

## 6. Connectors

The two connectors for external interfaces are accessible on the rear side of the unit. The connectors are twelve pin molded-in Deutsch DTM series connectors marked with a 1(J1) and a 2(J2).

Use caution and avoid plugging/unplugging of connectors when the device is powered up. Always replace damaged cables. If a connector pin becomes bent the interface may not function correctly and the device should be returned to CrossControl for repair.


### 6.1. Connector layout



Note that descriptions herein refer to the connectors located on the device and not the cable-side connectors which are attached to the device. However, the pinout numbering and signal descriptions are the same.

Pin	Function (DTM06-12SA)	Pin	Function (DTM06-12SB)
J1-1	Constant Power +12/24	J2-1	Configurable Input 1
J1-2	Power Ground	J2-2	Configurable Input 2
J1-3	Switched Power +12/24	J2-3	Configurable Input 3
J1-4	Switched Output 1	J2-4	Configurable Input 4
J1-5	Switched Output 2	J2-5	Analog Ground
J1-6	CAN 1 Shield	J2-6	Analog input 1
J1-7	CAN 1+	J2-7	Analog input 2
J1-8	CAN 1 -	J2-8	Analog input 3
J1-9	USB Ground	J2-9	Ethernet RD+
J1-10	USB Data -	J2-10	Ethernet RD-
J1-11	USB Data +	J2-11	Ethernet TD+
J1-12	USB Vbus	J2-12	Ethernet TD-

PWM duty cycle and frequency is adjustable via API/software.


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 Observe that high continuous current through several I/O channels simultaneously adds internal heating of the device. At high ambient temperatures, this may cause I/Os to switch off because of thermal protection in their internal circuitry. Normal function will be restored when temperature is within acceptable level again. Note, if this occurs frequently it's recommended to improve the ventilation around the device or if possible reduce the load on the outputs.

## 6. Connectors

All connectors are accessible from the rear of the unit. The connectors which are twelve pin molded-in Deutsch DTM series connectors are marked with a 1(J1) and a 2(J2).

Use caution and avoid plugging/unplugging of connectors when the computer is powered up. Always replace damaged cables. If a connector pin becomes bent the interface may not function correctly and the device should be returned to the manufacturer for repair.

### 6.1. Connector layout

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 Note that descriptions herein refer to the connectors located on the device and not the cable-side connectors which are attached to the device. Though, the pinout numbering and signal descriptions are the same.

Pin	Function (DTM06-12SA)	Pin	Function (DTM06-12SB)
J1-1	Constant Power +12/24	J2-1	Configurable Input 1
J1-2	Power Ground	J2-2	Configurable Input 2
J1-3	Switched Power +12/24	J2-3	Video Input 1
J1-4	Switched Output 1	J2-4	Video Ground
J1-5	Switched Output 2	J2-5	Analog Ground
J1-6	CAN 1 Shield	J2-6	CAN 2 Shield
J1-7	CAN 1+	J2-7	CAN 2+
J1-8	CAN 1 -	J2-8	CAN 2 -
J1-9	USB Ground	J2-9	Ethernet TD+
J1-10	USB Data -	J2-10	Ethernet TD-
J1-11	USB Data +	J2-11	Ethernet RD+
J1-12	USB Vbus	J2-12	Ethernet RD-

Connector J1 - GRAY			
Matching plug: DTM06-12SA (A-key)			
Pin	Function	Pin	Function
J1-12	USB VBUS	J1-1	VIN+ (main supply)
J1-11	USB D+	J1-2	VIN- (main supply)
J1-10	USB D-	J1-3	Ignition key input (ON/OFF)
J1-9	USB GND	J1-4	High side PWM out 1
J1-8	CAN 1 Low	J1-5	High side PWM out 2
J1-7	CAN 1 High	J1-6	CAN 1 Shield

Connector J2 - BLACK			
Matching plug: DTM06-12SB (B-key)			
Pin	Function	Pin	Function
J2-12	Ethernet RX-	J2-1	Video 1 Input
J2-11	Ethernet RX+	J2-2	Video 1 Ground
J2-10	Ethernet TX-	J2-3	Video 2 Input
J2-9	Ethernet TX+	J2-4	Video 2 Ground
J2-8	CAN 2 Low	J2-5	Touch-screen Ground
J2-7	CAN 2 High	J2-6	CAN 2 Shield

Connector J3 - GREEN			
Matching plug: DTM06-12SB (C-key)			
Pin	Function	Pin	Function
J3-12	Configurable Input 8	J3-1	Configurable Input 1
J3-11	Input Ground 7/8	J3-2	Input Ground 1/2
J3-10	Configurable Input 7	J3-3	Configurable Input 2
J3-9	Configurable Input 6	J3-4	Configurable Input 3
J3-8	Input Ground 5/6	J3-5	Input Ground 3/4
J3-7	Configurable Input 5	J3-6	Configurable Input 4

## 6.2. USB Mini-B connector pinout

Below is the pinout for the USB Mini-B connector:

Pin	Function
1	VBUS (5V, 500 mA)
2	Data (-)
3	Data (+)
4	ID-pin <sup>Note</sup>
5	GND
<b>Metal housing</b>	Cable shield (internally connected with GND)



Note: The ID-pin is used for selecting USB host-mode (pin low) or USB device-mode (pin high/floating). By default, the ID-pin is held low internally from CPU I/O-pin to force USB host-mode operation.

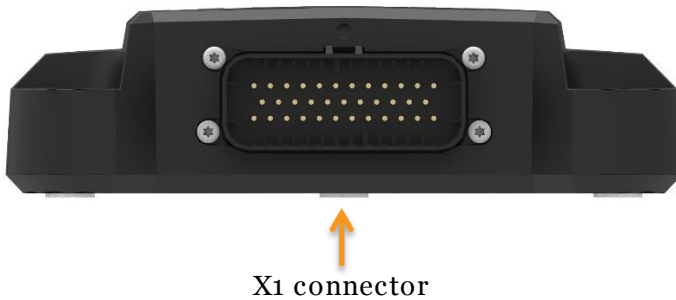
## 4. Electrical installation

This chapter contains details and recommendations for electrical installation of the *CrossFire IX* device.

### 4.1. Connectors

The connector is accessible from the side of the *CrossFire IX* unit. The connector, an AMP 35-pin multi-pin connector, is marked 1(X1).

- X1 connector black, TE connectivity 1-776163-1 (Mating connector, e.g. 776164-1)



Use caution and avoid plugging/unplugging of connectors when the *CrossFire IX* unit is powered up. Always replace damaged cables.

#### 4.1.1. Connector layout



Note that descriptions herein refer to the connectors located on the device and not the cable-side connectors which are attached to the device. Though, the pinout numbering and signal descriptions are the same.

1 AIN 1	2 AIN 2	3 AIN 3	4 DIN 1	5 DIN 2	6 UB	7 HS1	8 HS2	9 HS3	10 HS4	11 HS5	12 HS6
13 AIN 4	14 AIN 5	15 AIN 6	16 DIN 3	17 FIN 1	18 UB	19 IGN	20 12V	21 12V	22 12V	23 HS7	
24 AIN 7	25 AIN 8	26 GND	27 DIN 4	28 FIN 2	29 GND	30 GND	31 GND	32 CANH	33 CANL	34 CANS	35 HS8

HS x	High side output 1-4 (standard PWM)
HS x	High side output 5-8 (current controlled PWM)
GND	Ground
UB	Battery input
CAN_L	CAN bus x low
CAN_H	CAN bus x high
CAN_S	CAN bus x shield
AIN x	Analog input 1-8
DIN x	Digital input 1-4
FIN x	Frequency input 1-2
IGN	Ignition input
12V	12V sensor supply

Pin	Signals C000141-40	Signals C000141-50
1	Analog input 1	Analog input 1
2	Analog input 2	Analog input 2
3	Analog input 3	Analog input 3
4	Digital input 1	Digital input 1
5	Digital input 2	Digital input 2
6	Battery input	Battery input
7	High side output 1 (standard PWM)	High side output 1 (standard PWM)
8	High side output 2 (standard PWM)	High side output 2 (standard PWM)
9	[No signal]	High side output 3 (standard PWM)
10	[No signal]	High side output 4 (standard PWM)
11	[No signal]	High side output 5 (current controlled PWM)
12	[No signal]	High side output 6 (current controlled PWM)
13	Analog input 4	Analog input 4
14	Analog input 5	Analog input 5
15	Analog input 6	Analog input 6
16	Digital input 3	Digital input 3
17	[No signal]	Frequency input 1
18	Battery input	Battery input
19	Ignition input	Ignition input
20	Sensor supply 12 V	Sensor supply 12 V
21	Sensor supply 12 V	Sensor supply 12 V
22	Sensor supply 12 V	Sensor supply 12 V
23	[No signal]	High side output 7 (current controlled PWM)
24	Analog input 7	Analog input 7
25	Analog input 8	Analog input 8
26	Ground	Ground
27	Digital input 4	Digital input 4
28	[No signal]	Frequency input 2
29	Ground	Ground
30	Ground	Ground
31	Ground	Ground
32	CAN high	CAN high
33	CAN low	CAN low
34	CAN shield	CAN shield
35	[No signal]	High side output 8 (current controlled PWM)

#### 4.1.2 Cable installation

Cables shall be installed in such a way that they don't run any risk of being damaged, pinched or worn.

- Avoid excessive bending and twisting of cables.
- Use strain-relief on cables near the device to minimize stress on cables and connectors.
- Properly snap the connectors to give good contact and avoid unnecessary strain.
- Shielded cables are recommended and in some cases necessary to ensure reliable communication and compliance with industrial EMC standards.

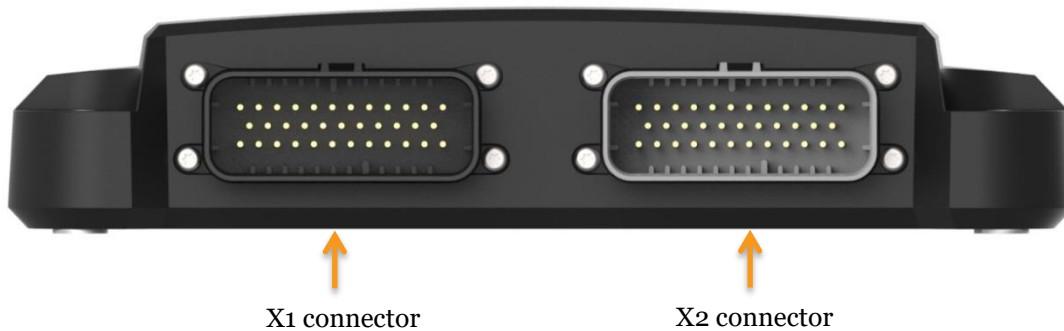
## 4. Electrical installation

This chapter contains details and recommendations for electrical installation of the *CrossFire SX* device.

### 4.1. Connectors

All connectors are accessible from the side of the *CrossFire SX* unit. The connectors which are two AMP 35-pin multi-pin connectors are marked with a 1(X1) and a 2(X2).

- X1 connector black, TE connectivity 1-776163-1 (Mating connector, e.g. 776164-1)
- X2 connector white, TE connectivity 1-776163-4 (Mating connector, e.g. 776164-4)



Use caution and avoid plugging/unplugging of connectors when the *CrossFire SX* unit is powered up. Always replace damaged cables.

#### 4.1.1. Connector layout



Note that descriptions herein refer to the connectors located on the device and not the cable-side connectors which are attached to the device. Though, the pinout numbering and signal descriptions are the same.

##### Connector pinning X1 (left)

1	2	3	4	5	6	7	8	9	10	11	12
HS 2A	HS 2A	HS 2A	HS 2A	HS 2A	HS 2A	HS 4A	HS 4A	GND	GND	UB	UB
13	14	15	16	17	18	19	20	21	22	23	
CAN1_L	CAN1_H	CAN1_S	5V out	Input	Input	Input	Input	IGN	FW UP	UB	
24	25	26	27	28	29	30	31	32	33	34	35
CAN1_L	CAN1_H	CAN1_S	GND	Input	Input	Input	Input	A0	A1	A2	A3

##### Connector pinning X2 (right)

1	2	3	4	5	6	7	8	9	10	11	12
UB	UB	GND	GND	HS 4A	HS 4A	HS 2A	HS 2A	HS 2A	HS 2A	HS 2A	HS 2A
	13	14	15	16	17	18	19	20	21	22	23
	HB A1	GND	RS-TX	Input	Input	Input	Input	Spare	CAN2_S	CAN2_H	CAN2_L
24	25	26	27	28	29	30	31	32	33	34	35
HB A2	HB B1	HB B2	RS-RX	Input	Input	Input	Input	GND	CAN3_S	CAN3_H	CAN3_L

HS 2A	High side output 2A
HS 4A	High side output 4A
GND	Ground
UB	Battery input
CANx_L	CAN bus x low
CANx_H	CAN bus x high
CANx_S	CAN bus x shield
5V out	5V sensor supply

Input	Configurable inputs
IGN	Ignition input
FW UP	Firmware upgrade enable
Ax	Slave address (0-15)
Spare	Spare pin for future use
RS-TX	RS-232 serial port transmit
RS-RX	RS-232 serial port receive
HB	H-bridge

Pin	Function X1	Pin	Function X2
X1-1	High side output 8, 2A, Group A	X2-1	Battery input
X1-2	High side output 7, 2A, Group A	X2-2	Battery input
X1-3	High side output 6, 2A, Group A	X2-3	Ground
X1-4	High side output 5, 2A, Group A	X2-4	Ground
X1-5	High side output 4, 2A, Group A	X2-5	High side output 9, 4A, Group B
X1-6	High side output 3, 2A, Group A	X2-6	High side output 10, 4A, Group B
X1-7	High side output 2, 4A, Group A	X2-7	High side output 11, 2A, Group B
X1-8	High side output 1, 4A, Group A	X2-8	High side output 12, 2A, Group B
X1-9	Ground	X2-9	High side output 13, 2A, Group B
X1-10	Ground	X2-10	High side output 14, 2A, Group B
X1-11	Battery input	X2-11	High side output 15, 2A, Group B
X1-12	Battery input	X2-12	High side output 16, 2A, Group B
X1-13	CAN 1 low	X2-13	H-bridge output A1, Group A
X1-14	CAN 1 high	X2-14	Ground
X1-15	CAN 1 shield	X2-15	RS-232 serial port transmit
X1-16	5V sensor supply	X2-16	Input 9
X1-17	Input 1	X2-17	Input 11
X1-18	Input 3	X2-18	Input 13
X1-19	Input 5	X2-19	Input 15
X1-20	Input 7	X2-20	Spare
X1-21	Ignition input	X2-21	CAN 2 shield
X1-22	Firmware upgrade pin	X2-22	CAN 2 high
X1-23	Battery input	X2-23	CAN 2 low
X1-24	CAN 1 low	X2-24	H-bridge output B1, Group B
X1-25	CAN 1 high	X2-25	H-bridge output B2, Group B
X1-26	CAN 1 shield	X2-26	H-bridge output A2, Group A
X1-27	Ground	X2-27	RS-232 serial port receive
X1-28	Input 2	X2-28	Input 10
X1-29	Input 4	X2-29	Input 12
X1-30	Input 6	X2-30	Input 14
X1-31	Input 8	X2-31	Input 16
X1-32	Slave address 0	X2-32	Ground
X1-33	Slave address 1	X2-33	CAN 3 shield
X1-34	Slave address 2	X2-34	CAN 3 high
X1-35	Slave address 3	X2-35	CAN 3 low