE POLARITY PROTECTION	-5.5V Rollers; -24V Switches
OVERVOLTAGE	5.5V Rollers; 24V Switches
CURRENT CONSUMPTION	93 mA

ELECTRICAL – ANALOGUE FNR SWITCH

SUPPLY VOLTAGE	4.5V to 5.5V
MAXIMUM VOLTAGE	5.5V
REVERSE POLARITY PROTECTION	-5.5V
FORWARD OUTPUT	-2.75V (\pm 0.25V)
NEUTRAL OUTPUT	-1.75V (\pm 0.15V)
REVERSE OUTPUT	-0.75V (\pm 0.25V)

ELECTRICAL – CAN STAND-ALONE GRIP

SUPPLY VOLTAGE – CAN	8.5V to 18Vdc Temporary Cold Cranking – 6V for 10 seconds Temporary Jumpstart – 26V for 5 minutes
REVERSE POLARITY	-48V
OVERVOLTAGE	48V Supply Overvoltage



ELECTRICAL – BACKLIGHTING

ANALOGUE – STAND-ALONE	Available on request
CAN – STAND-ALONE	Variable through CAN when chosen as an option
CAN – JC6000	Fixed brightness when chosen as an option
CAN – JC8100	Available on request

MECHANICAL

STRENGTH – Grip Static overload	1100N (Forward/Backward), 400N (Left/Right)
STRENGTH – Grip Horizontal Impact	10J
STRENGTH – Grip Maximum Torque	20Nm when mounted to JC6000, 30Nm when mounted to JC8100
STRENGTH – Pushbutton Overload	110N
STRENGTH – Roller Overload	17N at the tip of the tab
STRENGTH – FNR Overload	100 N
LIFE – Pushbutton	1 million operations
LIFE – Roller	2 million cycles reduced to 200k in overpress. Cycle defined as; Centre – Full Forward – Full Reverse – Return to Centre
LIFE – FNR	1 million cycles at 0.5Hz. Cycle defined as; Centre – Full Forward – Full Reverse – Return to Centre with 10N overload at the ends of travel
TRAVEL – Pushbutton	3 mm
TRAVEL – Roller	±30° - front mounted, ±25° rear mounted
TRAVEL – FNR	±18° at start of latch, ±20° at end of travel
OPERATING FORCE - Pushbutton	5N
BREAKOUT FORCE - Roller	3.5N @ Tab
OVERPRESS FORCE - Roller	17N @ Tab
OPERATING FORCE - FNR	5N ±1N (3N ±0.5N at end of life)
WEIGHT	Grip only <300g Grip/joystick when fitted to JC6000 <875g Grip/joystick when fitted to JC8100 <1200g
MTTFd	Standalone CAN > 36yrs Standalone Analogue > 39yrs

**EMC AND MAGNETIC FIELD**

EMC IMMUNITY LEVEL	ISO 11452-2: 2004	Radiated immunity (Free Field ALSE) 100V/m, CW/AM 1kHz sine 80% 80MHz – 200MHz 100V/m, CW/AM 1kHz sine 80% 200MHz – 400MHz 100V/m, CW/PM/AM 1kHz sine 80% 400MHz – 1000MHz 100V/m, CW/AM 1000MHz – 2000MHz
RADATED EMISSIONS	CISPR25: 2008 3 rd Edition 2008 and corrigendum 1 2008	30-300-1000MHz Test limits EN55016-2-3: 2010 +A1: 2010 +A2: 2014 (Class 2)
ESD IMMUNITY LEVEL	EN ISO10605: 2008 Air discharge Contact discharge Performance Criteria	Network 330pf // 2kR 15kV (Powered and unpowered) 8kV (Powered and unpowered) Class B – Unit operates correctly, without intervention after interference
RADIATED IMMUNITY (BCI)	ISO 11452-4: 2011	Test level 100mA, 1kHz sine 80% 1MHz – 400MHz
CONDUCTED DISTURBANCE IMMUNITY	ISO 7637-2:2004 / ISO 7637-2:2011 (CAN Grip) EN ISO 16750-2: 2012 (CAN Grip) Performance Criteria	Pulses – 1, 2a, 2b, 3a, 4 to 12V standard Pulse – 5a: (unclamped) to Vs+79V, Rs=4R, Td=40ms Pulse – 5b: (clamped) to Vs+35V, Rs=4R, Td=40ms Class A – No intervention, no loss of operation
POWER FREQUENCY MAGNETIC FIELD IMMUNITY	EN 61000-4-8: 2010 Performance Criteria	30A/m; 50Hz & 60 Hz. Class A – No intervention, no loss of operation



ENVIRONMENTAL AND LEGISLATIVE

DRY HEAT	BS EN 60068-2-2: 2007	+85°C
COLD	BS EN 60068-2-1: 2007	-40°C
OPERATING TEMPERATURE (CYCLING)	BS EN 60068-2-14: 2009	-40° to +85°C
TEMPERATURE & HUMIDITY	BS EN 60068-2-38: 2021	-40° to +85°C, up to 95% RH. 8.5V to 18V CAN / 5V Analogue, 10 x 24hr Cycles
WATER AND DUST INGRESS	BS EN 60529: 1992	IP67 Note: The grip has a flow in-flow out design and the internal components are sealed to meet the stated rating. Unless mounted on a C-W joystick, the cable exit point is open, and it is therefore the responsibility of the customer to ensure adequate sealing in the application
THERMAL SHOCK	BS EN 60068-2-14: 2009	-40° to +85°C with dousing
SALT MIST	EN 60068-2-11: 2021	96 hours
VIBRATION (SINUSOIDAL)	EN 60068-2-6: 2008	3gn, 10-200Hz, 1 hour per axis
VIBRATION (RANDOM)	EN 60068-2-64: 2008	3.6gn, 10-200Hz, 2 hours per axis
BUMP	EN 60068-2-27: 2009	25g, 10ms; 500 bumps in each of 6 directions
SHOCK	EN 60068-2-27: 2009	50gn, ½ Sine 6ms: 3 shocks in each of 6 directions
DROP (Packaged)	BS EN 60068-2-32:1993	1m
UV	ASTM G155: 2013	3600 lx, 3000 hours
OZONE	ASTM D1149: 2018	72hrs at 50 (±5) pphm
ABRASION (BUTTONS)	BS EN 60068-2-70: 2000	50,000 cycles at 10N

IMPORTANT INFORMATION

Whilst Curtiss-Wright Industrial Group - Penny & Giles has designed this joystick to meet a range of applications it is the responsibility of the customer to ensure it meets their specific requirement.

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 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.