Accupoint Continuous Rotation Positioners

OPERATOR'S MANUAL

LF251TCXXXRX2 *MF283TCXTXRX2* *HF262TCXDXRX2*

The Will-Burt Company (EU) LTD
Unit 5b, Station Approach
Four Marks, Alton, Hants GU34 5HN

www.willburt.com
PM-01015-REV 1, April 2, 2024

Warranty

Will-Burt warrants its Accupoint Positioners to be free from defects in material and workmanship for a period of two (3) years, with such time period running from the date of shipment by Will-Burt. Will-Burt shall not be responsible for any damage resulting to or caused by its products by reason of failure to properly install, maintain or store the product; use of the product in a manner inconsistent with its design; unauthorized service, alteration of products, neglect, abuse, accident, or acts of God. This warranty does not extend to any component parts not manufactured by Will-Burt; provided, however, Will-Burt's warranty herein shall not limit any warranties by manufacturers of component parts which extend to the buyer.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, AND NO REPRESENTATIONS, GUARANTEES OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, A WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT ARE MADE BY WILL-BURT IN CONNECTION WITH THE MANUFACTURE OR SALE OF ITS PRODUCTS. NO EMPLOYEE, DISTRIBUTOR, OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY ON BEHALF OF WILL-BURT.

Claims for defects in material and workmanship shall be made in writing to Will-Burt within thirty (30) days of the discovery of defect. Failure to provide notice as required hereby shall be conclusive evidence that the product was in conformity with the warranty, and Will-Burt shall be released from any and all liability relating to the product. Will-Burt may either send a service representative or have the product returned to its factory at Buyer's expense for inspection. If judged by Will-Burt to be defective in material or workmanship, the product will be replaced or repaired at the option of Will-Burt, free from all charges except authorized transportation.

THE REMEDIES OF BUYER SET FORTH HEREIN ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER REMEDIES. THE LIABILITY OF WILL-BURT WHETHER IN CONTRACT, TORT, UNDER ANY WARRANTY, OR OTHERWISE, SHALL NOT EXTEND BEYOND ITS OBLIGATION TO REPAIR OR REPLACE, AT ITS OPTION, ANY PRODUCT OR PART FOUND BY WILL-BURT TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP. WILL-BURT SHALL NOT BE LIABLE FOR COST OF INSTALLATION AND/OR REMOVAL, OR BE RESPONSIBLE FOR DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE.

EU Declaration of Conformity

According to EN 45014

The directives covered by this Declaration:
2004/108/EC Electromagnetic Compatibility directive, as amended

Name of Manufacturer:	Will-Burt United Kingdom
Address of Manufacturer:	Unit 5b, Station Approach Four Marks Alton Hants GU34 5HN

Hereby declares that the following product(s)

Product Designation:	Accupoint Positioners
Models:	All
Serial Number:	All
Year of Construction:	2024

are in conformity with the applicable requirements of the following documents:

BS EN 61000-6-1	Electromagnetic compatibility (EMC). Generic standards. Emission for residential, commercial, and light industrial environments.
BS EN 61000-6-2	Electromagnetic compatibility (EMC). Generic standards. Emission for residential, commercial, and light industrial environments.

I hereby declare that the equipment named above has been designed and tested to comply with the relevant sections of the above referenced specifications. The unit complies with all applicable essential requirements of the directives.

Issue Date: 2nd April 2024

Lee Turner
General Manager

UK Declaration of Conformity

According to BS EN 45014

The directives covered by this Declaration:
Electromagnetic Compatibility Regulations 2016
Electrical Equipment (Safety) Regulations 2016

Name of Manufacturer:	The Will-Burt United Kingdom
Address of Manufacturer:	Unit 5b, Station Approach Four Marks Alton Hants GU34 5HN

Hereby declares under our sole responsibility that the following product(s)

Product Designation:	Accupoint Positioners
Models:	All
Serial Number:	All
Year of Construction:	2024

Conforms with the following applicable requirements of the following documents:

BS EN 61000-6-1/2	Electromagnetic compatibility emission requirements for electrical and electronic equipment intended for use at residential, commercial, and light industrial locations and applies where's there's no relevant dedicated product or product family EMC emission standard.

The product herewith, named above has been designed and tested to comply with the relevant sections of the above referenced specifications. The unit complies with all applicable essential requirements of the directives.

The Technical Construction File is kept in the UK office (address as above)

Issue Date: 2nd April 2024	Lee Turner
Issue Place: Four Marks	General Manager

Document History

Document Numbers	Dates	Remarks
PM-01015-01	April, 2024	Initial Release.

Table of Contents

Table of Figures

Table of Tables

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Safety Summary

This section describes safety information for the Accupoint Continuous Rotation Positioners and its default joystick controller. These are recommended precautions that personnel must understand and apply throughout installation, operation, maintenance, and troubleshooting. Be sure to read and understand the entire manual before performing any procedure outlined in this manual.

SIGNAL WORD DEFINITIONS

⚠ WARNING

Warnings highlight an essential operating or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in injury to, or death of, personnel or long-term health hazards.

⚠ CAUTION

Cautions highlight an essential operating or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in damage to, or destruction of, equipment or loss of mission effectiveness.

Note: Notes highlight an essential operating or maintenance procedure, condition, or statement.

GENERAL SAFETY INSTRUCTIONS

The following are general safety precautions that are not related to any specific procedures. These are recommended precautions that personnel must understand and apply throughout installation, operation, maintenance, and troubleshooting. Additional precautions which apply to specific procedures and steps may be listed with the procedure or step to which they apply.

⚠ WARNING

Electrocution Hazard! Do not touch live wires. Make sure all power has been disconnected prior to performing installation or maintenance. Make certain that the area is free of overhead power lines and other unwanted sources of electricity. Do not operate the system during an electrical storm. Follow local safety regulations when working near energized power lines. Be sure to allow sufficient clearance on all sides of the mast to allow for side sway. Death or serious injury could result if proper precautions are not performed.

⚠ WARNING

Resuscitation! Personnel working with or near high voltages should be familiar with modern methods of resuscitation. Please refer to local Medical Guidelines for information & methods on resuscitation.

⚠ WARNING

Pinch Point Hazard! Keep clear of moving parts. Be sure to stay clear of the positioner during operation. Moving parts can crush and cut resulting in serious injury.

⚠ WARNING

Crush Hazard! Do not stand directly beneath the positioner or payload. Be certain payload is properly installed and secured. In locations or areas where the risk of injury occurs, or any part of the assembly may become detached or fall for any reason, a strong safety chain or wire hawser should be attached between the equipment and the mounting surface. At all times, normal safety precautions must be employed. Death or serious injury could result if positioner fails suddenly.

⚠ WARNING

Safety Equipment! Helmets or hard hats, eye protection, gloves, and safety shoes or combat boots must be properly worn while working in the deployment area. Death or serious injury could result if proper safety equipment is not properly worn.

⚠ WARNING

Trained Personnel Only! Installation, operation, and maintenance to be performed by trained and authorized personnel only. Death or serious injury could result if proper installation, inspection, operation, and maintenance procedures are not observed.

⚠ WARNING

Lifting Hazard! Manually lifting over 55 lb. (25kg) is prohibited. All lifting equipment must be thoroughly examined annually by a competent person according to the local regulations.

⚠ WARNING

Safety Instruction – Remote Control! The equipment is subject to remote control and may be operated at any time. Persons working on the equipment should take appropriate precautions to ensure that any unexpected movement does not occur as this could lead to injury.

⚠ CAUTION

Equipment Damage! All persons installing and maintaining this equipment should be suitably qualified and work to national and local standards and codes of practice.

⚠ CAUTION

Equipment Damage! Each positioner contains a 1.85 amp self-resetting circuit breaker to protect the PC board. Do not disassemble the positioner side plates, or separate from the pedestal. Doing so will break the environmental seal and potentially cause improper stop limit settings. This will void the warranty.

⚠ CAUTION

Equipment Damage! The connector used with the units are rated to IP68 when they are mated with the mating connector/ wire. Care must be taken when in an unmated state as water can seep through an unmated connector causing internal damage.

Section 1 Introduction

Review this manual in its entirety. Contact the Will-Burt Company with any questions before performing any procedure outlined in this manual.

The Accupoint Continuous Rotation units offer a reliable, dependable and rugged Pan & Tilt system that uses a high-quality slip ring that has the capability to transfer power, data and video signals reliably.

This manual covers the following models of the Accupoint Continuous Rotation range:

- AP-8 Continuous Rotation (**LF251TCXXXRX2**)
- AP-30 Continuous Rotation (**MF283TCXTXRX2**)
- AP-50 Continuous Rotation (**HF262TCXDXRX2**)

The Accupoint Continuous Rotation does not currently support the following:

- GPS Control
- Video Output Screen
- Infrared Remote Control
- RS-232 GUI Interface (customer supplied only)
- Mast Up / Down Control

1.1 Safety Precautions

Refer to the Safety Summary for precautions to be observed while installing, operating, maintaining, or troubleshooting this equipment.

1.2 How this Manual is Organized

This manual is organized into the following sections:

Section 1 Introduction

Section 2 Installation

Section 3 Operation

Section 4 Maintenance

Section 5 Troubleshooting

1.3 Additional Documentation

In addition to this manual, the controller ships with the controller manual. Reference this manual for additional information on the function of the controller.

1.4 Definitions of Terms and Symbols

Throughout this manual, the following will be used:

General Terms:

- Controller refers to the default joystick controller (P/N: 5098901).
- System refers to the entire product with controller.
- Product refers to the Accupoint Continuous Rotation Pan & Tilt unit.
- Payload refers to the object or equipment being mounted to the positioner.

Positions:

- “Factory Home” (Figure 1-1) refers to the factory set preset position [0] (zero) which is set to move the positioner to the mid-point of both the pan and tilt. In this position, the tilt platform will be horizontal, and the pan axis will be in the center position. In this position, the rear of the positioner is the side with the power/data connectors on the body of the positioner. Note that the offset on the left of the positioner, as you face the connector, is wider than the offset to the right. The positioner ships in the Factory Home position. The Factory Home position can be re-programmed to a new position however doing this would require re-programming of the tilt limit stops aswell.

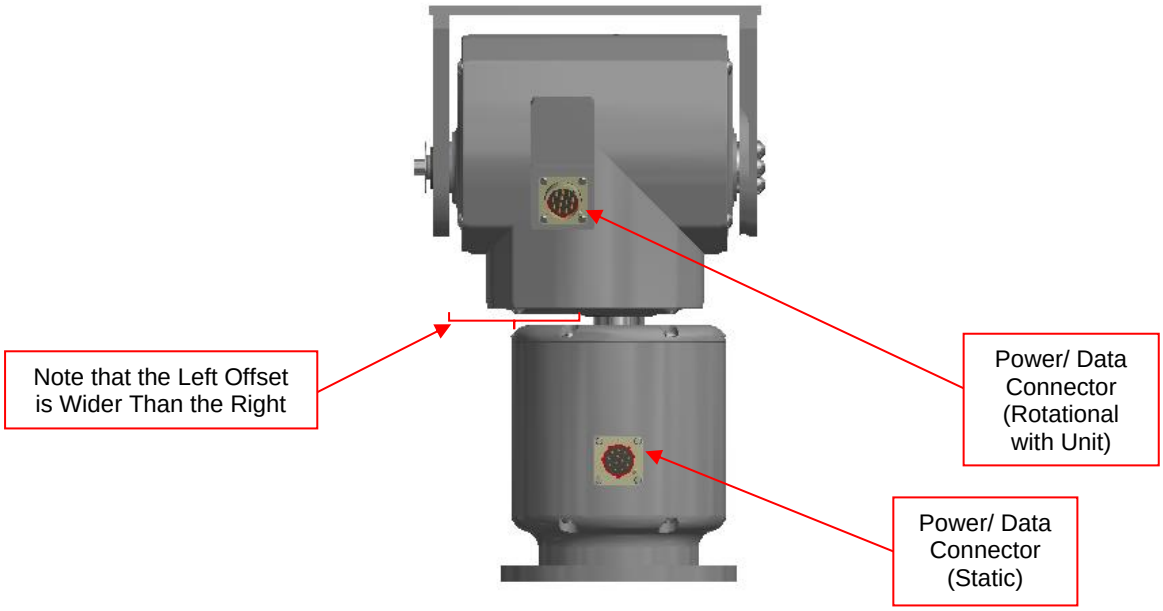

Figure 1-1 Factory Home Position

- "Stowed" refers to a customer-set preset position whereby the positioner moves the payload to a desired pan and tilt position for travel or safe storage. Preset [1] is designated as the "Stowed" position.
- "Unstowed" refers to a customer-set preset position whereby the positioner moves the payload to a desired pan and tilt position from the stowed position. The customer should be sure the positioner can be safely moved to this position from the stowed position without causing damage. Preset [2] is designated as the "Unstowed" position.

Directions:

- When operating the positioner, directions are given as follows:

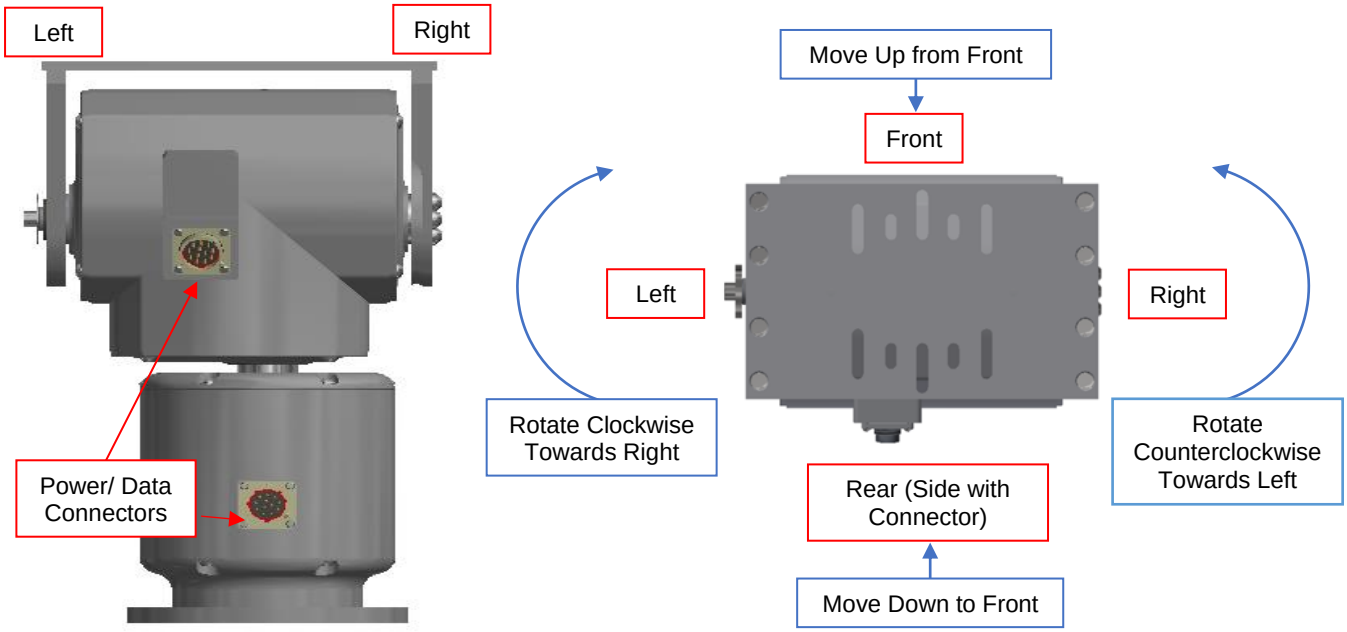

Figure 1-2 Positioner Directions

- When using the joystick controller:
  - Pushing the joystick forward will tilt the positioner towards the rear
  - Pulling the joystick back will tilt the positioner towards the front
  - Moving the joystick to the right will rotate the joystick clockwise
  - Moving the joystick to the left will rotate the joystick counterclockwise

Symbols:

- Characters inside < > as in <Success!> represent text that appears on the display screen.
- Characters inside [ ] as in [1] represent buttons or keys being used.
- Arrows as in "▲, ►, ▼, ◄" represent the direction(s) the positioner is moving in. These arrows are shown on the display screen of the default joystick controller (P/N: 5098901).

1.5 Specifications

Table 1-1 lists specifications for Accupoint Continuous Rotation. Table 1-2 lists specifications for the default joystick controller.

Table 1-1 Unit Specifications

	AP CR-8	AP CR-30	AP CR-50
Payload Capacity	8 ft.-lb. (10.85 Nm)	30 ft.-lb. (40.67 Nm)	50 ft.-lb. (67.79 Nm)
Overall Height	11.2 in. (283.5 mm)	13.4 in. (341.2 mm)	15 in. (381.6 mm)
Overall Width	6.2 in. (157.95 mm)	8.2 in. (207.65 mm)	9.6 in. (243.6 mm)
Overall Depth	5.00 in. (128.23 mm)	5.9 in. (151 mm)	6.6 in. (166.51 mm)
Weight	7.5 lb. (3.4kg)	21.82 lb. (9.9 kg)	38.58 lb. (17.5 kg)
Operating Temperature	-40°F to 140°F (-40°C to 60°C)		
Pan Degrees of Rotation	Continuous Rotation		
Tilt Degrees of Rotation	+90° / -45°		
Pan Speed (Proportional)	24° / Second	48° / second	30° / second
Tilt Speed (Proportional)	6° / Second	12° / second	10° / second
Backlash	≤ 0.15°		
Repeatability	≤ 0.3°		
Maximum Continuous Power	44 W		
Maximum Continuous Current	1.85 amps		
Input Voltage	24 VDC		
Protocol	Pelco D used (Pelco P available)		
Ingress Protection Rating	IP68		
Baud Rate	2,400 bps (Other Baud Rates Available)		

Table 1-2 Default Joystick Controller (P/N: 5098901) Specifications

Specifications	
Input Voltage	12 VDC
Rating Power	0.5 watts
Communication Interface	RS485
Communication Frequency	2,400 bps used (4,800; 9,600; 19,200 bps available)
Operating Temperature	32°F to 122°F (0°C to 50°C)
Dimensions (W x H x L)	5.4 x 4.2 x 6.6 in. (136 x 105 x 168 mm)
Weight	0.89 lb. (0.40 kg)
Protocol	Pelco D used

1.6 Major Components

The major components of the system are:

- Positioner
- Controller
- Power/Data Cable
- Power Supply
- Step Up Converter (Customer Supplied)
- Step Down Converter (Customer Supplied)
- Video output converter (Customer Supplied)
- Video Output Screen (Customer Supplied)

1.6.1 Positioner

Accupoint Continuous Rotation Range has the following features:

- Is made of die-cast aluminum casing
- Uses stainless steel fasteners
- Has weather and dust proofing to an IP68 rating
- Is designed to minimize backlash
- Is configured to run on RS485 data using Pelco D protocol
- Ships with the Accupoint Continuous Rotation Operator's Manual (this manual)

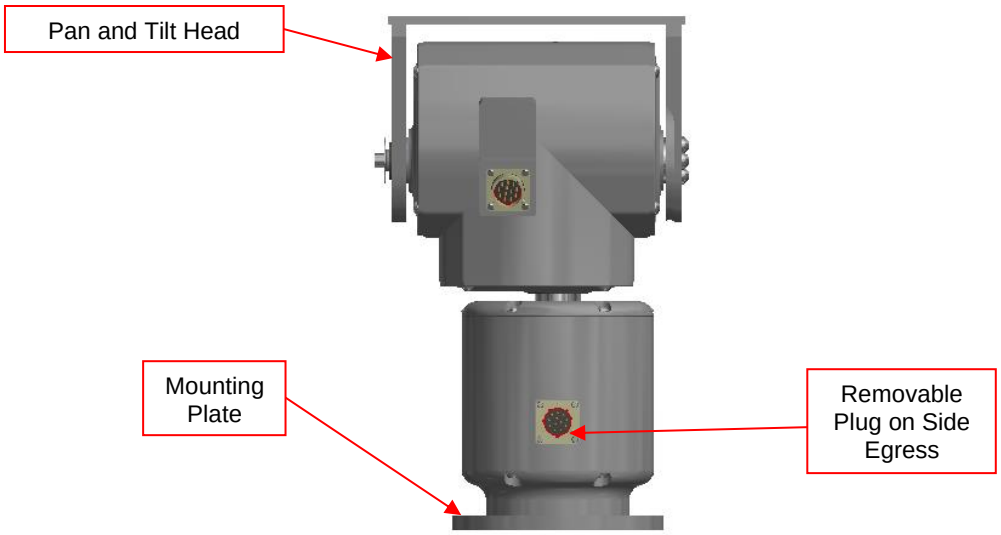

Figure 1-3 Accupoint Continuous Rotation Unit

1.6.2 Controller

A suitable PelcoD PTZ controller can be used to run the product however Will-Burt has a recommended joystick controller that is used throughout Will-Burt positioner products.

Recommended joystick controller (P/N: 5098901) (Figure 1-4):

- Controls pan and tilt functions
- Is Pelco D compatible
- Has a joystick, LCD Screen and a keyboard
- Has programmable presets
- Has programmable electronic limits
- Has speed control
- Ships with the controller manual
- Is not designed to handle inclement weather and should be kept in a protected environment

Figure 1-4 Default Joystick Controller (Left: With Keyboard Cover On. Right: With Keyboard Cover Off.)

1.6.3 Power/Data Cable

The standard power/data cable (Figure 1-5) consists of (2) power wires and (1) ground wire (18 AWG), (3) control wires (24 AWG twisted pair) & 75 Ohm Coaxial Cable. The cable assemblies can be shipped either with a straight connector or a 90-degree connector. The other end has loose wires to allow for a Nycoil pull. The end with the loose wires can be cut if the customer requires a shorter length.

A shorter cable assembly is also offered to be used at the top of the positioner to provide power, data or video signal to the payload/ camera.

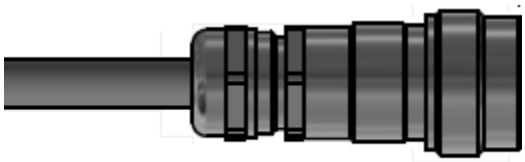

Figure 1-5 Power/Data Cable

Table 1-3 provides the part numbers for the cables with straight and 90 deg back shells.

Table 1-3 Standard Cables

Will-Burt Part Number	Length	Back shell Type
620/05206	33 ft. (10 m)	Straight
620/05207	66 ft. (20 m)	Straight
620/05208	108 ft. (33 m)	Straight
620/05210	3.28 ft. (1 m)	Straight
620/05203	33 ft. (10 m)	90°
620/05204	66 ft. (20 m)	90°
620/05205	108 ft. (33 m)	90°
620/05209	3.28 ft. (1 m)	90°

Table 1-4 shown below shows the flying lead assignment and Figure 1-6 shows the 90 deg flying lead.

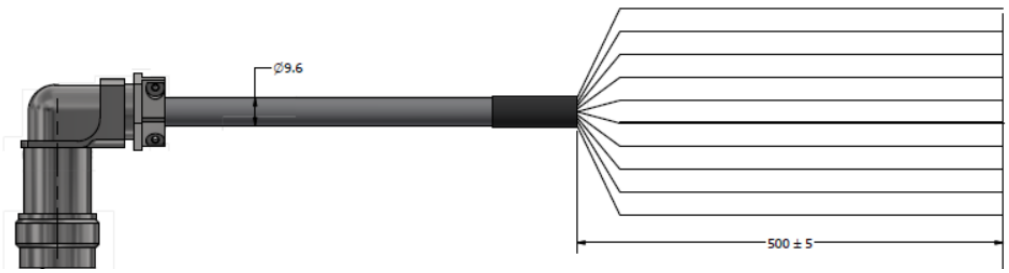

Figure 1-6 Power/Data Cable

Table 1-5 Flying Lead Assignment

Wire Identification/ Color	Assignment	Max Current
Red	+ ve	3 A
Black	- ve	3 A
Green	Ground	1 A (26 AWG)
White/ Brown	Aux Data	1 A (26 AWG)
Brown	Aux Data	1 A (26 AWG)
White/ Yellow	Data B	N/A
Yellow	Data A	N/A
White/ Blue	Aux Data	1 A (26 AWG)
Coax (RG179)	Coax	N/A
Blue	Aux Data	1 A (26 AWG)

1.6.4 Power Supply

The power supply (P/N: 208016) (Figure 1-7) is used in systems using 120 VAC (50 or 60 Hz) or 240 VAC (50 or 60 Hz) to convert the AC power to 24 VDC input power for the product. The power supply has short circuit, overcurrent, overvoltage, and over temperature protections. It is an IP67 design and is suitable for dry, damp, or wet locations.

Figure 1-7 Power Supply

1.6.5 Barrel Connector (2.1 mm)

The 2.1 mm barrel connector (P/N: 5195601) (Figure 1-8) can be used to connect the controller to the step down converter or 12 VDC power source.

Figure 1-8 Barrel Connector

1.6.6 Video Converter

To obtain video output from the product a 3GSDI to HDMI converter can be used in conjunction with a screen that has an HDMI input port.

1.7 Quick Overview

This section provides a quick overview of the system. Be aware of and follow all associated precautions when performing these procedures.

To install the product (Section 2):

1. Mount the product with (4) high-strength or M6 stainless steel bolts and nuts. See Section 2.5 for additional detail and bolt pattern.
2. Wire the product as per items used within the system.

To operate the product (Section 3):

1. Provide 24vDC to the Product through the cable.
2. Provide Data through the Data A & Data B wires.
3. If using camera with the system, video can be achieved by using a video output converter in conjunction with a screen.
4. Operate the positioner and camera (if used) using the recommended controller. See Section 3 for additional detail on the function of the default joystick controller (P/N: 5098901).
5. If required, see Section 3.3.4 for information on how to use preset positions.
6. If required, see Section 3.3.5 for information on how to adjust the electronic limit stops. The unit ships from the factory with electronic limit stops set. There are no hard stops.

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Section 2 Installation

This section describes the installation of the system and provides general procedures that must be followed to ensure a successful installation.

2.1 Pre-Installation Check

Before installing the system:

- Be sure to read and understand the entire installation procedure before beginning installation.
- Ensure that only a properly trained and qualified certified electrician performs electric installations and maintenance.
- All required tools are readily available.
- That the following warnings are understood and followed:

⚠ WARNING

Mounting Structure Hazard! Before installation, be certain the mounting structure is capable of resisting forces generated from all loading and environmental conditions including, but not limited to system size and weight, payload size and weight, sail size, and wind speed. Mounting the system to a structure unable to resist the forces generated from customer-specific loading scenario could result in death or serious injury and could damage the system.

⚠ WARNING

Safety Instruction – Mounting Instructions! Be sure to understand all mounting instructions. The mounting hardware must include proper means to resist vibration loosening such as thread-locking compound or locking hardware. Failure to follow mounting instructions can result in death or injury.

⚠ WARNING

Trained Personnel Only! Only trained and qualified personnel should perform installation, adjustments, and servicing. Only a properly trained and qualified certified electrician should perform electric installations and service. Death or serious injury could result if proper installation, inspection, operation, and maintenance procedures are not observed.

⚠ CAUTION

Equipment Damage! Only mount the unit so that the unit base faces down. Do not mount the unit upside down. Failure to follow mounting instructions can result in damage to the unit.

2.2 Installation Tools

Table 2-1 lists tools and materials recommended for installation.

Table 2-1 Tools and Materials Recommended for Installation

Tools and Materials		
Safety Glasses	Safety Gloves	Safety Shoes or Combat Boots
Hard Hat or Helmet	Wrenches	Screwdrivers
Wire Cutter / Stripper	Crimping Tools	Mounting Hardware (Pedestal)
Thread- Locking Compound or Locking Hardware	Level	Soldering Kit

2.3 Components

When unpacking, check to ensure all ordered components have arrived. The components your system includes will vary based upon your order.

Possible components include:

- Accupoint Continuous Rotation Unit
- Controller
- Controller Manual (ships with controller)
- Accupoint Continuous Rotation Unit Operator's Manual (this manual)
- Power/Data Cable
- Some combination of the following:
    - Power Supply (used in systems with AC input power)
    - Step Up Converter (used in systems with 12 VDC input power)
    - Step Down Converter (used in systems with 24 VDC input power)
- Barrel Connector (2.1 mm) (used to connect the controller to the power supply)

2.4 Unpacking

Unpack as follows:

1. Carefully open the box(es) and unpack all components.
2. Check for any damage from shipping. If damage has occurred, notify the carrier.
3. Ensure that all required tools are readily available.

2.5 Mounting the Product

When installing, the front of the product can be identified as the side of the product opposite of the side egress on the mounting pedestal while the product is in the home position (Figure 2-1).

Figure 2-1 Rear of Product

The mounting location must:

- Be capable of withstanding the holding forces required by the bolts.
- Be located on level terrain.
- Be free of obstructions.
- Allow for full pan and tilt movement.

Be sure to take into consideration other external factors, such as wind or ice loading, when selecting a mounting location. Make sure that these external factors do not overload the system.

Reference Figure 2-2 for the mounting hole locations for the system. There are (4) holes equally spaced. Connect the product to the top of the mast with (4) high-strength M6 stainless steel bolts and nuts (customer supplied). Torque all hardware as appropriate for its material and size. The mounting hardware must include proper means to resist vibration loosening such as thread-locking compound or locking hardware.

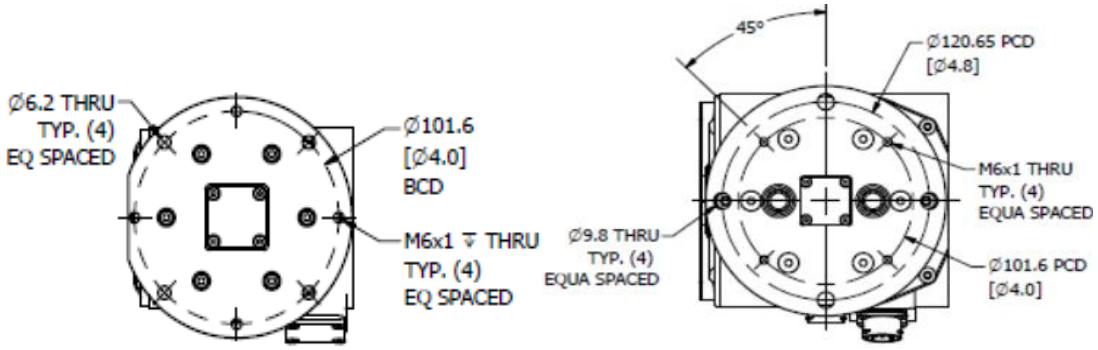


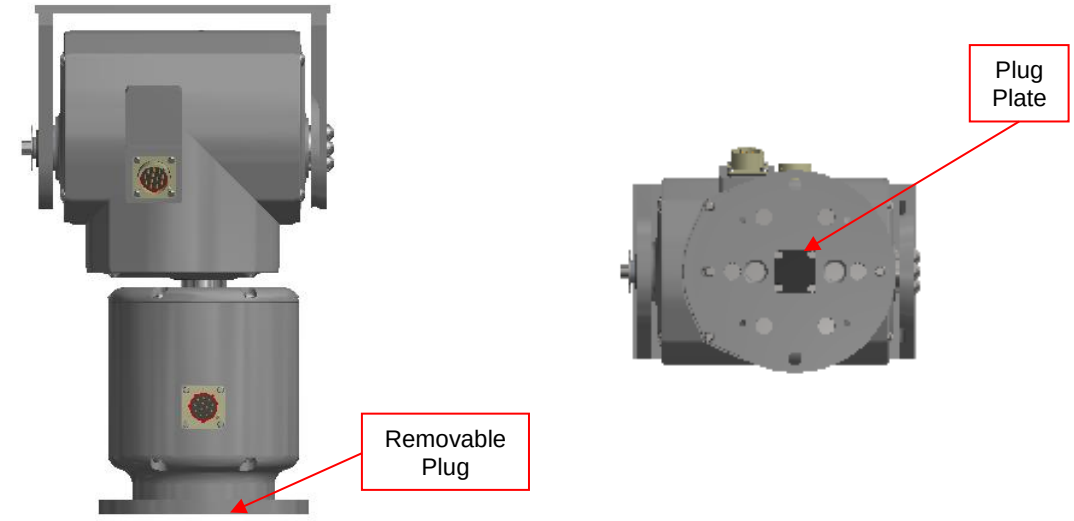
Figure 2-2 Product Mounting Hole Pattern AP-8 CR & AP-30 CR / AP-50 CR (See Section 6.2 for Enlarged version)

2.6 Wiring the System

This section discusses wiring the system assuming the default joystick controller (P/N: 5098901) is being used.

2.6.1 Product Plugs

The product has (2) plug locations on the mounting pedestal for wiring. The side egress (Figure 2-3) on the mounting pedestal ships from the factory with a removable plug installed. The bottom egress on the mounting pedestal ships from the factory with a plug plate installed. To use the bottom egress, the plug plate and the removable plug must be swapped. If either egress is not properly sealed, the product will leak and become damaged voiding the warranty.



Side Egress with Removable Plug
(View From Side)

Bottom Egress with Plug Plate
(View From Beneath)

Figure 2-3 Plug Locations

To use the bottom egress:

1. Ensure there is no power to the product.
2. Loosen the (4) bolts securing the removable plug to the side of the mounting pedestal.

3. Carefully pull away the removable plug and gently pull out the attached wires and gasket behind it (Figure 2-4).

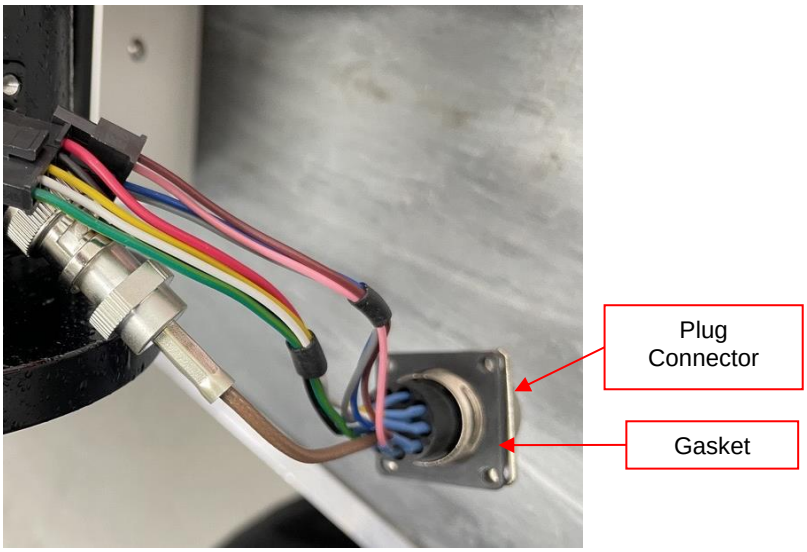


Figure 2-4 Carefully Pull Out the Removable Plug, Gasket, and Attached Wires

4. Disconnect the wires from the product. The wires are connected to the product with 2 quick connect and a coaxial connector (Figure 2-5).

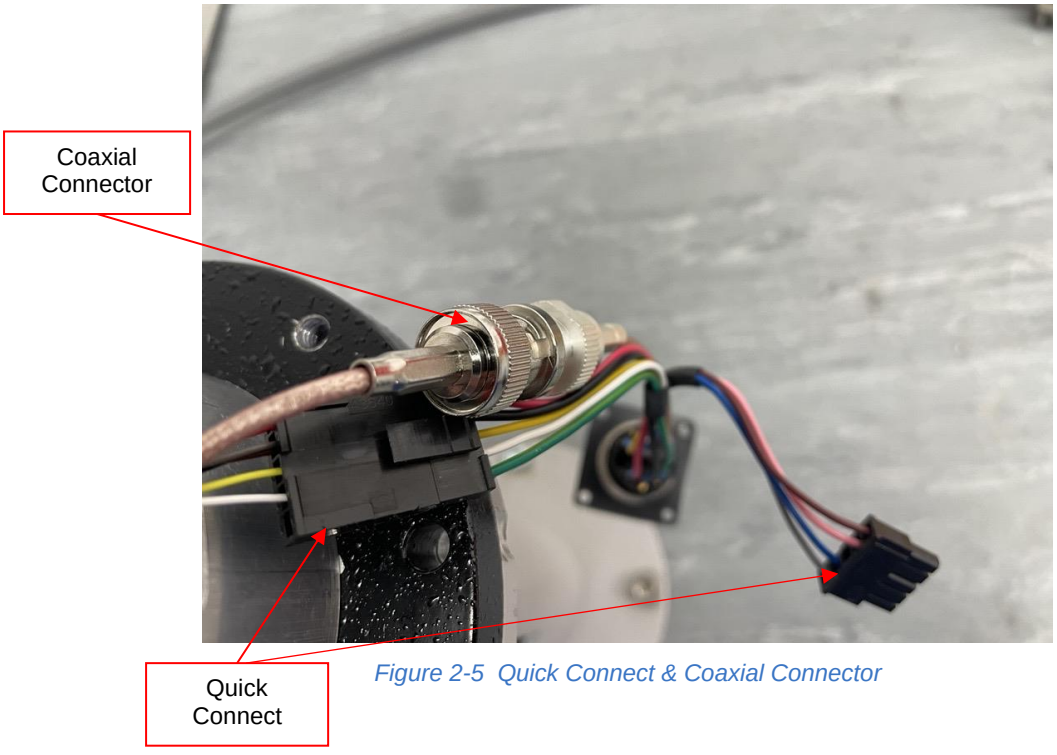


Figure 2-5 Quick Connect & Coaxial Connector

5. Remove the (4) bolts securing the plug plate to the bottom of the mounting pedestal (Figure 2-6).

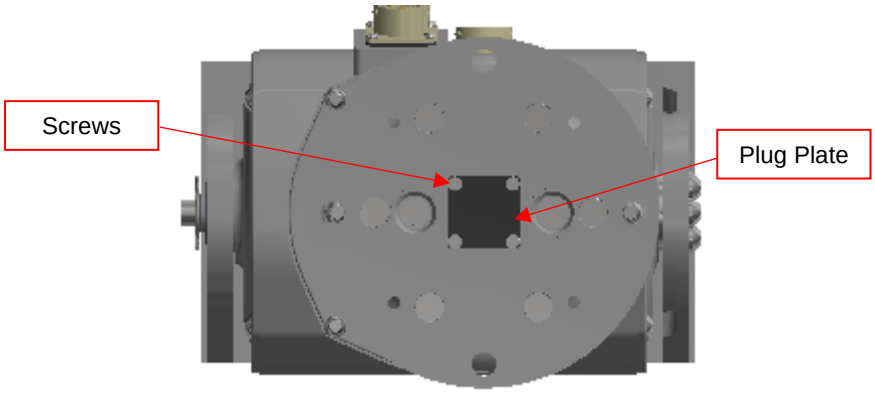


Figure 2-6 Remove the (4) Bolts Securing the Plug Plate

6. Remove the plug plate and the gasket behind it (Figure 2-7). Set the gasket and plug plate aside.

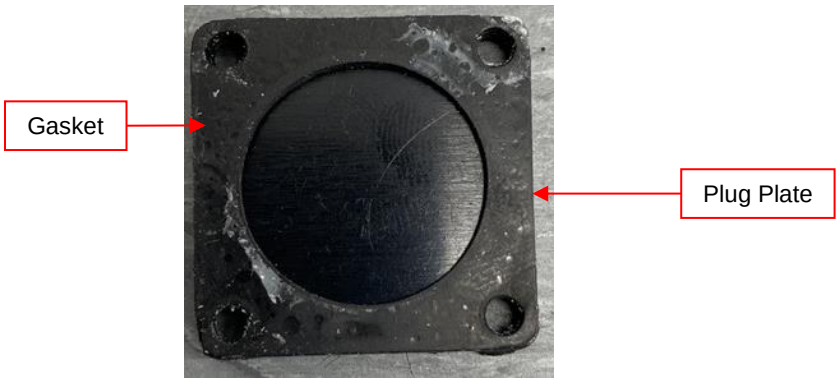


Figure 2-7 Remove Plug Plate and Gasket

7. Pull the wires still in the product through the hole at the side egress.

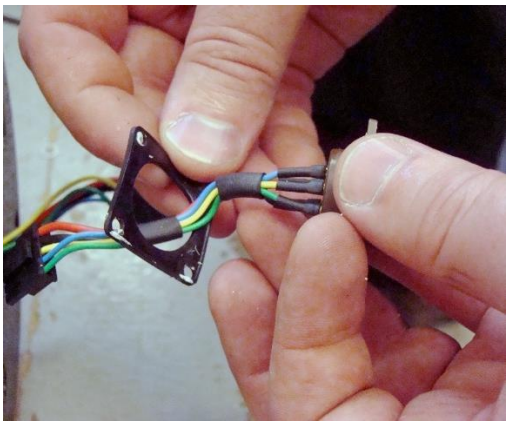


Figure 2-8 Pull the Wires out the Bottom of the Positioner

8. Reconnect the quick connect between the wires from the product and the plug making sure the gasket is in place.

9. Gently push the wires into the product and secure the gasket and removable plug-in place at the bottom of the mounting pedestal (Figure 2-9). If the gasket is not properly installed, the product will leak and become damaged voiding the warranty.

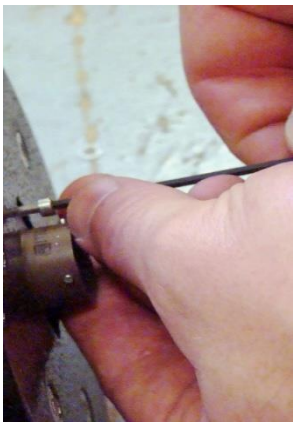


Figure 2-9 Secure the Gasket and Removable Plug to the Bottom Egress

10. Secure plug plate and its gasket at the side egress where the removable plug had previously been installed from the factory. If the gasket is not properly installed, the product will leak and become damaged voiding the warranty.
11. Check to ensure both plug locations are properly sealed. If either plug location is not properly sealed, the product will leak and become damaged voiding the warranty.

2.6.2 Connecting Power and Controls

This section describes how to connect the power and controls to the system.

⚠ CAUTION

Equipment Damage! Ensure the connections are made properly to prevent water ingress into the product through the connections. Should water enter the unit, extreme problems can occur.

Depending on the configuration of your system, power and controls can be hooked up several different ways. Select the appropriate method for your system and wire accordingly:

- Powered with 12 VDC
- Powered with 24 VDC
- Powered with 120 VAC (50 or 60 Hz) or 240 VAC (50 or 60 Hz)

Powered with 12 VDC:

The Accupoint Continuous Rotation unit runs on 24 VDC and power other than 24 VDC must be converted to 24 VDC for the positioner.

If the input power supply is 12 VDC, the system will require:

- A step-up converter from 12 VDC to 24 VDC to power the positioner
- A step-down converter from 24 VDC to 12 VDC may be required if 12 VDC power is required for the payload as well.
- A connector (P/N: 5195601) to connect 12 VDC to the controller

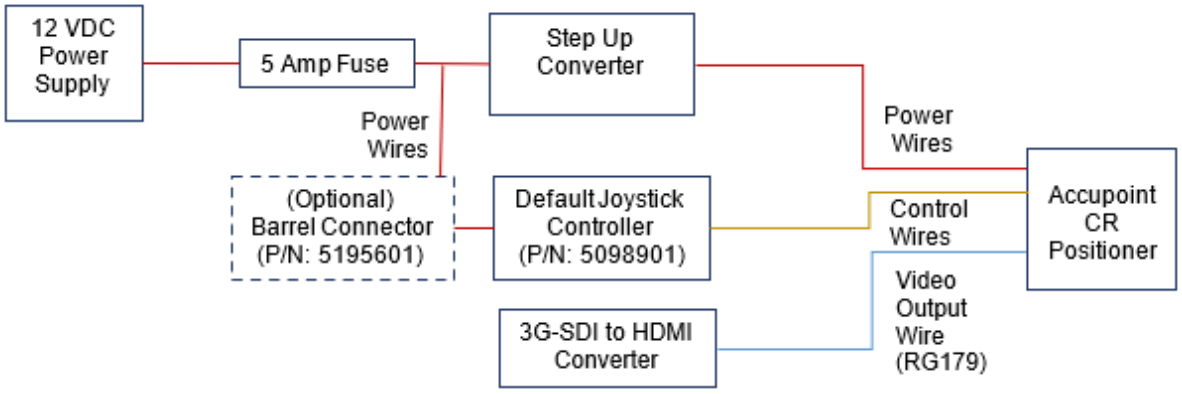


Figure 2-10 Powered with 12 VDC

To wire the positioner using 12 VDC:

1. Connect the 12-pin plug (attached to the power/data cable) to the product.
2. Twist the plug to the right to secure the connection.
3. Run the 24 AWG yellow (data A, +) and white with yellow (data B, -) wires from the power/data cable to the controller.
4. Run the 18 AWG red (power) and black (ground) wires from the power/data cable to the step-up converter.
5. Run the 12 VDC power to the controller and the step-up converter. Run a (5) amp slow blow fuse (customer supplied) inline between the power supply and the controller and step-up converter. An optional DC cable connector may be used to connect the controller and the power supply.
6. Crimp the video output cable onto a suitable connector to mate with the selected 3G-SDI to HDMI convertor (supplied by customer).
7. The connector on the top of the unit would also now have 24Vdc as output which would need to be stepped down.

Powered with 24 VDC:

The default joystick controller (P/N: 5098901) runs on 12 VDC power. To run 24 VDC systems, this must be stepped down to 12 VDC.

If the input power supply is 24 VDC, the system will require:

- A step-down converter from 24 VDC to 12 VDC to power the controller (if the AC power supply that comes with the controller is not used).
- A connector (P/N: 5195601) to connect 12 VDC to the controller (if the AC power supply is not used).

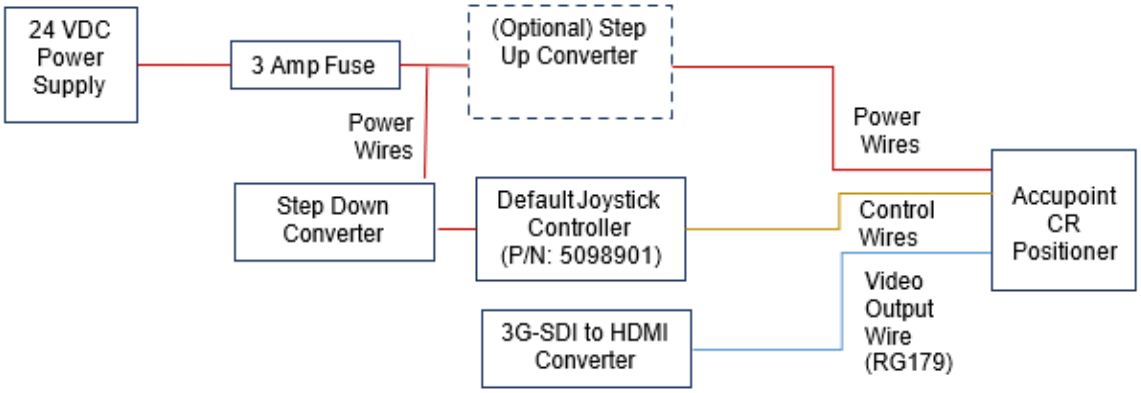


Figure 2-11 Powered with 24 VDC

To wire the positioner using 24 VDC:

1. Connect the 12-pin plug (attached to the power/data cable) to the positioner.
2. Twist the plug to the right to secure the connection.
3. Run the 24 AWG yellow (data A, +) and white with yellow (data B, -) wires from the power/data cable to the controller.
4. Run the 18 AWG red (power) and black (ground) wires from the power/data cable to the step-up converter.
5. Wire the step-down converter and the 18 AWG red (power) and black (ground) wires from the power/data cable to the 24 VDC power supply. Run a (2) amp slow blow fuse (customer supplied) inline between the power supply and the positioner and the step down converter. An optional DC to DC converter can be run inline between the power supply and the positioner to help maintain 24 VDC under low voltage situations.
6. Crimp the video output cable onto a suitable connector to mate with the selected 3G-SDI to HDMI convertor (supplied by customer).

Powered with 120 VAC (50 or 60 Hz) or 240 VAC (50 or 60 Hz):

The positioner runs on 24 VDC and power other than 24 VDC must be converted to 24 VDC for the positioner. The default joystick controller (P/N: 5098901) comes with its own power supply for the VAC input which is transformed to 12 VDC.

If the input power supply is VAC, the system will require:

- A power supply (P/N: 208016) for the positioner
- The existing joystick cable to power the joystick

If the customer is using AC input power and the power supply (P/N: 208016), the customer is responsible for installing a plug (customer-supplied) based on their region. The power supply ships with loose wires to connect to the appropriate customer supplied plug.

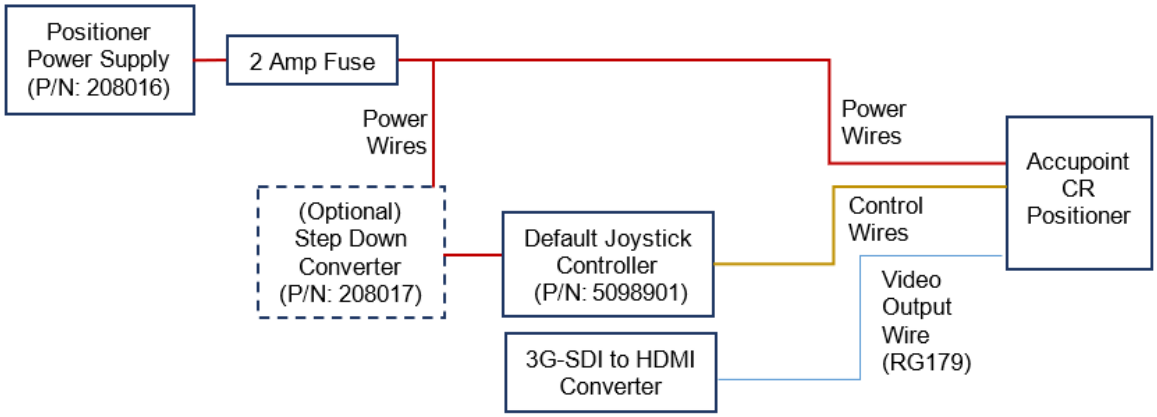


Figure 2-12 Powered with VAC

To wire the positioner using VAC:

1. Connect the 12-pin plug (attached to the power/data cable) to the positioner.
2. Twist the plug to the right to secure the connection.
3. Run the 24 AWG yellow (data A) and white with yellow (data B) wires from the power/data cable to the controller.
4. Wire the 18 AWG red (power) and black (ground) wires from the power/data cable and the controller to the positioner power supply. Run a (2) amp slow blow fuse (customer supplied) inline between the positioner power supply and the positioner and controller. An optional step-down converter can be run between the controller and the positioner power supply.
5. Crimp the video output cable onto a suitable connector to mate with the selected 3G-SDI to HDMI convertor (supplied by customer).

2.7 Setting Presets and Electronic Limit Stops

As part of the installation process, the operator may wish to set preset positions or adjust the electronic limit stops. For information on how to do this, see:

- Section 3.3.4 for setting presets
- Section 3.3.5 for adjusting electronic limit stops.

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Section 3 Operation

This section describes the operation of the system.

3.1 Pre-Operation Check

Before operating the system:

- Be sure to read and understand the entire operation procedure before beginning operation.
- Visually inspect the system for damage. If damage is apparent, do not use the system, and have it serviced prior to use.
- Read and understand the controller manual. Ensure that all warnings, associated with the controller are understood and followed. Ensure all relevant installation, operation, and maintenance instructions are followed.
- Ensure that the area around the pan and tilt area is clear so no damage will result from unexpected movement.
- Ensure that all wiring connections are tight and appropriately connected.
- Ensure that the following warnings are understood and followed:

⚠ WARNING

Tip Over Hazard! Do not operate in high winds. Operate on level ground only. Stand clear of unit and payload during operation. Be certain unit is level and secure. System tip over could result in death or serious injury.

⚠ WARNING

Safety Instruction – Operation! For outdoor use only. Do not use in areas that have been classified as hazardous.

⚠ WARNING

Safety Instruction – Keep Clear! Keep personnel clear of the unit during operation.

⚠ CAUTION

Equipment Damage! Check for and remove any objects which might obstruct motion, cause binding, or hinder function of the system. Hitting obstructions will cause damage to the unit.

⚠ CAUTION

Equipment Damage! If the electronic tilt limit stops are reset to their original settings, it is possible to drive the payload platform into contact with the unit. Damage to the unit and payload will occur.

⚠ CAUTION

Entanglement Hazard! Ensure cables are not tangled and are free to play out as the mast is extended. Tangled cables can cause equipment damage.

3.2 Operation Tools

Table 3-1 lists tools and materials recommended for operation

Table 3-1 Tools and Materials Recommended for Operation

Tools and Materials		
Safety Glasses	Safety Gloves	Safety Shoes or Combat Boots
Hard Hat or Helmet		

3.3 General Controls

The information and instructions described in this section are for the default joystick controller (P/N: 5098901) for the system. Refer to the controller manual for information on the specific controller with your system. Some functions of the default joystick controller are not used with the unit.

The default joystick controller is not designed to handle inclement weather and should be kept in a protected environment. When the controller is in operation, the LCD screen backlight will turn on. The keyboard and joystick can be used to access menu functions, adjust electronic limit stops, and store and recall preset positions.

The front of the unit can be identified as the side of the unit opposite the side egress on the mounting pedestal while the unit is in the home position.

3.3.1 Keyboard

The controller contains functions and keys which are not used with the unit. Keys (Figure 3-1) which are used for operation include:

- [Menu] which is used to access menu functions
- [Ent] (enter) which is used to make selections within the menu
- [Set] which is used in the process to store presets and electronic limit stops
- [Pre] (preset) which is used in the process to store presets and electronic limit stops, and in the process to recall presets
- [Mon] (monitor) which is used in the process to change the MonID
- [Cam] (camera) which is used in the process to change the CamID
- [Prev] (previous) which is used when using the menu to save preset positions, and to cancel out of a preset without recalling it
- [N], where “N” represents a number on the keyboard, which is used to access menu functions, and as part of the processes to store and recall presets

Figure 3-1 Keyboard Keys

3.3.2 Joystick

The joystick pans and tilts the unit. The speed of the movement will directly relate to the lean angle of the joystick.

Menu

When used with menu functions, the joystick controller functions as follows:

- Push the joystick forward to move up the menu
- Pull the joystick back to move down the menu
- When the joystick is moved to the right, the menu will go to the sub menu or save the setup
- When the joystick is moved to the left, the menu will be exited

Panning and Tilting

When moving the unit with the joystick, arrows pointing in the direction of the movement will display in the lower right corner of the LCD screen. The greater the lean of the joystick, the faster the movement. Viewed from the front, clockwise movement is to the left, and counterclockwise movement is to the right.

When panning and tilting, the joystick functions as follows:

- When the joystick is pushed forward, the camera housing will tilt forward. An arrow will appear pointing forward (▲) on the LCD screen.
- When joystick is pulled back, the camera housing will tilt back. An arrow will appear pointing back (▼) on the LCD screen.
- When the joystick is moved to the right, the unit will rotate to the right. An arrow will appear pointing right (►) on the LCD screen.
- When the joystick is moved to the left, the unit will rotate to the left. An arrow will appear pointing left (◄) on the LCD screen.
- It is possible to simultaneously adjust both the pan and tilt by moving the joystick towards a diagonal. Arrows for both applicable directions will appear on the LCD screen. For example, when tilting forward and panning right, both an arrow pointing forward and an arrow pointing right will appear (▲►).

The unit will continue to move in the direction given by the joystick until the joystick is released or centered, or the unit reaches one of its limits. Note that the Pan & Tilt motor and gearbox assemblies are designed to be stalled when they hit an obstruction, but that continuous abuse will cause damage.

3.3.3 Menu Functions

The controller has been designed to use the joystick as the primary controller for menu function.

To access menu functions:

1. Ensure power is on to the system.
2. Press [Menu] for (2) seconds. The Menu screen (Figure 3-2) will appear.

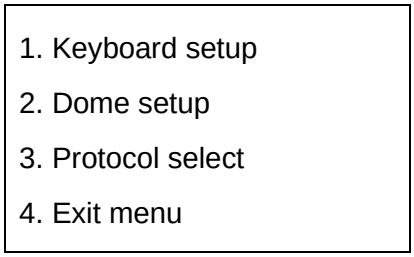

Figure 3-2 Menu Screen

3. Use the joystick to navigate through the menu. The number keys can also be used to assist in navigating through the menu.

Detailed steps of specific menu functions are listed in Section 3 and Section 5.

3.3.4 Presets

Preset positions can be stored to a preset number between (1) and (50).

The controller comes from the factory with the preset [0] (zero) set to move the unit to the mid-point of both the pan and tilt. In this position the tilt platform will be horizontal and the pan axis will be in the center position. This is referred to as the Home position.

The customer can program a stowed position by setting preset position [1]. The customer can program an unstow position by setting preset position [2].

Presets can be set or recalled using the keyboard keys, or through menu functions. Presets can only be cleared through menu functions. It is possible to overwrite presets through either method.

3.3.4.1 Setting Presets with the Keyboard

To store a preset position using the keyboard:

1. Use the joystick to drive the unit to the desired position for the preset.
2. Press [Set].
3. Press [N] where “N” represents the number being assigned to the preset position.
4. Press [Pre]. The preset position is stored.

3.3.4.2 Recalling Presets with the Keyboard

The preferred way to recall a preset position is with the keyboard as moving the joystick while in the menu will not stop the motion of the unit (e.g. if an emergency stop is required).

To recall a stored preset position using the keyboard:

1. Press [N] where “N” represents the number assigned to the desired preset position.
2. Press [Pre]. The unit will move to the preset position.

   As the unit nears the preset position, it will slow down. If an emergency stop is required as the unit is moving to a preset position, move the joystick to cancel out the preset position command.

3.3.5 Electronic Limit Stops

The unit uses electronic limit stops. The unit does not have mechanical hard stops. The unit comes from the factory with electronic limit stops set to the maximum recommended tilt (+90°/-45°), no limit stops set on Pan axis due to being continuous rotation. The limit stops can be adjusted through the controller.

The electronic tilt limits are set as follows:

- Tilt limit stops are set to 135° of rotation (+90°/-45°)

The default limits allow the maximum amount of travel possible from the gearboxes. If the tilt limit stops are reset to their default settings, it is possible to drive the camera housing past its allowed limit which will cause serious internal damage to the Accupoint Continuous Rotation.

3.3.5.1 Adjust Limit Stops with the Keyboard

To adjust the electronic limit stops with the keyboard:

1. Use the joystick to drive the unit to the desired electronic limit stop.
2. Press [Set].
3. Press [N] where “N” represents the number which corresponds to the preset being adjusted. Reference Table 3-2 to determine which number to use to change each electronic limit stop.

Table 3-2 Limit Stop Adjustment Numbers

Store Preset	Function
80	Stores new counterclockwise limit
81	Stores new clockwise limit
82	Stores new up limit
83	Stores new down limit

4. Press [Pre]. The electronic limit has been adjusted and the unit will no longer move past that point.

Note that it is possible to set the electronic limit stops such that the unit cannot move (e.g. setting the clockwise and counterclockwise limits to the same spot). If this happens, restore the electronic limit stops.

3.3.5.2 Restore Limit Stops with the Keyboard

To restore the electronic limit stops to factory settings with the keyboard:

1. Press [Set].
2. Press [N] where “N” represents the number which corresponds to the preset being restored. Reference Table 3-3 to determine which number to use to change each electronic limit stop.

Table 3-3 Default Limit Stop Numbers

Store Preset	Function
70	Restores default counterclockwise limit
71	Restores default clockwise limit
72	Restores default up limit
73	Restores default down limit

3. Press [Pre]. The electronic limit has been adjusted back to the factory default.

3.4 Changing Baud Rate and Address of System

To change the Baud Rate and address of the system, the Baud Rate and address on the camera has to be changed first. Please follow the recommended steps

3.4.1 Changing Baud Rate & Address of Positioner

Once the camera address and baud rate is changed, the Pan & Tilt address and Baud has to be changed to get the complete system to work with the Joystick. Please follow instructions below to change the Baud Rate and Address on the Pan & Tilt.

3.4.1.1 Easysync Setup.

1. Connect 1x Easysync ES-U-3001-M Unit with Data A & B cables to your Laptop/ PC/ Tablet using the USB connection cable.
    - Set to RS485 Half duplex by switching the white Dip Switches on the Easysync unit.
    - Settings: Up/Dn/Dn/Dn
    - Connect the Data A & B cables from the unit to ports 1 & 2 on the Easysync unit.

3.4.1.2 WB Positioner GUI.

Figure 3-3 GUI Layout

2. Press the “Select Com Port 1” drop down menu and select the Com Port the unit/ converter is connected to.
3. Press “UPDATE SETTINGS” for the unit to update all the necessary settings, the GUI will start updating the settings and this process should take approximately 30 seconds. Once the settings are updated all the boxes underneath the “UPDATE SETTINGS” and “Read Input Voltage” will go green.
4. If the sections do not go green as shown in figure 3-1 above, then swap the connection of Data cables A & B which are in port 1 & 2 on the Easysync unit.
5. Press “UPDATE PARAMS” which will update all the parameters set. Once all the parameters are updated all the boxes underneath the “UPDATE PARAMS” will go green.
6. To change the address of the unit, enter the address number within the box shown in the picture above marked as 4 and press “Set New Address” to save the setting onto the unit.
7. The current address will change to the one set however if the GUI is restarted the current address must be changed to the set address of the unit.
8. To change the baud rate of the unit, select the required Baud Rate from the “ChB Baud” section shown in figure 3-1.
9. To drive the unit using the GUI the Baud Rate from the dropdown menu “Select Baud Port1” must also be changed as per the set Baud rate on the unit.

3.5 Unstowing Accupoint Continuous Rotation

The customer must set preset position [2] before this function can be used.

To unstow the unit:

1. Power on the system.
2. Perform the pre-operation check (Section 3.1).
3. Press [2].
4. Press [Pre]. The unit will move to the preset unstowed position. As the unit nears the unstowed position, it will slow down. If an emergency stop is required as the unit is moving to position, move the joystick to cancel out the command. The system is unstowed and ready for use.

3.6 Stowing the Accupoint Continuous Rotation

The customer may desire to adjust preset position [1] before using this function.

To stow the unit:

1. Perform the pre-operation check (Section 3.1).
2. Press [1].
3. Press [Pre]. The unit will move to the preset stowed position. As the unit nears the stowed position, it will slow down. If an emergency stop is required as the unit is moving to position, move the joystick to cancel out the command. The system is stowed.
4. Power down the system.

3.7 Transportation

Before transporting the system, the system needs to be secured. Do not transport without the unit stowed and secured. It is the responsibility of the customer to properly secure the payload when transporting the system. These units are not rated for mobile applications hence extreme care must be taken.

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Section 4 Maintenance

This section describes maintenance of the system. Be sure to read and understanding the entire maintenance procedure before beginning maintenance.

4.1 Routine Maintenance

Maintain the unit as follows:

- Visually inspect to ensure the unit is kept clean.
- Visually inspect for damage. If damage is apparent, do not use the unit and have it serviced prior to use.
- Inspect to ensure all fixings and fastenings are tight. All fixings and fastenings must be thoroughly checked for tightness (1) month following installation, and thereafter at regular (6) month intervals.
- Inspect to ensure cables are undamaged and properly terminated. Cabling of the correct type as specified by national and local standards should be used. Cables should be checked for wear at (6) month intervals and replaced as necessary.
- Ensure no water can enter the unit particularly through the connectors. Water can cause extreme problems with the unit.

4.2 Replacement Parts

To order spare or replacement parts, refer to the part numbers list in Section 1.6.

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Section 5 Troubleshooting

This section describes troubleshooting of the system. Do not open the unit. Opening the unit will break the environmental seal and potentially cause improper stop limit settings. This will void the warranty. This troubleshooting guide assumes:

- Use of (1) unit, Accupoint Continuous Rotation Unit.
- Use of (1) default joystick controller (P/N: 5098901)

5.1 Troubleshooting Guide

This section covers troubleshooting as follows:

- Unit (Table 5-1)
- Controller (Table 5-2)

Table 5-1 Troubleshooting the Unit

Symptoms	Possible Cause	Remedy
Positioner Does Not Pan or Tilt		
Positioner does not pan or tilt in a single direction.	An electronic limit stop has been reached.	Reset the electronic limit stops (Section 3.3.5).
Positioner does not pan or tilt in multiple directions.	The system is not receiving power.	Check Wiring (Section 2.6)
	The power supply is wrong.	Check System Configuration (Section 2.6.2)
	The system is not receiving data	Check Wiring (Section 2.6) and controller setting
	System settings are incorrect.	Reset the factory defaults (See Joystick Controller Manual).
	The controller is in a menu.	Exit the menu.
	The system wiring is incorrect.	Check System Configuration (Section 2.6)
	Wires are broken or improperly terminated.	Check the wires and connections.
	The electronic limit stops have been set so that the positioner cannot move.	Reset the electronic limit stops (Section 2.7).
	The positioner is faulty.	Contact the factory.
Positioner Pans or Tilts Improperly		
Positioner pans or tilts in the wrong direction.	The positioner is faulty.	Contact the factory.

Table 5-2 Troubleshooting the Controller

Symptoms	Possible Cause	Remedy
Cannot Access the Controller Menu		
The operator cannot access the controller menu.	The controller is not receiving power and the display screen is off.	Power on the system.
		Check wiring of unit.
	The [Menu] button does not respond as quickly as other buttons.	Hold the [Menu] button down for at least (2) seconds.
Stuck in Controller Menu		
While in menu functions, the operator cannot exit a menu.	The method to exit individual menus varies.	Move the joystick to the left to back out of the menu.
		Press the [Prev] button to back out of the menu.
		Look for an <Exit menu> option. Select that option.
		Disconnect and reconnect power to the controller.
The Controller Display is Off		
The controller display is off.	The system is not receiving power.	Check wiring of unit.
	The power supply is wrong.	Check wiring of unit.
	The system wiring is incorrect.	Check wiring of unit.
	The controller is faulty.	Contact the factory.

5.2 Restoring Factory Defaults

The system is designed to function using the factory defaults shown in Figure 5-1. This settings will display when the controller is powered on. If these defaults are changed, the system may not function properly. There is no single key or command sequence to reset all factory settings.

CamID: 001	MonID: 001
Protocol:	Pelco-d
Baudrate:	2400

Figure 5-1 Start Up Screen

To reset these settings proceed as follows:

5.2.1 CamID

When the controller is powered on, the CamID will be displayed. The CamID should be 001. If necessary, reset the CamID to 001. To reset the CamID:

1. From the start up screen (Figure 5-1), press [1].
2. Press [Cam]. The CamID will change to 001. The setting is saved.

5.2.2 MonID

When the controller is powered on, the MonID will be displayed. The MonID should be 001. If necessary, reset the MonID to 001. To reset the MonID:

1. From the start up screen (Figure 5-1), press [1].
2. Press [Mon]. The MonID will change to 001. The setting is saved.

5.2.3 Protocol

When the controller is powered on, the protocol will be displayed. The protocol should be Pelco D. If necessary, reset the protocol to Pelco D. A quick guide to resetting the protocol can be found in Table 5-3.

Table 5-3 Resetting the Protocol

1. Keyboard setup 2. Dome setup **3. Protocol select** 4. Exit menu	1. Quad/DVR **2. Dome**	1. Factory 2. Pelco-p **3. Pelco-d** 4. DH-SD

To reset the protocol:

1. Press [Menu] for (2) seconds. The Menu screen will appear (Figure 5-2).

1. Keyboard setup
2. Dome setup
3. Protocol setup
4. Exit menu

Figure 5-2 Menu Screen

2. Navigate to <Protocol setup> and move the joystick to the right to go to the submenu. The Protocol setup screen will appear (Figure 5-3).

1. Quad/DVR
2. Dome

Figure 5-3 Protocol Setup Screen

3. Navigate to <Dome> and move the joystick to the right to go to the submenu. The Dome screen will appear (Figure 5-4).

1. Factory
2. Pelco-p
3. Pelco-d
4. DH-SD

Figure 5-4 Dome Screen

4. Navigate to <Pelco-d> and move the joystick to the right to select Pelco D as the protocol. <Success!> will briefly flash at the bottom of the LCD screen and the display will return to the Protocol setup screen (Figure 5-3). The setting is saved.

5.2.4 Baud Rate

When the controller is powered on, the baud rate will be displayed. The baud rate should be 2400 bps. If necessary, reset the baud rate to 2400. A quick guide to resetting the baud rate can be found in Table 5-4.

Table 5-4 Resetting the Baud Rate

1. Keyboard setup 2. Dome setup 3. Protocol select 4. Exit menu	1. Set KB ID(1-64): 2. Set baudrate: 2400 3. Joy-calibrate 4. About Keyboard	1. Set KB ID(1-64): 2. Set baudrate: 2400 3. Joy-calibrate 4. About Keyboard	Move the joystick down until the number beside <Set baudrate> reads 2400, then move the joystick right.

To reset the baud rate:

1. Press [Menu] for (2) seconds. The Menu screen will appear (Figure 5-2).
2. While remaining on <Keyboard setup>, move the joystick to the right to go to the submenu. The Keyboard setup screen (Figure 5-5) will appear. The number beside <2. Set baudrate:> may vary.

1. Set KB ID(1-64):
2. Set baudrate: 2400
3. Joy-calibrate
4. About Keyboard

Figure 5-5 Keyboard Setup Screen

3. Navigate to <Set baudrate> and move the joystick to the right. The screen will remain the same, but the number beside <2. Set baudrate:> will be selected.
4. Move the joystick forward or backward to adjust the baud rate.
5. Move the joystick to the right to save the baud rate. <Success!> will briefly flash at the bottom of the LCD screen and the display will return to the Menu screen (Figure 5-2). The setting is saved.

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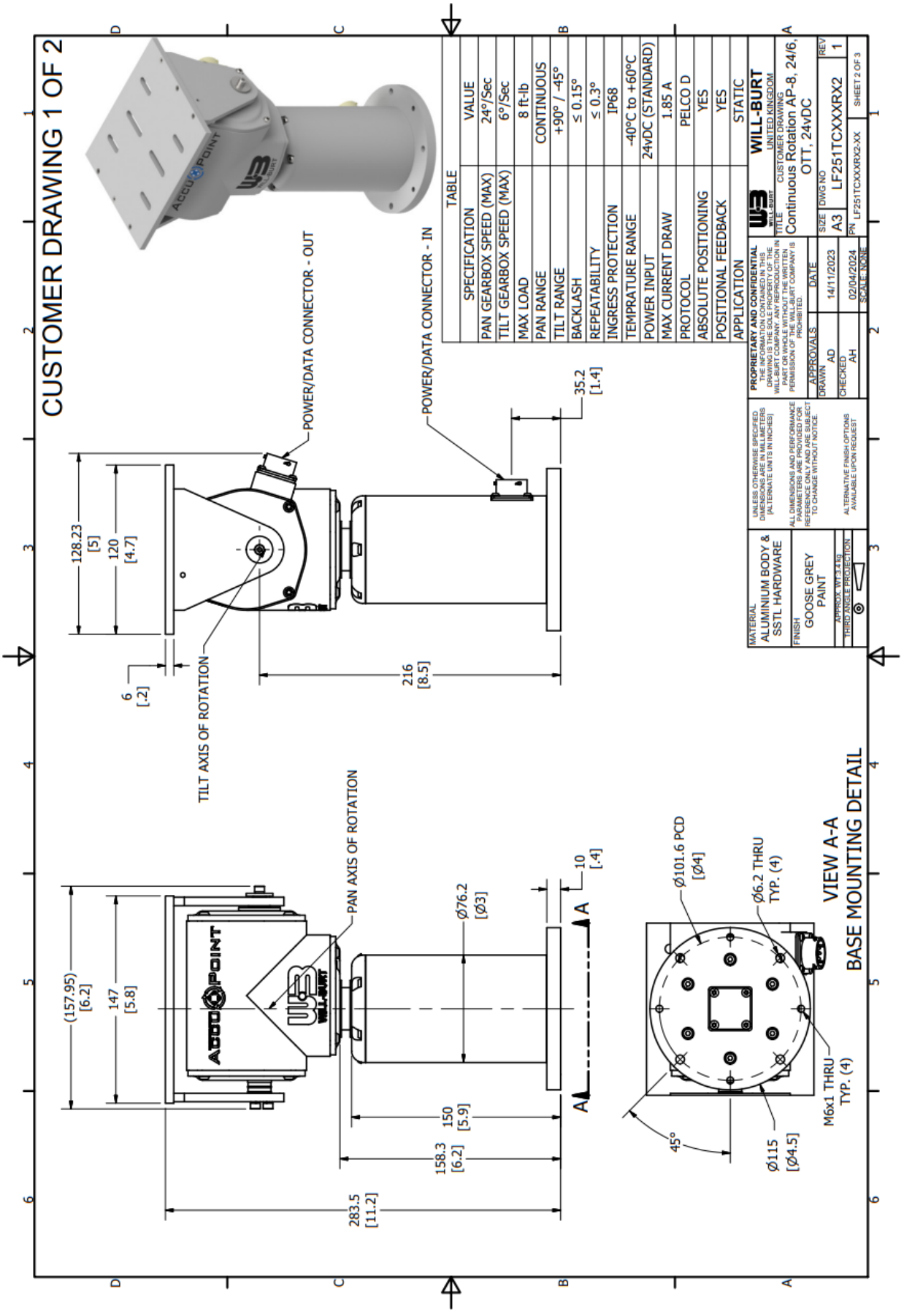
Section 6 Appendix

6.1 Supported Pelco D Commands

STANDARD COMMANDS	Op Code*	Hex Code	Decimal Code
STOP (Stop all Movement)	00	FF 01 00 00 00 00 01	255 001 000 000 000 000 001
Pan Right (Max. Speed)	02	FF 01 00 02 3F 00 42	255 001 000 002 063 000 066
Pan Left (Max. Speed)	04	FF 01 00 04 3F 00 44	255 001 000 004 063 000 068
Tilt Up (Max. Speed)	08	FF 01 00 08 00 3F 48	255 001 000 008 000 063 072
Tilt Down (Max. Speed)	10	FF 01 00 10 00 3F 50	255 001 000 016 000 063 080
Pan Right & Tilt Up (Max. Speed)	0A	FF 01 00 0A 3F 3F 89	255 001 000 010 063 063 137
Pan Right & Tilt Down (Max. Speed)	0C	FF 01 00 0C 3F 3F 8B	255 001 000 012 063 063 139
Pan Left & Tilt Up (Max. Speed)	12	FF 01 00 12 3F 3F 91	255 001 000 018 063 063 145
Pan Left & Tilt Down (Max. Speed)	14	FF 01 00 14 3F 3F 93	255 001 000 020 063 063 147
EXTENDED COMMANDS	**Op Code***	**Hex Code**	**Decimal Code**
Set Preset	03	FF 01 00 03 00 nn xx	255 001 000 003 000 nnn xxx
Clear Preset	05	FF 01 00 05 00 nn xx	255 001 000 005 000 nnn xxx
Go To Preset	07	FF 01 00 07 00 nn xx	255 001 000 007 000 nnn xxx
ADVANCED COMMANDS	**Op Code***	**Hex Code**	**Decimal Code**
Set Pan Position (Absolute Position – Pan)	4B	FF 01 00 4B mm ll xx	255 001 000 075 mmm lll xxx
Set Tilt Position (Absolute Position – Tilt)	4D	FF 01 00 4D mm ll xx	255 001 000 077 mmm lll xxx
Query Pan Position	51	FF 01 00 51 00 00 52	255 001 000 081 000 000 082
Query Pan Position Response	59	FF 01 00 59 mm ll xx	255 001 000 089 mmm lll xxx
Query Tilt Position	53	FF 01 00 53 00 00 54	255 001 000 083 000 000 084
Query Tilt Position Response	5B	FF 01 00 5B mm ll xx	255 001 000 091 mmm lll xxx
CUSTOM COMMANDS *This list is not exhaustive.	**Op Code***	**Hex Code**	**Decimal Code**
Query Movement Status	C1	FF 01 00 C1 00 00 C2	255 001 000 193 000 000 194
Query Movement Status Response [Go To Preset Active]	C3	FF 01 00 C3 00 10 D4	255 001 000 195 000 016 212
Query Movement Status Response [No Movement Sensed]	C3	FF 01 00 C3 00 00 C4	255 001 000 195 000 000 196
Query Movement Status Response [Up Limit Reached]	C3	FF 01 00 C3 00 01 C5	255 001 000 195 000 001 197
Query Movement Status Response [Down Limit Reached]	C3	FF 01 00 C3 00 02 C6	255 001 000 195 000 002 198
Query Movement Status Response [Left Limit Reached]	C3	FF 01 00 C3 00 08 CC	255 001 000 195 000 008 204
Query Movement Status Response [Right Limit Reached]	C3	FF 01 00 C3 00 04 C8	255 001 000 195 000 004 200
Query Movement Status Response [Up & Right Limit Reached]	C3	FF 01 00 C3 00 05 C9	255 001 000 195 000 005 201
Query Movement Status Response [Up & Left Limit Reached]	C3	FF 01 00 C3 00 09 CD	255 001 000 195 000 009 205
Query Movement Status Response [Down & Right Limit Reached]	C3	FF 01 00 C3 00 06 CA	255 001 000 195 000 006 202
Query Movement Status Response [Down & Left Limit Reached]	C3	FF 01 00 C3 00 0A CE	255 001 000 195 000 010 206
CUSTOM PRESETS (USER DEFINED LIMITS ... Set Preset Op)	**Op Code***	**Hex Code**	**Decimal Code**
Preset 70 Restore Default Left Limit	03	FF 01 00 03 00 46 4A	255 001 000 003 000 070 074
Preset 71 Restore Default Right Limit	03	FF 01 00 03 00 47 4B	255 001 000 003 000 071 075
Preset 72 Restore Default Up Limit	03	FF 01 00 03 00 48 4C	255 001 000 003 000 072 076
Preset 73 Restore Default Down Limit	03	FF 01 00 03 00 49 4D	255 001 000 003 000 073 077
Preset 80 Store New Left Limit	03	FF 01 00 03 00 50 54	255 001 000 003 000 080 084
Preset 81 Store New Right Limit	03	FF 01 00 03 00 51 55	255 001 000 003 000 081 085
Preset 82 Store New Up Limit	03	FF 01 00 03 00 52 56	255 001 000 003 000 082 086
Preset 83 Store New Down Limit	03	FF 01 00 03 00 53 57	255 001 000 003 000 083 087

6.2 Drawings


CUSTOMER DRAWING 1 OF 2
TABLE
SPECIFICATION | VALUE
PAN GEARBOX SPEED (MAX) | 24°/Sec
TILT GEARBOX SPEED (MAX) | 6°/Sec
MAX LOAD | 8 ft-lb
PAN RANGE | CONTINUOUS
TILT RANGE | +90° / -45°
BACKLASH | ≤ 0.15°
REPEATABILITY | ≤ 0.3°
INGRESS PROTECTION | IP68
TEMPRATURE RANGE | -40°C to +60°C
POWER INPUT | 24vDC (STANDARD)
MAX CURRENT DRAW | 1.85 A
PROTOCOL | PELCO D
ABSOLUTE POSITIONING | YES
POSITIONAL FEEDBACK | YES
APPLICATION | STATIC
POWER/DATA CONNECTOR - OUT
POWER/DATA CONNECTOR - IN
TILT AXIS OF ROTATION
PAN AXIS OF ROTATION
VIEW A-A
BASE MOUNTING DETAIL
Ø101.6 PCD [Ø4]
Ø6.2 THRU TYP. (4)
M6x1 THRU TYP. (4)
Ø115 [Ø4.5]
45°
Ø76.2 [Ø3]
128.23 [5]
120 [4.7]
6 [.2]
216 [8.5]
35.2 [1.4]
(157.95) [6.2]
147 [5.8]
150 [5.9]
158.3 [6.2]
283.5 [11.2]
10 [.4]
MATERIAL
ALUMINIUM BODY & SSTL HARDWARE
FINISH
GOOSE GREY PAINT
APPROX. WT 3.4 kg
THIRD ANGLE PROJECTION
PROPRIETARY AND CONFIDENTIAL
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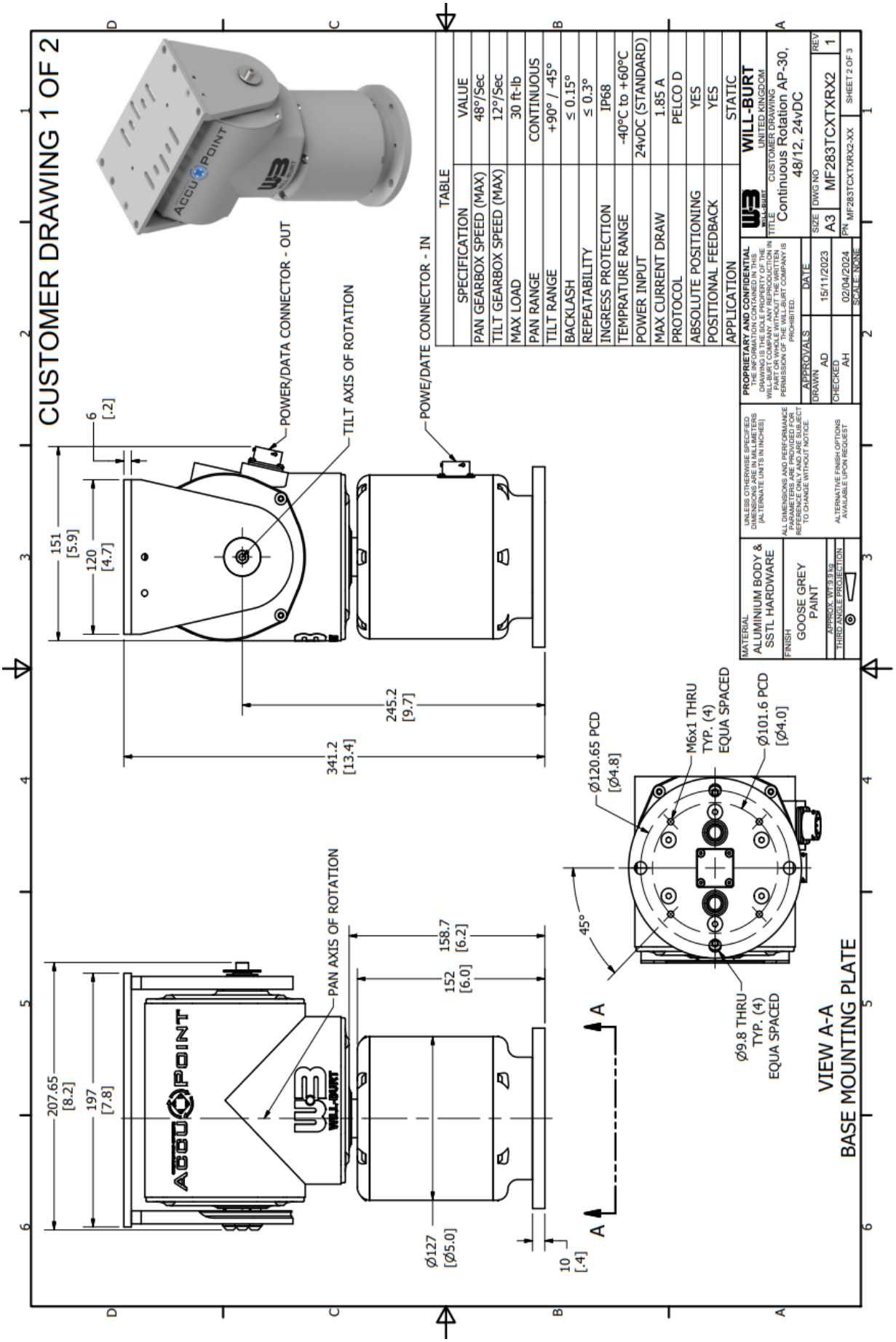
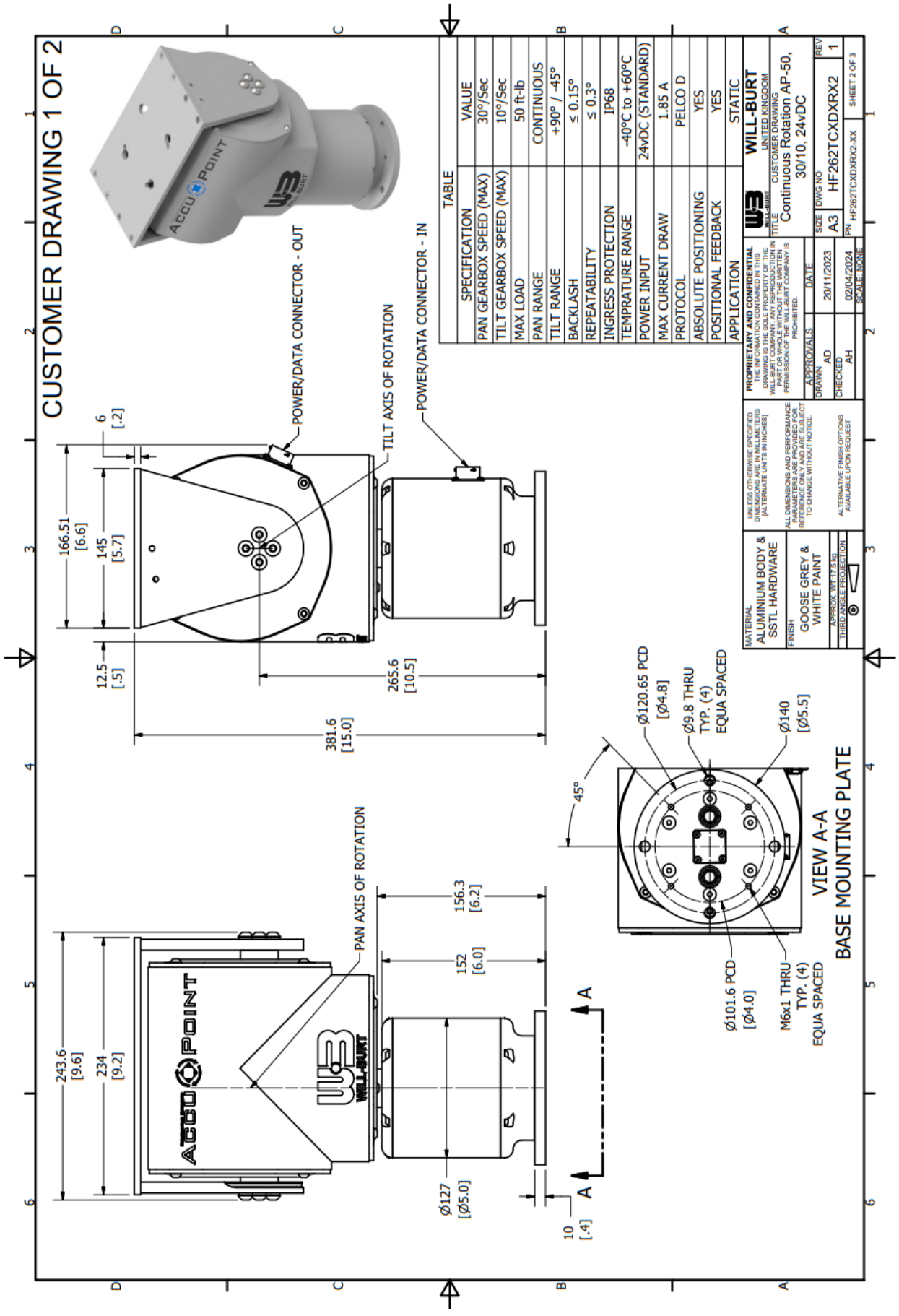
ALL DIMENSIONS AND PERFORMANCE PARAMETERS ARE NOMINAL AND ARE SUBJECT TO CHANGE WITHOUT NOTICE.
ALTERNATIVE FINISH OPTIONS AVAILABLE UPON REQUEST
APPROVALS
DRAWN AD 14/11/2023
CHECKED AH 02/04/2024
SCALE: NONE
WILL-BURT
UNITED KINGDOM
CUSTOMER DRAWING
TITLE
Continuous Rotation AP-8, 24/6, OTT, 24vDC
SIZE A3
DWG NO LF251TCXXXRX2
REV 1
PN LF251TCXXXRX2-XX
SHEET 2 OF 3


CUSTOMER DRAWING 1 OF 2
POWER/DATA CONNECTOR - OUT
TILT AXIS OF ROTATION
POWE/DATE CONNECTOR - IN
PAN AXIS OF ROTATION
VIEW A-A
BASE MOUNTING PLATE
TABLE
SPECIFICATION | VALUE
PAN GEARBOX SPEED (MAX) | 48°/Sec
TILT GEARBOX SPEED (MAX) | 12°/Sec
MAX LOAD | 30 ft-lb
PAN RANGE | CONTINUOUS
TILT RANGE | +90° / -45°
BACKLASH | ≤ 0.15°
REPEATABILITY | ≤ 0.3°
INGRESS PROTECTION | IP68
TEMPRATURE RANGE | -40°C to +60°C
POWER INPUT | 24vDC (STANDARD)
MAX CURRENT DRAW | 1.85 A
PROTOCOL | PELCO D
ABSOLUTE POSITIONING | YES
POSITIONAL FEEDBACK | YES
APPLICATION | STATIC
WILL-BURT
UNITED KINGDOM
CUSTOMER DRAWING
Continuous Rotation AP-30, 48/12, 24vDC
DWG NO MF283TCXTXRX2
REV 1
SIZE A3
PN MF283TCXTXRX2-XX
SHEET 2 OF 3
SCALE NONE
PROPRIETARY AND CONFIDENTIAL
APPROVALS
DRAWN AD 15/11/2023
CHECKED AH 02/04/2024
MATERIAL ALUMINIUM BODY & SSTL HARDWARE
FINISH GOOSE GREY PAINT
ALTERNATIVE FINISH OPTIONS AVAILABLE UPON REQUEST
THIRD ANGLE PROJECTION
APPROX WT 9.0 kg
151 [5.9]
120 [4.7]
6 [.2]
341.2 [13.4]
245.2 [9.7]
207.65 [8.2]
197 [7.8]
158.7 [6.2]
152 [6.0]
Ø127 [Ø5.0]
10 [.4]
Ø120.65 PCD [Ø4.8]
M6x1 THRU TYP. (4) EQUA SPACED
Ø101.6 PCD [Ø4.0]
45°
Ø9.8 THRU TYP. (4) EQUA SPACED


CUSTOMER DRAWING 1 OF 2
TABLE
SPECIFICATION | VALUE
PAN GEARBOX SPEED (MAX) | 30°/Sec
TILT GEARBOX SPEED (MAX) | 10°/Sec
MAX LOAD | 50 ft-lb
PAN RANGE | CONTINUOUS
TILT RANGE | +90° / -45°
BACKLASH | ≤ 0.15°
REPEATABILITY | ≤ 0.3°
INGRESS PROTECTION | IP68
TEMPRATURE RANGE | -40°C to +60°C
POWER INPUT | 24vDC (STANDARD)
MAX CURRENT DRAW | 1.85 A
PROTOCOL | PELCO D
ABSOLUTE POSITIONING | YES
POSITIONAL FEEDBACK | YES
APPLICATION | STATIC
POWER/DATA CONNECTOR - OUT
TILT AXIS OF ROTATION
POWER/DATA CONNECTOR - IN
PAN AXIS OF ROTATION
166.51 [6.6]
145 [5.7]
6 [.2]
12.5 [.5]
265.6 [10.5]
381.6 [15.0]
243.6 [9.6]
234 [9.2]
156.3 [6.2]
152 [6.0]
Ø127 [Ø5.0]
10 [.4]
A
A
45°
Ø120.65 PCD [Ø4.8]
Ø9.8 THRU TYP. (4) EQUA SPACED
Ø140 [Ø5.5]
Ø101.6 PCD [Ø4.0]
M6x1 THRU TYP. (4) EQUA SPACED
VIEW A-A
BASE MOUNTING PLATE
PROPRIETARY AND CONFIDENTIAL
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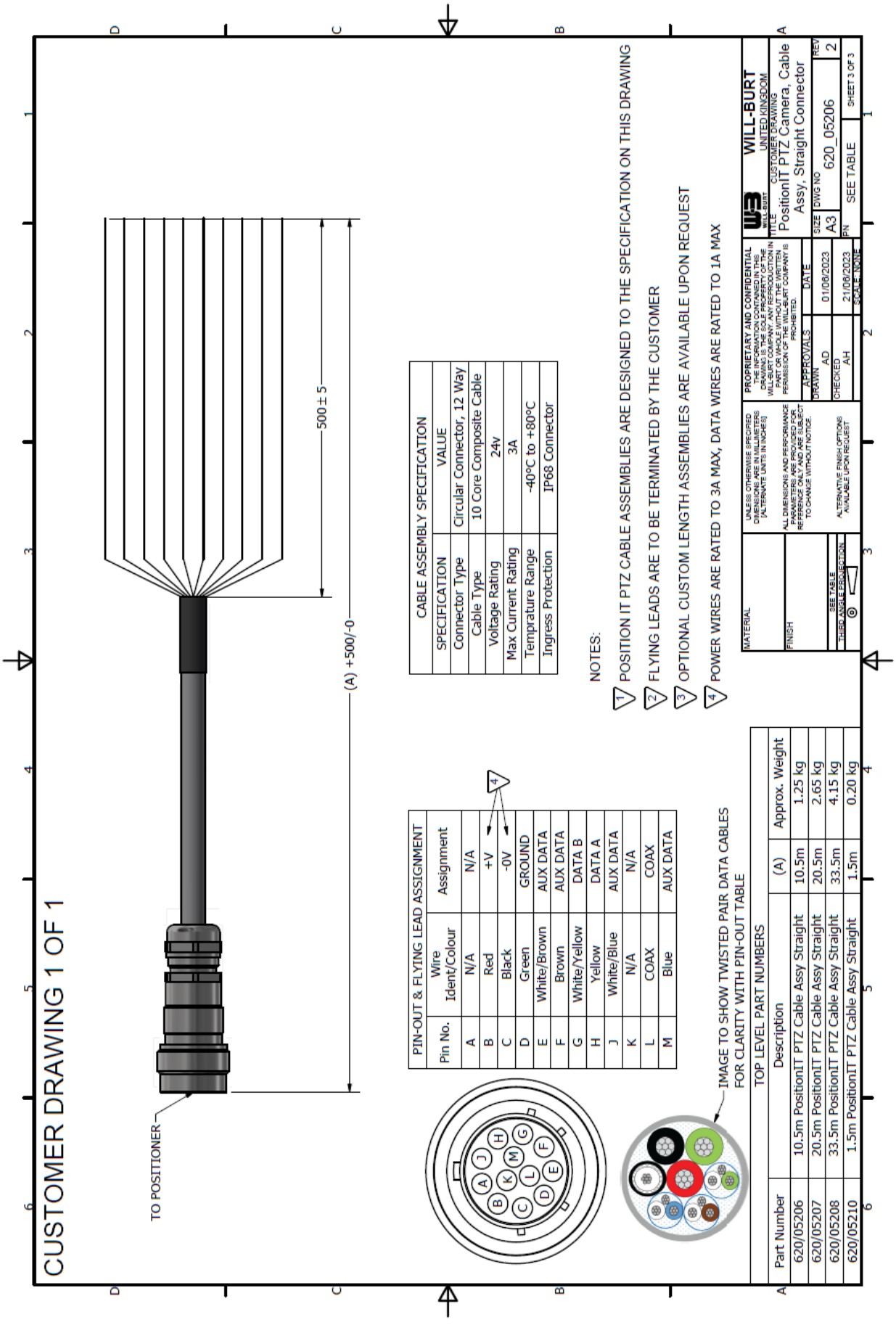
ALL DIMENSIONS AND PERFORMANCE PARAMETERS ARE NOMINAL FOR REFERENCE ONLY AND ARE SUBJECT TO CHANGE WITHOUT NOTICE.
ALTERNATIVE FINISH OPTIONS AVAILABLE UPON REQUEST
APPROVALS | DATE
DRAWN AD | 20/11/2023
CHECKED AH | 02/04/2024
SCALE: NONE
MATERIAL: ALUMINIUM BODY & SSTL HARDWARE
FINISH: GOOSE GREY & WHITE PAINT
APPROX. WT: 17.5 kg
THIRD ANGLE PROJECTION
WILL-BURT
UNITED KINGDOM
CUSTOMER DRAWING
TITLE: Continuous Rotation AP-50, 30/10, 24vDC
SIZE: A3
DWG NO: HF262TCXDXRX2
REV: 1
PN: HF262TCXDXRX2-XX
SHEET 2 OF 3


CUSTOMER DRAWING 1 OF 1
TO POSITIONER
500 ± 5
(A) +500/-0
CABLE ASSEMBLY SPECIFICATION
SPECIFICATION | VALUE
Connector Type | Circular Connector, 12 Way
Cable Type | 10 Core Composite Cable
Voltage Rating | 24v
Max Current Rating | 3A
Temprature Range | -40°C to +80°C
Ingress Protection | IP68 Connector
NOTES:
1 POSITION IT PTZ CABLE ASSEMBLIES ARE DESIGNED TO THE SPECIFICATION ON THIS DRAWING
2 FLYING LEADS ARE TO BE TERMINATED BY THE CUSTOMER
3 OPTIONAL CUSTOM LENGTH ASSEMBLIES ARE AVAILABLE UPON REQUEST
4 POWER WIRES ARE RATED TO 3A MAX, DATA WIRES ARE RATED TO 1A MAX
PIN-OUT & FLYING LEAD ASSIGNMENT
Pin No. | Wire Ident/Colour | Assignment
A | N/A | N/A
B | Red | +V
C | Black | -0V
D | Green | GROUND
E | White/Brown | AUX DATA
F | Brown | AUX DATA
G | White/Yellow | DATA B
H | Yellow | DATA A
J | White/Blue | AUX DATA
K | N/A | N/A
L | COAX | COAX
M | Blue | AUX DATA
IMAGE TO SHOW TWISTED PAIR DATA CABLES FOR CLARITY WITH PIN-OUT TABLE
TOP LEVEL PART NUMBERS
Part Number | Description | (A) | Approx. Weight
620/05206 | 10.5m PositionIT PTZ Cable Assy Straight | 10.5m | 1.25 kg
620/05207 | 20.5m PositionIT PTZ Cable Assy Straight | 20.5m | 2.65 kg
620/05208 | 33.5m PositionIT PTZ Cable Assy Straight | 33.5m | 4.15 kg
620/05210 | 1.5m PositionIT PTZ Cable Assy Straight | 1.5m | 0.20 kg
MATERIAL
FINISH
SEE TABLE
THIRD ANGLE PROJECTION
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS [ALTERNATE UNITS IN INCHES]
ALL DIMENSIONS AND PERFORMANCE PARAMETERS ARE SUBJECT TO REFERENCE ONLY AND ARE SUBJECT TO CHANGE WITHOUT NOTICE.
ALTERNATIVE FINISH OPTIONS AVAILABLE UPON REQUEST
PROPRIETARY AND CONFIDENTIAL
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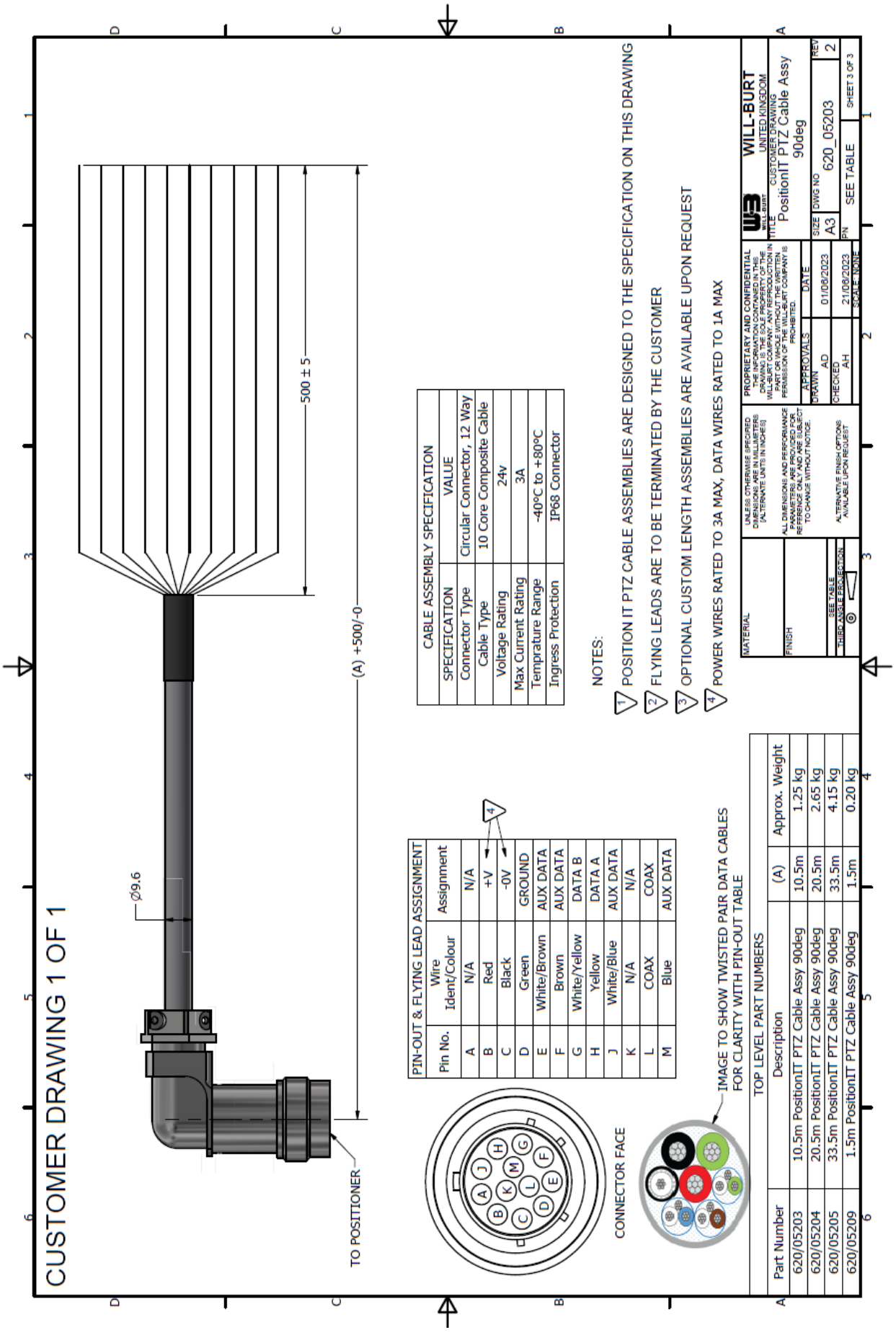
APPROVALS | DATE
DRAWN AD | 01/06/2023
CHECKED AH | 21/06/2023
SCALE NONE
WILL-BURT
UNITED KINGDOM
TITLE CUSTOMER DRAWING
PositionIT PTZ Camera, Cable Assy, Straight Connector
SIZE A3 | DWG NO 620_05206 | REV 2
SHEET 3 OF 3


CUSTOMER DRAWING 1 OF 1
Ø9.6
500 ± 5
(A) +500/-0
TO POSITIONER
CONNECTOR FACE
IMAGE TO SHOW TWISTED PAIR DATA CABLES FOR CLARITY WITH PIN-OUT TABLE
CABLE ASSEMBLY SPECIFICATION
SPECIFICATION | VALUE
Connector Type | Circular Connector, 12 Way
Cable Type | 10 Core Composite Cable
Voltage Rating | 24v
Max Current Rating | 3A
Temprature Range | -40°C to +80°C
Ingress Protection | IP68 Connector
PIN-OUT & FLYING LEAD ASSIGNMENT
Pin No. | Wire Ident/Colour | Assignment
A | N/A | N/A
B | Red | +V
C | Black | -0V
D | Green | GROUND
E | White/Brown | AUX DATA
F | Brown | AUX DATA
G | White/Yellow | DATA B
H | Yellow | DATA A
J | White/Blue | AUX DATA
K | N/A | N/A
L | COAX | COAX
M | Blue | AUX DATA
NOTES:
1 POSITION IT PTZ CABLE ASSEMBLIES ARE DESIGNED TO THE SPECIFICATION ON THIS DRAWING
2 FLYING LEADS ARE TO BE TERMINATED BY THE CUSTOMER
3 OPTIONAL CUSTOM LENGTH ASSEMBLIES ARE AVAILABLE UPON REQUEST
4 POWER WIRES RATED TO 3A MAX, DATA WIRES RATED TO 1A MAX
TOP LEVEL PART NUMBERS
Part Number | Description | (A) | Approx. Weight
620/05203 | 10.5m PositionIT PTZ Cable Assy 90deg | 10.5m | 1.25 kg
620/05204 | 20.5m PositionIT PTZ Cable Assy 90deg | 20.5m | 2.65 kg
620/05205 | 33.5m PositionIT PTZ Cable Assy 90deg | 33.5m | 4.15 kg
620/05209 | 1.5m PositionIT PTZ Cable Assy 90deg | 1.5m | 0.20 kg
WILL-BURT
UNITED KINGDOM
CUSTOMER DRAWING
PositionIT PTZ Cable Assy 90deg
DWG NO 620_05203
REV 2
SIZE A3
SEE TABLE
SHEET 3 OF 3
PROPRIETARY AND CONFIDENTIAL
APPROVALS
DRAWN AD 01/08/2023
CHECKED AH 21/08/2023
SCALE: NONE