Unknown P/N

90VDC Motor 1
Hall
GND
SIG
+5V
See Appendix A
Power
N
L

Speed Controller 1
Grainger- 5HA33
Lower Terminal Blk
LO
W
HI
+F ✗
-A/-F ✗
+A ✗
N ✗
L ✗

Upper Terminal Blk
COM
FWD
REV
A2
A1
N
L

Speed POT
LO
W
HI

HY1-1.5V
Direction Relay 1
1 NC
2 +
3 COM
4 COM
5 -
6 NO

Portenta PWM1
Portenta GND

SSR-240D25R
Mains Relay 1
Input 4
Input 3
Output 2
Output 1

Portenta PWM2
Portenta GND

120VAC Outlet
L
N

Limit Switch 1
Unknown P/N
Line 1
NO Circuit
NO Circuit
GND
NC Circuit
NC Circuit
Line 2
NO Circuit
NO Circuit
GND
NC Circuit
NC Circuit

Pullup Resistors here
Portenta VCC
Portenta GPIO 0
Portenta VCC
Portenta GPIO 1
Pullup Resistors here

Unknown P/N

90VDC Motor 2
Hall
GND
SIG
+5V
See Appendix B
Power
N
L

Speed Controller 2
Grainger- 5HA33
Lower Terminal Blk
LO
W
HI
+F ✗
-A/-F ✗
+A ✗
N ✗
L ✗

Upper Terminal Blk
COM
FWD
REV
A2
A1
N
L

Speed POT
LO
W
HI

HY1-1.5V
Direction Relay 2
1 NC
2 +
3 COM
4 COM
5 -
6 NO

Portenta PWM3
Portenta GND

SSR-240D25R
Mains Relay 2
Input 4
Input 3
Output 2
Output 1

Portenta PWM4
Portenta GND

120VAC Outlet
L
N

Limit Switch 2
Unknown P/N
Line 1
NO Circuit
NO Circuit
GND
NC Circuit
NC Circuit
Line 2
NO Circuit
NO Circuit
GND
NC Circuit
NC Circuit

Pullup Resistors here
Portenta VCC
Portenta GPIO 2
Portenta VCC
Portenta GPIO 3
Pullup Resistors here

ASX00031
Portenta Breakout Board

ABX00042
Portenta H7
USB-C Conn

Left pins	Right pins
ETH A+	FORCE_BTLDR
ETH A-	BOOT_SOURCE
ETH B+	POWER_ON_REQ
ETH B-	COINCELL
ETH C+	PCIE TX0+
ETH C-	PCIE TX0-
ETH D+	PCIE RX0+
ETH D-	PCIE RX0-
ETH L1	PCIE CK+
ETH L2	PCIE CK-
VIN	PCIE RST
USB1 VBUS	VCC
USB1 D+	UART3 TX
USB1 D-	UART3 RX
USB1 ID	UART3 RTS
GND	UART3 CTS
UART1 TX	GND
UART1 RX	SPIO CS
UART1 RTS	SPIO CK
UART1 CTS	SPIO MISO
VIN	SPIO MOSI
I2C1 SDA	VCC
I2C1 SCL	I2C2 SDA
GND	I2C2 SCL
CAN1 TX	SAI CK
CAN1 RX	SAI FS
VSYS	SAI D0
SDC CLK	SAI D1
SDC CMD	GND
SDC D0	PWM 1 → Direction Relay 1 (2 +)
SDC D1	PWM 2 → Mains Relay 1 (Input 4)
SDC D2	PWM 3 → Direction Relay 2 (2 +)
SDC D3	PWM 4 → Mains Relay 2 (Input 4)
SDC_CD	PWM 5
SDC_WP	VCC
SDC_RST	ADC VREF+
RESET	ADC A0
SWDIO	ADC A1
SWCK	ADC A2
SWO	ADC A3
DSI D3+/DP D3+	CAM D7/CSI D3+
DSI D3-/DP D3-	CAM D6/CSI D3-
DSI D2+/DP D2+	CAM D5/CSI D2+
DSI D2-/DP D2-	CAM D4/CSI D2-
DSI D1+/DP D1+	CAM D3/CSI D1+
DSI D1-/ DP D1-	CAM D2/CSI D1-
DSI D0+/DP D0+	CAM D1/CSI D0+
DSI D0-/DP D0-	CAM D0/CSI D0-
DSI CK+/DP AUX+	CAM VS/CSI CK+
DSI CK-/DP AUX-	CAM CLK/CSI CK-
GND	CAM HS
USB0 VBUS	GND
USB0 D+	UART2 TX
USB0 D-	UART2 RX
USB0 ID	UART2 RTS
VIN	UART2 CTS
UART0 TX	VCC
UART0 RX	SPI1 CS
UART0 RTS	SPI1 CK
UART0 CTS	SPI MISO
GND	SPI MOSI
I2C0 SDA	GND
I2C0 SCL	GPIO 0 → Limit Switch 1 Line 1 (NO Circuit)
VIN	GPIO 1 → Limit Switch 1 Line 2 (NO Circuit)
CAN0 TX	GPIO 2 → Limit Switch 2 Line 1 (NO Circuit)
CAN0 RX	GPIO 3 → Limit Switch 2 Line 2 (NO Circuit)
GND	GPIO 4
I2C MCK	GPIO 5/CARRIER_PWR_ON
I2C WS	GPIO 6
I2C DI	PWM 6 → Hall Sensor Sig 1
I2C DO	PWM 7 → Hall Sensor Sig 2
VSYS	PWM 8
DMIC CK	PWM 9
DMIC D0	PWM 10
DMIC D1	GND
V-SDCARD	ADC VREF-
SPDIF TX	ADC A4
SPDIF RX	ADC A5
JTAG_TDI	ADC A6
JTAG_NRST	ADC A7

Appendix

Appendix A
GND
SIG
5V
22k
1uF
1k
Portenta PWM 6

Appendix B
GND
SIG
5V
22k
1uF
1k
Portenta PWM 7

SSR-240D25R

Mains Relay 1

Input 4
Input 3
Output 2
Output 1

120VAC Outlet

L
N

Mains Breaker

In
Out

Unknown P/N

90VDC Motor 1

Hall	GND	See Appendix A
	SIG	
	+5V	

Power | N
      | L

Portenta PWM2

Portenta GND

Speed Controller 1

Grainger- 5HA33

Lower Terminal Blk
| LO |
| W |
| HI |
| +F ✗ |
| -A/-F ✗ |
| +A ✗ |
| N ✗ |
| L ✗ |

Limit Switch 1

Unknown P/N

Line 1	NO Circuit	Portenta VCC
	NO Circuit	Portenta GPIO 0
	GND	
	NC Circuit	
	NC Circuit	

Line 2	NO Circuit	Portenta VCC
	NO Circuit	Portenta GPIO 1
	GND	
	NC Circuit	
	NC Circuit	

Upper Terminal Blk
| COM |
| FWD |
| REV |
| A2 |
| A1 |
| N |
| L |

Speed POT
| LO |
| W |
| HI |

HY1-1.5V

Direction Relay
| 1 NC |
| 2 + |
| 3 COM |
| 4 COM |
| 5 - |
| 6 NO |

Appendix A

GND	22k	1uF
SIG		
5V	1k	

y 1

Portenta
PWM1

Portenta
GND

Portenta PWM 6