HUMPHREE®

INSTALLATION MANUAL

INTERCEPTOR SYSTEM

For software versions 5.1.x

HCS-5

FOREWORDS

Congratulations on your choice of the Humphree Interceptor System.

Humphree's Interceptor Systems provide effective solutions to enhance your vessels performance in both calm and rough water. Depending on configuration, Humphree's Interceptor Systems can provide the following benefits and features:

- Reduced resistance at hump speed
- Reduced wave making and wash
- Increased speed and vessel range
- Easy adaptation to your specific hull shape
- Protected inboard electric servo actuators
- No environmental pollution from oil
- Composite materials eliminating corrosion
- Operator control of running trim and list
- Automatic trim control
- Automatic list control
- Heel control when turning with coordinated turn
- Active damping of pitch and roll motions
- Auxiliary steering using vertical Interceptors
- Remote control or monitoring from external system

For more information, see www.humphree.com

Contents

SAFETY INFORMATION

Installation procedures performed incorrectly could lead to personal injury, damage to the Humphree Interceptor System or damage to other property.

Please read the installation manual carefully before starting to install the Humphree Interceptor system and pay extra attention to the safety information.

Safety information in this manual is presented in the way shown and explained below.

WARNING!

Failure to pay attention to a warning or follow any instructions included in the warning could lead to personal injury or death.

IMPORTANT!

Failure to pay attention to important information or follow an important instruction could lead to damage or malfunction of the Humphree Interceptor System or other property.

NOTE!

A note contains information that will facilitate the work during the installation of the Humphree Interceptor System.

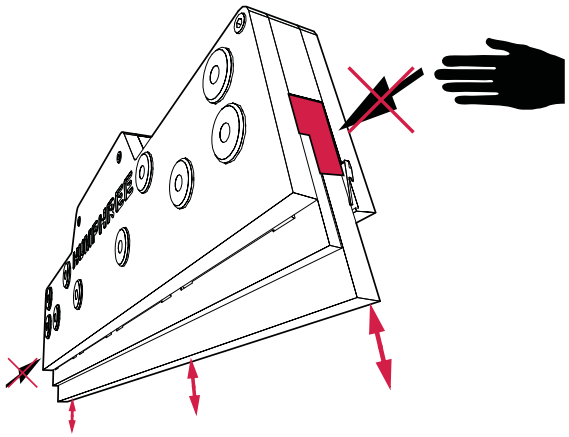
General safety information

WARNING!

When installing the Humphree Interceptor System make sure that there is no current connected to the system. (Isolate shore current to the engine block, battery charger or accessories mounted on the engine.)

WARNING!

Sharp edges, watch your fingers.

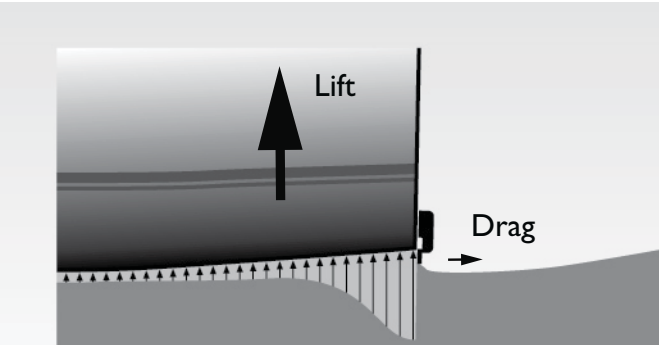


IMPORTANT NOTICES

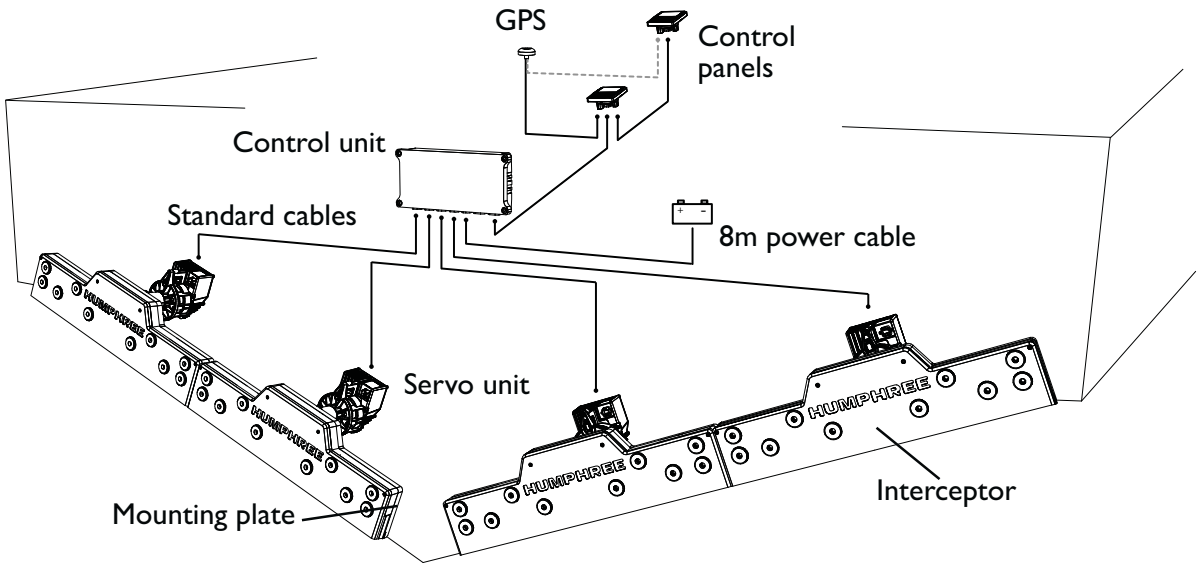
- This manual is for Humphree service workshops, ship-builders, machine manufacturers and other authorized workshops which have personnel with qualified professional training. The installation instructions are only for professionals. Humphree will not assume any liability whatsoever for damage incurred, either damage to materials or personal injury, which may result if the installation instructions are not followed or if the work is carried out by non-professional personnel.
- The information in this document is the property of Humphree and may not be copied or communicated to a third party, or used for any purpose other than that for which it is supplied, without the express written consent of Humphree. This information is given in good faith based upon the latest information available to Humphree, no warranty or representation is given concerning such information, which must not be taken as establishing any contractual or other commitment binding upon Humphree or any of it subsidiary or associated companies.
- If this manual is lost or worn, see www.humphree.com or contact your local Humphree dealer.
- The contents of this manual and equipment specifications are subject to change without notice.
- All illustrations in this manual are schematically correct but may not be exact copies of the corresponding equipment on your vessel.
- The screens shown in this manual may not match in detail the screens you see on the display. The screens you see depends on software versions, system configuration and system settings.
- Humphree will assume no responsibility for damage caused by improper use or modification of the Interceptor system parts, or claims of loss of profit by a third party.
- The Interceptor system is protected by patent.
- Inspect the parts at arrival for damage occurred during transportation.

THE INTERCEPTOR WORKING PRINCIPLE

The fundamental working principle of an Interceptor is to generate an increase in pressure on the hull bottom plate directly ahead of the transom by intercepting the flow with a blade. The blade only has to extend a few millimetres below the transom edge to substantially raise the pressure over a large area. This results in a high hydrodynamic lift while the smallness of the projected blade, despite being subject to high pressure, results in low hydrodynamic drag. Provided the Interceptor spans across or nearly across the full width of the transom, the lift-drag ratio of the Interceptor is superior to any other transom-mounted lifting device. This makes it a most suitable device for providing forces to optimise running trim and actively dampen vessel motion.



GENERAL SYSTEM OVERVIEW



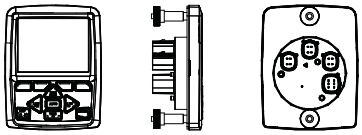
Example of a general system.

SYSTEM COMPONENTS

The Humphree Interceptor System includes one or several control panels, one or several control units, Interceptors, servo units, cables for the complete system, mounting plates (optional), special tools for installing, installation manual, setup manual and operator's manual.

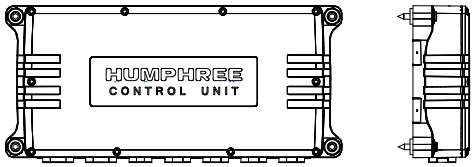
Details of the basic system components are located in the APPENDIX of this installation manual.

Control panel (CP)

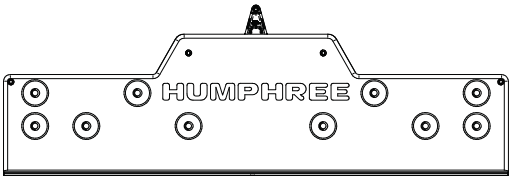


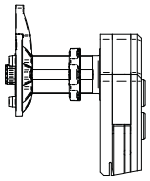
GPS Antenna

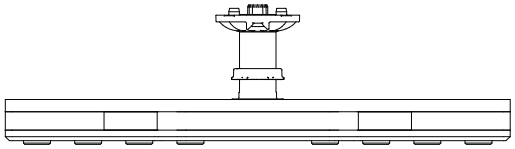
Control unit (HCU/RCU)



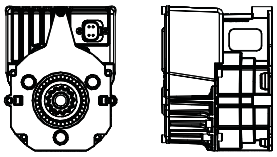
Interceptor (H, HA, HE)



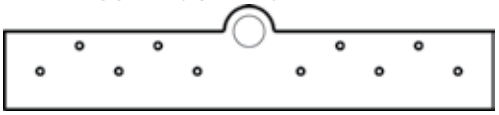




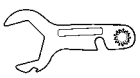
Servo unit (SU)



Mounting plate (optional)



Humphree wrench tool (70mm / shaft fit)



Humphree torque adapter tool (36mm /shaft fit)

INSTALLATION **WITHOUT** MOUNTING PLATE

Installation planning

Preparations for Interceptor models Standard (H), Asymmetric (HA) and Extended (HE).

NOTE!

If an installation drawing has been obtained from Humphree see this for guidance.

Special tools needed for installation

Hexagon wrenches (allen keys) 4, 5 and 6 mm

Humphree wrench (included) (70mm / shaft fit)

Humphree torque adapter (included) (36mm / shaft fit)

Socket 36mm

Torque wrench

Hole saw Ø60 (Interceptor shaft) and Ø80mm (control panel)

Spring scale (for torque measurement)

Loctite 243

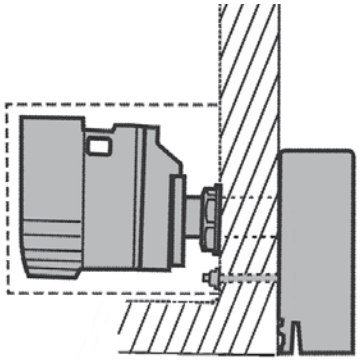
Marine sealant (sikaflex 291)

Torx T25, T30, T35

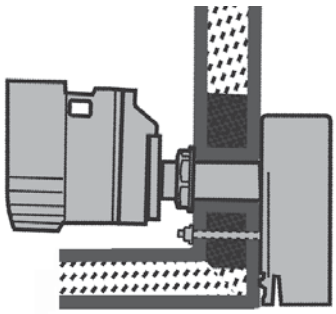
Screw driver PZ2

Attachment area general requirements

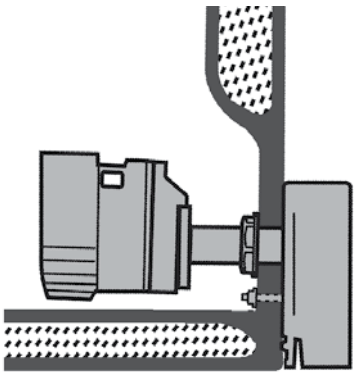
Make sure to install the Interceptors and servo units with enough space for service and maintenance.



Reinforce the area for the mounting holes and the shaft hole if the hull has a sandwich core.



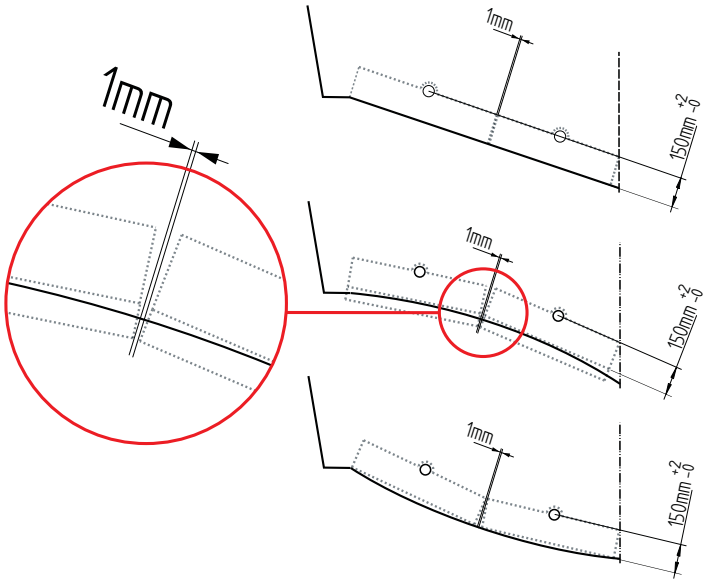
Hull showing an internal recess.



NOTE!

The Interceptor extends a blade which intercepts the flow of water. This water interception creates a pressure on the hull. It is important that this pressure does not escape between the Interceptor and hull. For best performance the bottom edge of the Interceptor should be flush with the hull and no gaps or recesses should be in front of the extending blade.

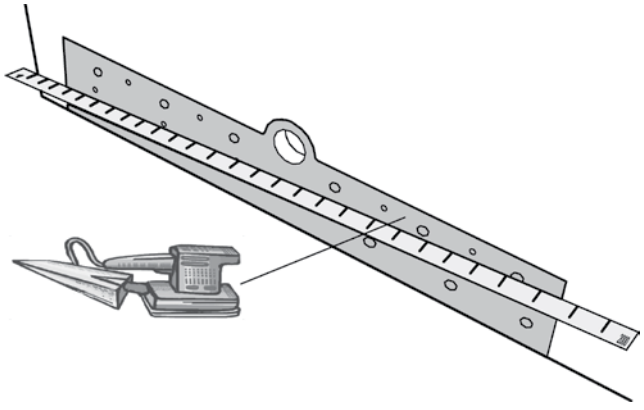
Define the Interceptor position and install the Interceptor flush to the hull bottom edge.



IMPORTANT!
The Interceptor blades must not hit each other when deployed.

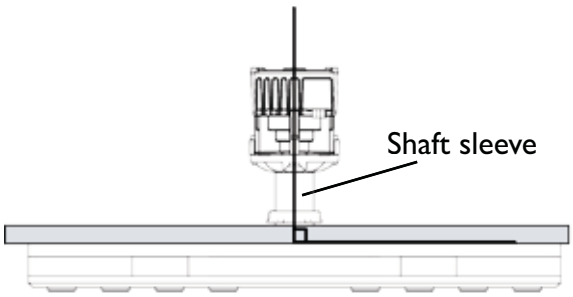
Make sure to place the Interceptors as close to each other as possible, but not closer than 1 mm.

Prepare the transom surface to be flat creating a planarity within 1mm.



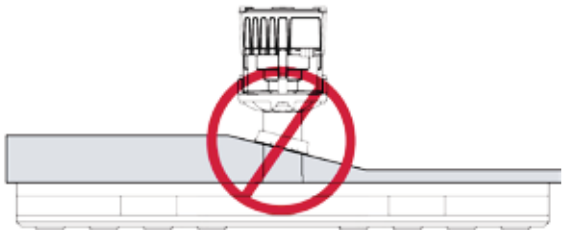
IMPORTANT!
If the planarity is not within 1mm the Interceptor may have a higher torque. (Max 12Nm)

Make sure that the shaft sleeve can be installed 90° to the Interceptor mounting surface.



If the inside surface has an angle, a spacer (plastic or aluminium) must be produced to provide a parallel surface. This spacer must be secured to the transom so that it will not move or glide when the shaft sleeve nut is tightened.

Check that the shaft sleeve does not bend during the installation.



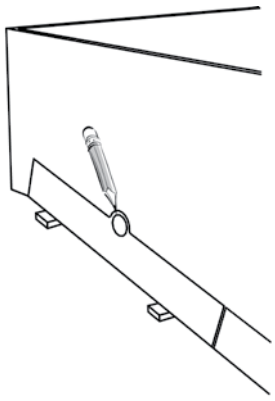
Pre-Interceptor installation

Before installation verify that the Interceptor is free to move by turning the shaft with the included Humphree wrench.

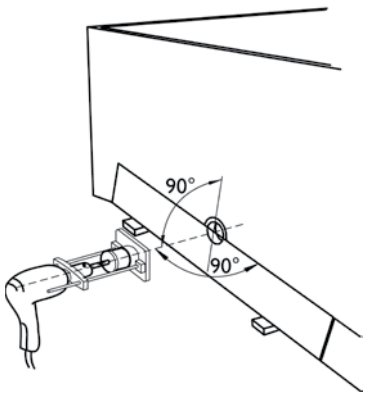
The transom surface should be made flat as described in chapter Installation Planning.

Mark the position of the Ø60 hole.

Drill a pilot hole first.



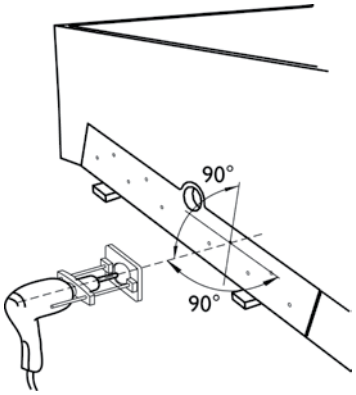
Drill a Ø60 hole with a hole saw for the shaft perpendicular to the transom.



IMPORTANT!
If the shaft is not perpendicular to the transom the Interceptor can malfunction.

Insert the shaft sleeve into the shaft hole and position the Interceptor in line with the hull bottom. Then mark the transom where the passing bolts are.

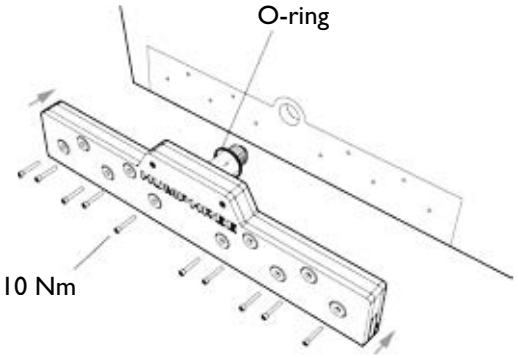
Remove the Interceptor and drill the holes using a 9mm drill. Drill the holes perpendicular to the transom.



Make sure the area on the hull where the O-ring will be located is flat and smooth without skratches.

Find a suitable length M8 A4 (AISI 316) stainless steel bolt to secure the Interceptor to the hull. Use a large M8 washer and a nylock M8 stainless steel nut on the inside.

Pre-install the Interceptors and check the torque.



Position the shaft sleeve's O-ring in its groove and keep it in position.

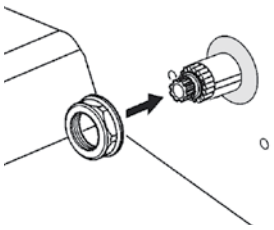
Insert the shaft sleeve through the Ø60 hole and temporary install the M8 bolts for centering / supporting the Interceptor.

NOTE!

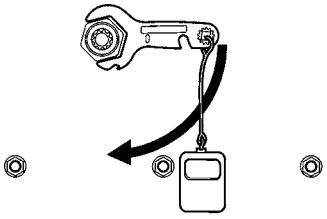
During the pre-installation do not apply thread locker (Loctite 243) to the M8 bolts.

Tighten the M8 bolts to 10 Nm.

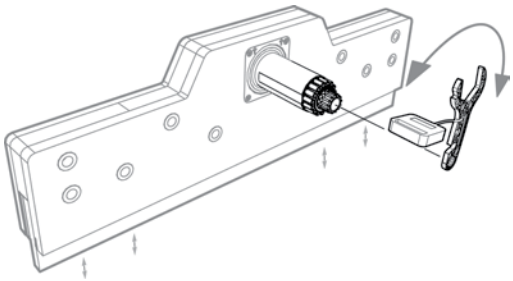
Pre-install the shaft sleeve nut.



Tighten the shaft sleeve nut to 16 Nm (9 kg with a spring scale and a Humphree wrench).



Check the shaft torque.

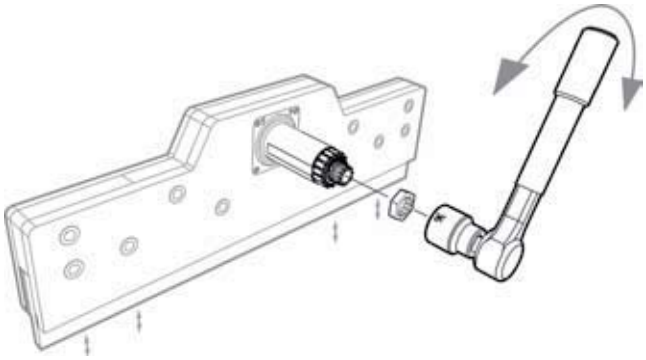


IMPORTANT!

Do not proceed with the installation if the shaft torque exceeds 12Nm. Repeat from chapter Installation planning until the torque is below 12Nm.

Use the Humphree wrench and a spring scale to check the operational torque.

Alternativly push the Humphree torque adapter onto the shaft and use a torque wrench with a socket size 36, to check the torque of the shaft.



If the shaft torque is below 12Nm after the pre-installation then proceed.

Final installation of the Interceptor

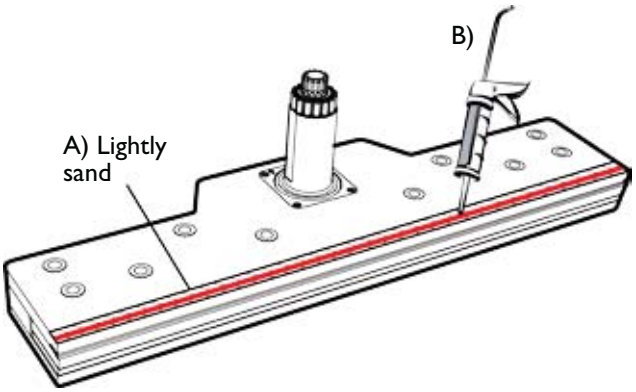
Remove the Interceptor.

Clean all surfaces properly with soaped water!

IMPORTANT!

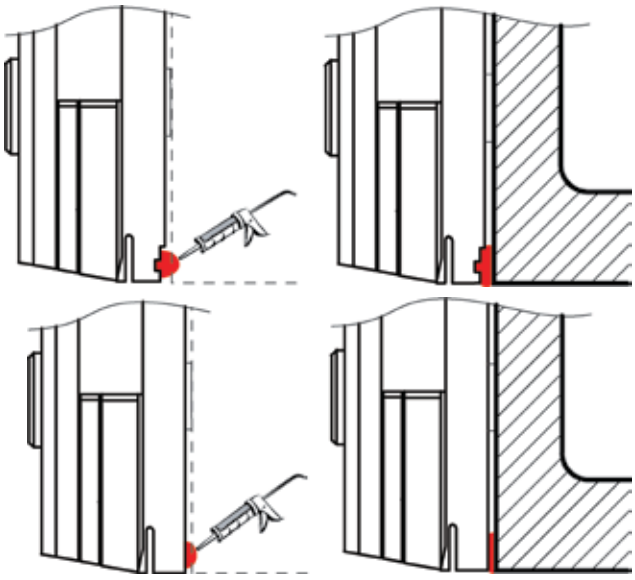
Do not clean the Humphree parts with acid or strong detergents. This will effect the strenght and lifetime of the composites and could cause a future malfunction of the system.

A) Lightly sand the lower edge of the Interceptor, on the surface facing the transom, and the corresponding opposite area of the hull in order to improve the adhesion of the sealant.



B) Apply marine sealant (sikaflex 291) to the lower edge of the Interceptor. See side view on next page.

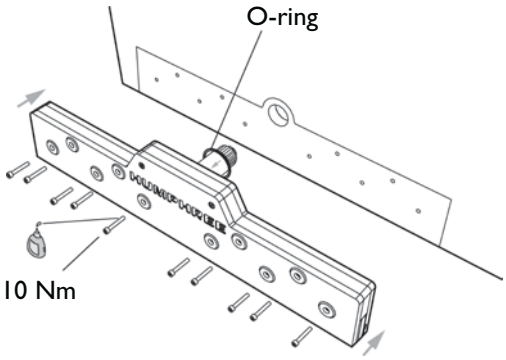
Pre-milled groove for sealant.



Gap between the Interceptor and hull.

The lower edge gap between the Interceptor and hull must be sealed to achieve max water pressure when the blade extends.

Insert the shaft sleeve and make sure the O-ring is in position. Apply a layer of marine grease in order to keep it in position.



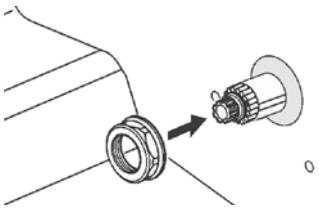
Apply thread locker (Locktite 243) to the M8 Interceptor mounting bolts.

Check the Interceptor position.

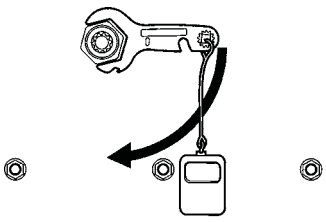
Verify that the lower edge of the Interceptor is flush with the hull bottom.

Tighten the M8 bolts to 10 Nm to install the Interceptor.

Install the shaft sleeve nut.

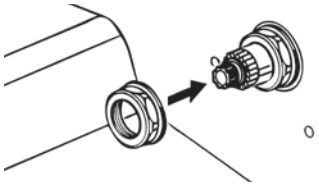


Tighten the shaft sleeve nut to 16 Nm (9 kg with a spring scale and a Humphree wrench).

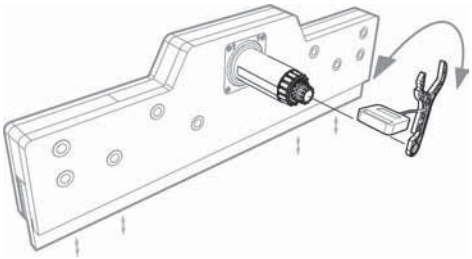


Install the second shaft sleeve nut and tighten it to lock the first nut.

If space is limited and does not allow the second nut, lock the first nut with sealant instead.



Final shaft torque check.

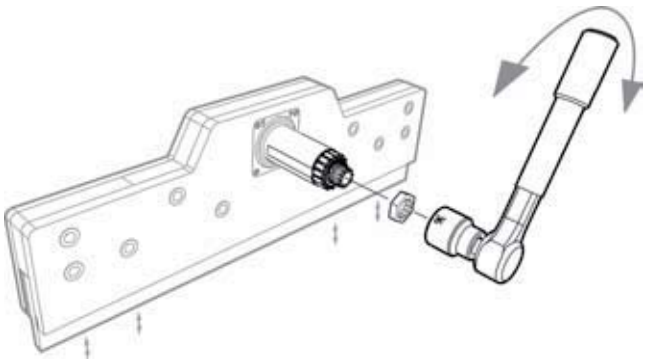


IMPORTANT!

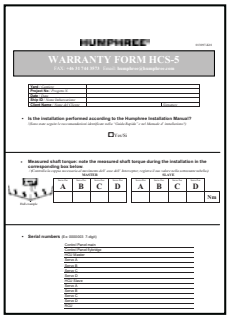
Do not proceed with the installation if the torque exceeds 12Nm. Repeat from chapter Installation planning until the torque is below 12Nm.

Use the Humphree wrench and a spring scale to check the operational torque.

Alternativly push the Humphree torque adapter onto the shaft and use a torque wrench with a socket size 36, to check the torque of the shaft.



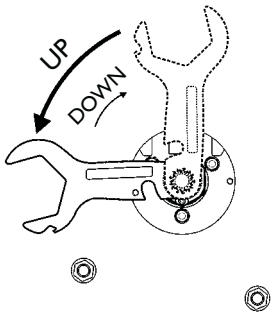
Note the measured torque in the WARRANTY FORM located in the installation kit.


HUMPHREE®

WARRANTY FORM HCS-5

	A	B	C	D	A	B	C	D	Nm

Place the Humphree key on the shaft. Rotate the key counter clockwise until it stops to retract the blade.



Retract the blade fully.

Proceed to Engine Room Installation.

INSTALLATION **WITH** MOUNTING PLATE

Installation planning

Preparations for Humphree mounting plates and Interceptor models Standard (H), Asymmetric (HA) and Extended (HE).

NOTE!

If an installation drawing has been obtained from Humphree see this for guidance.

Special tools needed for installation

Hexagon wrenches (allen keys) 4, 5 and 6 mm

Humphree wrench (included) (70mm / shaft fit)

Humphree torque adapter (included) (36mm / shaft fit)

Socket 36mm

Torque wrench

Hole saw Ø60 (Interceptor shaft) and Ø80mm (control panel)

Spring scale (for torque measurement)

Loctite 243

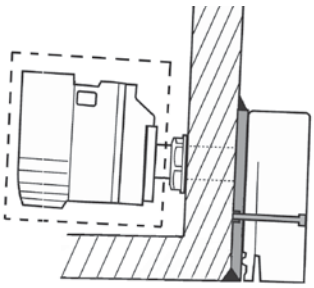
Marine sealant (sikaflex 291)

Torx T25, T30, T35

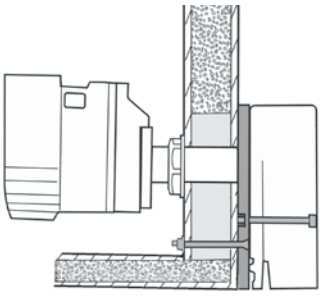
Screw driver PZ2

Attachment area general requirements

Make sure to install the Interceptors and servo units with enough space for service and maintenance.



Reinforce the area for the mounting holes and the shaft hole if the hull has a sandwich core.



NOTE!

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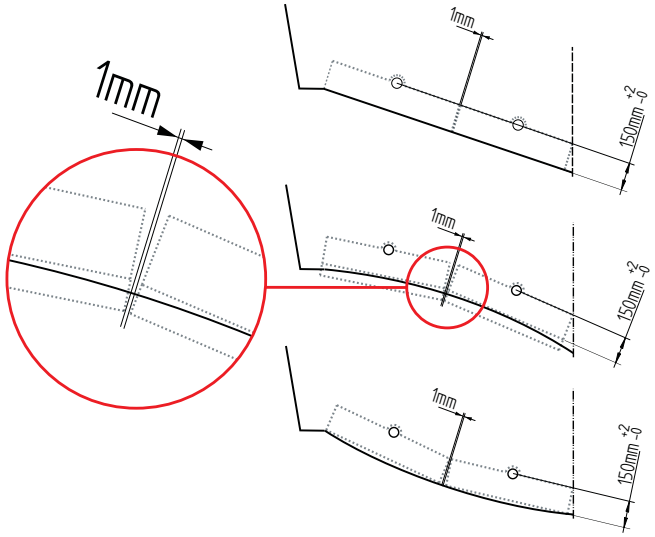
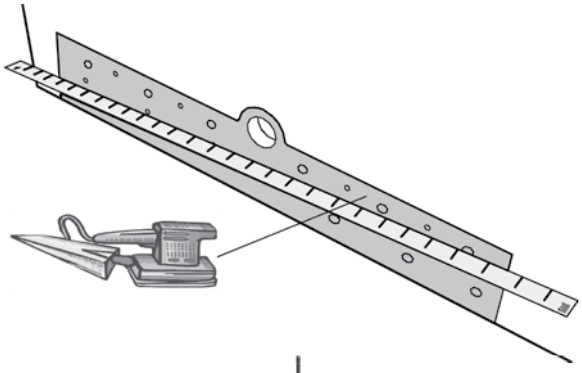
Define the Interceptor position and install the mounting plate flush to the hull bottom edge.



IMPORTANT!
The Interceptor blades must not hit each other when deployed.

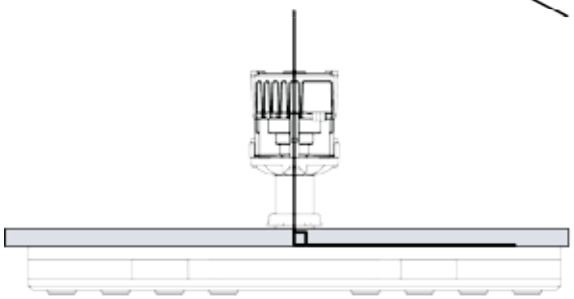
Make sure to place the mounting plates as close to each other as possible, but not closer than 1 mm.

Prepare the transom surface to be flat creating a planarity within 1mm.



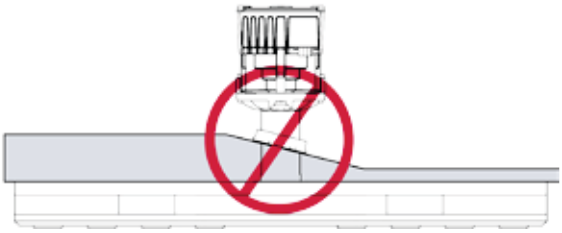
IMPORTANT!
If the planarity is not within 1mm the Interceptor may have high torque. (Max 12Nm)

Make sure that the shaft sleeve can be installed 90° to the Interceptor mounting surface.



If the inside surface has an angle, a spacer (plastic or aluminium) must be produced to provide a parallel surface. This spacer must be secured to the transom so that it will not move or glide when the shaft sleeve nut is tightened.

Check that the shaft sleeve does not bend during the installation.



Transom installation

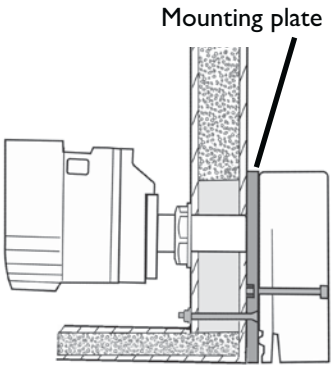
Installation instructions for Humphree mounting plates and Interceptors.

Mounting plate installation

The mounting plate can be installed on the hull in four ways: A, B, C or D.

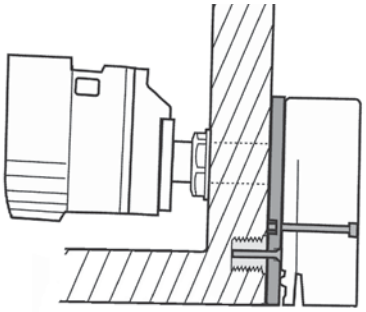
A. Holes through the transom. (most common for GRP hulls)

Drill the mounting plate and the hull for the attachment holes for the mounting plate. Minimum M8 bolts (AISI 316) must be used.



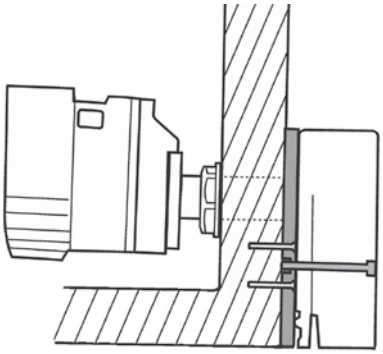
B. Threaded inserts for GRP hulls.

In order to avoid internal obstacles or stringers, the yard can partially drill the transom in order to install threaded inserts. The inserts must be flush to the transom surface and permit the installation of the bolts that will hold the mounting plate and Interceptor in place. Yard must perform calculations for the strength of the inserts. Design load of 50 knots use a load per bolt of 19kN.



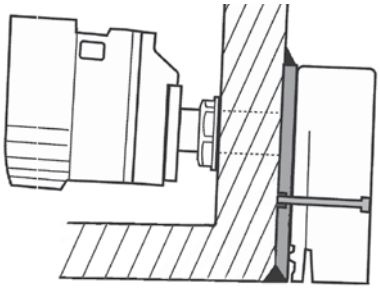
C. Screws for GRP hulls.

In order to avoid internal obstacles or stringers, the yard can mount the mounting plate with BUMAX HARD-FTS ST 6,3x50 screws.



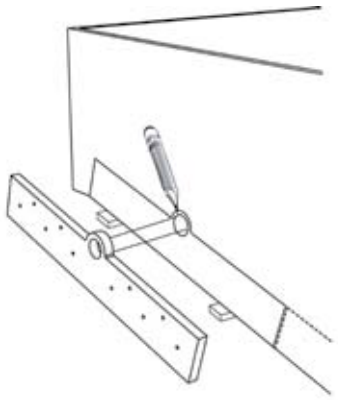
D. Welding a plate to the hull (most common for aluminium or steel hull).

An aluminium mounting plate can be provided which can be welded to the hull. This mounting plate has predrilled holes with threads for the Interceptor making the Interceptor easy to mount.



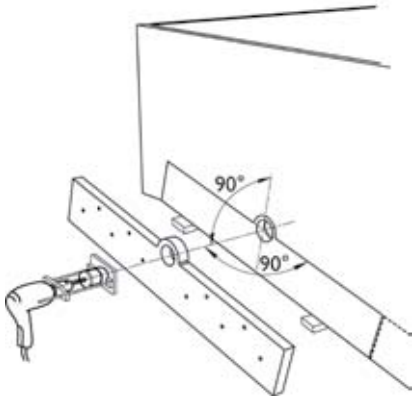
Secure the mounting plate in the preferred position.

Mark the position of the Ø60 hole.



Drill a pilot hole first.

Drill a Ø60 hole with a hole saw for the shaft perpendicular to the transom.

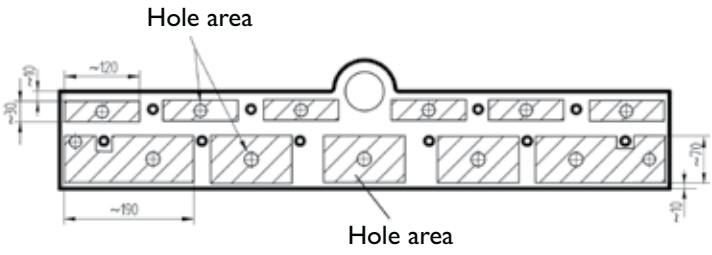


IMPORTANT!
If the shaft is not perpendicular to the transom the Interceptor can malfunction.

A. and B option.

The mounting plate is to be assembled to the transom with countersunk head bolts.

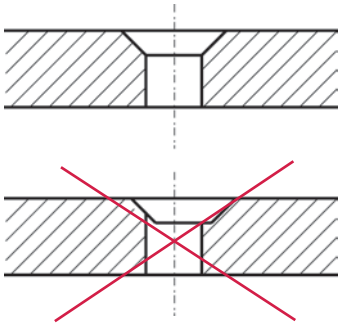
Install the bolts in the areas shown in the figure to the right.



IMPORTANT!
Use bolts with a minimum size of M8 and of A4 (AISI 316) stainless steel.

Do not use cutting or milling fluids when drilling the holes in the Humphree composite mounting plate.

Use the same angle as the bolt head to recess the head and drill the through holes at the same time using a pillar drill machine. Do not use a hand held machine.



Drill the bolt holes through the mounting plate.

Secure the mounting plate against the transom. Mark and drill the holes through the hull (A option).

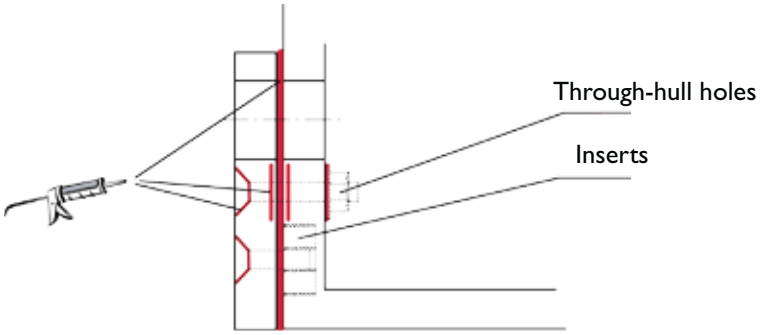
If inserts are to be used (B option), mark the position and obtain the instructions from the yard engineering office for the insert requirments. Design load of 50 knots use a load per bolt of 19kN.

Remove the mounting plate.

Pre-mount the M8 Interceptor mounting bolts to each M8 stainless steel nut of the mounting plate to check if the threads are free from particles.

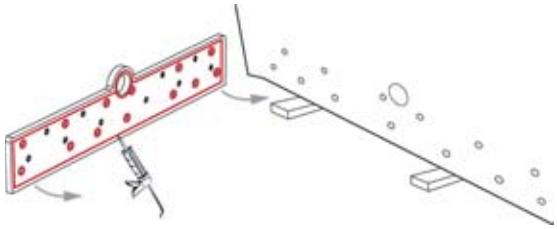
Clean all surfaces properly with soaped water!

Apply marine sealant (Sikaflex 291 or equivalent) on the mounting plate's side facing the transom and around the drilled holes and bolts.

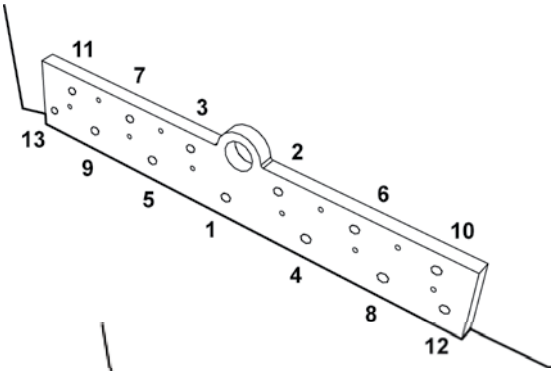


Make sure to apply sealant uniformly to retain the planarity of the Interceptor mounting surface.

Beware of air pockets which can press out the sealant around the edges.

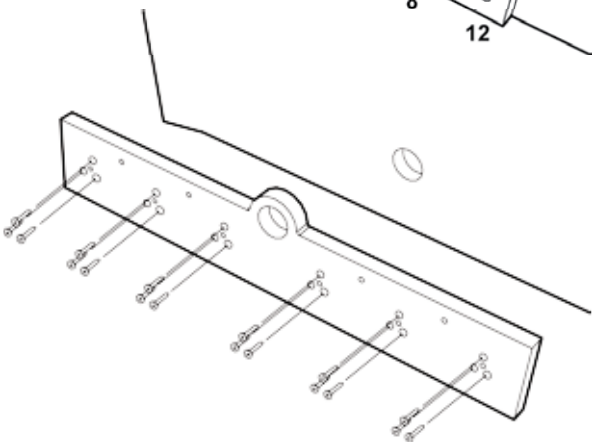


Tighten the bolts from the center and out to 12Nm.



C option.

Install the mounting plate with BUMAX HARD-FTS ST 6,3x50 screws, drill three holes in a triangle pattern around each nut inserts in the lower row of the mounting plate.



Secure the mounting plate against the transom and drill a 5mm hole for each BUMAX HARD-FTS ST 6,3x50 screw in the hull.

The BUMAX HARD-FTS ST 6,3x50 screw must be screwed into minimum of 13 mm solid GRP material of the hull.

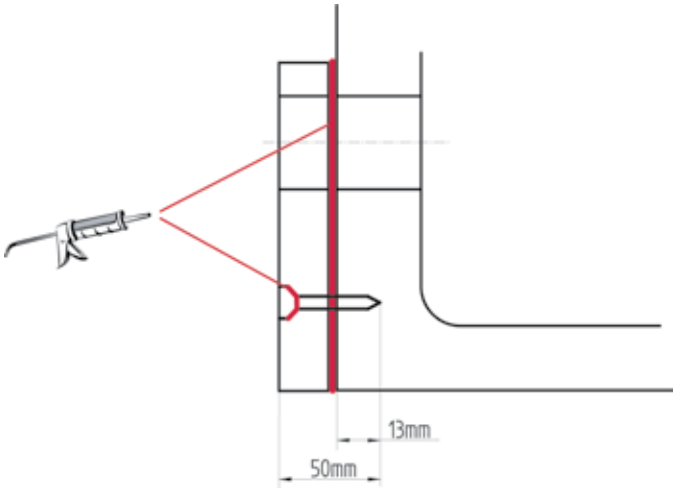
Remove the mounting plate.

Pre-mount the M8 Interceptor mounting bolts to each M8 stainless steel nut of the mounting plate to check if the threads are free from particles.

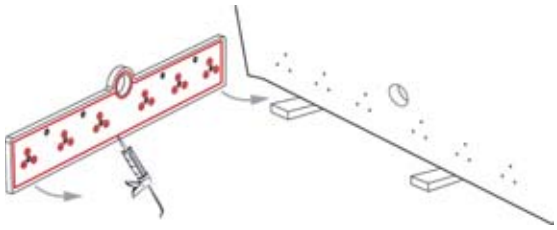
Clean all surfaces properly with soaped water!

Apply marine sealant (Sikaflex 291 or equivalent) on the mounting plate's side facing the transom and around the drilled holes and bolts.

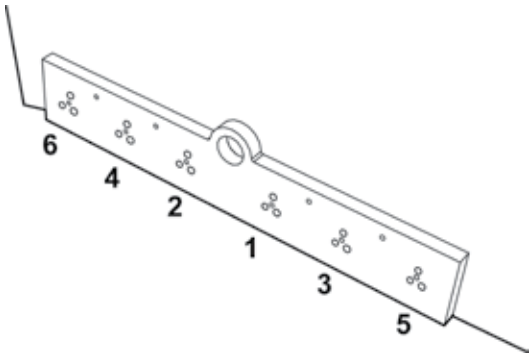
Make sure to apply sealant uniformly to retain the planarity of the Interceptor mounting surface.



Beware of air pockets which can press out the sealant around the edges.



Tighten the bolts from the center and out to 12Nm.



D option.

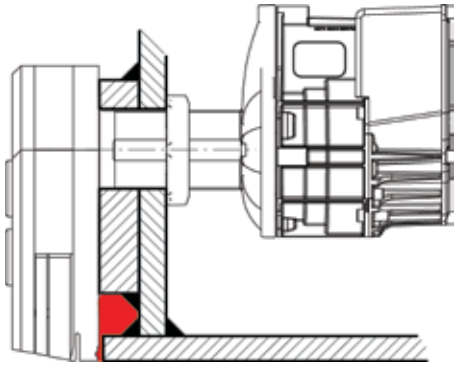
In case the yard intends to weld the mounting plate to the hull, the following has to be considered:

- Corrosion problems when combining / using different materials.
- Feasibility to easily grind the surface in contact with the Interceptor in order to achieve the requested planarity.
- Interceptor should be flush with the hull bottom for best performance.

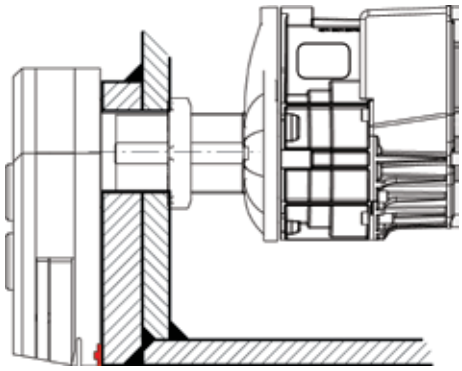
If the hull plating extends aft, past the transom plating the aluminium Interceptor mounting plate can be made so it is possible to weld it from underneth.

It is important that the Ø60 hole is placed in the correct position so the Interceptor unit will mount flush with the hull bottom edge.

The open area between the Interceptor unit and transom must be filled with marine sealant to prevent pressure leakage when the Interceptor blade extends.



The aluminium Interceptor mounting plate can be welded flush with the vessel hull making it easier to install the Interceptor.

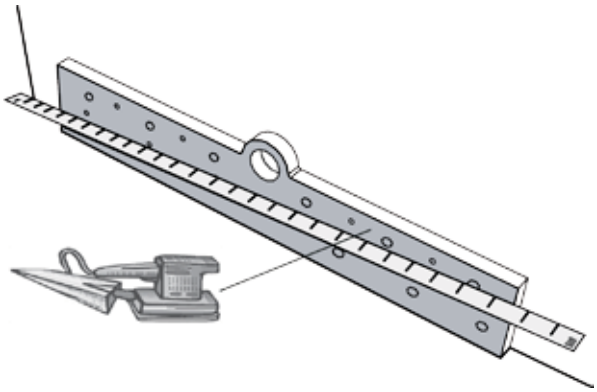


IMPORTANT!

Select plate thickness such that the plate and its threads can manage the load from the M8 bolts. For a design load of 50 knots use a load per bolt of 19kN (9 + 10, hydrodynamic force and bolt pre-tensioning respectively).

Grind the mounting plate

Check the mounting plate planarity with a steel ruler after the installation. If the planarity is not within 1mm use a grinding machine to adjust it.



Do not grind the composite mounting plate more than 2mm, so the M8 inserts will have enough thickness left in the mounting plate to withhold the force from the M8 bolt when the Interceptor is loaded.

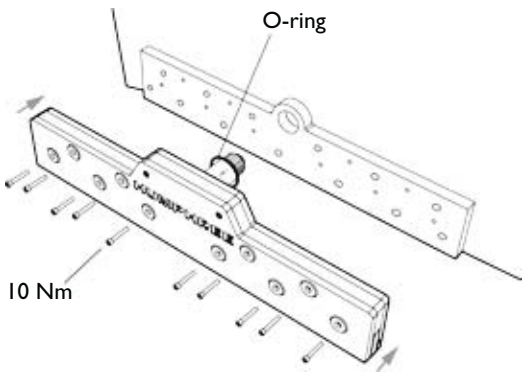
Pre-Interceptor installation

Before installation verify that the Interceptor is free to move by turning the shaft with the included Humphree wrench.

Pre-install the Interceptors and check the torque.

Position the shaft sleeve's O-ring in its groove and keep it in position.

Insert the shaft sleeve through the Ø60 hole and temporary install the M8 A4 (AISI 613) bolts for centering / supporting the Interceptor.



Check the Interceptor position.

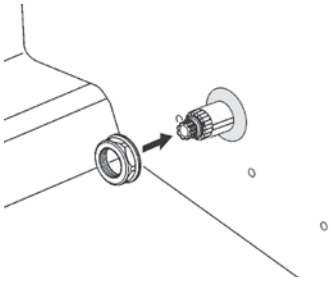
Verify that the lower edge of the Interceptor is flush with the hull bottom.

NOTE!

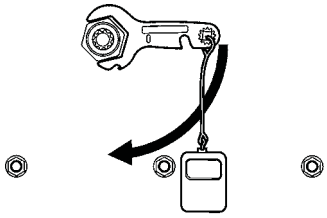
During the pre-installation do not apply thread locker (Loctite 243) to the M8 bolts.

Tighten the M8 bolts to 10 Nm.

Pre-install the shaft sleeve nut.



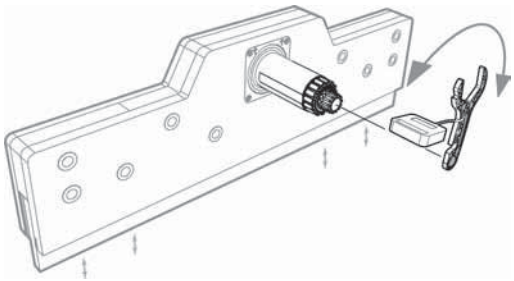
Tighten the shaft sleeve nut to maximum 16 Nm. (9 kg with a spring scale and a Humphree wrench).



Check the shaft torque.

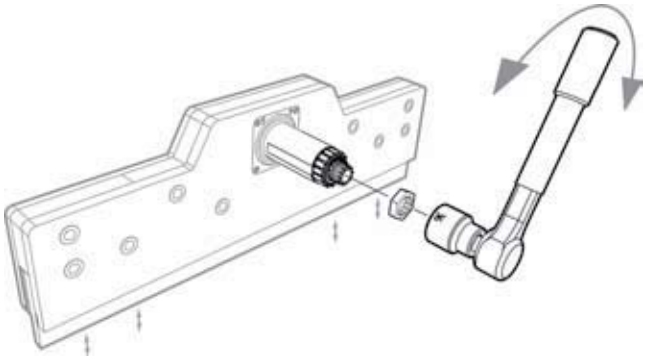
IMPORTANT!

Do not proceed with the installation if the shaft torque exceeds 12Nm. Repeat from chapter Installation planning until the torque is below 12Nm.



Use the Humphree wrench and a spring scale to check the operational torque.

Alternativly push the Humphree torque adapter onto the shaft and use a torque wrench with a socket size 36, to check the torque of the shaft.



If the shaft torque is below 12Nm after the pre-installation then proceed.

Final installation of the Interceptor

Remove the Interceptor.

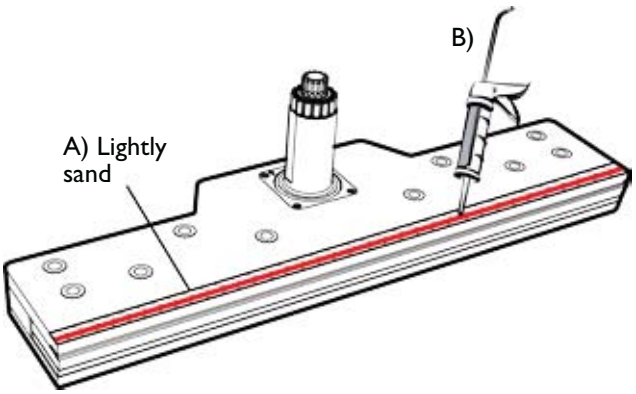
Clean all surfaces properly with soaped water!

IMPORTANT!

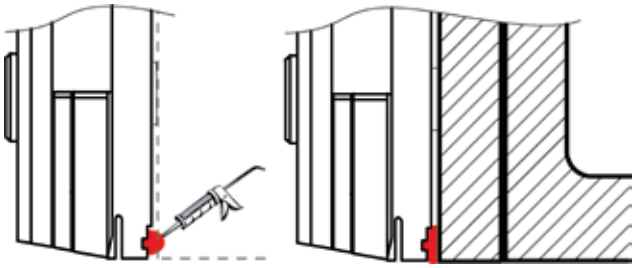
Do not clean the Humphree parts with acid or strong detergents. This will effect the strenght and life-time of the composites and could cause a malfunction of the system.

A) Lightly sand the lower edge of the Interceptor, on the surface facing the transom, and the corresponding opposite area of the mounting plate in order to improve the adhesion of the sealant.

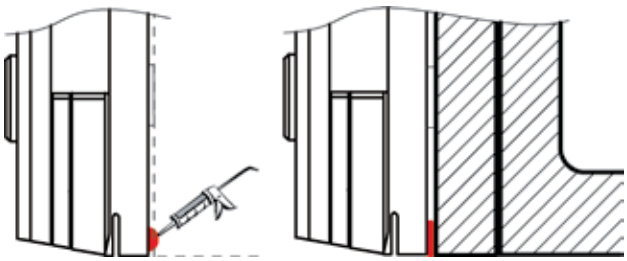
B) Apply marine sealant (sikaflex 291) to the lower edge of the Interceptor. See side view below.



Pre-milled groove for sealant.



Gap between the Interceptor and mounting plate.



The lower edge gap between the Interceptor and mounting plate must be sealed so the water pressure will not be released when the blade extends.

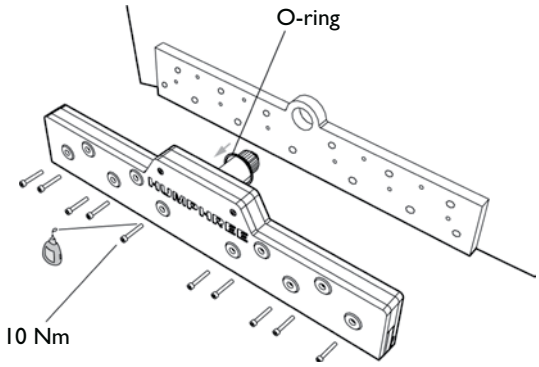
Insert the shaft sleeve and make sure the O-ring is in position.

Apply a layer of marine grease in order to keep it in position.

Apply thread locker (Locktite 243) to the M8 Interceptor mounting bolts.

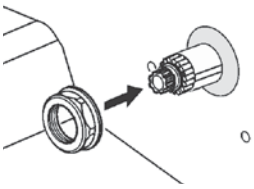
Check the Interceptor position.

Verify that the lower edge of the Interceptor is flush with the hull bottom.

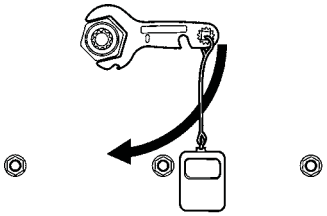


Tighten the M8 bolts to 10 Nm to install the Interceptor.

Install the shaft sleeve nut.

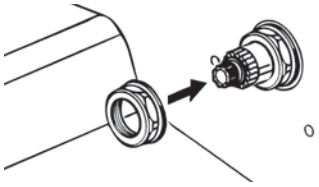


Tighten the shaft sleeve nut to maximum 16 Nm (9 kg with a spring scale and a Humphree wrench).



Install the second shaft sleeve nut and tighten it to lock the first nut.

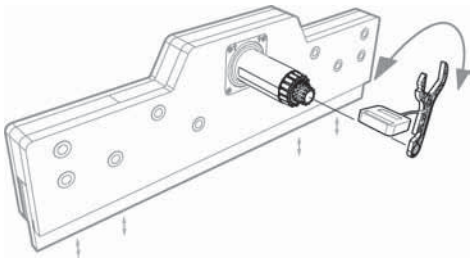
If space is limited and does not allow the second nut, lock the first nut with sealant instead.



Final shaft torque check.

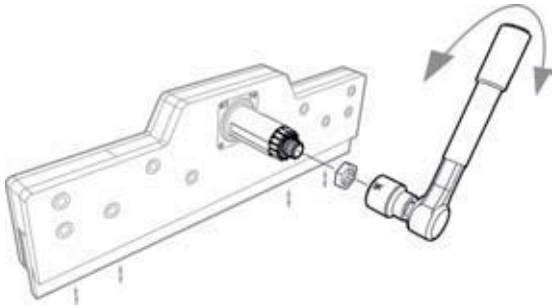
IMPORTANT!

Do not proceed with the installation if the torque exceeds 12Nm. Repeat from chapter Installation planning until the torque is below 12Nm.

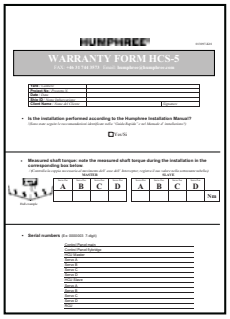


Use the Humphree wrench and a spring scale to check the operational torque.

Alternativly push the Humphree torque adapter onto the shaft and use a torque wrench with a socket size 36, to check the torque of the shaft.

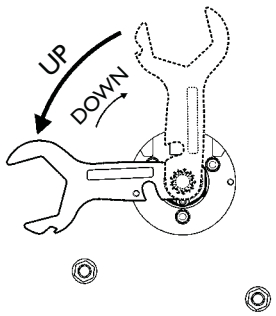


Note the torque in the WARRANTY FORM located in the installation kit.


HUMPHREE
WARRANTY FORM HCS-5

Place the Humphree key on the shaft. Rotate the key counter clockwise until it stops to retract the blade.

Retract the blade fully.



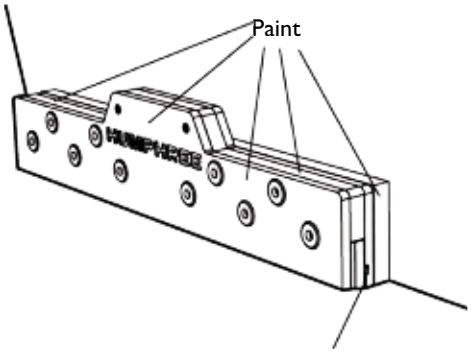
PAINTING

IMPORTANT!

Do not clean the Humphree parts with acid or strong detergents. This will effect the strength and lifetime of the composites and could cause a future malfunction of the system.

It is required to paint the Interceptor's external surfaces with antifouling paint. Use a paint cycle recommended for GRP (glass reinforced plastic).

Lightly sand the external surfaces of the Interceptor and mounting plate before painting in order to increase the adhesion. Clean all surfaces with soaped water.



Do not paint the gaps of the moving parts

IMPORTANT!

No paint should be applied to the moving parts, which will extend outside of the Interceptor housing. Protect the Interceptor's lower gaps and side gaps during the painting.

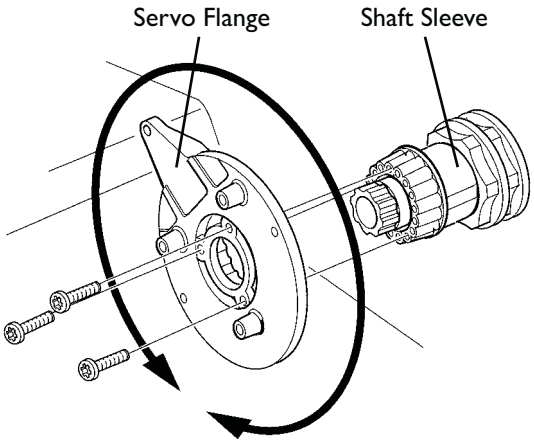
ENGINE ROOM INSTALLATION

Servo unit installation

The servo flange and stainless steel screws are delivered separated from the Interceptor.

Align the servo flange on the shaft sleeve and press it in position with the three stainless steel screws and tighten to 2Nm.

The servo flange can be rotated in any direction to avoid that the servo unit interferes with internal structures.



Connect the Interceptor shaft's male torx with the servo unit's female torx.

Rotate the servo unit without loosing the connection

Align the three servo flange pins with the holes in the servo unit.

Press the servo unit onto the servo flange pins. Apply grease to the thread of the three bolts and tighten to 3Nm to secure the servo unit.

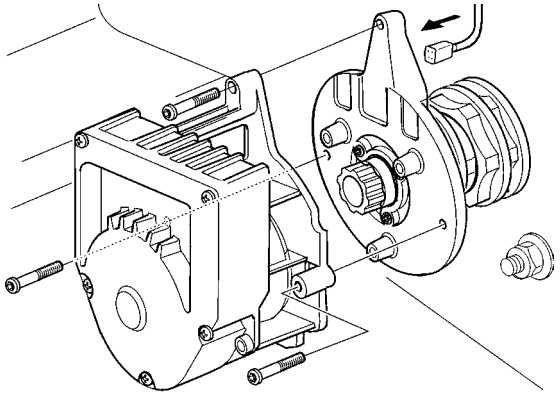
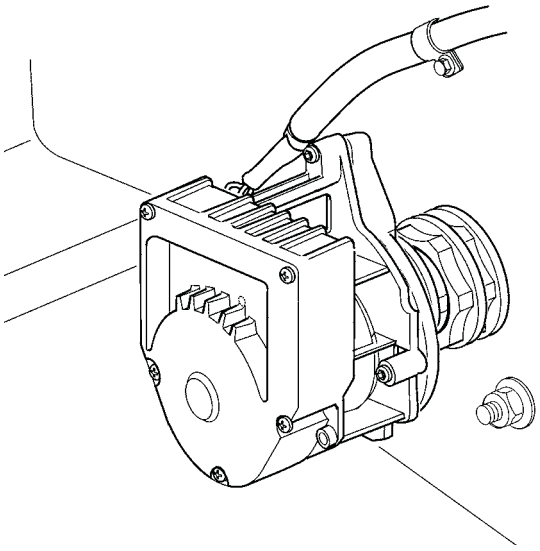


Illustration shows installed servo unit with strain relief on the cable.



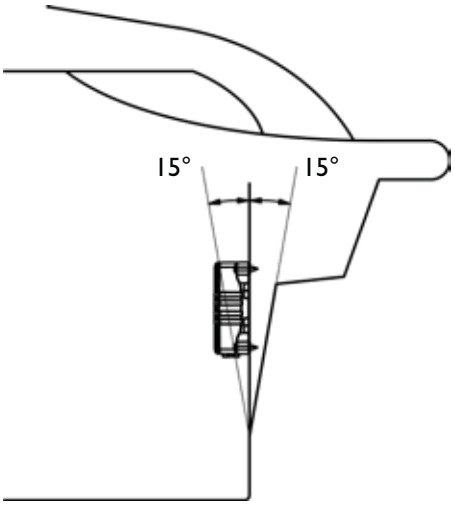
Control unit HCU 501/502 and RCU 501/502 installation

The control unit (HCU / RCU) must be mounted on the inside of the transom or close to the transom.

The control unit includes sensors which need to be aligned with the vessel's hull.

Mount it perpendicular to the centerline of the vessel and parallel to 0° list.

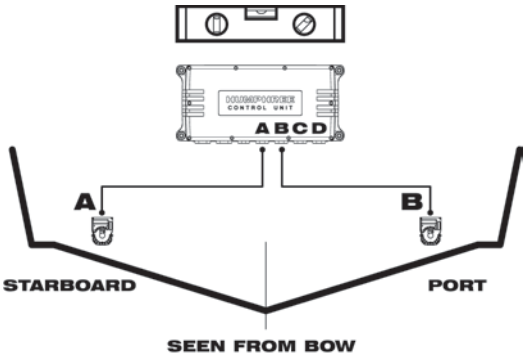
Place the control unit high enough to avoid water or other liquids.



Mount the control unit with four suitable M8 bolts or equivalent.

If this position is not possible, the orientation must be changed in an advanced setup menu in the control panel. See Setup Manual.

The RCU 501/502 is used instead of a HCU 501/502 with the ACTIVE RIDE CONTROL function.



Master and slave control unit HCU 501/502 installation

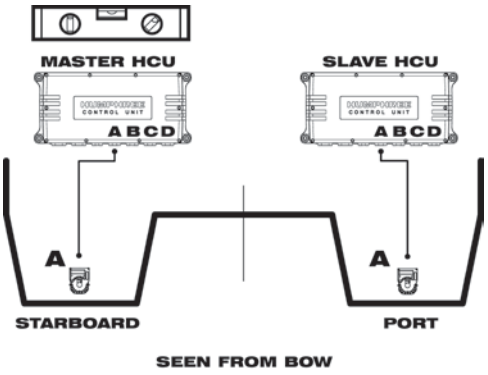
For systems with more than four servo units or catamarans systems place the MASTER control unit on the starboard side and the SLAVE control unit on the port side of the vessel. If placed opposite this will effect the function of the system.

Mount them on the inside of the transom or close to the transom.

A combination of HCU 501 and HCU 502 can be installed on a vessel depending on the configuration.

The master control unit includes sensors which need to be aligned with the vessel's hull.

Mount it perpendicular to the centerline of the vessel and parallel to 0° list.



Place the control unit high enough to avoid water or other liquids.

Mount the control units with four suitable M8 bolts or equivalent.

If this position is not possible, the orientation must be changed in an advanced setup menu in the control panel. See Setup Manual.

Ride control unit RCU 551 installation

The ride control unit RCU 551 includes sensors which needs to be aligned with the vessels hull. This unit is used with the ACTIVE RIDE CONTROL function.

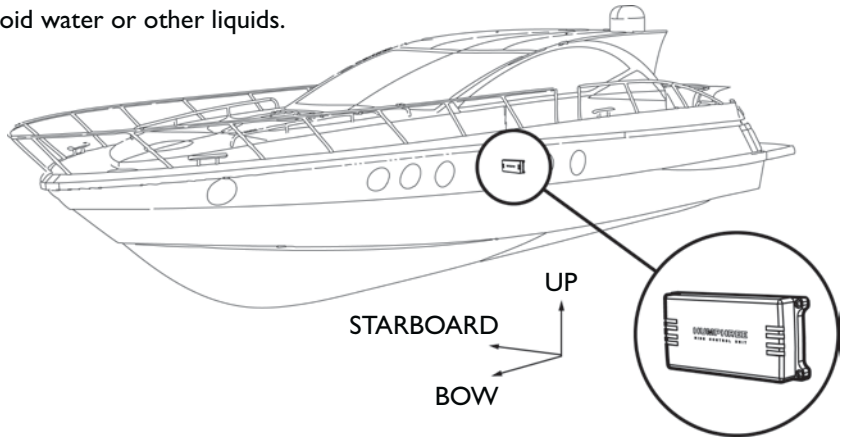
Mount the RCU perpendicular to the centerline of the vessel and parallel to 0° list. Also try to position it as close to the vessel's centre of gravity as possible.

Standard orientation is the Humphree text pointing towards the bow and the connectors are pointing down.

Place the control unit high enough to avoid water or other liquids.

Mount the control unit with four suitable M8 bolts or equivalent.

If this position is not possible, the orientation must be changed in an advanced setup menu. See Setup Manual.



BRIDGE INSTALLATION

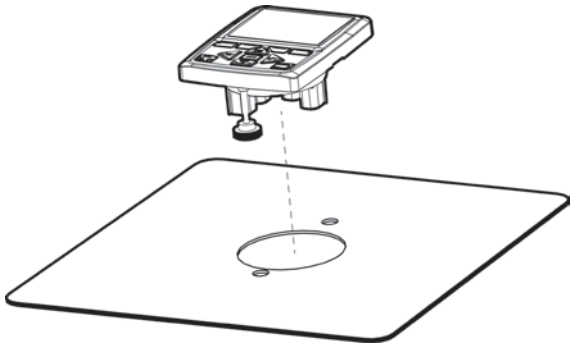
Control panel installation

The control panel is the operator's terminal for controlling and supervising the system. It should be installed in a position that gives the operator good access and view at the helm.

The control panel can be placed on the bridge or on a secondary station.

The cut out drawing for the control panel is located in the APPENDIX of this manual or use the box cut out which the panel was delivered in.

The control panel is mounted from the back with two M5 bolts and two composite nuts.



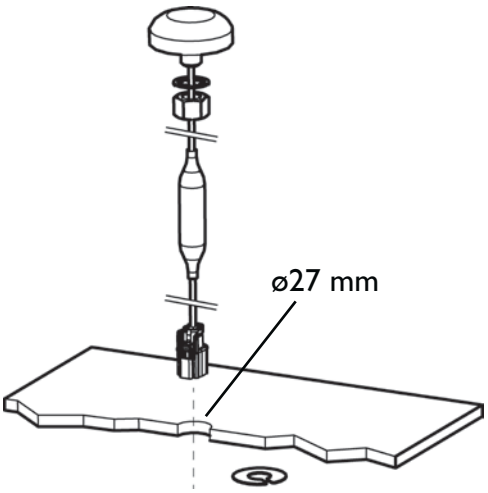
If the panel is thicker than 30 mm extra long M5 bolts have to be used.

Use the two composite nuts to tighten the seal around the control panel, securing it in place.

Place the cover on the control panels.

GPS installation

The Humphree GPS cable has a total length of 14 m. Place the Humphree GPS in the mast or under nonmetallic super structure which has minimum vibrations, and insures good GPS satellite reception. Make sure that no electronic units, which can disturb the satellite signal, are close to the Humphree GPS.

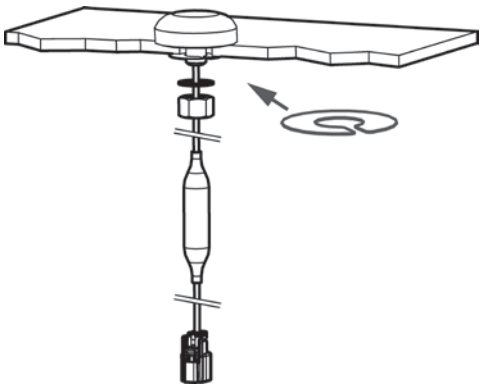


NOTE!

Some wind shields with metallic coatings can cause interference with GPS satellite reception.

The GPS can be connected to either a bridge control panel or a secondary station control panel.

Drill a 27 mm hole and pull the connector, shrink tube, cable, toothed washer and nut through the hole.



Use the stainless open washer underneath the hole to secure the GPS with the toothed washer and nut. Do not over tighten the nut.

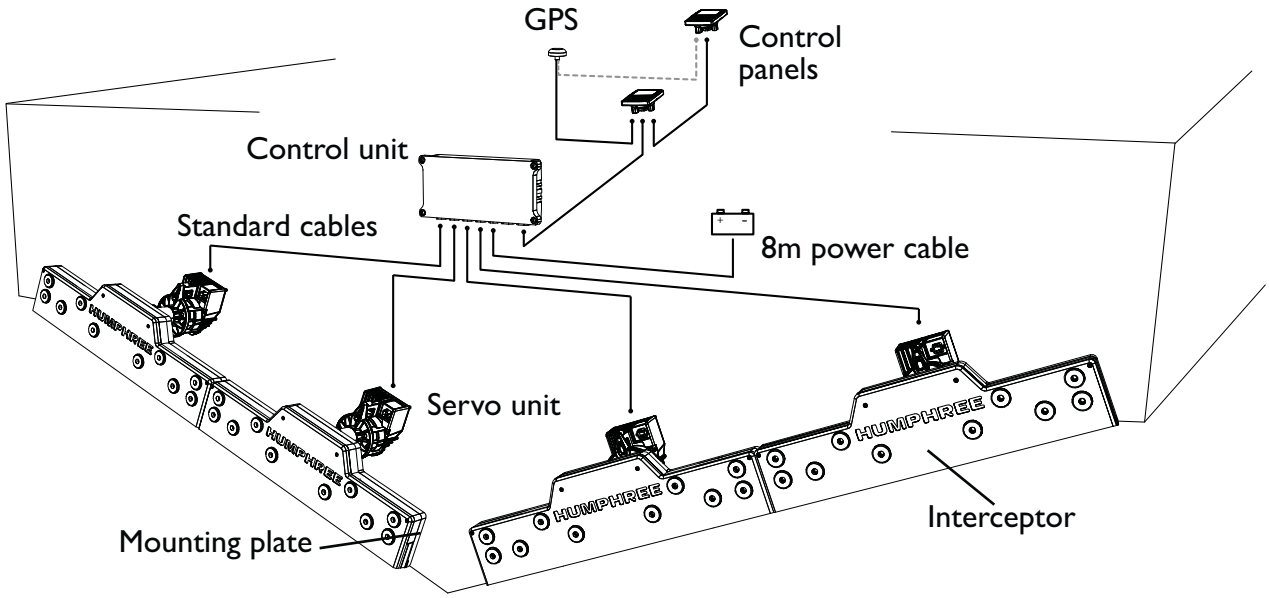
Maximum panel thickness is 8 mm.

ELECTRICAL INSTALLATION

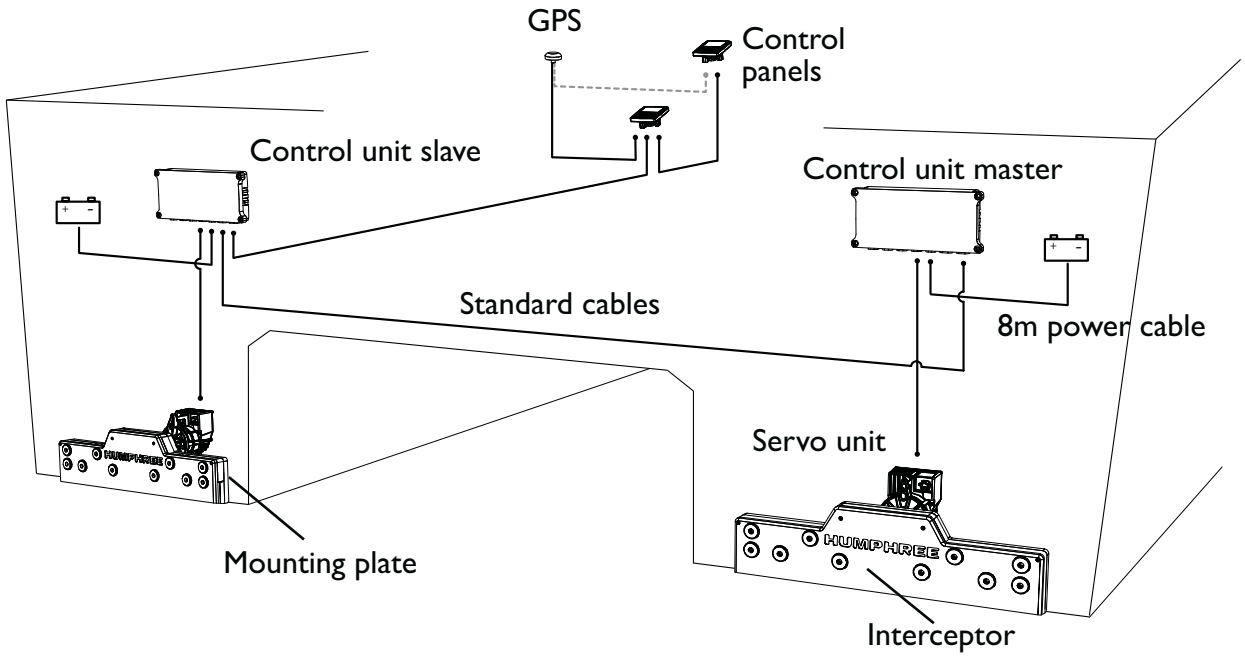
NOTE!

Before wiring make sure to check how to connect the cables. See the connection diagram and external interface pin out in the APPENDIX of this manual.

General system overview: monohull

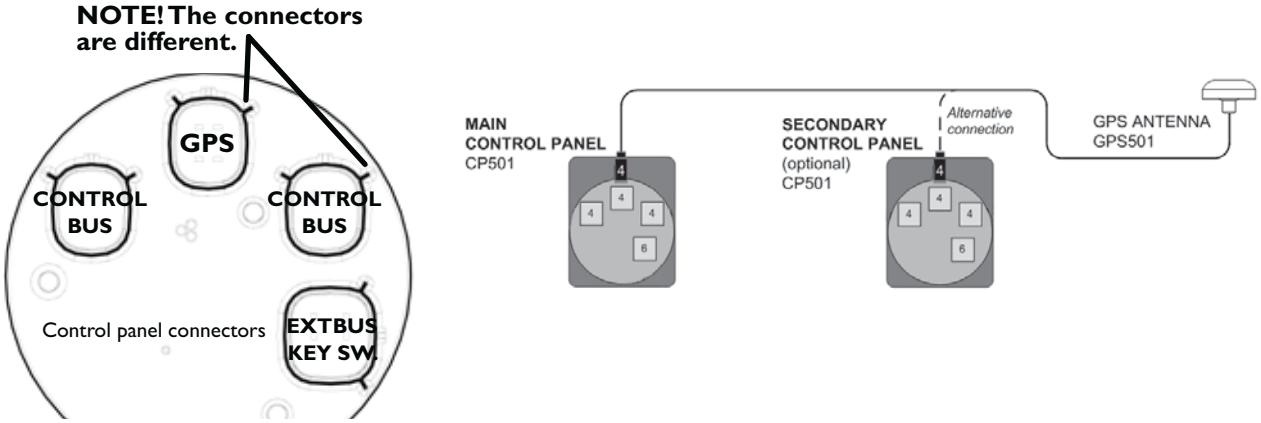


General system overview: catamaran



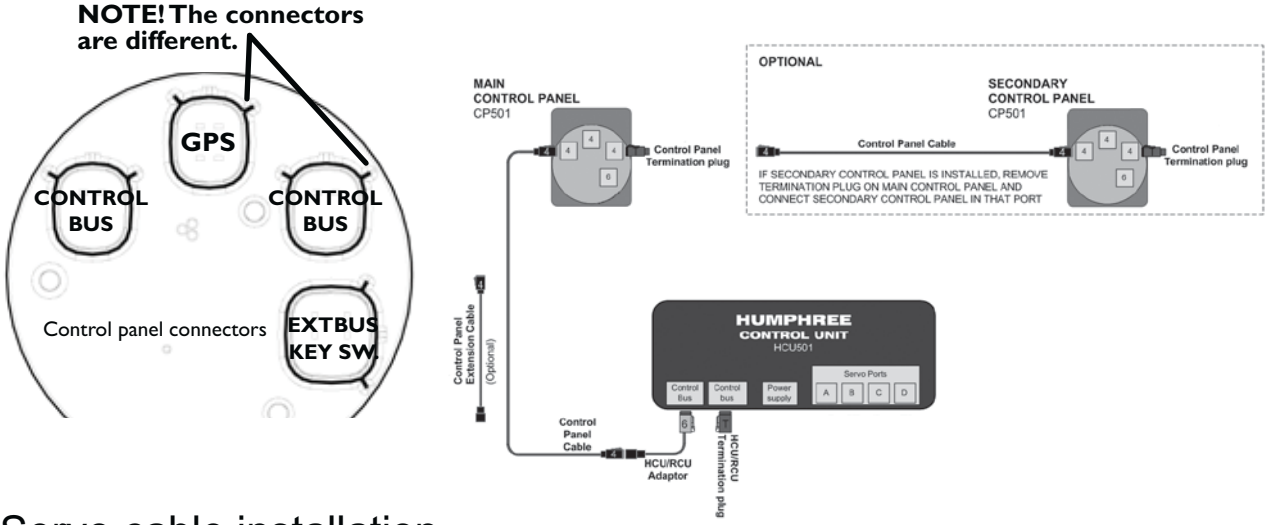
GPS cable connection

Connect the GPS cable connector to the corresponding connector of the main control panel or the secondary station control panel.



Control panel and HCU 501/502 or RCU 501/502 connection

Connect the control panel cable 10,15, 20, 25, 30, 40 or 50m to the HCU/RCU adapter and then connect it to the control unit. Use the same typ of cable to connect the secondary station panel. An optional extension cable of 7 meters is avalible. If a secondary control panel is installed remove the termination plug in the main control panel and keep the termination plug in the secondary control panel.



Servo cable installation

The servo units are connected to a control unit HCU / RCU with the servo cables.

Connect each servo unit to the corresponding port: A, B, C or D on the correct control unit. Find the correct figure which matches the vessel's configuration on the next page.

For a vessel's configuration which is not presented on the next page please contact a Humphree representative for a specific connection diagram.

Remove three of the color bands on each servo cable saving one unique color for each cable. Use this marking to know which cable goes to which servo during the installation.

For a 24 VDC system a four meter or eight meter servo cable is avalible. For a 12 VDC system only the four meter servo cable can be used.

The control units are delivered with sealing plugs in the ports which are not used. (see cable position in the figures on the next page)

Route the cables to a HCU / RCU high enough to avoid water or other liquids.

Vessel configuration examples

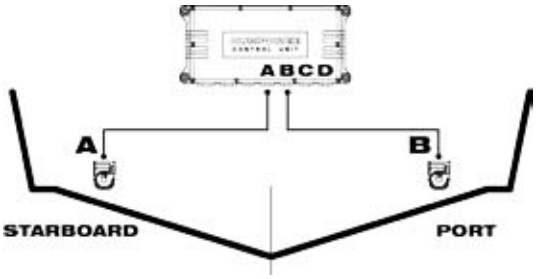


Figure 1. Monohull: 1 HCU/RCU+2 SU

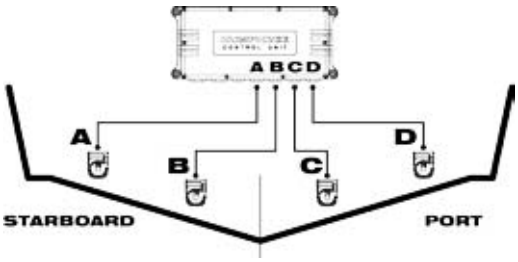


Figure 2. Monohull: 1 HCU + 4SU

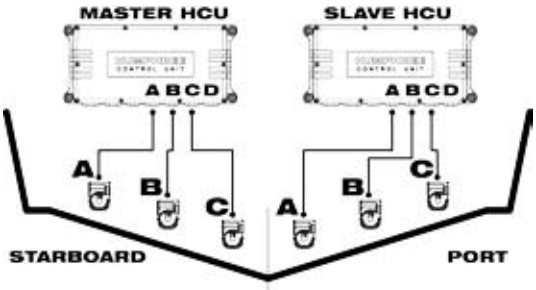


Figure 3. Monohull: 2 HCU + 6 SU

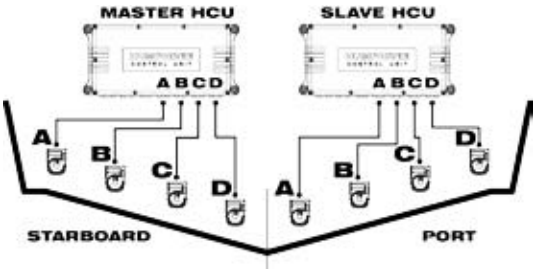


Figure 4. Monohull: 2 HCU + 8 SU

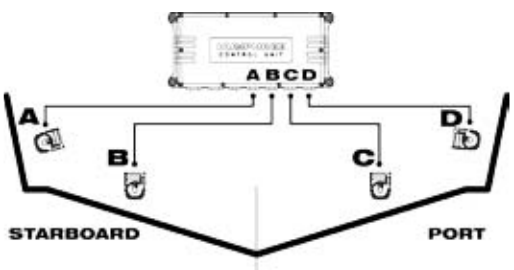


Figure 5. Monohull: 1 HCU + 2SU +2STEER.SU

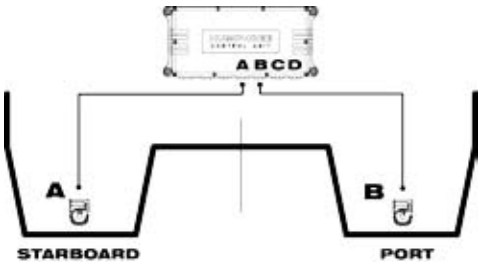


Figure 6. Catamaran: 1 HCU/RCU+2 SU

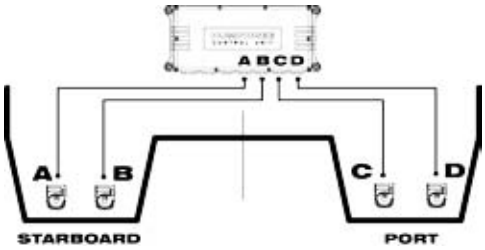


Figure 7. Catamaran: 1 HCU + 4 SU

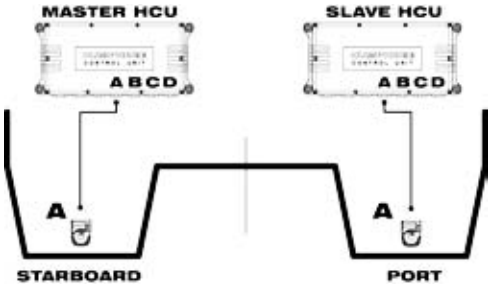


Figure 8. Catamaran: 2 HCU + 2 SU

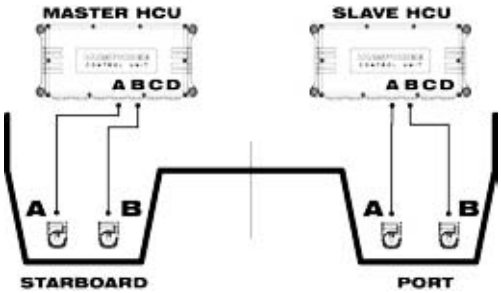


Figure 9. Catamaran: 2 HCU + 4 SU

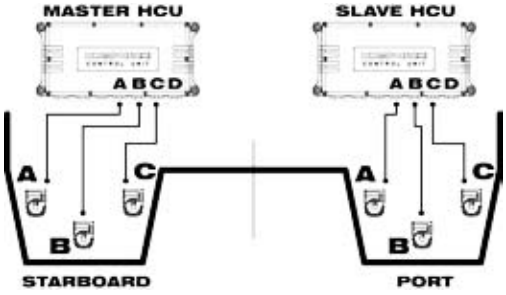
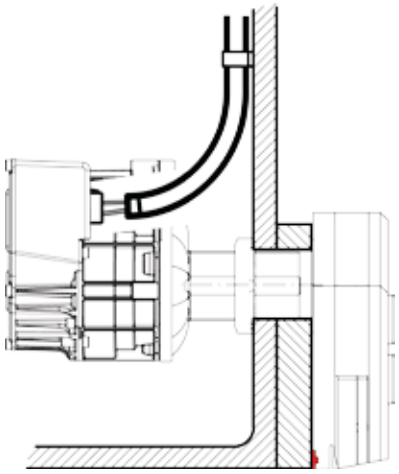


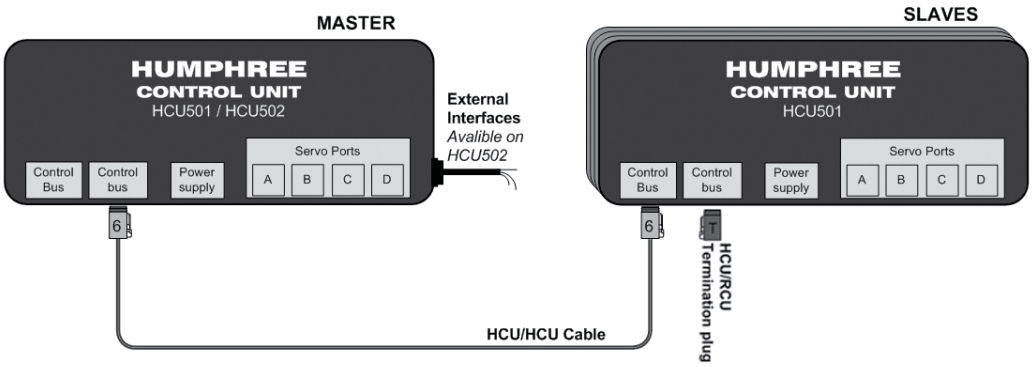
Figure 10. Catamaran: 2HCU + 2SU +4STEER.SU

Route the cables from the servo unit in a smooth arc up against the transom toward the control unit.



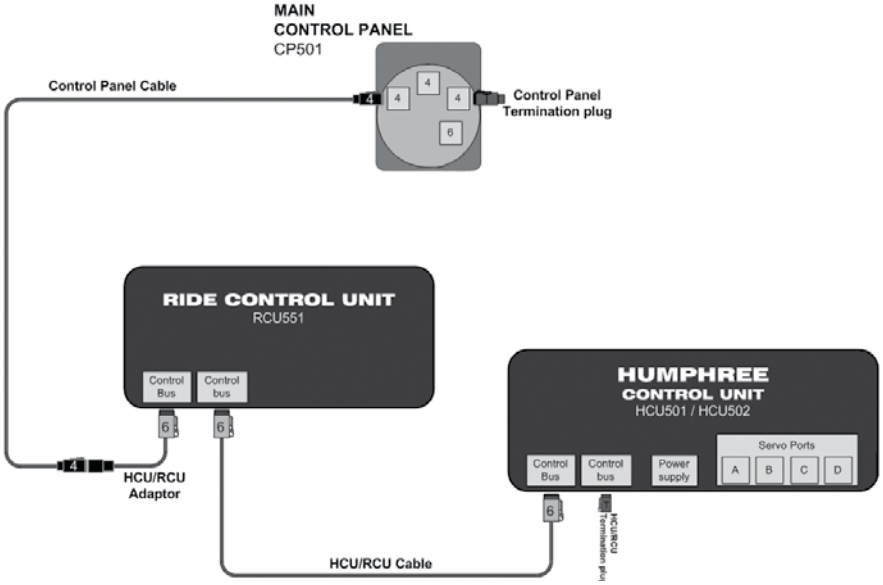
Master and slave control unit cable installation

Use a HCU/HCU cable to connect the control units to each other. The HCU/HCU cable is available in lengths 5, 10 or 20 meters.



Ride control unit RCU551 cable installation

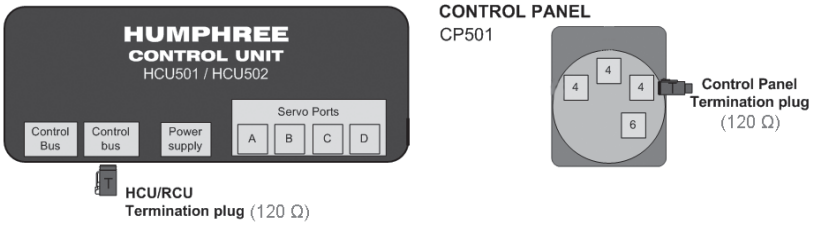
Connect the ride control unit to the Humphree control bus using a HCU/RCU cable. Move the HCU/RCU adapter to the Ride Control Unit. The HCU/RCU cable is available in custom length.

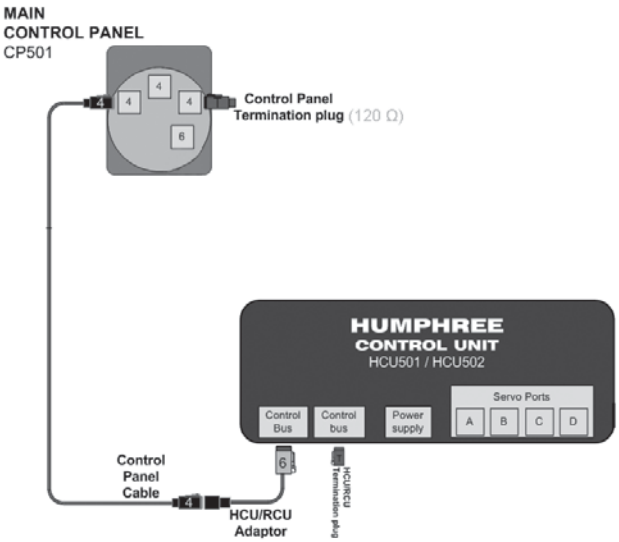


End termination plug installation

Connect the four pin termination plug (120 Ω) in the last control panel on the control bus.

Connect the six pin termination plug (120 Ω) in the last control unit (HCU/RCU) on the control bus.





IMPORTANT!

Make sure to install the Humphree termination plugs to avoid short circuit and/or control bus signal errors.

NOTE!

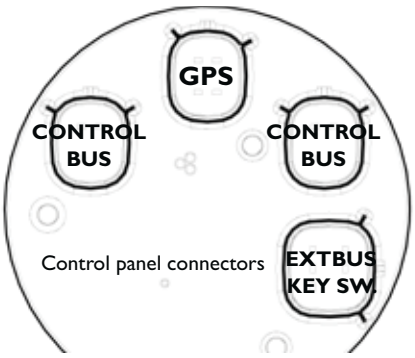
If the termination plugs are not installed, the control panel may show an alarm for communication error.

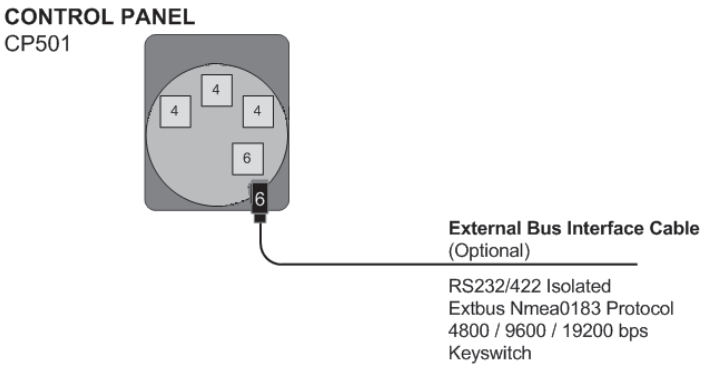
EXTBUS and analog interface cable installation

A steering signal, rudder signal, external GPS or monitoring system can be connected through an interface cable to either the control panels or the control unit HCU 502 or RCU 502. The signals are NMEA 0183 based. See EXTBUS manual for more details.

The interface cable for the control panel also has a remote key switch output. See next chapter for more information.

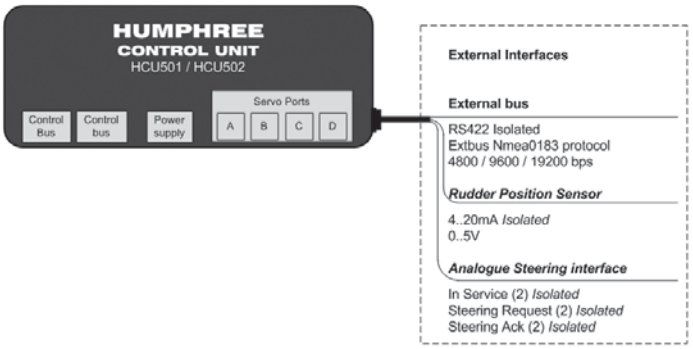
Extbus Interface through control panel:





Extbus and analog Interface through a control unit:

HCU 502 / RCU 502.



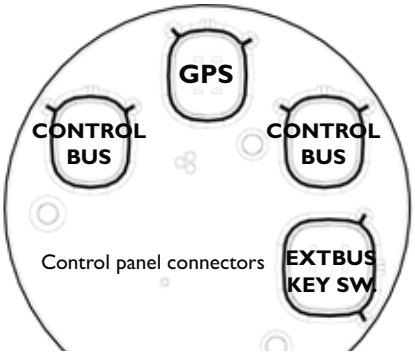
Check the external interface pin out in the APPENDIX for pin out information.

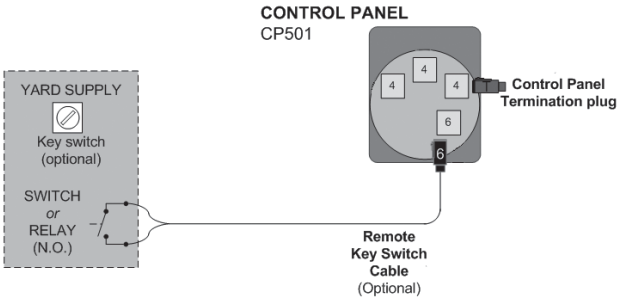
NOTE!

The same type of signal can not be connected to both a control unit and to a control panel.
Several different signal types can however be connected to different units.

Remote key switch installation

The remote key switch will put the Humphree system in sleep mode when a key is switched off (typically engine ignition). Connect the remote key switch cable to a relay.





In sleep mode the system will consume less than 10 mA power.

When the relay is closed the system will turn on and when the relay is open the system will enter sleep mode. Cleaning will still work when the system is in sleep mode.

The key switch is also available in the interface cable above.

See external interface pin out in the APPENDIX for pin out information.

Power supply cable

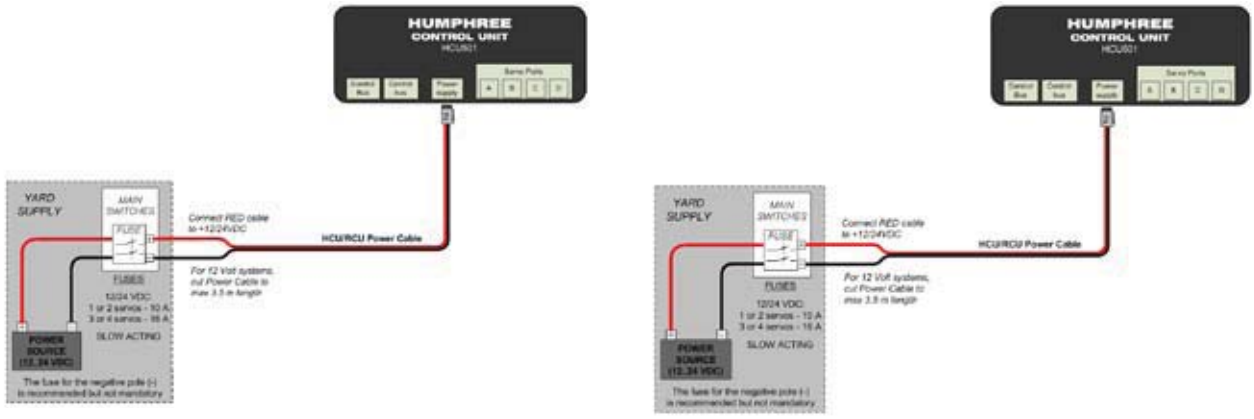
IMPORTANT!

Mount the cables high enough to avoid areas where water or other liquids may be collected.

IMPORTANT!

The Interceptor System has a cleaning function that helps to prevent long term marine growth. To be able to use the cleaning function, it is recommended that a dedicated main circuit breaker, separating the Interceptor system from other systems on board the vessel, is installed.

The power supply must be distributed to each control unit via separate fuses for each pole that will protect each control unit. The fuse for the negative pole (minus) is recommended but not mandatory.



Dimensioning of power supply cable

The Humphree supplied power cable (8m for 24VDC) must be cut to max 3,5 meter on a 12VDC system.

The cable area to the main switches must be dimensioned to supply minimum 12/24VDC, 10A for 1-2 servos on one control unit, 16A for 3-4 servos on each control unit.

STARTING UP THE SYSTEM (1-4)

Once the system is installed, do the following steps to get the system up and running:

1) Turn on the power to the Interceptor System (main switch and fuses).

Do not proceed to operate the system until all servos have been successfully calibrated.

When the system power is turned on, the MAIN SCREEN will be shown and a popup screen will indicate that the servos will need to be calibrated. The status bar will also turn red, indicating that the servo units need to be calibrated.

2) Calibrate the servos.

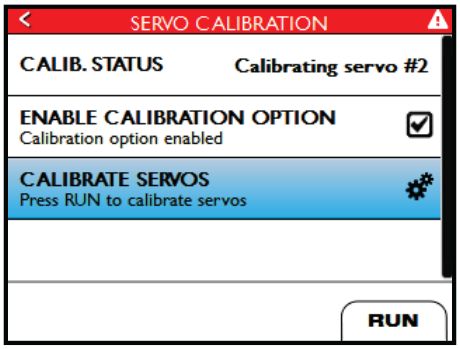
WARNING!

The vessel must be at zero speed when performing a calibration.

Press MENU and go to SETTINGS.

Go to SERVO CALIBRATION

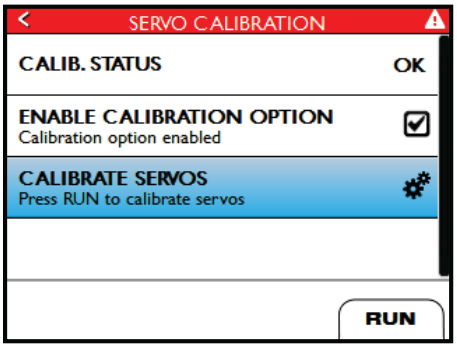
ENABLE SERVO CALIBRATION by pressing ON and then scroll to calibrate.



Press RUN and the servos will calibrate.

NOTE!

The servos will only need to be calibrated once. If the servos have been dismount for any reason a new calibration must be done.



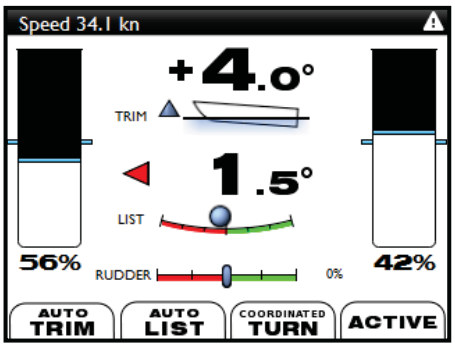
When all servos have been calibrated the CALIB. STATUS will read OK.

Press EXIT to go to the main screen.

3) Check GPS signal.

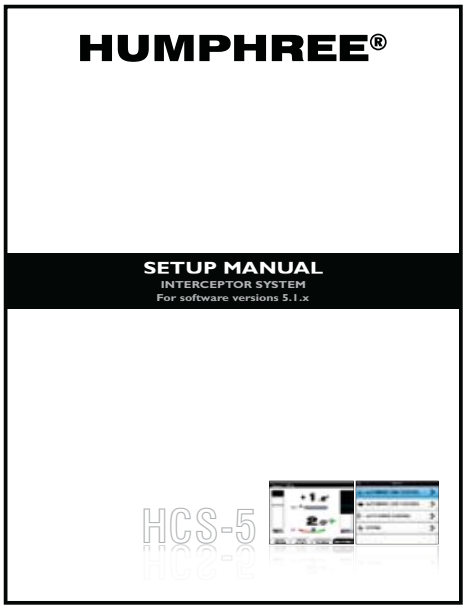
Verify that the GPS is working properly. On the control panel, check that the SPEED indication on the main screen shows a speed value.

If a speed value is not shown see trouble shooting in the Operators Manual.



4) Now switch to the Humphree Setup Manual HCS-5 and follow the steps under Initial Setup.

This must be performed for all systems to function properlly. If there are AUTO functions to be calibrated, these are also descrided in the Setup Manual.



FILL OUT THE WARRANTY FORM

Fill out the WARRANTY FORM and send it to Humphree.

IMPORTANT!

For warranty to be affective a complete WARRANTY FORM must be sent to Humphree.

The warranty form is located in the installation kit.

Fill out:

-Yard, Project No, Date, Vessel ID and Client Name.

-Write down the shaft torque values which was done under step final shaft torque check.

-Make a note of the serial numbers of the control panels, servo units and other Humphree equipment installed on board the vessel.

APPENDIX

Humphree control panel cut out

Humphree control panel drawing

Humphree GPS drawing

Humphree servo unit drawing

Humphree control unit (HCU 501) drawing

Humphree control unit (HCU 502) drawing

Ride control unit (RCU 501) drawing

Ride control unit (RCU 502) drawing

Ride control unit (RCU 551) drawing

Connection diagram 1

Connection diagram 2

Connection diagram 3

Connection diagram 4

External interface pin out

Notes

ATTACHMENTS

Interceptor installation drawing (when applicable)

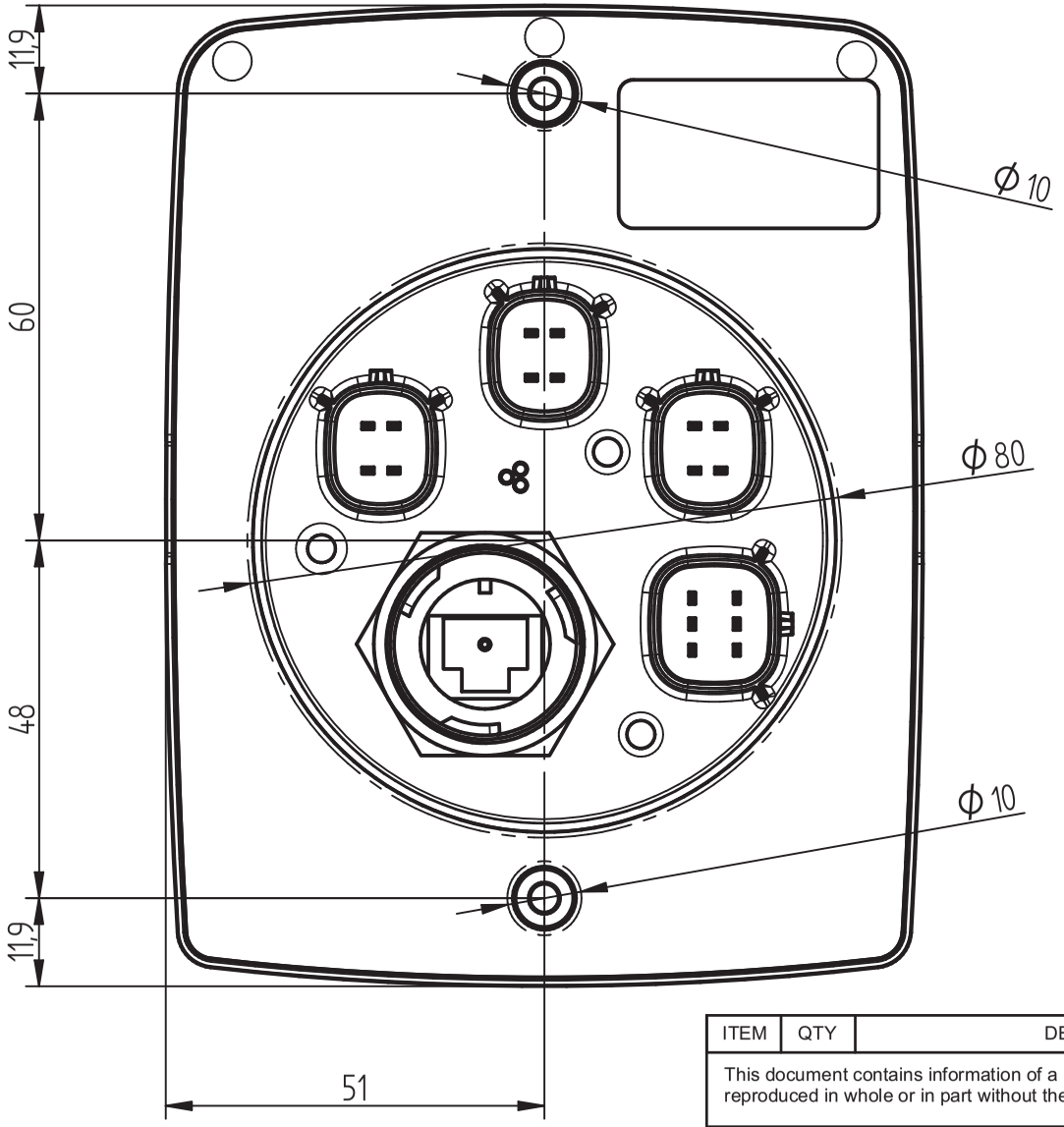
Client Interceptor drawing (when applicable)

Client mounting plate/bracket and/or bolt plan (when applicable)

Specific connection diagram (when applicable)

Warranty form

REV	DESCRIPTION	DATE	APPVD



ITEM	QTY	DESCRIPTION	MATERIAL	SIZE	PART NUMBER	REV

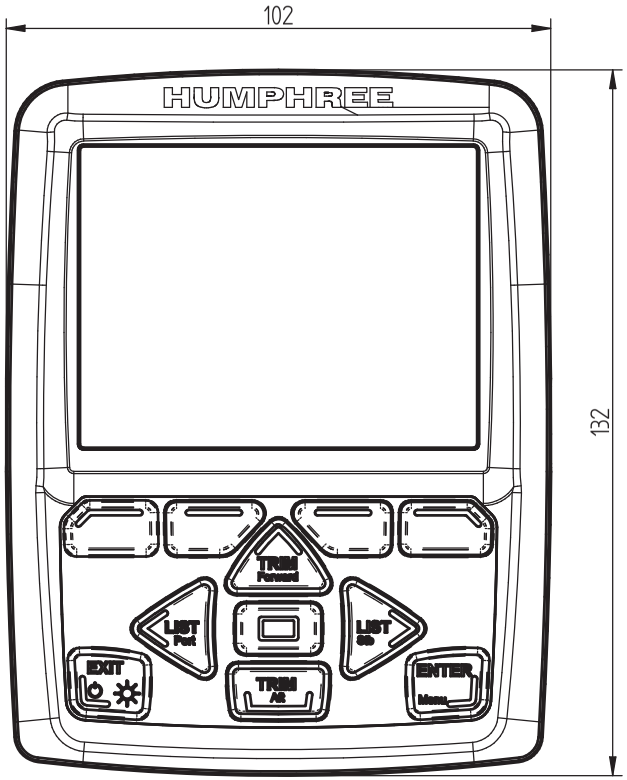
PROJECT	FILE NAME 020318-P01_CP501_cutout.dft
TITLE Panel cutout 501	CLIENT

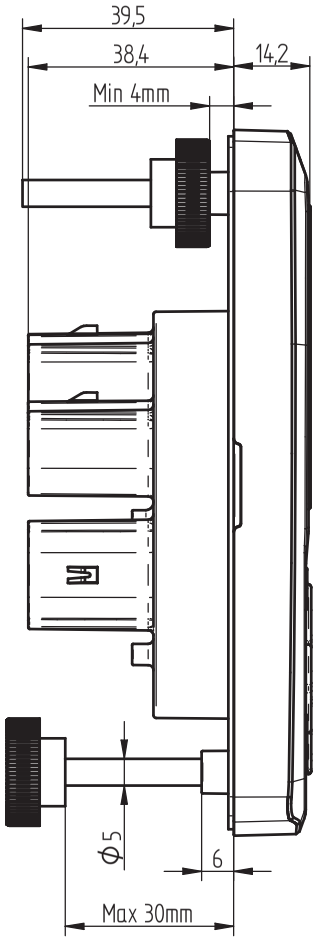
DRAWN JL	CHKD	APPVD BH	SCALE 1:1	DATE 2012-12-10

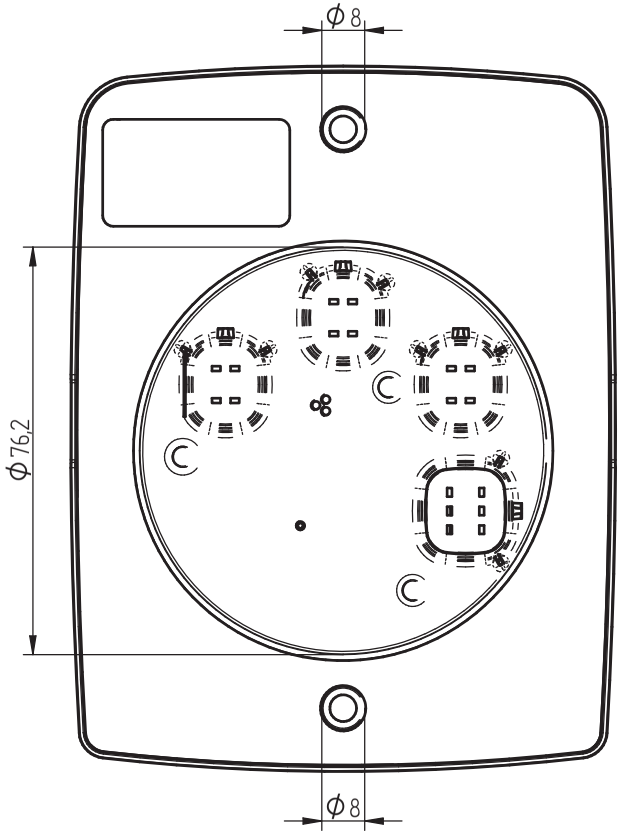
HUMPHREE®
www.humphree.com

SIZE	DRAWING NO	SHEET	REV
A4	020318	1 OF 1	P01

REV	DESCRIPTION	DATE	APPVD







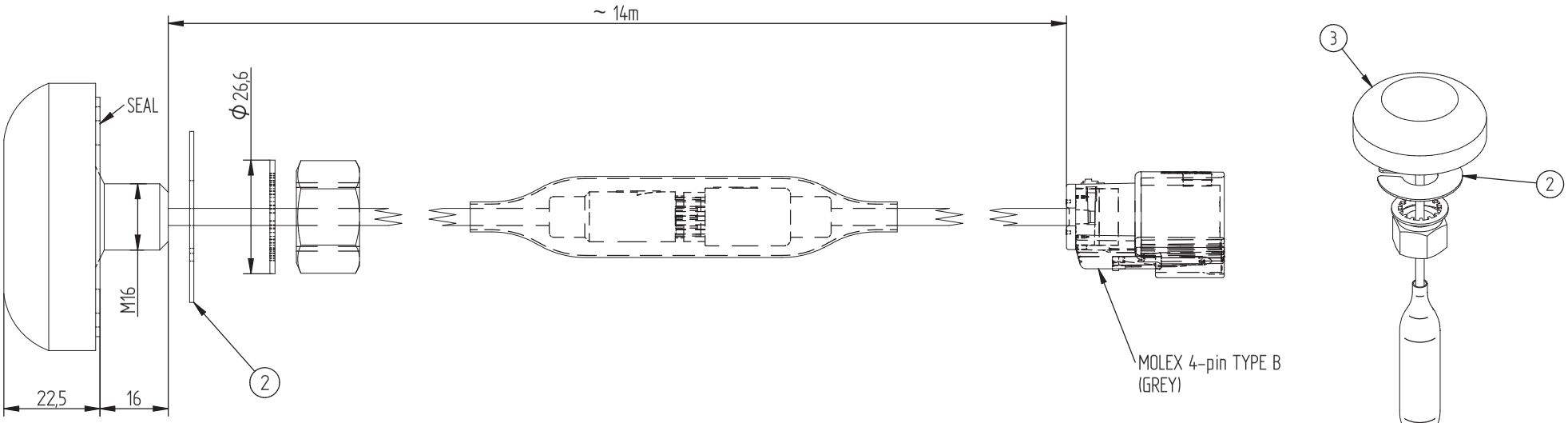
Specifications:
Power supply 12V ~ 24V DC
Front side waterproof IP66 when mounted
Operating temperature -20 to +70 degrees
Weight 0,3 kg

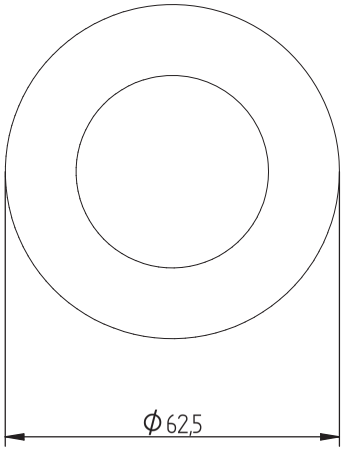
ITEM	QTY	DESCRIPTION	MATERIAL	SIZE	PART NUMBER	REV

PROJECT	FILE NAME 020144-K01_CP501_DIMENSIONS.dft
TITLE CP 501 DIMENSIONS	CLIENT

HUMPHREE® www.humphree.com	DRAWN JL	CHKD	APPVD BH	SCALE 1:1	DATE 2013-01-16
	SIZE A3	DRAWING NO 020144		SHEET 1 OF 1	REV K01

REV	DESCRIPTION	DATE	APPVD





Specifications:
Power supply 4.5V ~ 6.5V DC
Power consumption 70mA

Waterproof
Operating temperature -40 to +85
Dimension 62,5mm diameter, 22,5mm height

ITEM	QTY	DESCRIPTION	MATERIAL	SIZE	REFERENCE	REV
3	1	GPS-105			010730	
2	1	GPS ASSEMBLY PLATE	Stain. steel A4		020294	P01
1	1	Extension Cable PS/2 F MOLEX TYPE B		10m	020290	

PROJECT | FILE NAME 020145-K01_GPS_HCS-5_DIMENSIONS.dft

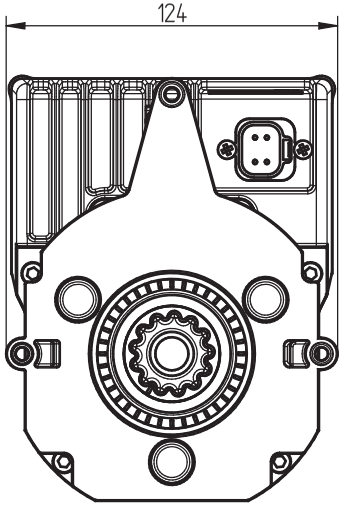
TITLE GPS HCS-5 DIMENSIONS | CLIENT

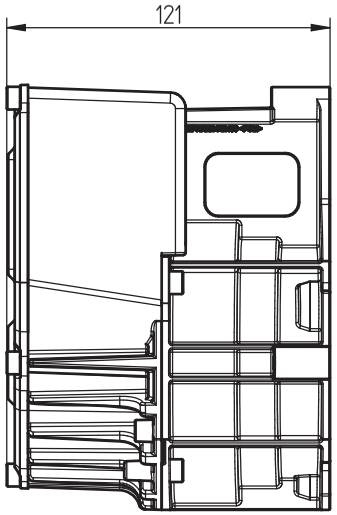
HUMPHREE®
www.humphree.com

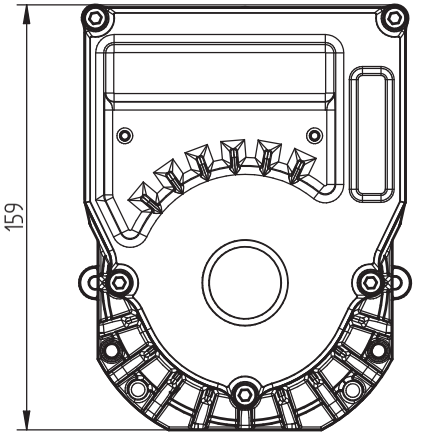
DRAWN BH | CHKD JL | APPVD CW | SCALE 1:1 | DATE 2012-12-18

SIZE A3 | DRAWING NO 020145 | SHEET 1 OF 1 | REV K01

REV	DESCRIPTION	DATE	APPVD







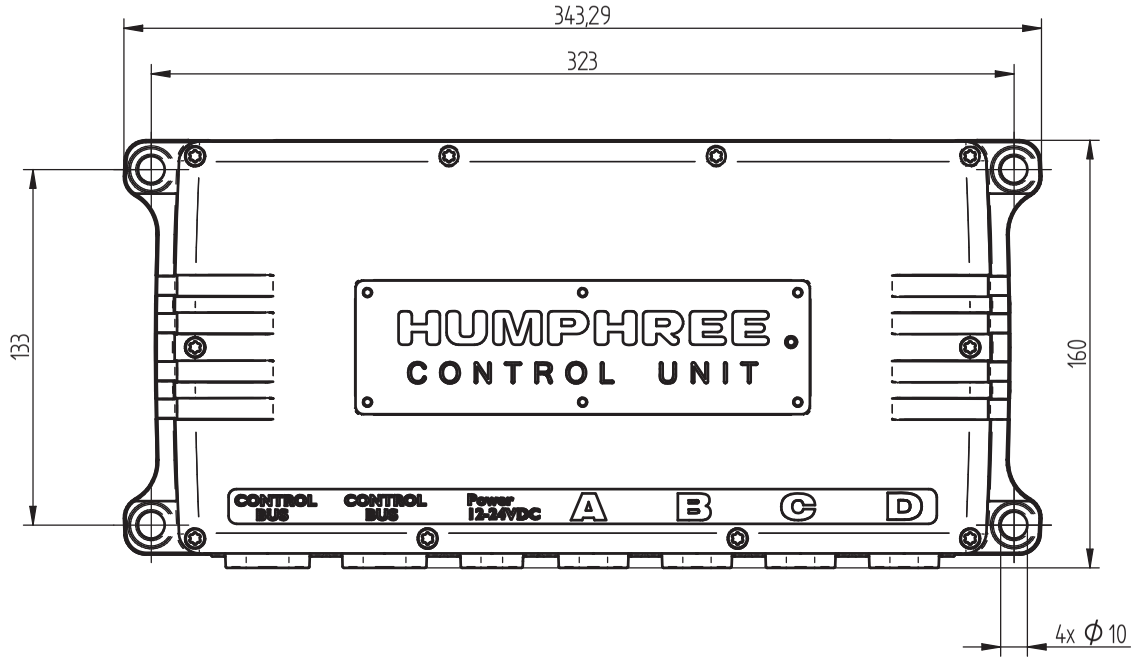
Specifications:
Power supply 12V ~ 24V DC
Waterproof IP67 (Note: When mounted)
Operating temperature -20 to +100 degrees
Weight 2,3 kg

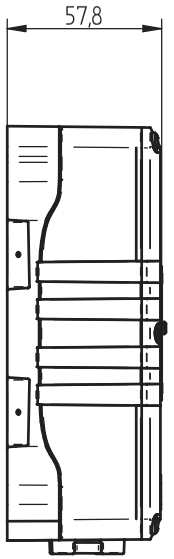
ITEM	QTY	DESCRIPTION	MATERIAL	SIZE	PART NUMBER	REV

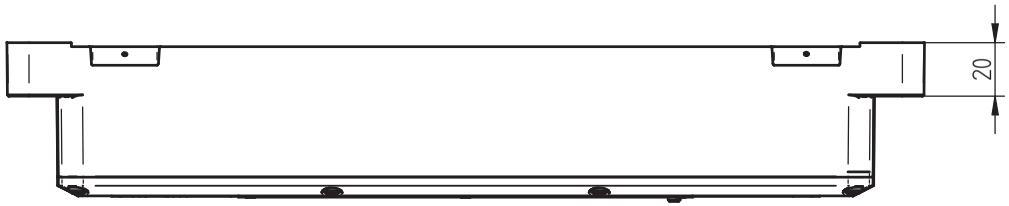
PROJECT	FILE NAME 020165_SU501-DIMENSIONS.dft
TITLE SU501 DIMENSIONS	CLIENT

HUMPHREE® www.humphree.com	DRAWN JL	CHKD	APPVD CW	SCALE 1:2	DATE 2012-12-18
	SIZE A3	DRAWING NO 020165		SHEET 1 OF 1	REV K01

REV	DESCRIPTION	DATE	APPVD







DATA
WIEGHT: 1kg
IP CLASS: IP66
POWER: 12-24 VDC

ITEM	QTY	DESCRIPTION	MATERIAL	SIZE	PART NUMBER	REV

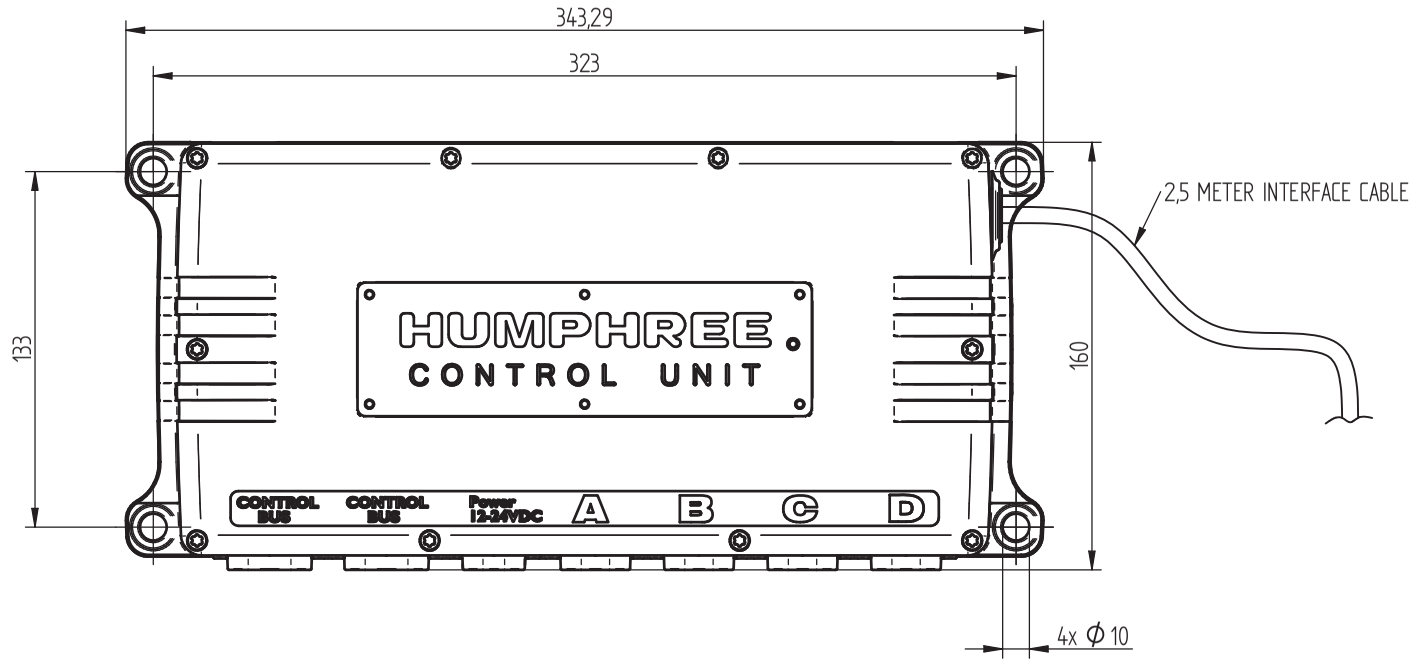
PROJECT	FILE NAME 020166-K01_HCU501_DIMENSIONS.dft
TITLE HCU501 DIMENSIONS	CLIENT

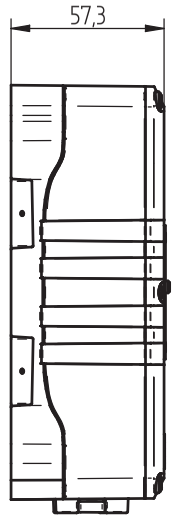
HUMPHREE®
www.humphree.com

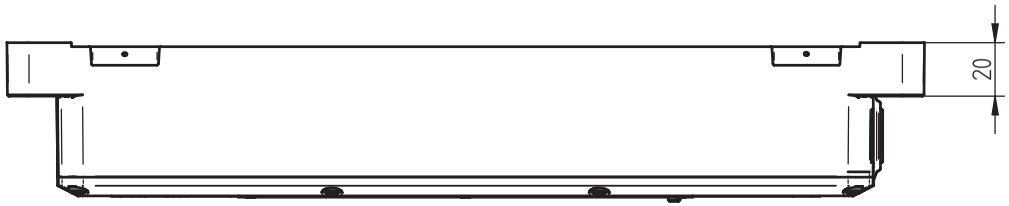
DRAWN BH	CHKD	APPVD CW	SCALE 1:2	DATE 2011-08-26

SIZE	DRAWING NO	SHEET	REV
A3	020166	1 OF 1	K01

REV	DESCRIPTION	DATE	APPVD







DATA
WIEGHT: 1,1 kg
IP CLASS: IP66
POWER: 12-24 VDC

ITEM	QTY	DESCRIPTION	MATERIAL	SIZE	PART NUMBER	REV

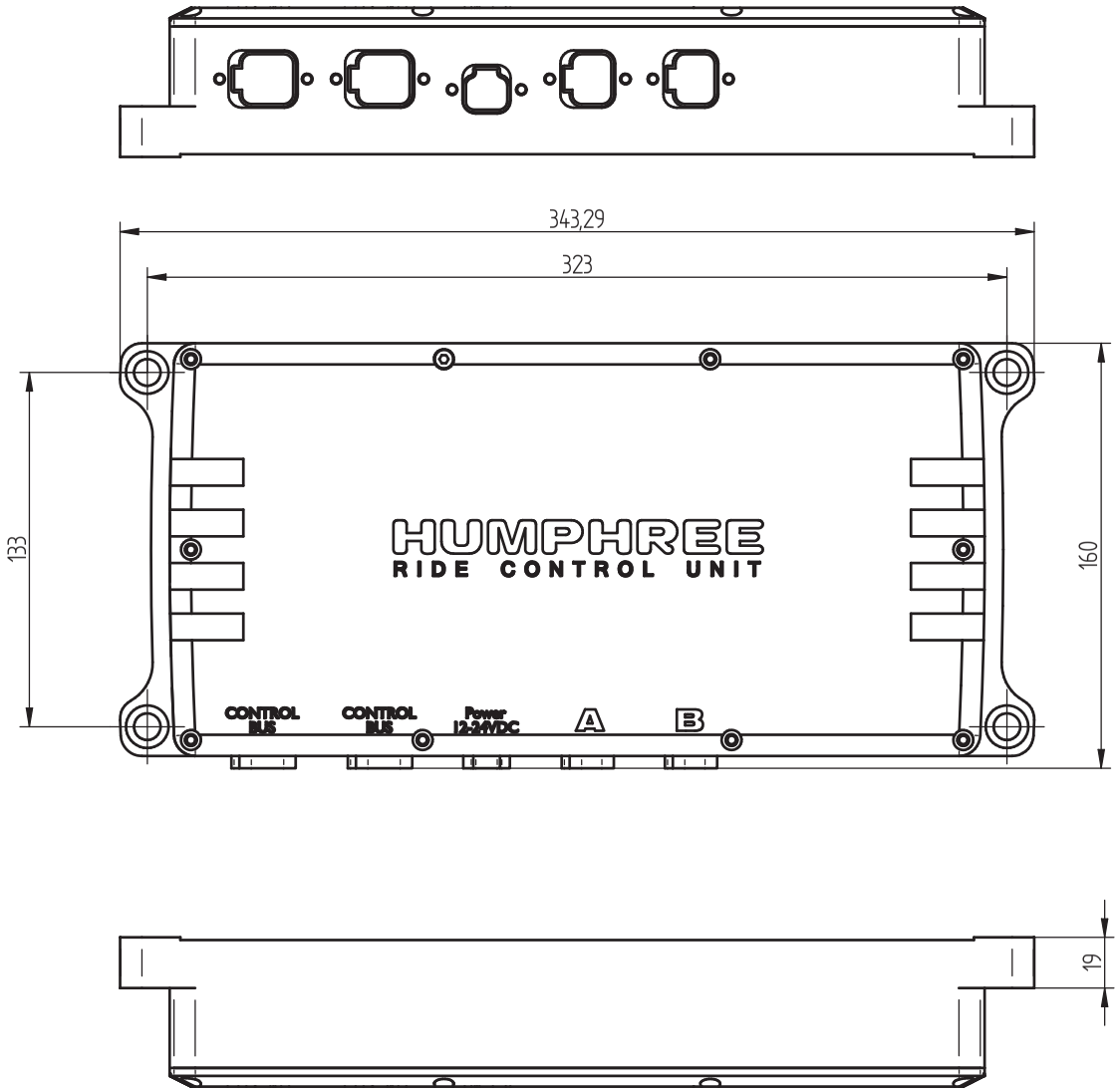
PROJECT	FILE NAME 020167-K01_HCU502_DIMENSIONS.dft
TITLE HCU502 DIMENSIONS	CLIENT

HUMPHREE®
www.humphree.com

DRAWN	CHKD	APPVD	SCALE	DATE
BH		CW	1:2	2011-08-26

SIZE	DRAWING NO	SHEET	REV
A3	020167	1 OF 1	K01

REV	DESCRIPTION	DATE	APPVD



DATA
WIEGHT: 2,5kg
IP CLASS: IP66
POWER: 12-24 VDC

ITEM	QTY	DESCRIPTION	MATERIAL	SIZE	PART NUMBER	REV

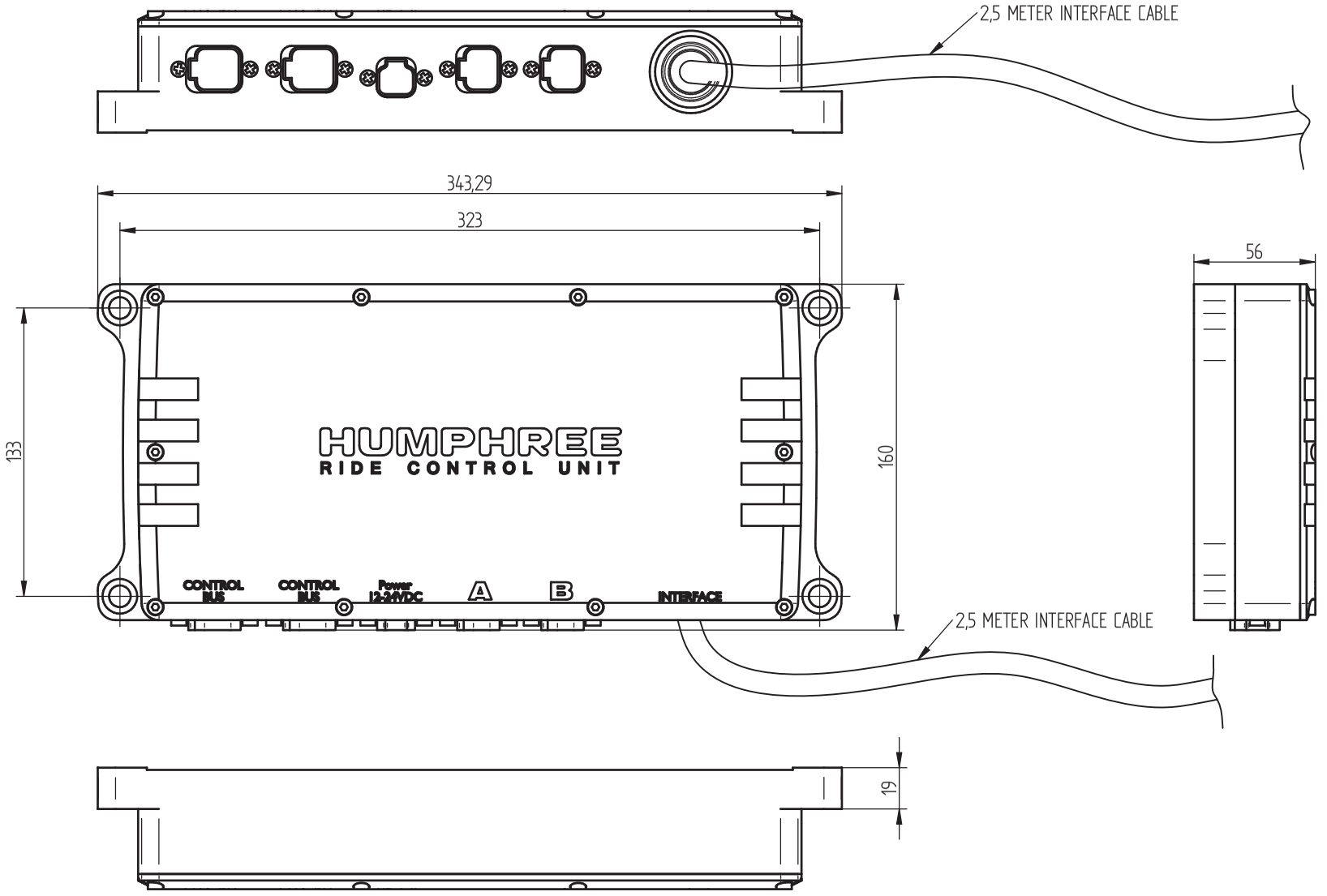
PROJECT	FILE NAME 020175-K01_RCU501_DIMENSIONS.dft
TITLE RCU501 DIMENSIONS	CLIENT

HUMPHREE®
www.humphree.com

DRAWN BH	CHKD JL	APPVD CW	SCALE 1:2	DATE 2012-12-18

SIZE	DRAWING NO	SHEET	REV
A3	020175	1 OF 1	K01

REV	DESCRIPTION	DATE	APPVD



DATA
WIEGHT: 2,6kg
IP CLASS: IP66
POWER: 12-24 VDC

ITEM	QTY	DESCRIPTION	MATERIAL	SIZE	PART NUMBER	REV

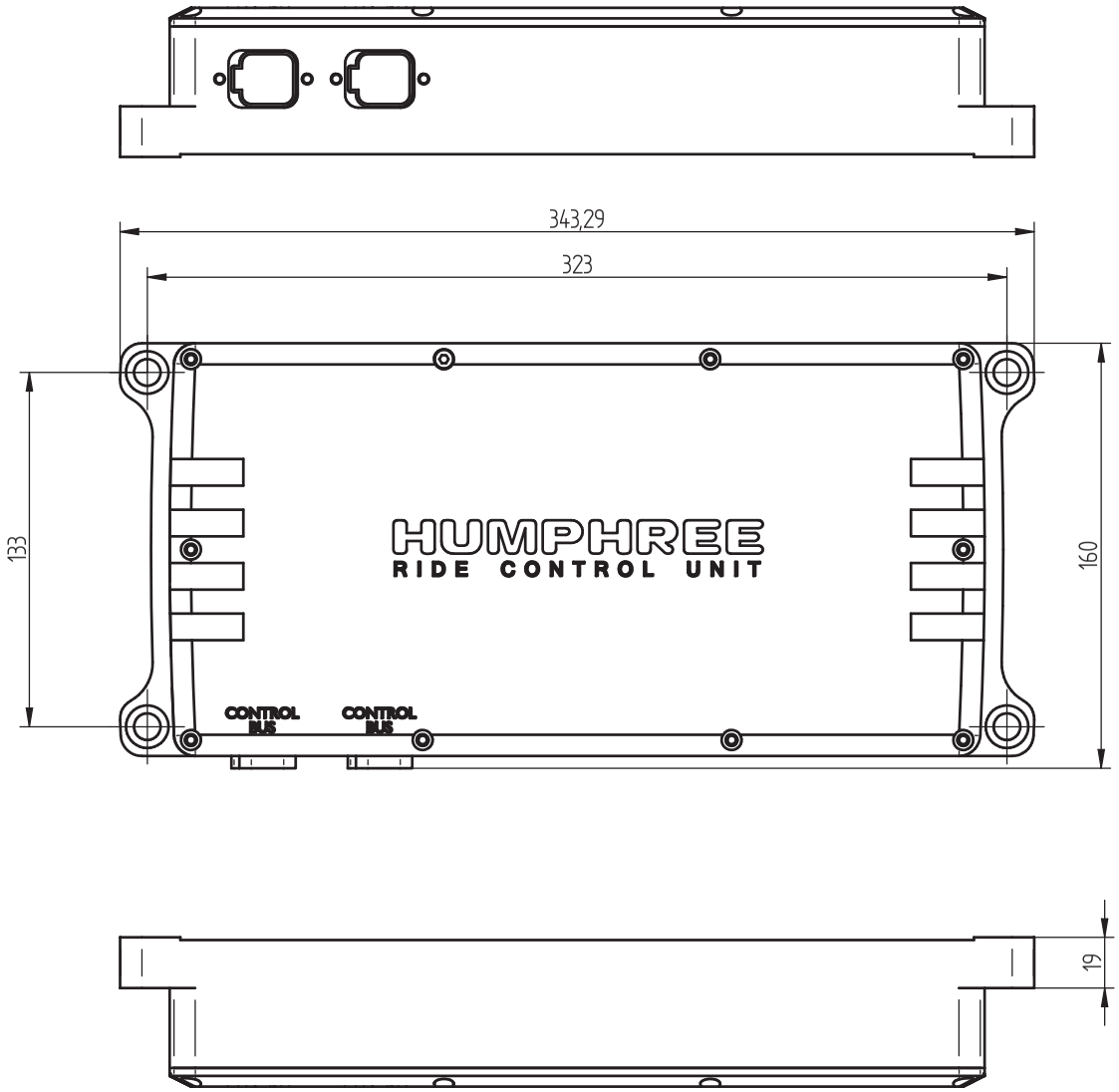
PROJECT	FILE NAME 020363-K01_RCU502_DIMENSIONS.dft
TITLE RCU502 DIMENSIONS	CLIENT

HUMPHREE®
www.humphree.com

DRAWN BH	CHKD JL	APPVD CW	SCALE 1:2	DATE 2012-12-18

SIZE	DRAWING NO	SHEET	REV
A3	020363	1 OF 1	K01

REV	DESCRIPTION	DATE	APPVD



DATA
WIEGHT: 2,5kg
IP CLASS: IP66
POWER: 12-24 VDC

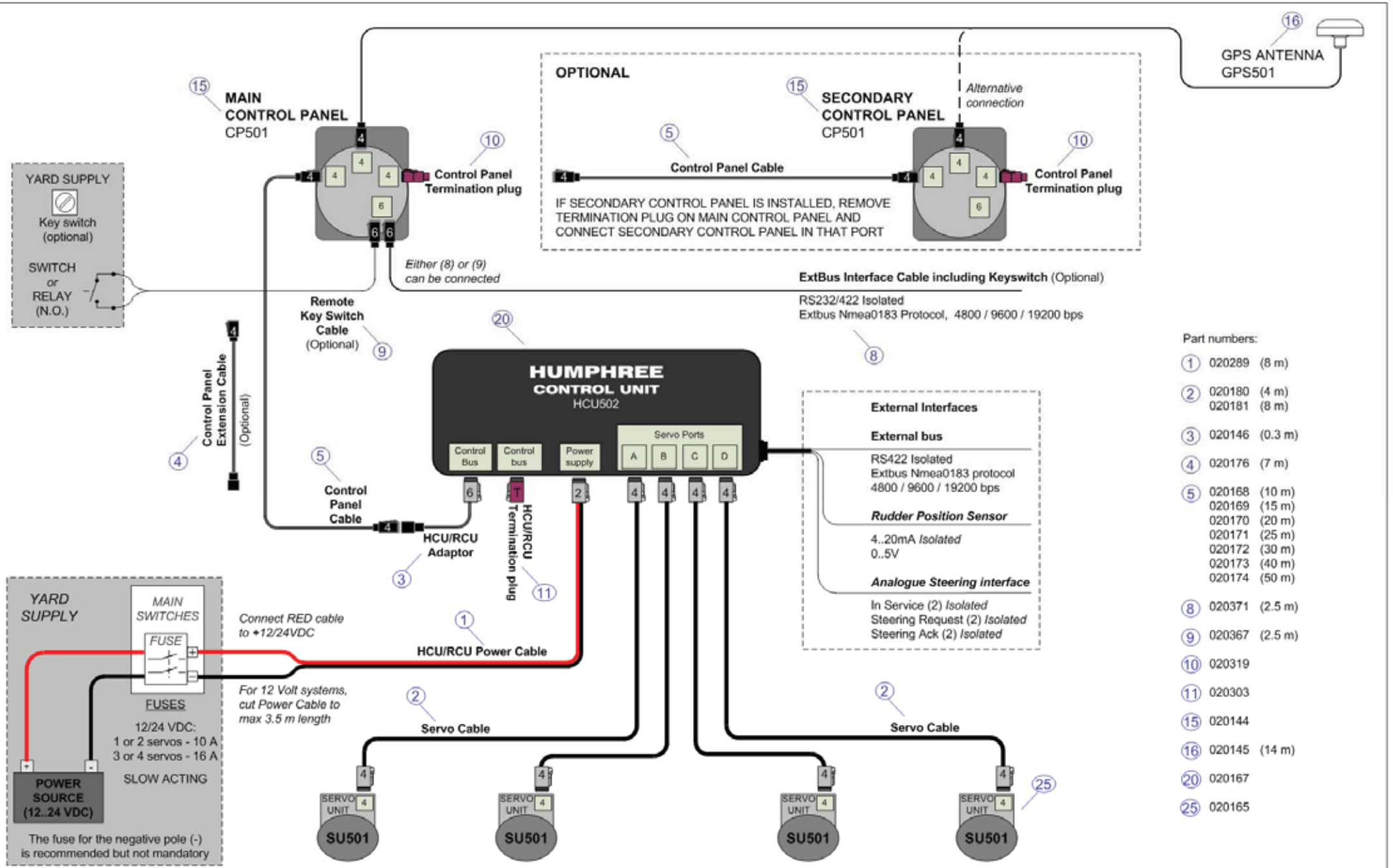
ITEM	QTY	DESCRIPTION	MATERIAL	SIZE	PART NUMBER	REV

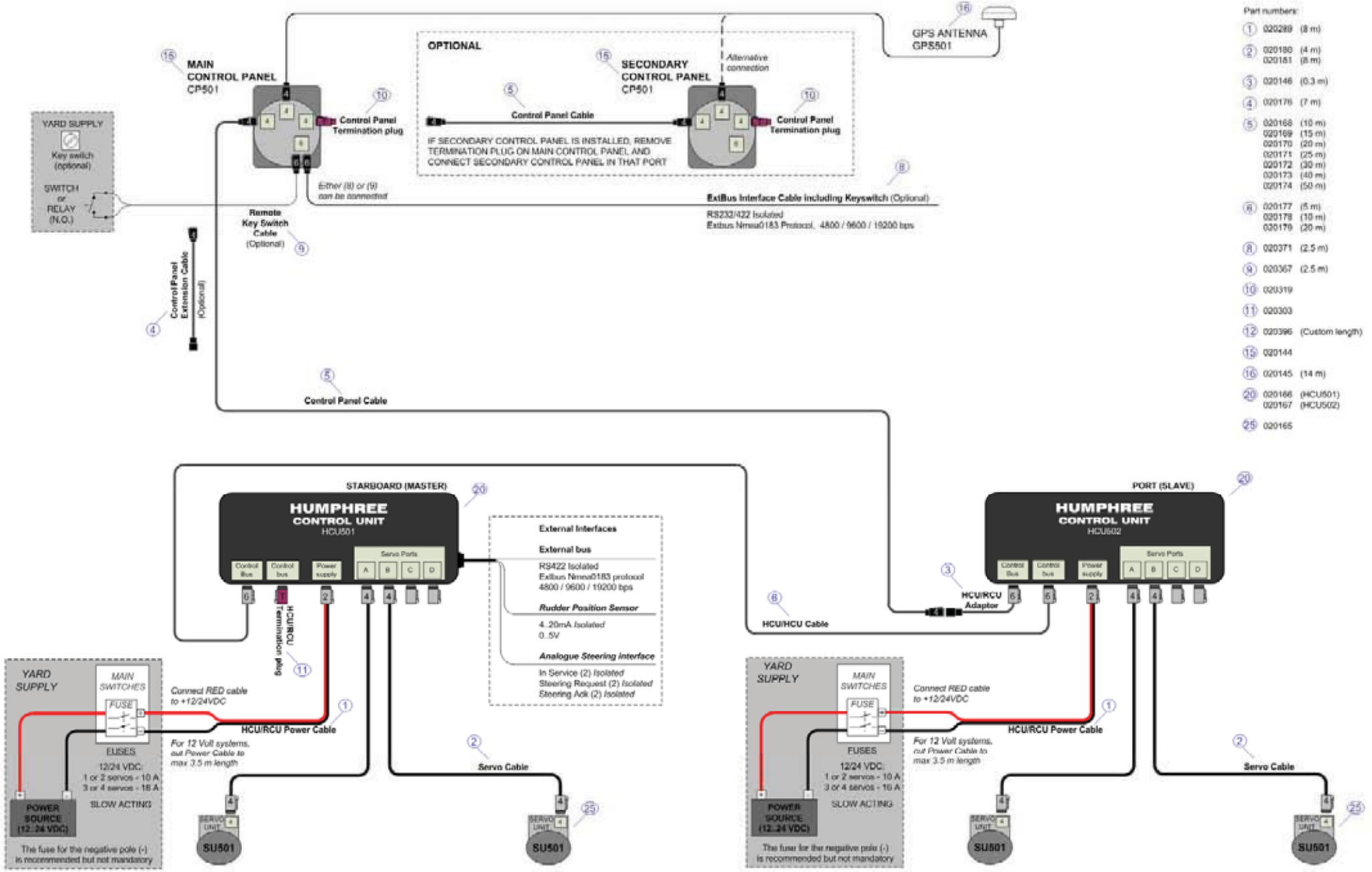
PROJECT	FILE NAME 020304-K01_RCU551_DIMENSIONS.dft
TITLE RCU551 DIMENSIONS	CLIENT

HUMPHREE®
www.humphree.com

DRAWN BH	CHKD JL	APPVD CW	SCALE 1:2	DATE 2012-12-18

SIZE	DRAWING NO	SHEET	REV
A3	020304	1 OF 1	K01

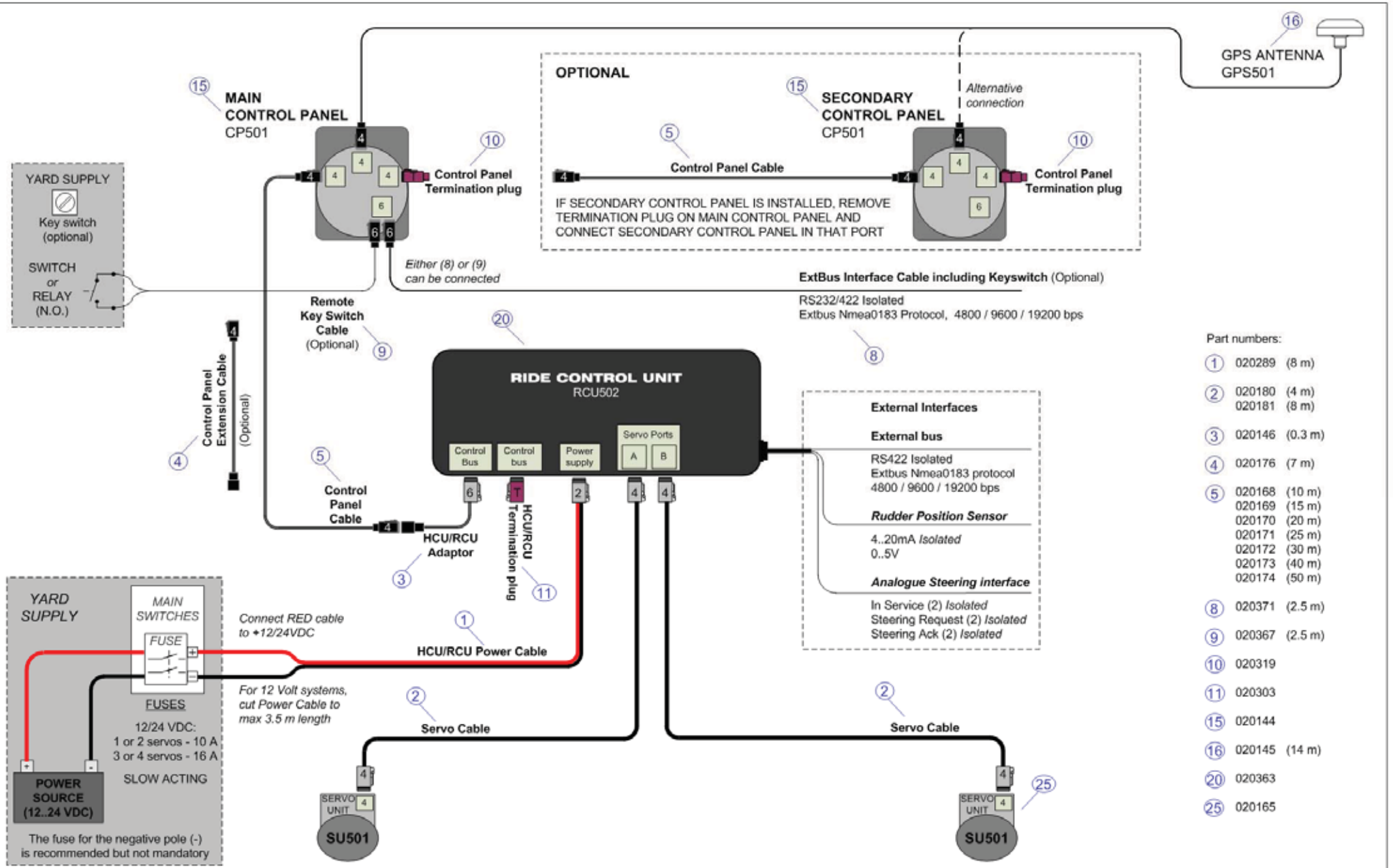

16
GPS ANTENNA
GPS501
OPTIONAL
15
SECONDARY
CONTROL PANEL
CP501
Alternative
connection
5
Control Panel Cable
10
Control Panel
Termination plug
IF SECONDARY CONTROL PANEL IS INSTALLED, REMOVE
TERMINATION PLUG ON MAIN CONTROL PANEL AND
CONNECT SECONDARY CONTROL PANEL IN THAT PORT
15
MAIN
CONTROL PANEL
CP501
10
Control Panel
Termination plug
YARD SUPPLY
Key switch
(optional)
SWITCH
or
RELAY
(N.O.)
Either (8) or (9)
can be connected
ExtBus Interface Cable including Keyswitch (Optional)
RS232/422 Isolated
Extbus Nmea0183 Protocol, 4800 / 9600 / 19200 bps
8
Remote
Key Switch
Cable
(Optional)
9
20
HUMPHREE
CONTROL UNIT
HCU502
Control
Bus
Control
bus
Power
supply
Servo Ports
A
B
C
D
Control Panel
Extension Cable
(Optional)
4
5
Control
Panel
Cable
HCU/RCU
Adaptor
3
HCU/RCU
Termination plug
11
External Interfaces
External bus
RS422 Isolated
Extbus Nmea0183 protocol
4800 / 9600 / 19200 bps
Rudder Position Sensor
4..20mA Isolated
0..5V
Analogue Steering interface
In Service (2) Isolated
Steering Request (2) Isolated
Steering Ack (2) Isolated
YARD
SUPPLY
MAIN
SWITCHES
FUSE
FUSES
12/24 VDC:
1 or 2 servos - 10 A
3 or 4 servos - 16 A
SLOW ACTING
POWER
SOURCE
(12..24 VDC)
The fuse for the negative pole (-)
is recommended but not mandatory
Connect RED cable
to +12/24VDC
1
HCU/RCU Power Cable
For 12 Volt systems,
cut Power Cable to
max 3.5 m length
2
Servo Cable
2
Servo Cable
SERVO
UNIT
SU501
SERVO
UNIT
SU501
SERVO
UNIT
SU501
SERVO
UNIT
SU501
25
Part numbers:
1 020289 (8 m)
2 020180 (4 m)
020181 (8 m)
3 020146 (0.3 m)
4 020176 (7 m)
5 020168 (10 m)
020169 (15 m)
020170 (20 m)
020171 (25 m)
020172 (30 m)
020173 (40 m)
020174 (50 m)
8 020371 (2.5 m)
9 020367 (2.5 m)
10 020319
11 020303
15 020144
16 020145 (14 m)
20 020167
25 020165
PROJECT HCU5
FILE NAME
TITLE
HCU5 Connection Diagram 4xTRIM HCU502
CLIENT
DRAWN SD
CHKD
APPVD
SCALE -
DATE 2013-06-26
HUMPHREE®
www.humphree.com
SIZE
A3
DRAWING NO
-
SHEET
1 OF 1
REV
K03



Part numbers:

1	020289	(8 m)
2	020180	(4 m)
	020181	(8 m)
3	020146	(0.3 m)
4	020176	(7 m)
5	020168	(10 m)
	020169	(15 m)
	020170	(20 m)
	020171	(25 m)
	020172	(30 m)
	020173	(40 m)
	020174	(50 m)
6	020177	(5 m)
	020178	(10 m)
	020179	(20 m)
8	020371	(2.5 m)
9	020367	(2.5 m)
10	020319	
11	020303	
12	020396	(Custom length)
15	020144	
16	020145	(14 m)
20	020166	(HCU501)
	020167	(HCU502)
25	020165	

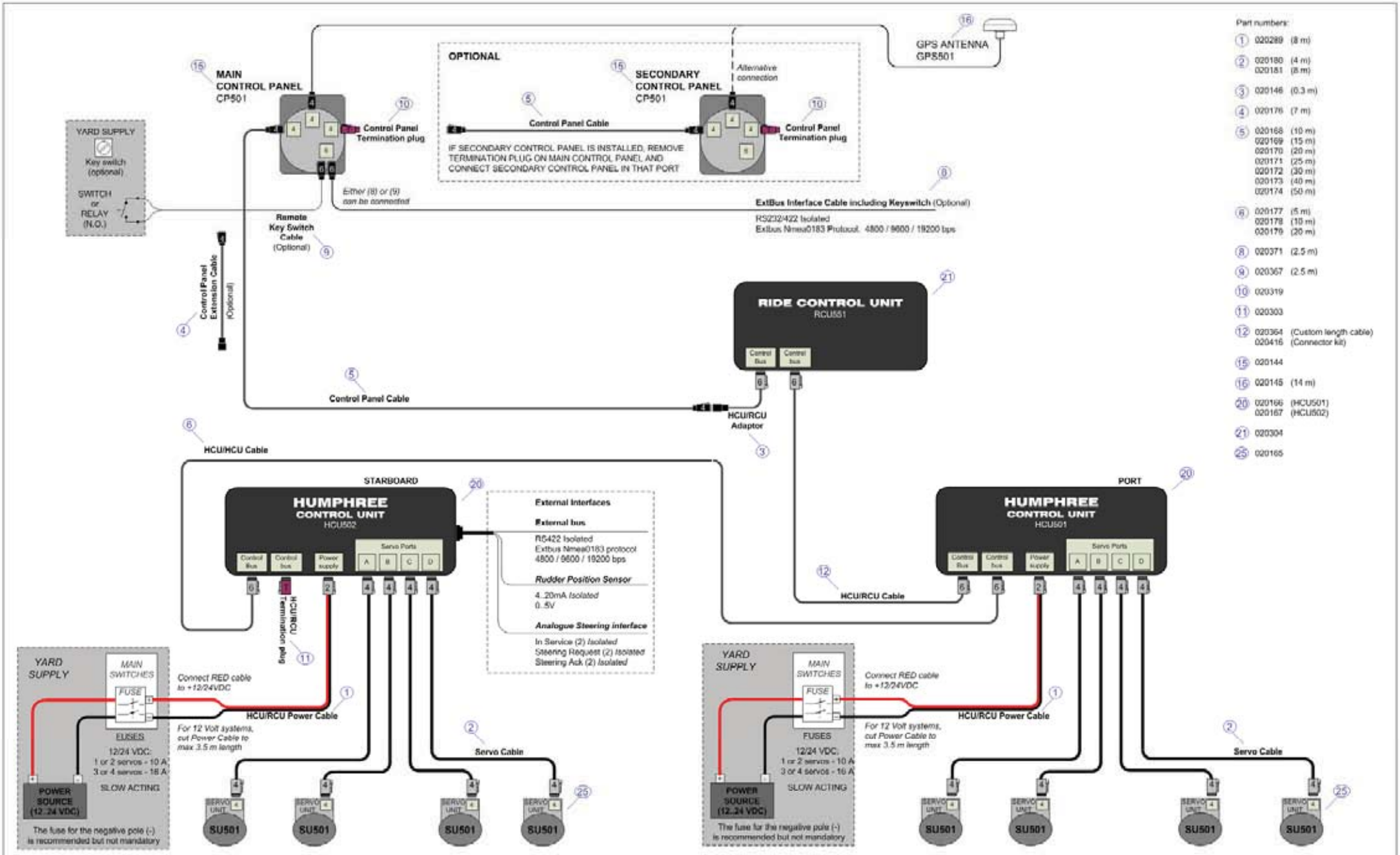
PROJECT		FILE NAME	
TITLE: HCU Connection Diagram w/RIM HCU502 HCU501		CLIENT	
HUMPHREE® www.humphree.com	DRAWN	CHKD	APPVD
	SCALE	DATE 2019-06-28	
	SIZE A2	DRAWING NO. -	SHEET 1 OF 1
	REV K03		



Part numbers:

1	020289	(8 m)
2	020180	(4 m)
	020181	(8 m)
3	020146	(0.3 m)
4	020176	(7 m)
5	020168	(10 m)
	020169	(15 m)
	020170	(20 m)
	020171	(25 m)
	020172	(30 m)
	020173	(40 m)
	020174	(50 m)
8	020371	(2.5 m)
9	020367	(2.5 m)
10	020319	
11	020303	
15	020144	
16	020145	(14 m)
20	020363	
25	020165	

PROJECT HCS5				FILE NAME	
TITLE HCS5 Connection Diagram 2xTRIM RCU502				CLIENT	
HUMPHREE®	DRAWN SD	CHKD	APPVD	SCALE -	DATE 2013-06-26
www.humphree.com	SIZE A3	DRAWING NO -		SHEET 1 OF 1	REV K03


Part numbers:
1 020289 (8 m)
2 020180 (4 m)
020181 (8 m)
3 020146 (0.3 m)
4 020176 (7 m)
5 020168 (10 m)
020169 (15 m)
020170 (20 m)
020171 (25 m)
020172 (30 m)
020173 (40 m)
020174 (50 m)
6 020177 (5 m)
020178 (10 m)
020179 (20 m)
8 020371 (2.5 m)
9 020367 (2.5 m)
10 020319
11 020303
12 020364 (Custom length cable)
020416 (Connector kit)
15 020144
16 020145 (14 m)
20 020166 (HCU501)
020167 (HCU502)
21 020304
25 020165
GPS ANTENNA GPS501
OPTIONAL
MAIN CONTROL PANEL CP501
SECONDARY CONTROL PANEL CP501
Alternative connection
Control Panel Cable
Control Panel Termination plug
IF SECONDARY CONTROL PANEL IS INSTALLED, REMOVE TERMINATION PLUG ON MAIN CONTROL PANEL AND CONNECT SECONDARY CONTROL PANEL IN THAT PORT
YARD SUPPLY
Key switch (optional)
SWITCH or RELAY (N.O.)
Either (8) or (9) can be connected
ExtBus Interface Cable including Keyswitch (Optional)
RS232/422 Isolated
ExtBus Nmea0183 Protocol. 4800 / 9600 / 19200 bps
Remote Key Switch Cable (Optional)
Control Panel Extension Cable (Optional)
RIDE CONTROL UNIT
RCU551
Control Bus
HCU/RCU Adaptor
HCU/HCU Cable
STARBOARD
HUMPHREE CONTROL UNIT
HCU502
PORT
HUMPHREE CONTROL UNIT
HCU501
Servo Ports
Power supply
External Interfaces
External bus
RS422 Isolated
ExtBus Nmea0183 protocol
4800 / 9600 / 19200 bps
Rudder Position Sensor
4..20mA Isolated
0..5V
Analogue Steering interface
In Service (2) Isolated
Steering Request (2) Isolated
Steering Ack (2) Isolated
HCU/RCU Termination plug
HCU/RCU Cable
YARD SUPPLY
MAIN SWITCHES
FUSE
FUSES
Connect RED cable to +12/24VDC
HCU/RCU Power Cable
For 12 Volt systems, cut Power Cable to max 3.5 m length
12/24 VDC:
1 or 2 servos - 10 A
3 or 4 servos - 16 A
SLOW ACTING
POWER SOURCE (12..24 VDC)
The fuse for the negative pole (-) is recommended but not mandatory
Servo Cable
SERVO UNIT
SU501
PROJECT
FILE NAME
TITLE
HCS Connection Diagram for RAM RCU551 HCU502 HCU501
CLIENT
DRAWN
CHKD
APPVD
SCALE
DATE
HUMPHREE®
www.humphree.com
SIZE
A2
DRAWING NO
-
SHEET
1 OF 1
REV
K03

External Interfaces: PIN-OUT

1. HCU / RCU 502

External Interfaces Cable (16 Wires)

COLOUR:	NAME:	DESCRIPTION:
RED	4TO20_P	4 to 20 mA Sender: Positive
LIGHT BLUE	4TO20_N	4 to 20 mA Sender: Negative
YELLOW	0TO5_IN	0 to 5V Sender: Sensor input to HCU
WHITE	5V_OUT	0 to 5V Sender: +5V supply
GREEN	GND	0 to 5V Sender: Ground
DEEP PURPLE	TX_H	RS422: Transmit from HCU Positive
GREY	RX_H	RS422: Receive to HCU Positive
BLACK	TX_L	RS422: Transmit from HCU Negative
PINK	RX_L	RS422: Receive to HCU Negative
BROWN	ISO_GND	RS422: Isolated Ground
YELLOW/BROWN	RELAY_A1_P	System In Service: Relay Positive
YELLOW/WHITE	RELAY_A1_N	System In Service: Relay Negative
BLUE/RED	RELAY_A2_P	Steering Acknowledge: Relay Positive
GREY/PINK	RELAY_A2_N	Steering Acknowledge: Relay Negative
WHITE/GREEN	SWITCH_IN_P	Steering Request: Switch Positive
BROWN/GREEN	SWITCH_IN_N	Steering Request: Switch Negative

2. CP501

Extbus Interface Cable including Keyswitch

COLOUR:	NAME:	DESCRIPTION:
YELLOW	RX_H	RS232/422: Receive to CP Positive
GREY	TX_H	RS232/422: Transmit from CP Positive
GREEN	RX_L	RS422: Receive to CP Negative
PINK	TX_L	RS422: Transmit from CP Negative
WHITE	KEY	Keyswitch Positive
BROWN	GND	Keyswitch Negative AND RS232/422 Ground

Extbus Port 6-pin

PIN:	NAME:	DESCRIPTION:
1	RX_H	RS232/422: Receive to CP Positive
2	TX_H	RS232/422: Transmit from CP Positive
3	RX_L	RS422: Receive to CP Negative
4	TX_L	RS422: Transmit from CP Negative
5	KEY	Keyswitch Positive
6	GND	Keyswitch Negative AND RS232/422 Ground

NOTES

NOTES

NOTES

For software versions 5.1.x

Ship ID

Your Local Agent/Dealer

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Göteborg Sweden

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www.humphree.com

020311-5.1.x-03