

CANopen USER MANUAL

PKU SERIES KEYPAD

SW V2.3

THE **POWERKEY** ULTIMATE RANGE:

PKU1000
PKU1400
PKU1200M
PKU1200Mi
PKU1500M
PKU1800M
PKU2200
PKU2200M
PKU2300M
PKU2400
PKU2400M
PKU2600M
PKU2800M
PKU3500M



CONTENTS

POWERKEY Ultimate Range	3
Deutsch 4 Pin Connection	4
1. Default Keypad Settings	5
2. CANopen Commands	6
2.1 Start Message	6
2.2 Change Node Address	6
2.3 Periodic Message Enable	7
2.4 Auto Start Enable	7
2.5 Change Baud Rate	8
2.6 Boot Message	8
2.7 Set Start-Up Flash	9
2.8 Backlight Brightness	9
2.9 Backlight Colour	10
2.10 Start-Up Backlight Brightness	10
2.11 Start-Up Backlight Colour	11
2.12 Start-Up Message Enable	11
2.13 Heartbeat Message Timer	12
2.14 Primary LED Brightness	12
2.15 Start-Up Primary LED Brightness	13
2.16 Start-Up Active High Enable	13
2.17 Auxiliary Backlight Brightness	14
2.18 Start-Up Auxiliary Backlight Brightness	14
PDO Messages	
2.19 Key Status	15
2.20 LED Control	15
2.21 Extended LED Control	16-17
Key Identifier and LED Identifier	18
Revision History	19

POWERKEY ULTIMATE RANGE (15mm Inserts)



PKU1200M



PKU1200Mi



PKU1500M



PKU1800M



PKU2200M



PKU2300M



PKU2400M



PKU2600M



PKU2800M



PKU3500M

POWERKEY ULTIMATE RANGE (24mm Inserts)



PKU2200



PKU2400

POWERKEY ULTIMATE RANGE (Laser Etched Rubber)



PKU1000

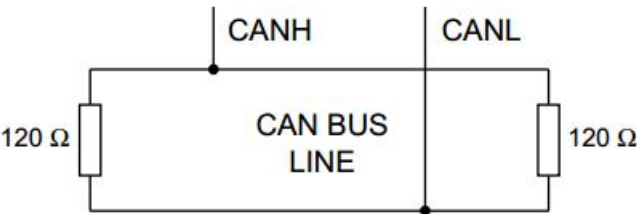


PKU1400

DEUTSCH PIN CONNECTION:

CAN KEYPAD PIN-OUT:

PIN	WIRE COLOUR	FUNCTION
1	RED	+12/24VDC
2	BLACK	GROUND
3	YELLOW	CAN H
4	GREEN	CAN L



Each end of the CAN bus is terminated with 120 Ω resistors in compliance with the standard to minimise signal reflections on the bus. You may need to place a 120 Ω resistor between CAN-L and CAN-H.



WARNING: To avoid breakage do not over tighten the backshell nuts - Torque Maximum 7 +/- 1 in.lbs

MOUNT ON A FLAT SURFACE ONLY

Nut Size*:	10-32 UNF S/S
Washer Sizes:	M5 Spring Washer S/S, M5 Flat Washer S/S
Torque Maximum:	7 +/- 1 in. lbs

***DO NOT USE NYLOC NUTS**

1. DEFAULT KEYPAD SETTINGS:

Setting	Default Value
Baud rate	125kbps
Keypad Node Address	15h
Periodic Message	Disabled
Start -Up Flash	Normal
Auto Start	Disabled
Start -Up Backlight Bright ness	00h(Off)
Start -Up Backlight Colour	Red
Start -Up Primary LED Brightness	3Fh (100%)

2. CANopen COMMANDS:

2.1 Start Message:

Type: Received by module
ID: 0x00
Length: 2 Bytes
Byte #0: 0x01 (Go to "Operational")
Byte #1: 0x00 (All Nodes)

Example:

	CAN ID	Format	Length	Message	Description
To Keypad	0x00	STD	2	01 00	Set all Keypads to Operational
To Keypad	0x00	STD	2	01 15	Set Keypad with address 15h to Operational

2.2 Change Node Address:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x70 (Set Address Command)
Byte #5: New Address
Byte #6: 0x00
Byte #7: 0x00

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 70 16 00 00	Set keypad address to 16h

2.3 Periodic Message Enable:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x12 (Set Periodic Command)
Byte #5: Enable (0x01 = Enable, 0x00 = Disable)
Byte #6: Period (Resolution: 1 Count = 10ms)
Byte #7: 0x00

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 12 01 0A 00	Enable periodic message with 100ms time period

2.4 Auto Start Enable:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x10 (Start Mode Command)
Byte #5: Enable (0x01 = Enable, 0x00 = Disable)
Byte #6: 0x00
Byte #7: 0x00

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 10 01 00 00	Enable the Auto start

2.5 Change Baud Rate:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x11 (Change Baud Rate Command)
Byte #5: Baud Rate
Byte #6: 0x00
Byte #7: 0x00

* Note: Requires reboot to take effect.

BAUD RATE			
0x00 – 125kbps	0x01 – 250kbps	0x02 – 500kbps	Default – 125kbps

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 11 01 00 00	Change the keypad Baud rate to 250kbps

2.6 Boot Message:

Type: Transmitted by module on power up
ID: 0x700 + Address
Length: 1 Byte
Byte #0: Status

Boot Message Status			
0x00 = Boot up	0x04 = Stopped	0x05 = Operational	0x7F = Pre-Operational

Example :

	CAN ID	Format	Length	Message	Description
From Keypad	715	STD	1	05	Boot message-keypad Operational

2.7 Set Start -Up Flash:

Type: Transmitted To Module
ID: 0x600 +Address
Length: 8
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x50 (Set Start -Up Flash Command)
Byte #5: State
Byte #6: Ignored
Byte #7: Ignored

Start-Up Flash State		
0x01 = Normal	0x02 = Fast	0x03 = None

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 50 02 00 00	Set Start-Up flash to Fast

2.8 Backlight Brightness:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 Write Four Bytes
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x03 (Backlight Brightness Command)
Byte #5: Brightness Level (0x00 - 0x3F -> 0-100 %, default = 0x00 (0%))
Byte #6: 0x00
Byte #7: 0x00

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 03 1F 00 00	Set the backlight brightness to 50% intensity

2.9 Backlight Colour :

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x04 (Backlight colour Command)
Byte #5: Backlight Colour
Byte #6: 0x00
Byte #7: 0x00

Backlight Colour			
0x00 – Red	0x01 – Green	0x02 – Yellow	0x03 – Blue
0x04 – Magenta	0x05 – Cyan	0x06 – White	--

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 04 06 00 00	Set the backlight colour to White

2.10 Start -Up Backlight Brightness:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x7B (Start -Up Backlight Brightness Command)
Byte #5: Start -Up Brightness Level (0x00 - 0x3F -> 0100 %, default = 0x00 (0%))
Byte #6: 0x00
Byte #7: 0x00

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 7B 1F 00 00	Set the Start-Up backlight brightness to 50% intensity

2.11 Start-Up Backlight Colour:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x05 (Start -Up Backlight colour Command)
Byte #5: Start -Up Backlight Colour
Byte #6: 0x00
Byte #7: 0x00

Start -Up Backlight Colour			
0x00 – Red	0x01 – Green	0x02 – Yellow	0x03 – Blue
0x04 – Magenta	0x05 – Cyan	0x06 – White	--

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 05 05 00 00	Set the Start-Up backlight colour to Cyan

2.12 Start-Up Message Enable:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x13 (Start -Up Message Command)
Byte #5: Enable (0x01 =Enable, 0x00=Disable)
Byte #6: 0x00
Byte #7: 0x00

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 13 01 00 00	Enable the Start-Up message

2.13 Heartbeat Message Timer:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x44 (Heartbeat Message Command)
Byte #5: Period (Time in 10's of ms, 0x00=Disable)
Byte #6: 0x00
Byte #7: 0x00

* Note : Minimum value for Heartbeat Message Period is 0x05 (50ms)

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 44 05 00 00	Heartbeat message with 50 ms

2.14 Primary LED Brightness:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x02 (Primary LED Brightness Command)
Byte #5: Brightness Level (0x00 - 0x3F -> 0100 %, default = 0x3F (100%))
Byte #6: 0x00
Byte #7: 0x00

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 02 1F 00 00	Set the primary LED brightness to 50% intensity

2.15 Start -Up Primary LED Brightness:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x7C (Start -Up Primary LED Brightness Command)
Byte #5: Start -Up Brightness Level (0x00 - 0x3F -> 0100 %, default = 0x3F (100%))
Byte #6: 0x00
Byte #7: 0x00

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 7C 1F 00 00	Set the Start-Up primary LED brightness to 50% intensity

2.16 Start -Up Active High Enable:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x7D (Start -Up Active High Enable Command)
Byte #5: AHE (0x07 = All Active High (Default), 0x00 = All Active Low)
Byte #6: 0x00
Byte #7: 0x00

* Note : This command is used for keypads with add-on keys

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 7D 00 00 00	Set the Add-on keys to Active low

2.17 Auxiliary Backlight Brightness:

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x40 (Auxiliary Backlight Brightness Command)
Byte #5: Auxiliary Backlight Brightness (0x00 - 0x3F -> 0100 %, default = 0x3F (100%))
Byte #6: 0x00
Byte #7: 0x00

* Note : This command is used only for PKU1000 and PKU1400 keypads

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 40 1F 00 00	Set the Auxiliary Backlight Brightness to 50% intensity

2.18 Start-Up Auxiliary Backlight Brightness

Type: Received by module
ID: 0x600 + Address
Length: 8 Bytes
Byte #0: 0x23 (Write Four Bytes)
Byte #1: 0x00 (Message Low 0x6500)
Byte #2: 0x65 (Message High 0x6500)
Byte #3: 0x01 (Sub 0x01)
Byte #4: 0x41 (Start -up Auxiliary Backlight Brightness Command)
Byte #5: Start -up Auxiliary Backlight Brightness (0x00 - 0x3F -> 0100 %, default = 0x3F (100%))
Byte #6: 0x00
Byte #7: 0x00

* Note : This command is used only for PKU1 000 and PKU1400 keypads

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	615	STD	8	23 00 65 01 41 1F 00 00	Set the Start-up Auxiliary Backlight Brightness to 50% intensity

PDO MESSAGES

2.19 Key Status:

Type: Transmitted by module
ID: 0x180 + Address
Length: 5 Bytes
Byte #0: Keys #1- #8
Byte #1: Keys #9- #16
Byte #2: Keys #17- #24
Byte #3: Keys #25- #32
Byte #4: Tick Timer (100ms)

Example :

	CAN ID	Format	Length	Message	Description
From Keypad	195	STD	5	01 00 00 00 7A	Key #1 in Keypad (Address-15h) is pressed
From Keypad	195	STD	5	00 04 00 00 7A	Key #11 in Keypad (Address-15h) is pressed
From Keypad	195	STD	5	03 00 00 00 7A	Key #1 and #2 in Keypad (Address-15h) is pressed

*Note: Send Start message or enable the Auto start to receive the switch status message

*Note: Refer to Key Identifier on Page 19

2.20 LED Control:

Type: Received by module
ID: 0x200 + Address
Length: 6 Bytes
Byte #0: Red LED #1 - #8
Byte #1: Red LED #9 - #16
Byte #2: Green LED #1 - #8
Byte #3: Green LED #9 - #16
Byte #4: Blue LED #1 - #8
Byte #5: Blue LED #9 - #16

* Note: Unused LEDs are ignored on models with fewer than 16 positions.

For PKU1000 and PKU1400, use extended LED control in section 2.21 to access all the LEDs

*Note: Refer to LED Identifier on Page 19

Example :

	CAN ID	Format	Length	Message	Description
To Keypad	215	STD	5	01 00 00 00 00 00	RED LED #1 in Keypad (Address-15h) is ON, all other LEDs are OFF
To Keypad	215	STD	5	03 00 00 00 00 00	RED LED #1 and #2 in Keypad (Address-15h) is ON, all other LEDs are OFF
To Keypad	215	STD	5	00 00 01 01 00 00	Green LED #1 and #9 in Keypad (Address-15h) is ON, all other LEDs are OFF

2.21 Extended LED Control:

- Type:** Received by module
ID: 0x300 + Address
Length: 6 Bytes
Byte #0: LED Index (Refer to LED Identifier on Page 19)
Byte #1: Key LED Colour (0xFF = No Change)
Byte #2: Key LED Pattern (0xFF = No Change)
Byte #3: Key LED Pattern Speed (0xFF = No Change)
Byte #4: Invert Key LED Pattern (0xFF = No Change)
Byte #5: Backlight Colour (0xFF = No Change)

Key LED Colour Palette:			
0x00 – Off	0x01 – Red	0x02 – Green	0x03 – Yellow
0x04 – Blue	0x05 – Magenta	0x06 – Cyan	0x07 – White
0x08 – Dark Blue	0x09 – Purple	0x0A – Amber	0x0B – Maroon
0x0C – Teal	0x0D – Light Blue	0x0E – Dark Green	0x0F – Aqua

Key LED Pattern			
0x00 – Off	0x01 – On	0x02 – Blink	0x03 – Breathe
0x04 – Spin	0x05 – Ripple	0x06 – Reserved	0x07 – Reserved

Key LED Pattern Speed			
0x00 – Slow	0x01 – Medium	0x02 – Fast	0x03 – Reserved
0x04 – Reserved	0x05 – Reserved	0x06 – Reserved	0x07 – Reserved

Invert Key LED Pattern			
0x00 – No	0x01 – Yes	0x02 – Reserved	0x03 – Reserved

Backlight Colour			
0x00 – Off	0x01 – Red	0x02 – Green	0x03 – Yellow
0x04 – Blue	0x05 – Magenta	0x06 – Cyan	0x07 – White

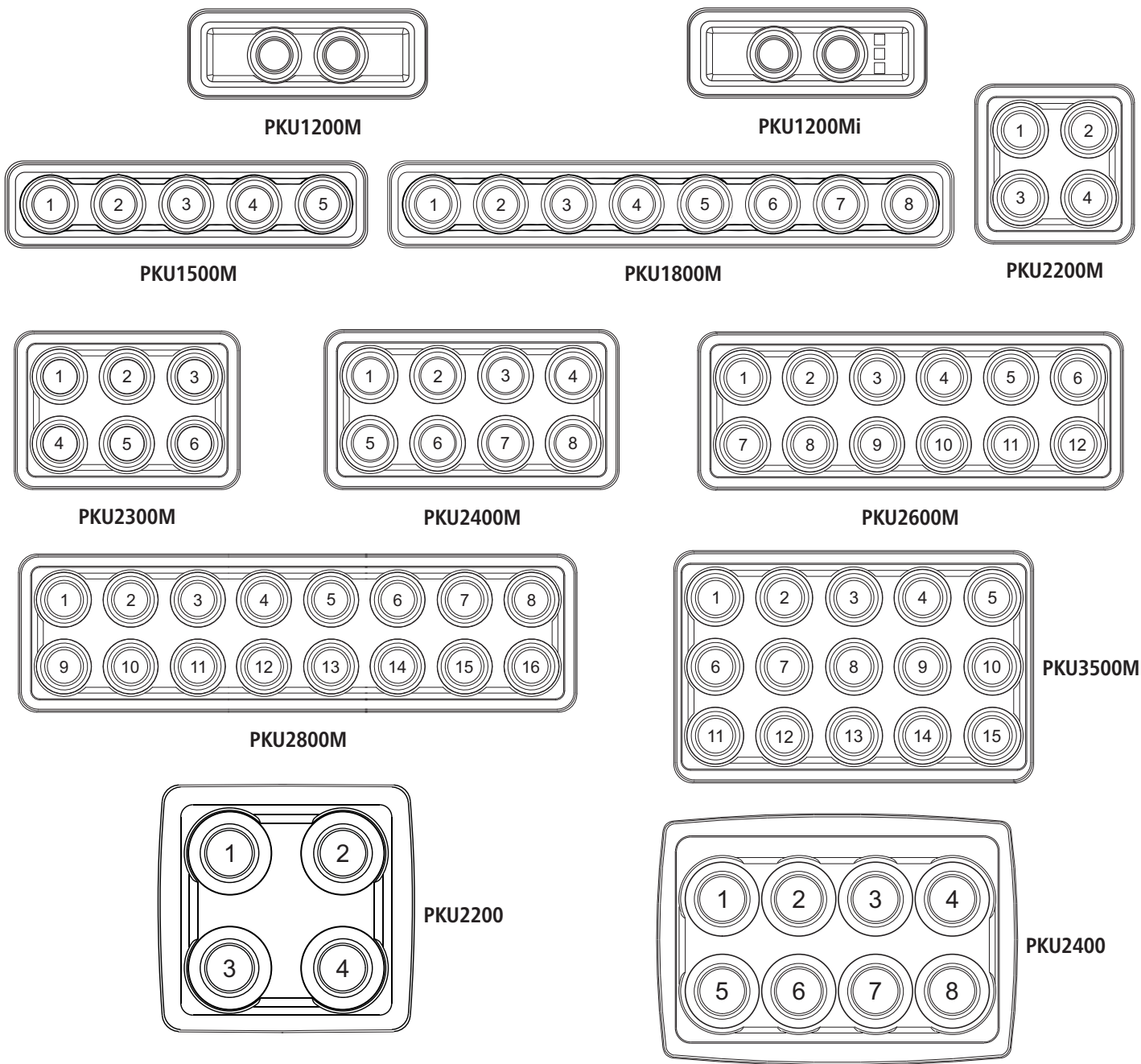
*Note: Backlight brightness defaults to 0%. Backlight brightness must be increased for backlight colour to have any effect.

PKU1000 & PKU1400 DO NOT support Spin & Ripple LED types

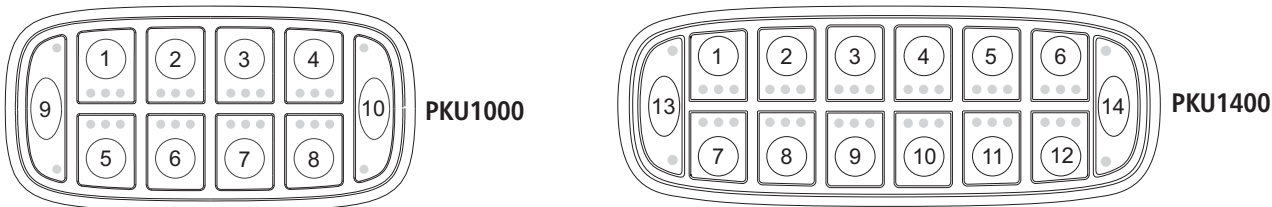
Example :

	CAN ID	Format	Length	Message	Description
To Keypad	315	STD	6	01 02 04 01 01 04	Set LED #1 colour to Green, LED pattern to spin, LED Pattern speed to Medium, Pattern invert is set true and backlight colour is blue
To Keypad	315	STD	6	02 0A 02 01 00 07	Set LED #2 colour to Amber, LED pattern to blink, LED Pattern speed to Medium, Pattern invert is set off and backlight colour is white

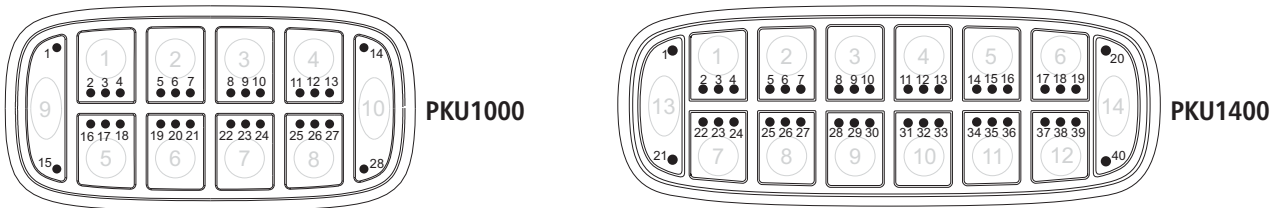
KEY & LED IDENTIFIER



KEY IDENTIFIER



LED IDENTIFIER



REVISION HISTORY

Date	Version	Comment	Compatible SW Version
9/07/20	2.0	Changed LED control message and added Extended LED control for version 2.0	Version 2.0
23/09 /20	2.1	Restructured the User manual and added Examples for each Command	Version 2.0
08/10/20	2.2	Added Auxiliary Backlight Commands for PKU1000 and PKU1400 Keypads	Version 2.0
10/06/21	2.3	Added Heartbeat message Timer	Version 2.1
06/09/21	2.4	Added PDO message Command with Data	Version 2.1
14/04/22	2.5	Removed PDO message Command with Data; Compatible with SW V2.3	Version 2.3