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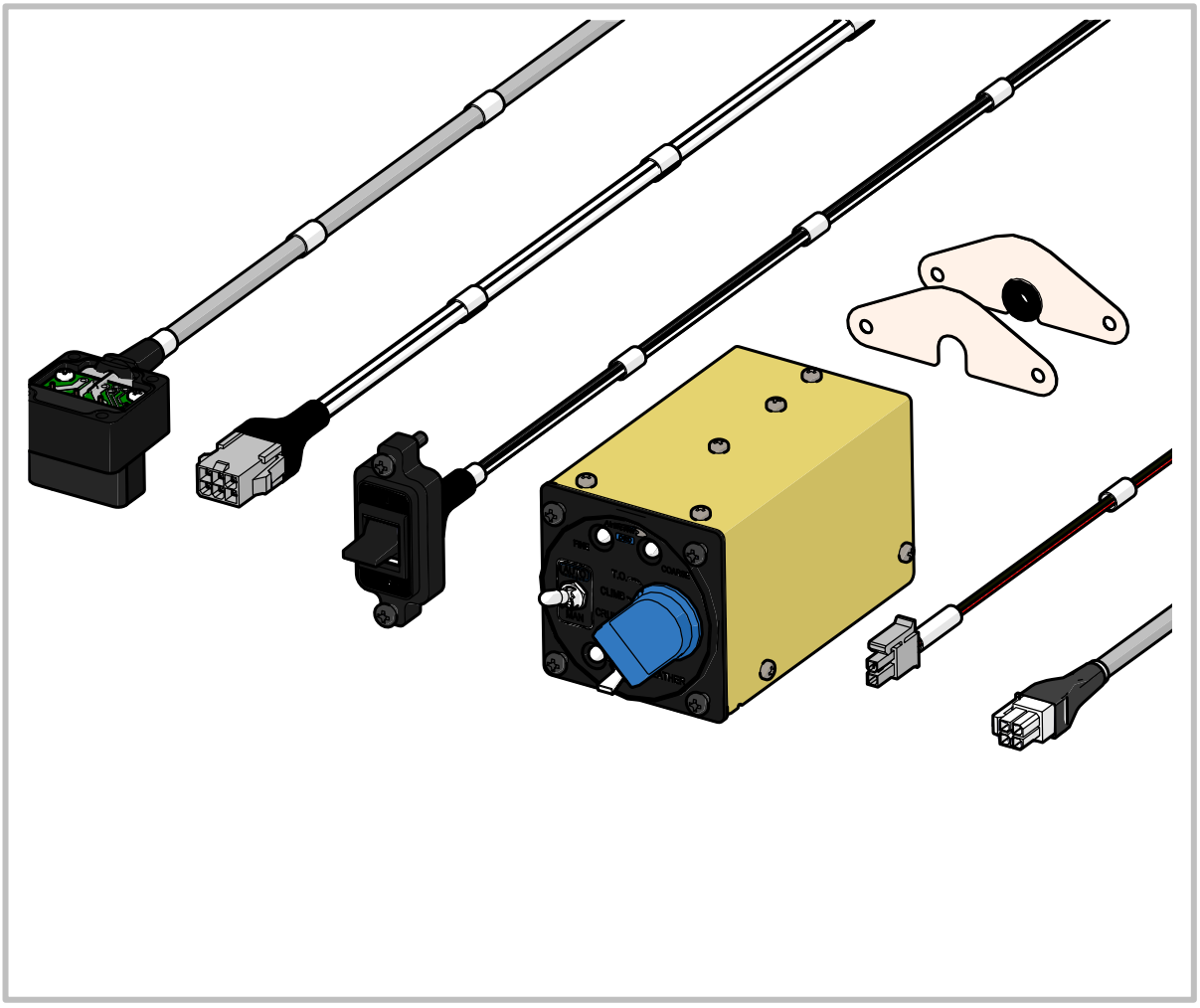
ASI-4-9-1

CONTROL SYSTEM INSTALLATION

PROCEDURE



SUBJECT:	
Control System Installation	
ASSEMBLY NO:	**APPLICABILITY:**
AC-xxx	All propeller models

1. TOPIC

1.1 Introduction

This document provides guidance on installing the control system for an Airmaster propeller. Always refer to the circuit wiring diagram for the propeller (see assembly drawings).

The control system is designed to work exclusively with Airmaster propeller systems. Installation of the control system will vary with different aircraft and engine combinations. The following instruction is a guide, and installers should design an installation that suits their aircraft using accepted aviation practices and follow the advice given herewith.

1.2 Control System Assembly

The control system consists of the following (3) main components:

- **AC200 or AC300 Controller:**
  This is the core of the control system and is mounted in the aircraft instrument panel. All electrical cables are connected to the rear of the controller.

- **Manual Control Switch:**
  This is mounted separately in the aircraft instrument panel, usually close to the throttle, so that it can be easily operated by the pilot.

- **Sensor-Brush Block**:
  This senses rotational speed (rpm) of the propeller and transfers electrical power to the propeller hub to perform pitch change operations. This is mounted to the engine in such a way that it contacts the slipring assembly. Mounting requirements differ for different engine types

> *Note*
> *For more information on mounting the sensor-brush assembly for a specific engine (or slipring), refer to the applicable installation procedure.*

Custom manufactured cables are supplied with the control system to support the connection of the main control system components as shown in the schematic below. It is the installers responsibility to determine the best method for routing these cables through the firewall/engine bay.

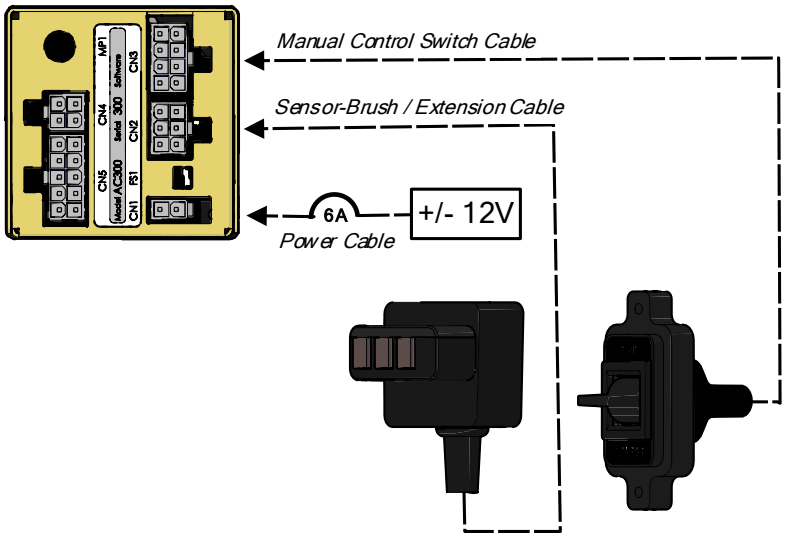


Figure 1. *Simple schematic of control system components.*

1.3 Circuit Breaker Protection

The Airmaster control system is designed with two forms of over-current protection:

- **Internal Current Monitoring:**
  Should the current drawn by the pitch change motor during automatic operation exceed a defined value (typically 4A), the controller will temporarily disable and cease to drive propeller pitch. This function may be reset in flight by briefly selecting MAN and then back to AUTO.

- **Internal Fuse (FS1):**
  All automatic functions of the controller draw power through a resettable thermal circuit breaker fuse (FS1). This fuse will trip when the total current drawn by the system during automatic operation exceeds 6A (this is 3.15A for AC200 controller versions below 5). The fuse may be reset by pushing the white button at the rear of the controller. Manual operation of the propeller bypasses this internal fuse and is therefore still possible in the event of the fuse tripping.

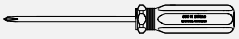
It is recommended that an independent 6A circuit breaker is also fitted behind the controller (in series with the power cable) to provide an additional layer of over-current protection.

2. MATERIAL REQUIREMENTS

2.1 Parts

ITEM	QTY	PART NO.	DESCRIPTION	IMAGE
1.	1	AC-xxx	Airmaster Control System Assembly	

2.2 Tooling

ITEM	QTY	DESCRIPTION	IMAGE
1.	1	PH2 Screwdriver	
2.	1	Torque Screwdriver (PH2) [0.7Nm]	
3.	As required	Heat Gun	

2.3 Paperwork

ITEM	QTY	CODE	DESCRIPTION
1.	1	AC-xxx	Airmaster Control System Assembly Drawing & BoM
2.	1	As applicable	Airmaster Control System Circuit Diagram
3.	1	As applicable	ACx00 Firmware & Parameters Sheet

3. PROCEDURE

3.1 Controller Circuit Diagram

Circuit diagram for AC300 controller is shown below. This is also applicable for AC200 controllers.

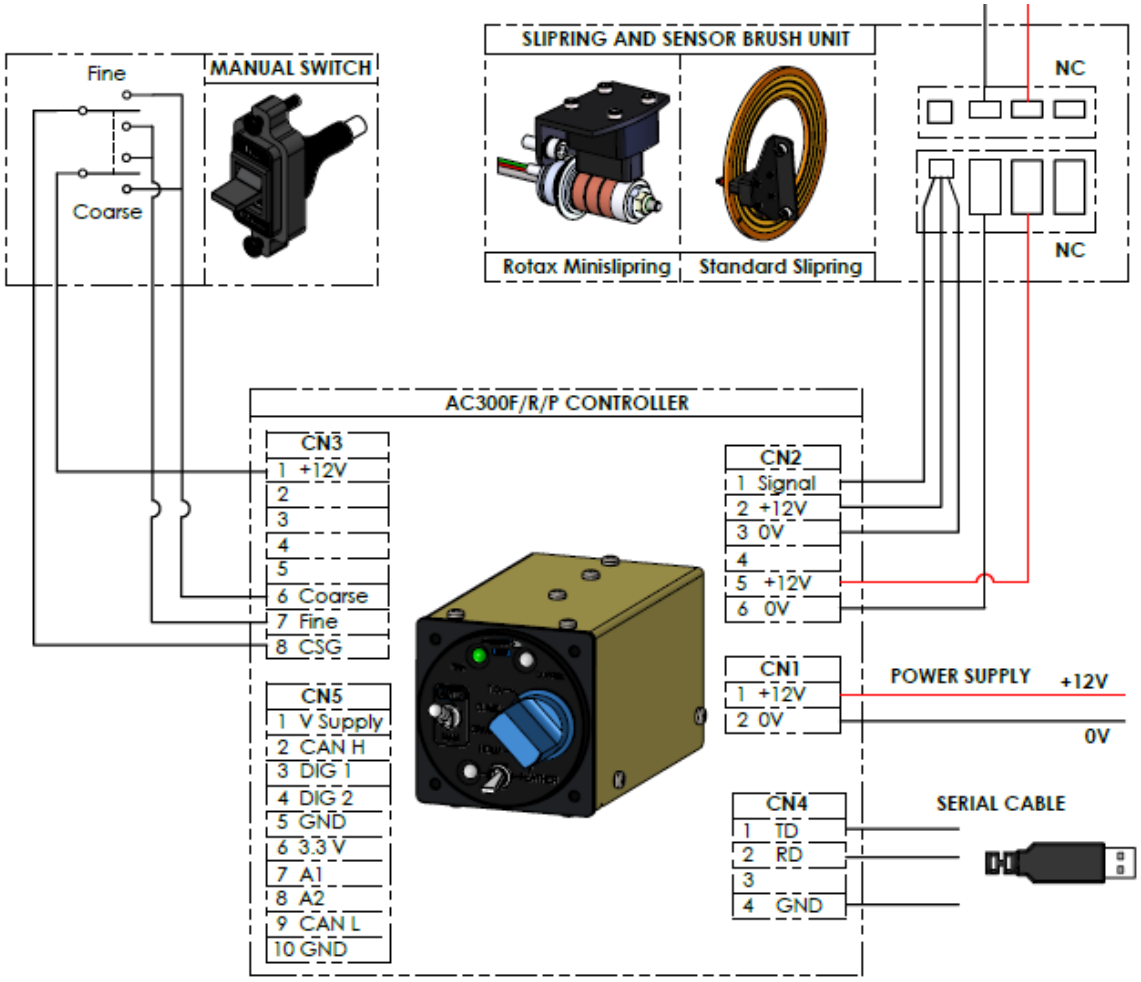


Figure 2. *AC300 controller circuit diagram.*

3.2 Controller Installation

3.2.1 Requirements

- The controller is designed to be mounted in a standard 2 ¼-inch circular cutout in the instrument panel. See installation dimensions below (identical for AC200 and AC300 controllers).
- The controller should be mounted such that it is easily accessible and visible to the pilot. A position near to the engine controls and instrumentation is recommended.
- The controller should be mounted in a position that is away from magnetically sensitive instruments (e.g. aircraft compass).

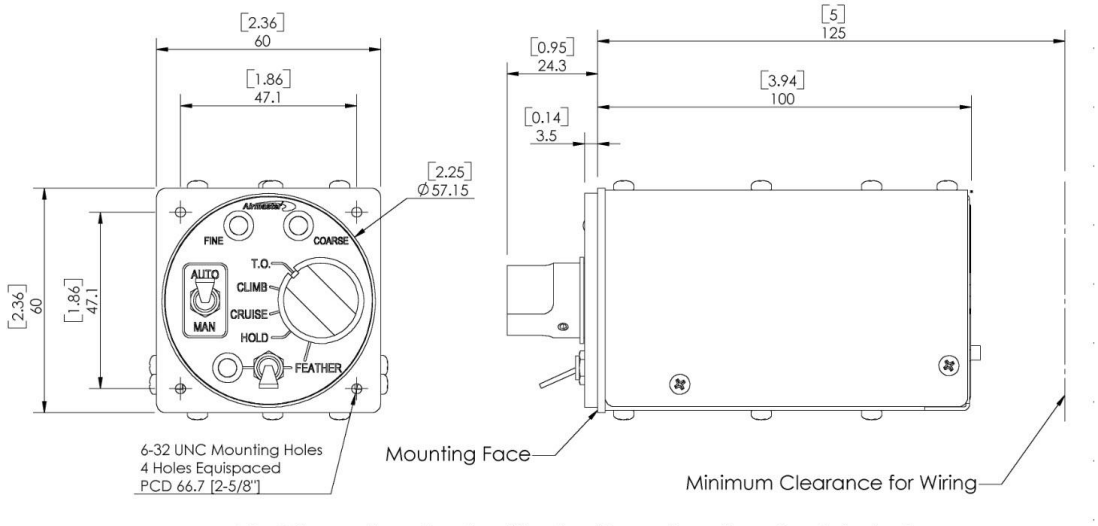


Figure 3. *Installation dimensions for Airmaster controller.*

3.2.2 Installation

- The controller is connected to other control system components via connectors at the rear, using the custom cables supplied:

IDENTIFICATION CODE	DESCRIPTION	FUNCTION
CN1	2-way Connector	Power Supply
CN2	6-way Connector	Sensor-Brush Cable / Extension Loom
CN3	8-way Connector	Manual Control Switch Cable
CN4	4-way Connector	Serial Programming Cable
CN5	10-way Connector	Auxiliary Input / Output (generally unused)
FS1	Thermal CB	Reset for Controller's Internal Current Protection

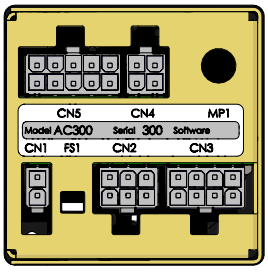


Figure 4. *Connectors at rear of Airmaster controller (AC300 controller shown).*

- Plug all connectors into the rear of the controller as access to this area may be difficult once the controller is mounted to the instrument panel. Ensure that all cable connectors are pushed all the way home and the latch on their side is fully engaged.

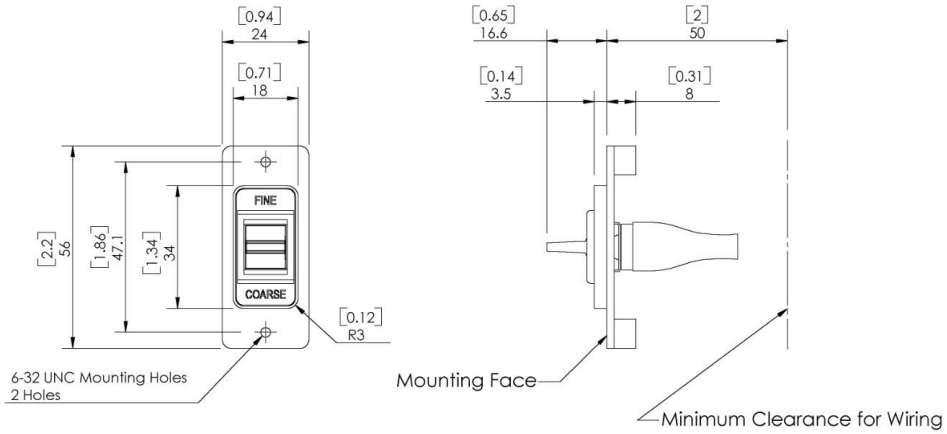
- It is recommended that the controller is mounted to the instrument panel last (once all cables are finalized and connected). Mount using (4) 6-32 x ¾ inch UNC screws (*P0278*). Torque **0.7Nm**.

> ⓘ *Note* *These are standard brass instrument screws (MS35214-29).*

3.3 Manual Control Switch Installation

3.3.1 Requirements

- The manual control switch requires its own cutout in the aircraft instrument panel. See installation dimensions below.
- The manual control switch should be mounted in a position that is near to the controller.
- The manual control switch is used in conjunction with the aircraft throttle so it is recommended that it is positioned adjacent to it. An arrangement where the throttle may operate while the switch is operated by the index finger is suggested as ideal.



NB: Primary dimensions in millimeters [Secondary dimensions in inches]

Figure 5. *Installation dimensions for Airmaster manual control switch.*

3.3.2 Installation

- Mount the manual control switch to the instrument panel using (2) 6-32 x ¾ inch UNC screws (*P0278*). **0.7Nm (0.5ft-lbs).**

> ⓘ *Note* *These are standard brass instrument screws (MS35214-29).*

- Check all pins in the cable connector are properly inserted and none are bent.
- Plug connector into rear of controller [CN3].

3.4 Firewall Protection Installation

3.4.1 Requirements

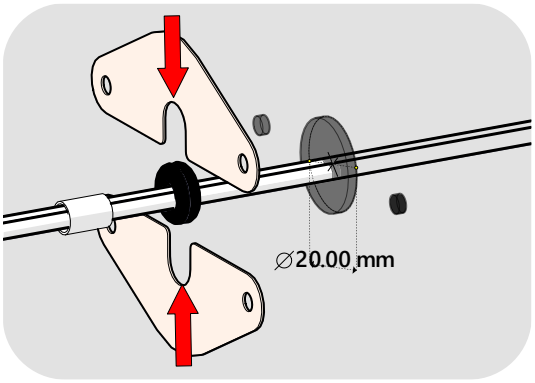
- The extension loom should be routed through the firewall.
- A 20mm (3/4in) hole should be fabricated to route the extension loom through the firewall.
- A two-part stainless steel firewall shield (*P0195)* and grommet *(P0292)* is supplied with the control system assembly to provide the necessary protection if required.
- After installation of the control system is complete, the firewall should be resealed and the cables protected as necessary.

3.4.2 Installation

PROCEDURE

Step 1 **Assemble Firewall Shield**

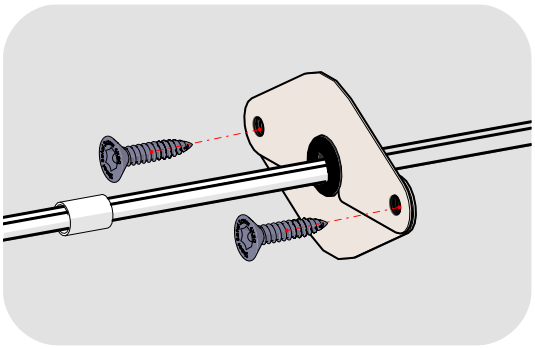
- Slice one side of the grommet.
- Fit the grommet over the extension loom in the position where it shall pass through the 20mm hole in the firewall.
- Assemble the two-part firewall shield around the grommet.



Attention *Knife*

Step 2 **Install Firewall Shield**

- The firewall shield may be attached to the firewall by either:
  - Attaching with (2) #10 sheet metal screws.
  - Drilling out firewall to accept (2)10-32UNF fasteners (use 5mm or #9 drill bit).
- Later, the firewall shield may be further sealed with high temperature silicone once installation of the control system is complete.



Attention *HT RTV Silicone*

3.5 Power Supply Installation

3.5.1 Requirements

- The power cable (*A0116*) supplied with the control system assembly must be connected to the aircraft electrical system via an independent 6A circuit breaker with the polarity indicated on the cable.
- It is recommended that the main bus be used to supply power to the propeller system.
- A stable electrical supply of +12V DC nominal should be used to power the control system (acceptable variance of 10V to 14V).

Note *24V systems are possible but require special hardware. Enquire with Airmaster.*

3.5.2 Installation

- Connect the wire coloured white with red stripe to the +12V DC power supply.
- Connect the wire coloured white with black stripe to ground.

- Install a 6A circuit breaker in series with the power cable and the main bus.
- Check both pins in the cable connector are properly inserted and none are bent.
- Plug connector into rear of controller [CN1].

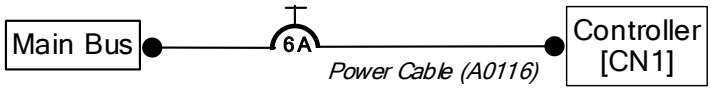


Figure 6. *Block diagram showing 6A fuse feeding power cable from main bus.*

3.6 Extension Loom Installation

3.6.1 Requirements

- The extension loom (*A0125-x*) is used to extend the sensor-brush assembly (*A0120*) cable to the controller. It should be installed to suit the engine installation.

> ⓘ *Note*
> *FAA Advisory Circular AC43.13-1B, chapter 11, provides good advice on the acceptable methods, techniques and practices for the installation of electrical equipment.*

3.6.2 Installation

- If the sensor-brush assembly is already installed onto the engine, plug the cable connector into the female connector of the extension loom.

> ⓘ *Note* *It is recommended that this connection is protected with a tube of heat shrink.*

- Route the extension loom through the engine bay ensuring that any areas of excessive heat or strong magnetic fields are avoided.
- Secure the extension loom with wire ties every 100 - 200mm (4–8in).
- Feed male connector of extension loom through the firewall.
- Check all pins in cable connector are properly inserted and none are bent.
- Plug connector into rear of controller [CN2].

3.7 Connector Pins for Control System Components

The control system cables are terminated with plastic multi-pin connectors (Molex mini-fit). The arrangement of pins inside each of these cables, as well as their function, is discussed below.

> **Note** *Pin numbers are moulded on the face of the connector (where wires enter connector).*

3.7.1 Power Cable [CN1]

PIN NO.	FUNCTION	WIRE COLOUR	
1	+12V DC supply (from aircraft supply)	White with red stripe	Red
2	Ground	White with black stripe	Black

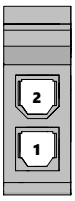


Figure 7. *Pin Map of Power Cable Connector (Front view).*

3.7.2 Sensor-Brush Assembly Cable [CN2]

PIN NO.	FUNCTION	WIRE COLOUR	AWG
1	Speed Signal Input (from RPM sensor)	Orange / White	
2	+12V DC Supply (to RPM sensor)	White	22
3	Ground (to RPM sensor)	Blue / White	
4	Feather Drive (to hub)	Orange / White	
5	Coarse Drive (to hub)	White	20
6	Fine Drive (to hub)	Blue / White	

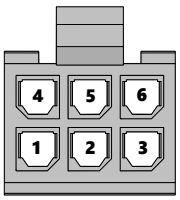


Figure 8. *Pin Map of Sensor-Brush Assembly (and Extension Loom) Cable Connector (Front view).*

3.7.3 Manual Control Switch Cable [CN3]

PIN NO.	FUNCTION	WIRE COLOUR
1	+12V DC Supply (to switch)	Red
6	Coarse Input (from switch)	White
7	Fine Input (from switch)	Blue
8	Ground (current sense ground)	Black

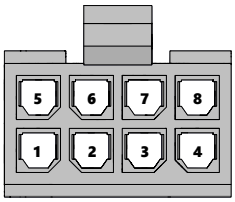


Figure 9. *Pin Map of Manual Control Switch Cable Connector (Front view).*

3.7.4 USB-Serial Cable [CN4]

PIN NO.	FUNCTION	WIRE COLOUR
1	Transmit Data (Tx)	Yellow
2	Receive Data (Rx)	Orange
3	-	-
4	Ground	Black

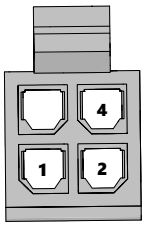


Figure 10. *Pin Map of USB-Serial Cable Connector (Front view).*