

INSTRUCTION FOR INSTALLATION, OPERATION, AND MAINTENANCE

⚠ DANGER

Understand manual before use. Operation of this device without understanding the manual and receiving proper training is a misuse of this equipment. Obtain safety information at tft.com/serial-number.

This equipment is intended for use by trained and qualified emergency services personnel for firefighting. All personnel using this equipment shall have completed a course of education approved by the Authority Having Jurisdiction (AHJ).

This instruction manual is intended to familiarize firefighters and maintenance personnel with the operation, servicing, and safety procedures associated with this product. This manual should be kept available to all operating and maintenance personnel.

Operator Station Options

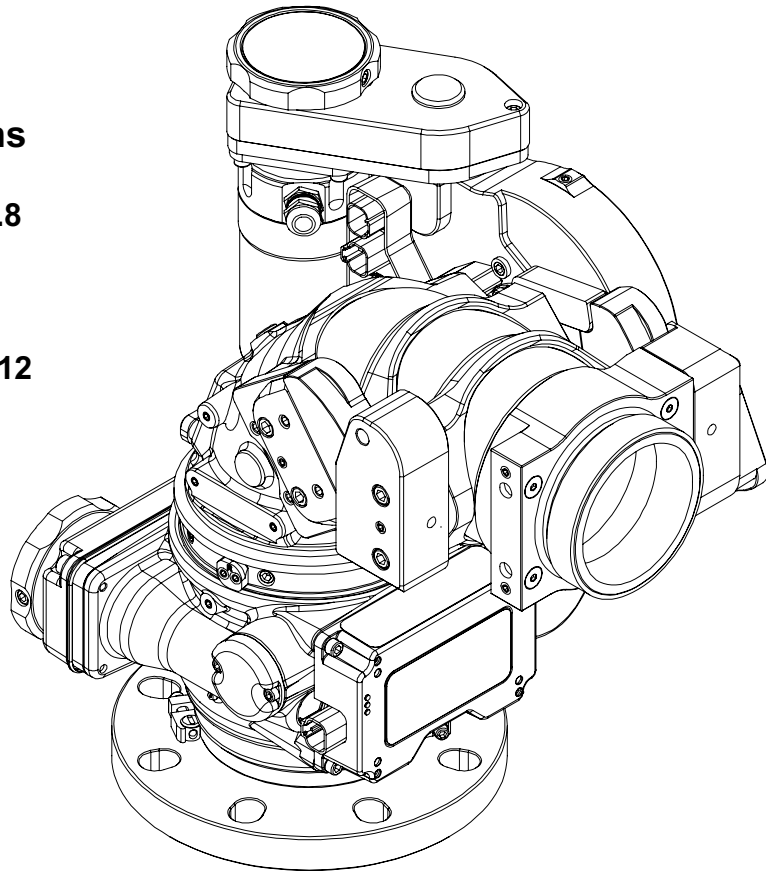
Monitor Mount - Section 4.8

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FLEX RC MONITOR

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DANGER

PERSONAL RESPONSIBILITY CODE

The member companies of FEMSA that provide emergency response equipment and services want responders to know and understand the following:

1. **Firefighting and Emergency Response** are inherently dangerous activities requiring proper training in their hazards and the use of extreme caution at all times.
2. **IT IS YOUR RESPONSIBILITY** to read and understand any user's instructions, including purpose and limitations, provided with any piece of equipment you may be called on to use.
3. **IT IS YOUR RESPONSIBILITY** to know that you have been properly trained in Firefighting and/or Emergency Response and in the use, precautions, and care of any equipment you may be called upon to use.
4. **IT IS YOUR RESPONSIBILITY** to be in proper physical condition and to maintain the personal skill level required to operate any equipment you may be called upon to use.
5. **IT IS YOUR RESPONSIBILITY** to know that your equipment is in operable condition and has been maintained in accordance with the manufacturer's instructions.
6. Failure to follow these guidelines may result in death, burns or other severe injury.





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FEMSA

1.0 MEANING OF SAFETY SIGNAL WORDS

A safety related message is identified by a safety alert symbol and a signal word to indicate the level of risk involved with a particular hazard. Per ANSI Z535.6, the definitions of the four signal words are as follows:

	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
	NOTICE is used to address practices not related to physical injury.

2.0 SAFETY

	An inadequate supply of pressure and/or flow will cause an ineffective stream and can result in injury or death. Choose operating conditions to deliver adequate fire suppression.
	This equipment is intended for use by trained personnel for firefighting. Use of this equipment for other purposes may involve hazards not addressed by this manual. Seek appropriate guidance and training to reduce risk of injury.
	Equipment may be damaged if frozen while containing significant amounts of water. Such damage may be difficult to detect visually. Subsequent pressurization can lead to injury or death. Any time the equipment is subject to possible damage due to freezing, it must be tested and approved for use by qualified personnel before being considered safe for use.
	This device is not rated as ignition proof, explosion proof, or intrinsically safe. Use only in locations with adequate ventilation and no hazard of flammable vapor buildup.
	The electric drives are current limited but may still produce enough force to cause injury. To avoid injury from moving equipment: <ul style="list-style-type: none">• Be aware that equipment may be remotely operated• Keep hands and fingers away from pinch points• Never operate the manual override while electric controls are in operation
	High-pressure spray can infiltrate connection points, causing damage to electrical components. Use care when using a pressure washer or other high pressure spray around this equipment. To avoid damage, NEVER apply high-pressure spray to any seams in the actuator housing or connection points on the electrical cable.
	To prevent mechanical damage, do not drop or throw equipment.

3.0 GENERAL INFORMATION

The FLEX RC monitor is controlled by a very powerful, state-of-the-art electronic system. The key components of the system are the motor control boards and a communication board. Each motor control board has its own microprocessor and a sophisticated motor control chip. The communication board also has a microprocessor, which handles the interface to the operator stations. All the components on these boards are solid state; there are no relays or electromechanical devices to wear out over time. The hardware and software have been designed with several key features.

3.0.1 MOTOR CURRENT LIMITING

The microprocessor on the motor control board continuously monitors the motor current. As the motor reaches an end stop or if there is an obstruction, the motor current rises very quickly and the motor control chip automatically shuts down the motor in a few milliseconds. This eliminates the need for any type of external limit switches and the associated wiring. The microprocessor also locks the operator from moving in the stopped direction again, until the operator first moves in the opposite direction.

3.0.2 MOTOR SOFT STOPS AND ABSOLUTE POSITION

The horizontal and vertical motors are equipped with feedback encoders and absolute position sensors which allow the microprocessor to know the motor position at all times, even after power loss. As the monitor approaches an end stop, the control board automatically slows down the motor until the end stop is reached. This significantly reduces the wear on the motor, gearbox, and gear drives.

3.0.3 COMMUNICATION PROTOCOL

The communication from the monitor to the operator stations is performed over two wires using J1939 CANbus serial protocol. Multiple operator stations can be added with only two wires for power and two wires for the J1939 CANbus protocol between each station.

3.0.4 OSCILLATE AND STOW FEATURES

The OSCILLATE feature allows the user to program up to 30 points of continuous movement of the horizontal and vertical axes. The OSCILLATE pattern can be programmed from the app, or from any operator station that has low profile keypad buttons. The STOW feature allows the user to move the monitor, with one touch of a button, to a safe position before moving the fire truck. During the programming procedure, the user has the ability to select which axis moves first. This is helpful to avoid lights, hoses, obstructions, etc. The user can program up to 10 points of movement to reach the final stowed position. The STOW pattern can be programmed from the app, or from any operator station that has low profile keypad buttons. A relay contact, located in the interface box, is available for connection to the truck alarm.

3.0.5 SMART STREAM TECHNOLOGY

This technology, only available with TFT ER nozzles, utilizes a position encoder in the nozzle actuator to give the user greater control on the stream pattern, especially at FOG position. Nozzles equipped with a FLUSH position are programmed to stop and pause at full FOG position when moving towards the FLUSH position, preventing unwanted water flow. A second press on the button will cause the nozzle shaper to continue to move to FLUSH position for removing debris from the nozzle.

3.0.6 MONITOR DISABLE LOCK

This feature provides an interlock for RC monitors that are installed on trucks in extremely confined spaces. This interlock can also be used to prevent an RC monitor from moving and potentially damaging surrounding equipment. TFT RC Extend-A-Guns are shipped with the Monitor Disable Interlock feature enabled. This feature prevents the monitor from moving when the RC Extend-A-Gun is in the retracted position. Ladder/ Platform versions of monitors require a signal wired to an inhibit input in the electronics interface box. Once active this interlock will prevent the monitor from damaging the apparatus that the monitor is installed on and prevent operator error from causing costly damage.

3.0.7 MONITOR SIT-AND-STAY FEATURE

Once the STOW pattern has been performed, the monitor will enter an active state of checking axis positions. If road vibration causes the axes to move or an operator tries to move the manual override knob, the motor control boards will command the motors back to the STOW axis position. This feature can be canceled by hitting any of the movement buttons on an operator station. This feature is not disabled by the INHIBIT interlock feature. Power must be applied to the monitor for this feature to remain active.

3.0.8 MONITOR DEPLOY FEATURE

This feature will move the monitor horizontal & vertical axes to a predetermined position. This feature is useful to quickly move the monitor from a STOW position into an attack position, ready for water flow. The monitor MUST be in the STOW position before DEPLOY can be activated. Initiating a DEPLOY movement will command each axis to a default position of 50% of their overall travel limits. These percentages can be adjusted by the user in the app.

3.1 SPECIFICATIONS

ELECTRICAL SPECIFICATIONS				
Nominal Operating Voltage	12 or 24 VDC (auto sense)			
Voltage Range (at monitor, motors running)	12 Volt system 9 VDC min./32 VDC max.		24 Volt system 18 VDC min./32 VDC max.	
Motor Current	@12 VDC		@24 VDC	
	Nominal*	Limit	Nominal*	Limit
Elevation Motor	6 amps	15 amps	3 amps	7.5 amps
Horizontal Rotation Motor	6 amps	10 amps	3 amps	5 amps
Nozzle Motor	1 amp	5 amps	0.5 amps	2.5 amps
Recommended Fuse or Circuit Breaker Size	15 amp		7.5 amp	
	*with rated water pressure applied			
At Rest Current	.25 amps		.13 amps	
Operating Temperature Range	-30°F to 120°F (-34°C to 49°C)			
Storage Temperature Range	-40°F to 150°F (-40°C to 65°C)			
RC Monitors and Accessories	All components designed to meet minimum rating of IP66/IP67			

Table 3.1A

WIRELESS OPERATOR SPECIFICATIONS (YC-RF-24)	
Handheld Unit Batteries	Rechargeable
Operating Range	500 ft (152m)
Operating Frequency	2.4 GHz (2.4000 - 2.4835 GHz)
Agency Approvals	
FCC	MCQ-XBEE3
Industry Canada (IC)	1846A-XBEE3
Europe	2014/53/EU

Table 3.1B

YC-RF-24 CONTAINS FCC ID: SQG-LYRAP THE ENCLOSED DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION

4.0 ELECTRICAL CONTROLS INSTALLATION AND OPERATION

The FLEX RC monitor is supplied with a monitor mounted electronics hub. The wiring on the monitor and for the electronics hub is factory installed. The assembly is supplied with a cable for connection to the operator control stations as shown in Figure 4.0 or directly to a protected voltage supply. This cable has 4-conductors which supply power and communications from the operator stations to the monitor. To complete the installation, the installer will need to mount and wire the selected operator stations. The power supply for the monitor will need to be connected to a protected (fused) circuit from the truck's power distribution center. Refer to the specifications section 3.1 for nominal current draw.

For installations where the customer would like to turn off the voltage to the monitor independent of the truck master switch, the installer needs to install a user supplied SPST (single-pole single-throw) toggle switch. Install this toggle switch in a location that can quickly be accessed before using the RC monitor. The toggle switch needs to be wired between the protected voltage supply and the red wire feeding the RC monitor.

NOTICE

INSTALLATION AND SERVICE PRACTICES

- Disconnect power before installing or servicing the electrical components to avoid electrical shock hazard or injury due to moving parts.
- Provide adequate power for all electrical controls and motors taking into account voltage drops on wiring. See section 3.1 for electrical specifications.
- Careful selection of wiring is critical to avoid excessive voltage drop.
- Cable must be used in strain relief fittings.
 - Larger (PG11) fitting - 0.20" - 0.39" (5mm - 10mm) cable diameter.
 - Smaller (PG9) fitting - 0.16" - 0.31" (4mm - 8mm) cable diameter.
- Good mechanical connections on the wires are absolutely necessary and should be checked periodically. Poor electrical connections can cause power loss to the electric RC monitor and be a fire hazard.
- Be careful to route cables and controls in protected areas away from high heat sources.
- Use grommets whenever wires pass through holes to prevent damage due to snags, abrasions, etc.
- Secure cables close to control box with plastic wire ties or cable clamps to relieve stress on the cables.
- Observe precautions for electrostatic sensitive devices when installing or servicing controls. Touch fingers to bare metal surface before handling control boards to dissipate static electricity.
- Make sure that all control covers and gaskets are restored to their original condition after installation or servicing to maintain weather tight seal.
- Ensure ground wires are connected to a proper grounding connection or ground stud capable of handling required current. Do not rely on chassis or frame ground as these connections can deteriorate over time. Run ground wire directly to battery terminal if necessary.

Recommended Tool List - 11/32" nut driver - Wire cutter/stripper - Terminal crimping tool - Utility knife - 20mm open-end box wrench - 17mm open-end box wrench - 3mm hex wrench - 5/32" drill bit - 25/32" drill bit - #2 Phillips screwdriver - Small flat blade screwdriver

IMPORTANT - When mechanical installation and electrical connections are complete, perform the following test to verify voltage supply is adequate and the current limiting feature is functioning.

1. Apply power to monitor control box.
2. Press LEFT button and hold until monitor reaches its stop position. Continue to hold button down.
3. Once movement is stopped, manually turn override knob in opposite direction while continuing to hold button down. If knob can be turned, then voltage supply is adequate. If knob cannot be turned and motor continues to operate, then the voltage supply or wiring is not adequate. Check connections and voltage connection point, rewire if necessary. **NOTE: Override knob will only turn in one direction.**
4. Once proper voltage is confirmed, move monitor to RIGHT, UP, and DOWN stop positions. Be sure to hold button each move until motor current limits.

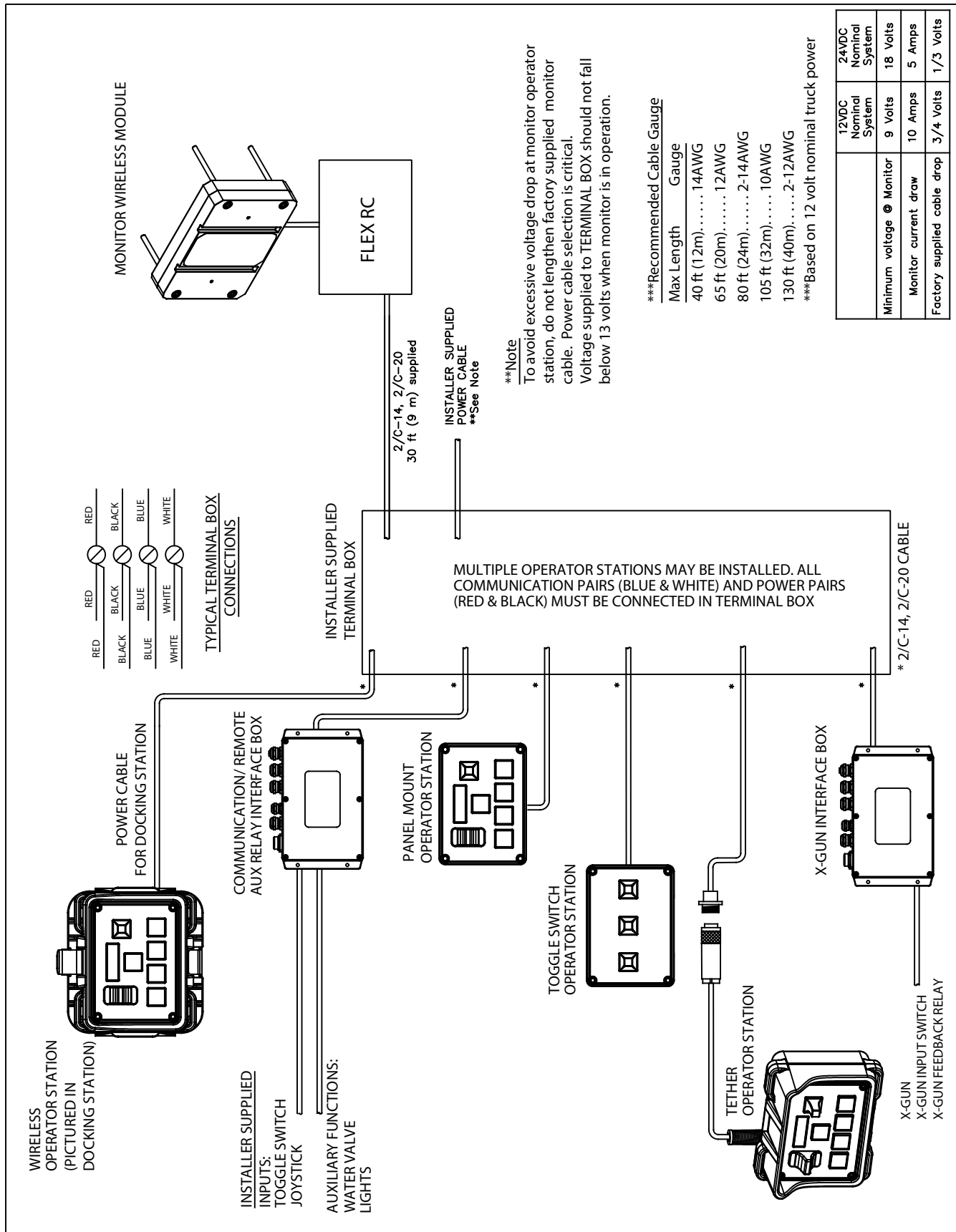


Figure 4.0
 ELECTRICAL COMPONENTS (non-aerial installation)

4.0.1 J1939 CANbus WIRING INSTRUCTIONS AND TERMINATING RESISTORS

The FLEX RC monitor and accessories operate on a J1939 CANbus serial protocol. All FLEX RC monitors and accessories contain an internal resistor that can be set to OPEN or CLOSED via the TFT SmartPlex App. (See LIY-701 TFT SmartPlex App manual for instructions).

For correct operation of the FLEX RC monitor and accessories, it is critical to ensure that the resistors are set correctly for each device on the CANbus line. The default status of the resistor varies by product.

PRODUCT NAME	MODEL NUMBER	DEFAULT RESISTOR STATUS
FLEX RC Monitor	YN-E* - Series	CLOSE
Panel Mount Operator Station	YC-RP	OPEN
Monitor Mount Operator Station	YC-RM	OPEN
Toggle Switch Operator Station	YC-TS	OPEN
Tethered Operator Station	YC-CT-30	OPEN
Wireless Operator Station Antenna	YC-RF-RAD-24	OPEN
Communication Interface Box	YC-COMM	OPEN
Extend-A-Gun RC	XGJ* - Series	CLOSE

Table 4.0.1

4.0.2 CANbus WIRING CONFIGURATION WITH INTERNAL RESISTORS

For systems that use **internal resistors**, ensure that the 2 items located the furthest apart on the CANbus line (terminating devices) have the resistors set to CLOSED. All other items located in between must be set to OPEN.

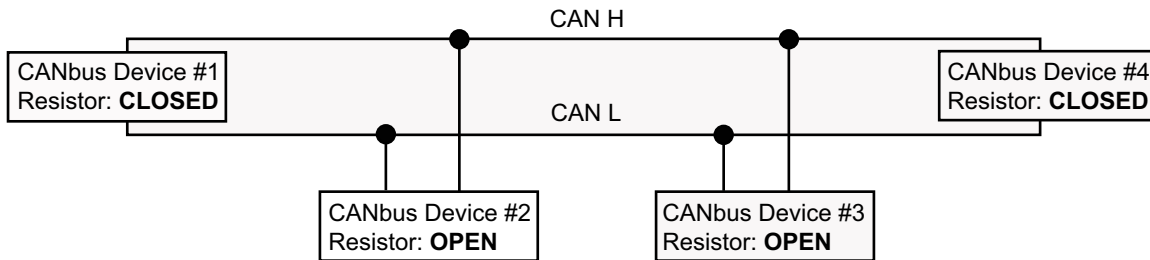


Figure 4.0.2

4.0.3 CANbus WIRING CONFIGURATION WITH EXTERNAL RESISTORS

For systems that use external resistors, ensure that all items located on the CANbus line are set to OPEN.

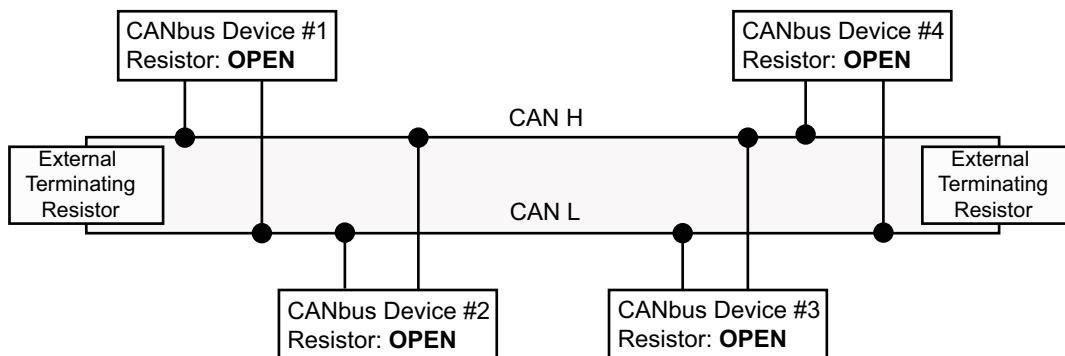


Figure 4.0.3

4.0.4 CANbus WIRING DISTANCE REQUIREMENTS

Per J1939 CANbus installation requirements, the distance between the terminating devices must be no more than 130 ft (40 m). All other components must be no more than 32 ft (10 m) from the CANbus line.

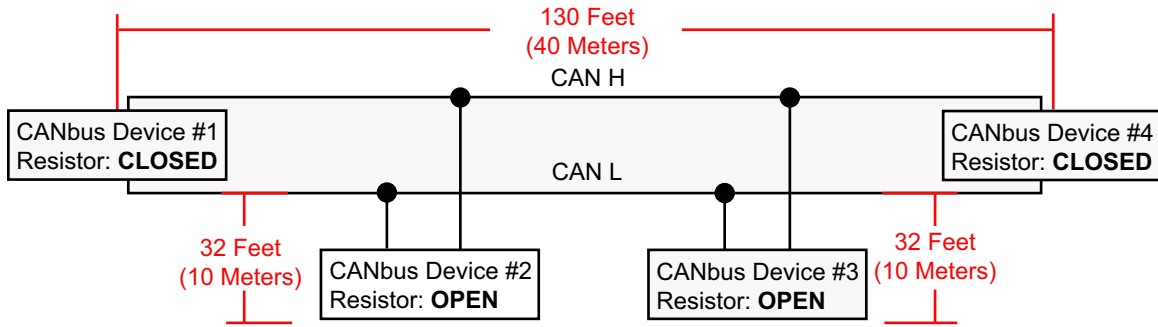


Figure 4.0.4

4.1 OPERATOR STATIONS

The FLEX RC monitor has several different styles of operator stations for use in various locations on the fire truck or fire ground.

The design of the operator station communications allows users to override commands on other stations. The “last” button pressed has control. The overridden user can regain control by releasing the button and pressing again.

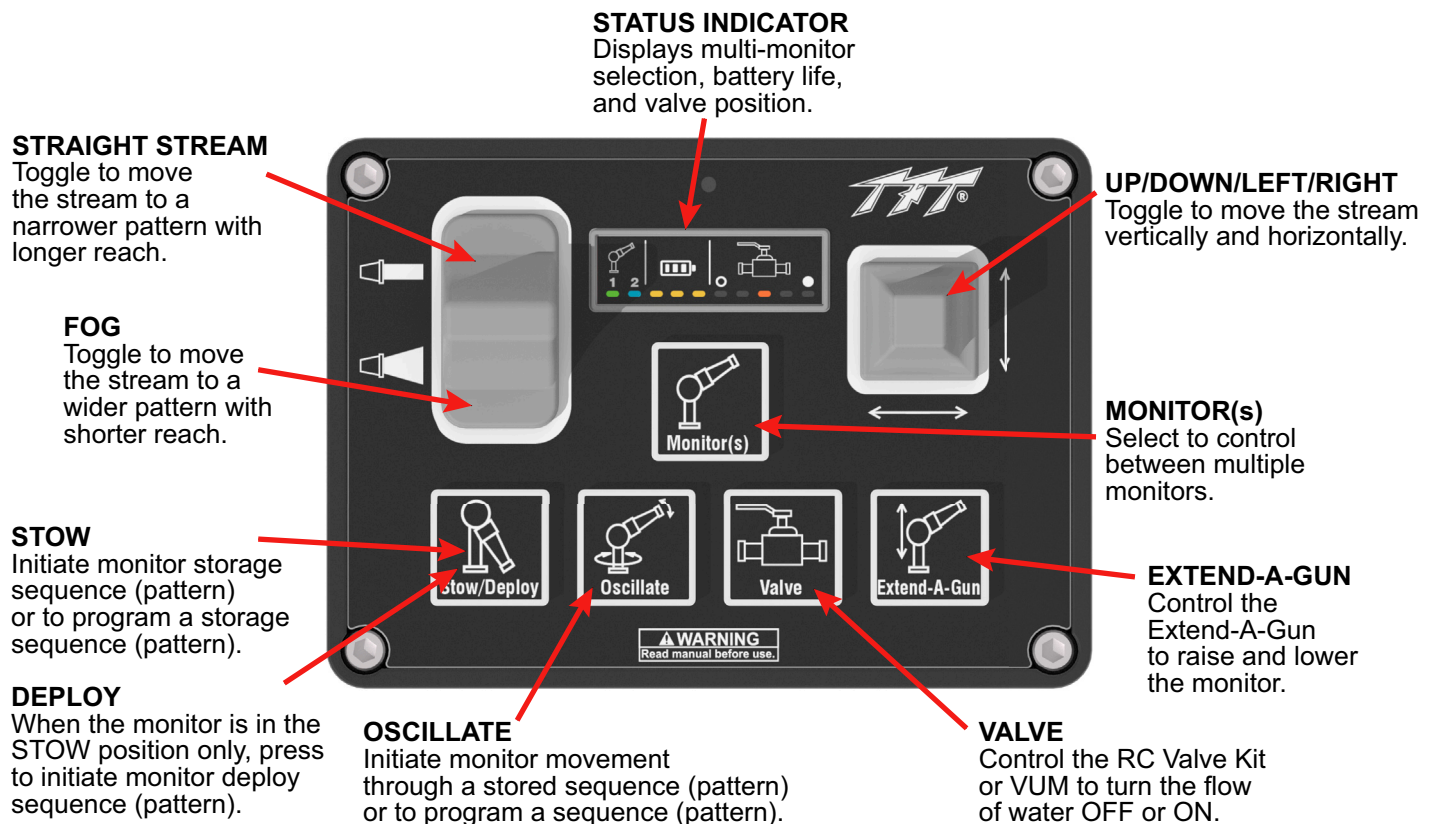


Figure 4.1
Operator Station Control Pad

4.2 STOW FEATURE

The STOW position must be programmed during installation.

During normal operation, each time the STOW button is pressed, the monitor moves the nozzle to the full straight stream position, moves to each programmed location, and then moves to the STOW position. While the monitor is performing the STOW feature, pressing any button will stop the monitor. If the installer prefers to have the nozzle move to the full fog position during the STOW pattern, see section 4.2.1.2. When the STOW feature is running, the monitor operator station will light YELLOW.

RECOMMENDED STOW POSITION: For truck mounted applications, it is recommended that the monitor be stowed in a position such that the monitor's nozzle rests against a bracket or support surface. This will minimize bouncing of the nozzle when the apparatus is traveling. Always be sure the monitor is properly stowed before moving the truck and know the overall height to avoid damage from overhead obstructions such as doors or bridges.

4.2.1 PROGRAMMING

**STOW PROGRAMMING MUST BE INITIATED
WITHIN 1 MINUTE OF APPLYING POWER TO THE MONITOR FROM ANY OPERATOR STATION.
STOW PROGRAMMING CAN BE ENTERED AT ANY TIME WHILE USING THE SMARTPLEX APP.**

**IF PROGRAMMING RC EXTEND-A-GUN, THE EXTEND-A-GUN MUST BE
IN THE FULLY RAISED POSITION TO RELEASE THE BUTTON INTERLOCK.**

After 1 minute, programming access is blocked. Power must then be cycled to reset 1-minute timer.

Press and hold STOW button (~10 seconds) until back light blinks. Release button. Back light will continue to blink YELLOW while in program mode.

MOVE TO STOW POSITION:

Press and hold the LEFT/RIGHT or UP/DOWN buttons to move monitor to first point of stow routine, then press and release STOW button.

Back light will blink WHITE to acknowledge position.

Repeat until pattern is complete (up to 10 points).

Note: Both axes can be moved together to reach a point.

Press and hold STOW button until back light changes to BLUE. Release button.

4.2.1.1 STOW PROGRAMMING EXAMPLE

- Press and hold STOW button until back light blinks YELLOW.
- Press LEFT button to move 45 degrees, then press and release STOW button. (back light blinks WHITE.)
- Press DOWN button to move 90 degrees, then press & release STOW button. (back light blinks WHITE.)
- Press and hold STOW button until back light turns BLUE.

4.2.1.2 SELECT NOZZLE DIRECTION DURING STOW

By default, the nozzle will move to the full straight stream position.

To select nozzle movement to the full fog position during STOW pattern, do the following:

- Enter STOW programming mode as indicated in section 4.2.1.1.
- Once STOW light is flashing, press FOG button for 1 second and release.
- Continue with STOW pattern programming as outlined in section 4.2.1.1.

To change back to the full straight stream position during STOW pattern, do the following:

- Enter STOW programming mode as indicated in section 4.2.1.1.
- Once STOW light is flashing, press STRAIGHT STREAM button for 1 second and release.
- Continue with STOW pattern programming as outlined in section 4.2.1.1.

4.3 OSCILLATE FEATURE

The OSCILLATE feature allows the user to program a repeating pattern to control the horizontal and vertical axes of the monitor.

When the OSCILLATE feature is enabled, the monitor operator station will turn ORANGE.

4.3.1 PROGRAMMING

- Press and hold OSC button (~5 seconds) until back light blinks ORANGE. Release button. Back light will continue to blink ORANGE while in program mode.
- Move monitor to first point, then press and release OSC button. Back light will blink WHITE to acknowledge position.
- Repeat until pattern is complete (up to 30 points).
- Press and hold OSC button until back light turns BLUE. Release button.

4.3.1.1 OSCILLATE PATTERN RETAIN FEATURE

The monitor can be configured so that upon power down, the OSCILLATE pattern is retained. The OSCILLATE pattern must be programmed at least one time. To enable the OSCILLATE pattern retain feature, use the TFT SmartPlex App. See LIY-701 TFT SmartPlex App manual for instructions.

4.4 OVERRIDE KNOBS

In the event of electrical system failure on the monitor or fire apparatus, the FLEX RC is factory supplied with override knobs so the monitor may be manually operated. If desired, the override knobs may be removed. The drive shafts have a hex so a wrench or socket may be used for manual override.

4.5 MULTI-MONITOR

The FLEX RC monitor has the capability to have 2 monitors operated by the same controller. Both monitors must be connected on the same CANbus line. The Monitor(s) button on the operator station allows the user to toggle control between the monitors.

4.6 STATUS INDICATOR

The STATUS INDICATOR on the operator stations contains LED lights that provide feedback to the user pertaining to Multi-monitor, battery life, and valve position.

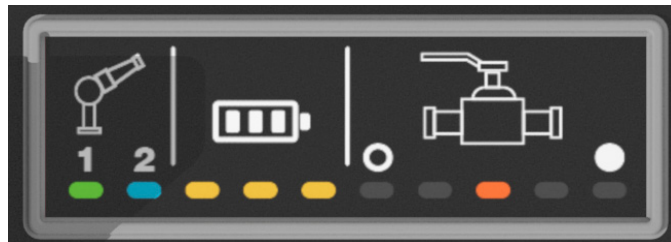
MONITOR SELECTION
(only works when
2 monitors are connected)

GREEN
Monitor is selected to control.

NO LIGHT
No monitor(s) connected.

FLASHING WHITE
Wireless Operator Station
is not paired to a monitor.

FLASHING GREEN
Wireless Operator Station
is in pairing mode.



BATTERY LIFE
(for wireless only)

3 LIGHTS - 70% to 100%

2 LIGHTS - 30% to 70%

1 LIGHT - Below 30%

VALVE POSITION
(5 LIGHTS)

FAR LEFT - Fully OPEN

FAR RIGHT - Fully CLOSED

3 middle lights indicate
valve position between
OPEN and CLOSED

Figure 4.6

4.7 OPERATOR STATION STATUS COLOR CODE

The Operator Stations used with a FLEX RC monitor have a back light that changes colors to convey the status condition of the monitor.

COLOR	MODE	OPERATOR STATION STATUS
BLUE	SOLID	Normal Operating Mode
YELLOW	SOLID	Monitor is moving to STOW position
YELLOW	FLASHING	Programming STOW Mode
ORANGE	SOLID	Oscillate pattern is active
ORANGE	FLASHING	Programming Oscillate Pattern
WHITE	1 FLASH	STOW/OSC pattern point stored/reached
GREEN	SOLID	Wireless Operator Station is fully charged
GREEN	FLASHING	Wireless Operator Station is charging
RED	FLASHING	Wireless Operator Station needs to be charged
MAROON	3-4 FLASHES	Wireless Operator Station fail to send command
PURPLE	SOLID	Operator Station paired successfully
TURQUOISE	SOLID	Operator Station unpaired successfully
RASPBERRY/PINK	SOLID	Hard stops not set correctly or motor fault (See LIY-701 TFT SmartPlex App manual for instructions to program hard stops)

Table 4.7

4.8 MONITOR MOUNT OPERATOR STATION

The YN-RM monitor mount operator station allows operation from the monitor location. If ordered with a monitor, the operator station is factory installed. If ordered separately, follow the instructions below to mount the operator station.

4.8.1 MOUNTING (FIELD INSTALLATION)

To install a MONITOR MOUNT OPERATOR STATION:

1. Locate the CONNECTION CABLE under the MONITOR HUB.
2. Join the CONNECTION CABLE to the connector on the MONITOR MOUNT OPERATOR STATION.
3. Secure the MONITOR MOUNT OPERATOR STATION to the MONITOR HUB using the fasteners provided and Loctite® 242 or equivalent. Ensure the cable is not pinched during installation.

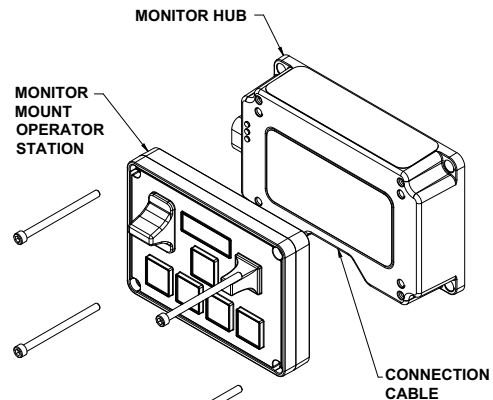


Figure 4.8.1

4.8.2 ELECTRICAL WIRING

See Figure 4.0 for typical connections. The wiring on the monitor is factory installed. The assembly is supplied with a cable for connection to the other operator control stations. The cable has 4 conductors which supply power and the communications from the operator stations to the monitor.

4.8.3 OPERATION

This operator station is installed on the monitor and is used by personnel at the monitor. See Figure 4.1 for standard button configuration.

4.9 PANEL MOUNT OPERATOR STATION

This YC-RP allows the monitor to be controlled from a remote location. The installer will need to mount the operator station and connect the cable to the monitor and power. The enclosure is designed to sit flush against a panel.

4.9.1 MOUNTING

Select proper operator location. Panel space required will be 5" x 3.6" (127 x 91 mm). A depth of 2" (50 mm) will be required behind the panel. Refer to Figure 4.9.1 for cutout dimensions. Allow at least 6" of slack in cable for future access, if needed.

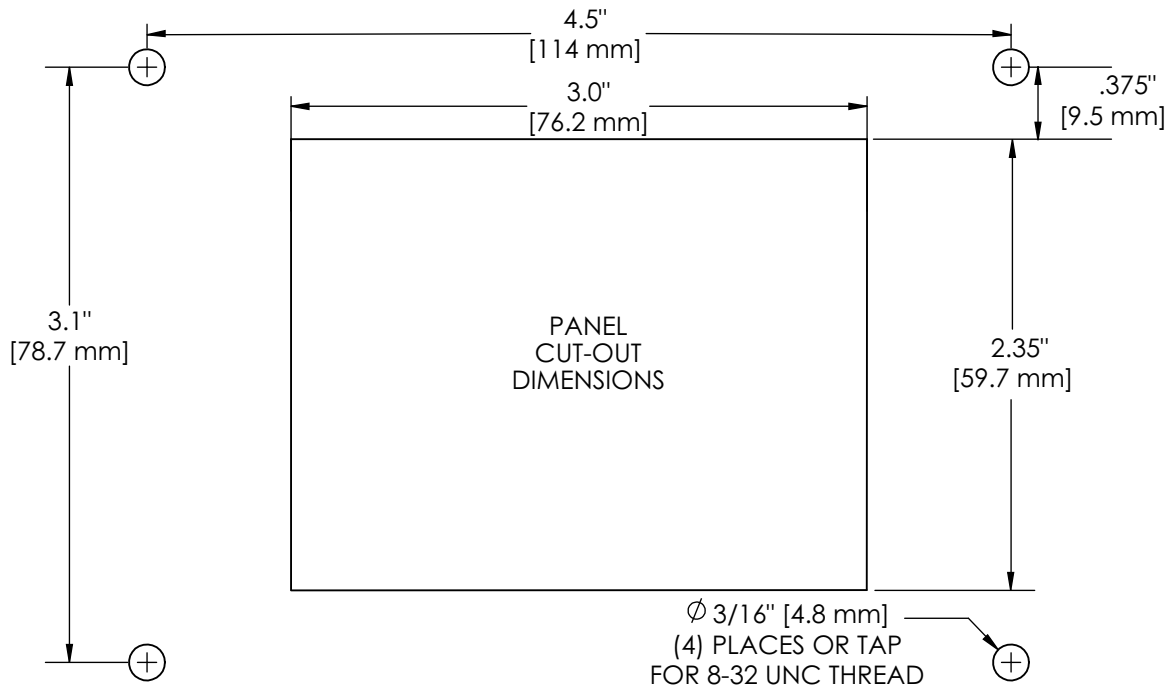


Figure 4.9.1

4.9.2 ELECTRICAL WIRING

See Figure 4.0 for typical connections. The 4-conductor cable from the operator station needs to be connected to power (red & black) and to the communication link (blue & white) from the monitor. See below for typical cable preparation. Be sure to tighten all terminal block screws securely. Secure the device's input cable near the connector to act as a strain relief during installation.

DEVICE INPUTS

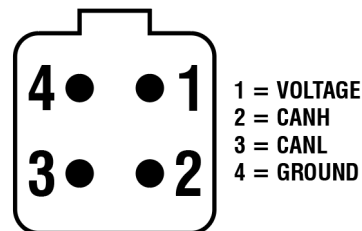


Figure 4.9.2

Female Connector Pin Layout

4.9.3 OPERATION

This operator station is installed on the truck, for example the pump operator's panel. It is used to operate the monitor from a location on the truck. See Figure 4.1 for button operation.

4.10 WIRELESS OPERATOR STATION

The YC-RF-24 is supplied with a docking station that stores and charges the control. A WIRELESS MONITOR MODULE (YC-RF-RAD-24), contains a radio that communicates with the wireless operator station. This module needs to be installed on the monitor in order for the monitor to operate.

4.10.1 MOUNTING THE DOCKING STATION

Select proper location for mounting the docking station. Panel space required is 6.2" x 6.2" (158 x 158 mm). Verify the area behind the mounting surface is clear of obstructions. A minimum depth of 2" (50mm) is required behind the panel.

The docking station is supplied with (4) #10-16 stainless steel self-tapping screws. The material beneath the bracket must be substantial and thick enough to hold self-tapping screws. We recommend a minimum thickness of 3/32" (.093" - 2.4 mm) in aluminum and 5/64" (.078"-2mm) in steel. Drill pilot holes and cut out the panel using the diagram below or use the bracket as a template.

Assure that the DOCKING HUB, LATCH, and SHELL are stacked in the order shown below during installation. The self-tapping screws run through all of the components.

NOTICE

Over-tightening screws can cause the docking hub to deform and/or crack, which can damage the electronic components inside. Damaged components may not function properly. Tighten screws until snug enough to secure the hub. DO NOT OVERTIGHTEN SCREWS.

NOTICE

Tight or abrupt bends when routing cables can damage the cable and connector on the docking hub. Ensure the cable and connectors exiting the back of the docking station have adequate space for cable routing.

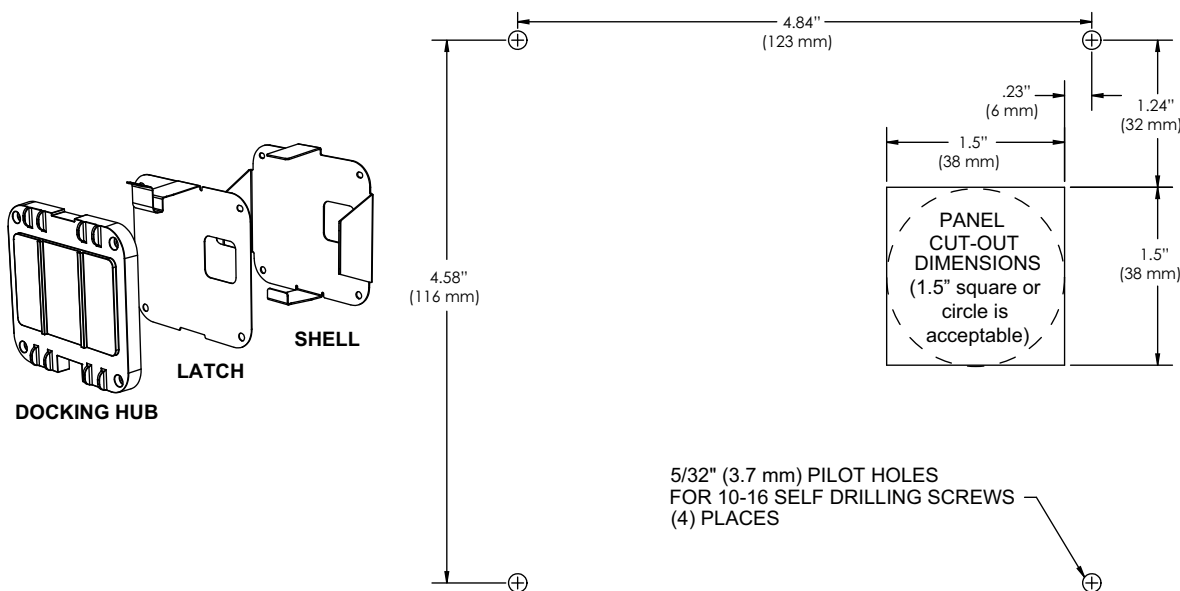


Figure 4.10.1

4.10.2 INSERTING REMOTE OPERATOR STATION INTO DOCKING HUB

1. Insert the Remote Operator Station into the dock at an angle. Make sure to catch the bottom stationary latch.
2. Rotate the operator station into the dock so the movable latch engages the controller.

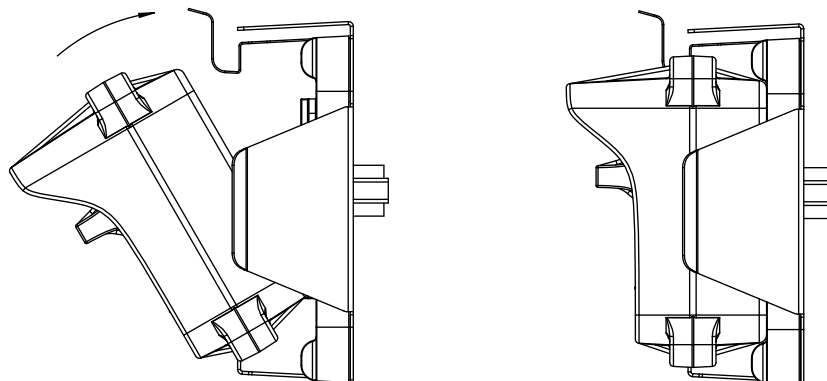


Figure 4.10.2

4.10.3 ELECTRICAL WIRING

See section 4.9.2 for wiring instructions. CAN lines are not used.

4.10.4 PAIRING

A Wireless Operator Station can be paired to a monitor using the SmartPlex App. See LIY-701 TFT SmartPlex APP Manual for instructions.

4.10.5 CHARGING

When the handheld unit is installed in the docking station, the unit will pulse green to indicate that it is charging. If the battery is completely depleted, it may take up to 1 minute for the light to begin flashing. When fully charged, the handheld unit will illuminate a solid green light.

4.10.6 OPERATION

The Wireless Operator Station allows a user to move away from the truck to get a better view for redirecting the monitor. This operator station gives the user full control of the monitor including the STOW, OSCillate, and any AUXiliary functions.

The range of the wireless operator station is 500 ft (152 m). The rechargeable handheld unit comes with a docking station. At full charge, the handheld unit will provide 30 hours of continuous operation. When the battery voltage is low, the handheld unit will begin to flash red to indicate 30 minutes of battery life remaining. If the battery indicator is on the LED strip, the last bar will turn red to indicate 3 hours of battery life remaining. To preserve battery life, the handheld unit will automatically turn off after 5 minutes if no buttons are pressed. Press any button to turn the unit on again.

NOTE: If after pressing a button, the operator station monitor indicator light flashes rapidly, this indicates no communication link is present with the monitor. The handheld unit is out of range or cannot establish a link with the monitor. Move to a different location and then retry, also verify monitor has power applied.

4.10.7 WIRELESS MODULE MOUNTING (FIELD INSTALLATION)

Attaching the YC-RF-RAD-24 wireless module directly to the monitor hub upgrades the monitor with wireless control capability. See section 4.8.1 for mounting using the same process as the MONITOR MOUNT OPERATOR STATION.

4.10.8 WIRELESS MODULE AND OPERATOR STATION MOUNTING

To install a monitor mount operator station and a wireless module on a single monitor hub, YC-RFRM is required. This kit includes both modules and a spacer plate. Contact TFT or your local dealer to purchase.

1. Locate the CONNECTION CABLE under the MONITOR HUB.
2. Join the CONNECTION CABLE to either of the two connectors on the WIRELESS MONITOR MODULE.
3. Secure the WIRELESS MONITOR MODULE and SPACER PLATE to the MONITOR HUB using the (2) #8-32 fasteners provided and Loctite 242 or equivalent. Ensure the 2 cables exit within the notch in the MONITOR HUB and are not pinched during installation. Tuck the cable and plugs into the bottom of the hub.
4. Connect the cable on the MONITOR MOUNT OPERATOR STATION to the other cable on the WIRELESS MONITOR MODULE.
5. Secure the MONITOR MOUNT OPERATOR STATION to the SPACER PLATE. Ensure the cable and plugs are tucked behind the OPERATOR STATION and exit through the notch at the bottom of the SPACER PLATE.

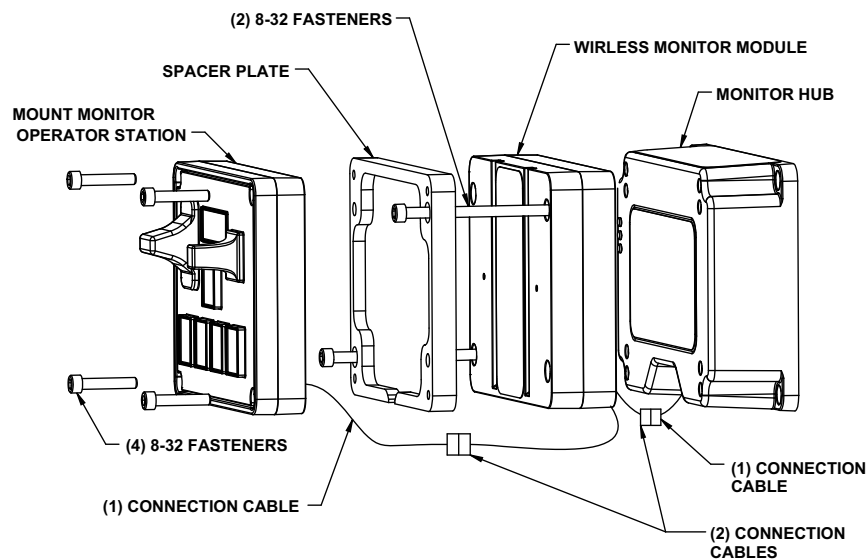


Figure 4.10.8

4.11 TETHERED OPERATOR STATION

The YC-CT-30 has factory installed 4- conductor cable with a screw-locking plug that connects to the truck. The installer will need to mount the storage bracket and receptacle.

4.11.1 MOUNTING THE STORAGE BRACKET

See section 4.10.1 for mounting bracket installation instructions.

4.11.2 RECEPTACLE MOUNTING

Select proper location for mounting receptacle. Receptacle is 1-1/4" x 1-1/4" and 1/2" deep (32 mm x 32 mm x 13 mm). Allow extra room behind receptacle for wires. Refer to Figure 4.11.2 for hole dimensions.

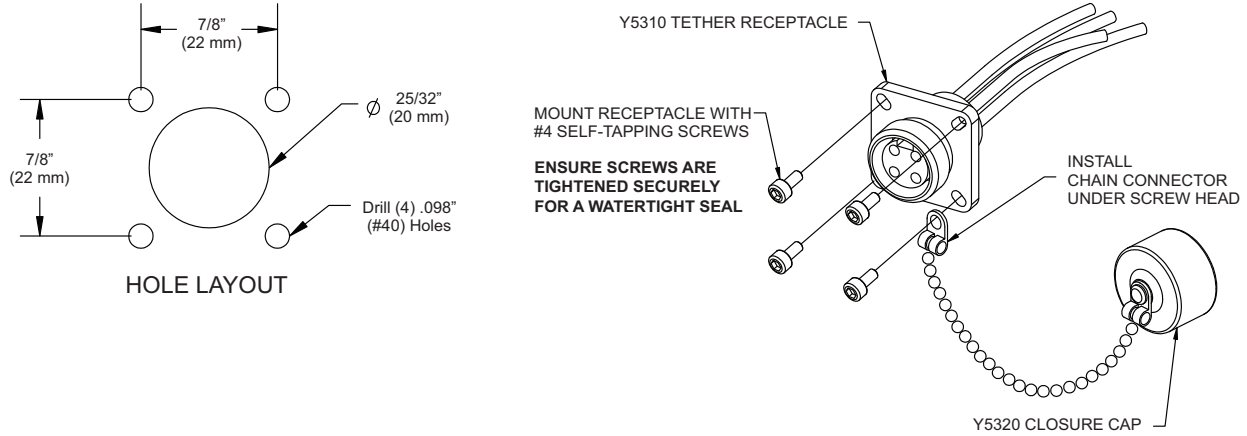


Figure 4.11.2

4.11.3 ELECTRICAL WIRING

See section 4.9.2 for wiring instructions.

4.11.4 OPERATION

This operator station is tethered to the truck with a cable. It is used to move slightly away from the truck to get a better view for redirecting the monitor. This operator station gives the user full control of the monitor including the STOW, OSCILLATE, and any AUXILIARY functions. See Figure 4.1 for standard button operation.

4.12 TOGGLE SWITCH OPERATOR STATION

The YC-TS operator station allows the monitor to be controlled by three toggle switches. The installer will need to mount the operator station and connect the cable to the monitor and power.

4.12.1 ENCLOSURE MOUNTING

Select proper operator location. Enclosure is designed to be surface mounted and the size is 5" x 3.6" (127 x 91 mm). Height to the top of the switches is 1.9" (48 mm)

The toggle switch backing plate contains (2) 1/4"-20 tapped holes for mounting the panel. The backing plate can be installed in one of 2 orientations allowing the cables to be routed to the top or bottom of Toggle Switch Operator Station.

If low clearance is desired, the backing plate may also be removed and the Toggle Switch Operator station may be installed in the same manner as the Panel Mount Operator Station per 4.9.1.

Refer to graphic for mounting hole dimensions.

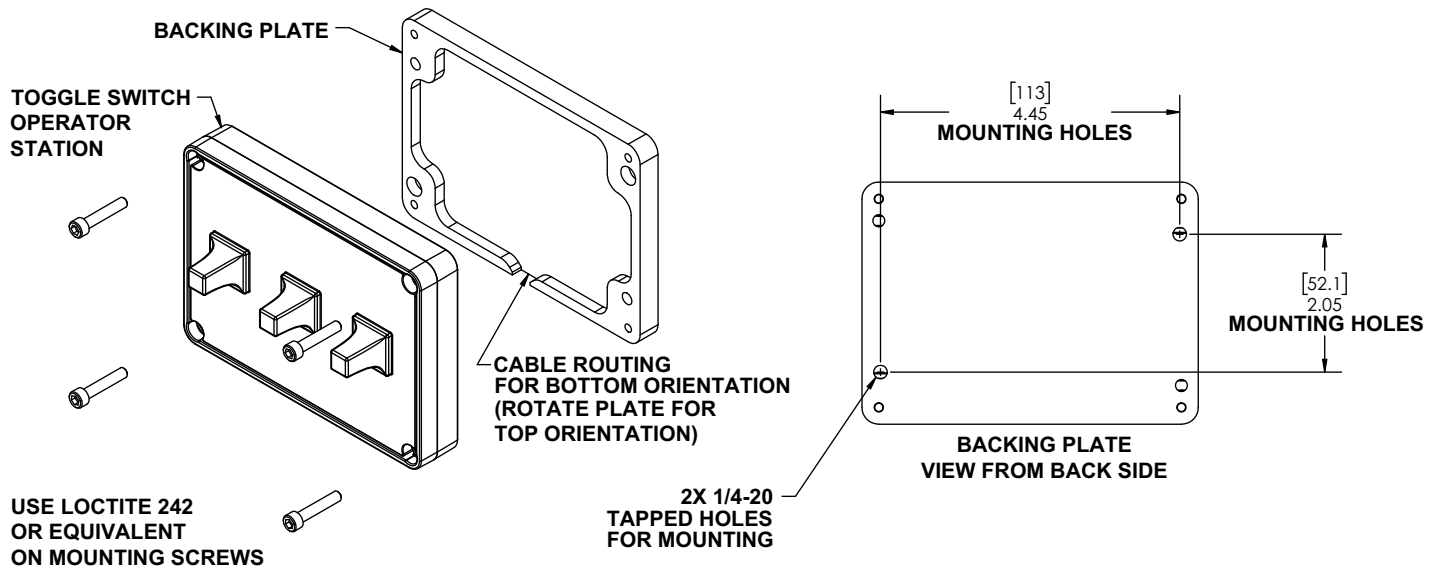


Figure 4.12.1

4.12.2 ELECTRICAL WIRING

See section 4.9.2 for wiring instructions.

4.12.3 OPERATION

Move the switches toward the desired command. Hold the switch until the monitor or nozzle is in the desired position. Release the switch to stop monitor or nozzle movement.

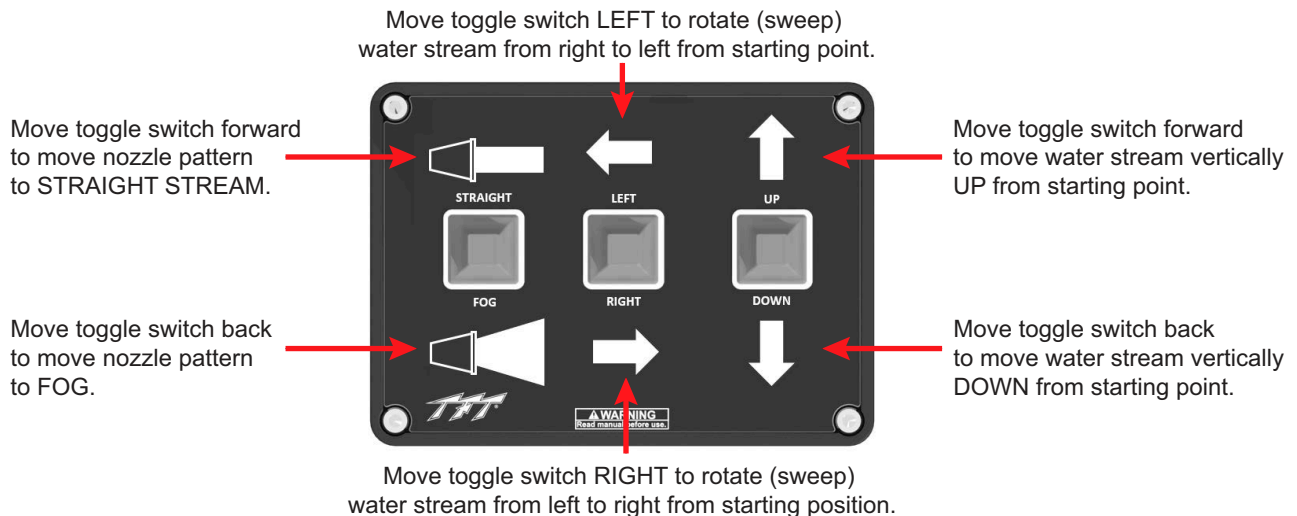


Figure 4.12.3

4.13 MONITOR COMMUNICATION INTERFACE CONTROL (YC-COMM)

This Communication Interface Control converts discrete input signals into serial communications for controlling the monitor. The discrete input signals can be from a joystick, toggle switches, relay contacts or CANbus output module. The interface box accepts +12/24 VDC signals, but can be field changed to accept ground signals. The installer will need to mount the interface box and connect the cable to the monitor and power.

Communication Interface Control also allows a user to utilize the optional AUX1 and AUX2 buttons located on the monitor operator station any remote operator station. See LIY-701 SmartPlex APP manual for AUX button setup. The Interface Control is equipped with two relays that can operate lights, interface to a valve controller, or in some cases operate a valve directly, etc. The contact rating of the relay is 16 amps @ 30VDC for resistive loads and 8 amps @ 30VDC for inductive loads.

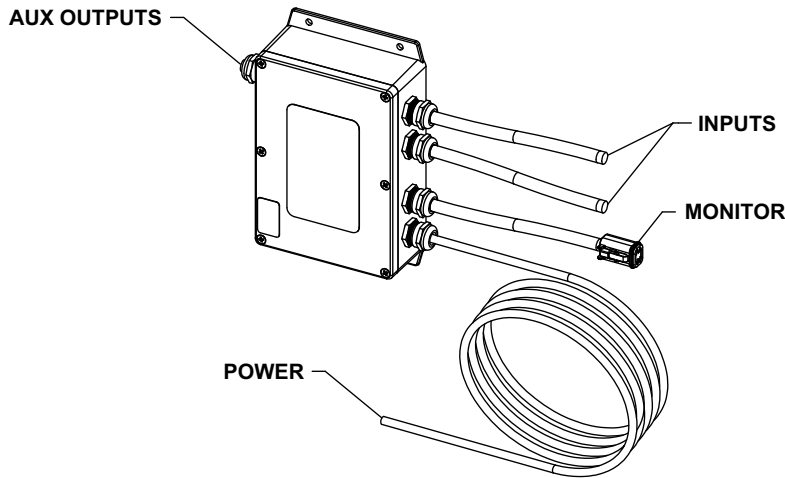


Figure 4.13

NOTICE

The Interface Control provides no overload protection for the device it is controlling. Failure to provide overload protection will damage relay contacts, which will disable the device being controlled. Provide manual device operation, where necessary, in addition to remote control.

4.13.1 ENCLOSURE MOUNTING

Select proper enclosure location. Enclosure is designed to be surface mounted and the size is 5" x 3 1/8" (127 x 80mm). Height of enclosure is 2 3/8" (60mm).

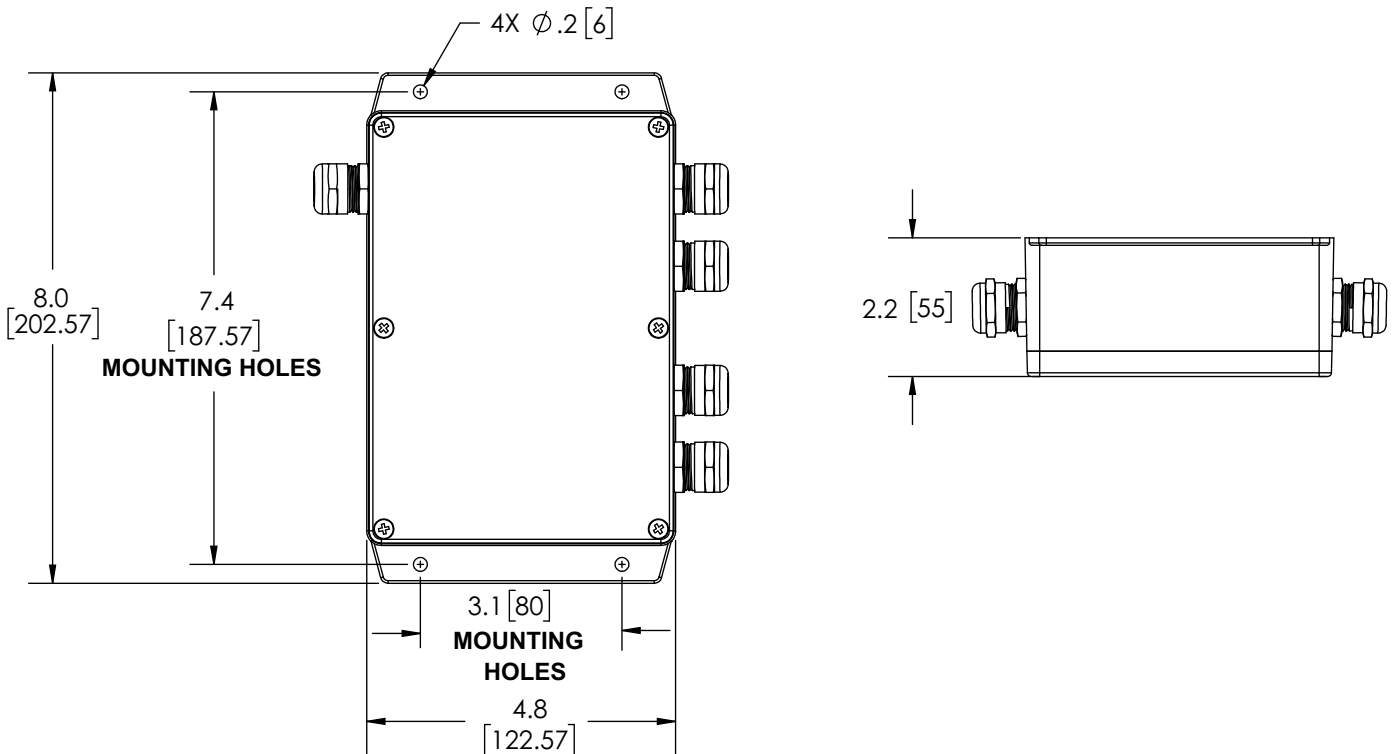


Figure 4.13.1

4.13.2 ELECTRICAL WIRING

See figure 4.0 for typical connections. The 4-conductor cable from the communication interface box needs to be connected to power (red & black) and to the communication link (blue & white) from the monitor. Refer to Figure 4.9.2 for typical cable preparation.

4.13.3 INPUTS SIGNAL CONFIGURATION

The Communication Interface Control is shipped from the factory configured to accept +12/24 volt DC input signals, but can be field changed. See LIY-701 TFT SmartPlex APP manual for instructions.

4.13.4 COMMUNICATION INTERFACE CONTROL WITH AT STOW RELAY

The Communication Interface Box provides feedback for the user that the monitor is in the AT STOW position. The Interface Box contains a circuit board that is equipped with a relay that is energized when the monitor is in use and de-energized when the monitor reaches its final STOW location. The contact rating of the relay is 1 amp @ 30VDC for resistive loads and 0.2 amps @ 30VDC for inductive loads.

The AT STOW relay has one Form-C contact (common, normally open, normally closed) that can be used. Figure 4.13.4 shows the terminal blocks available for user wiring.

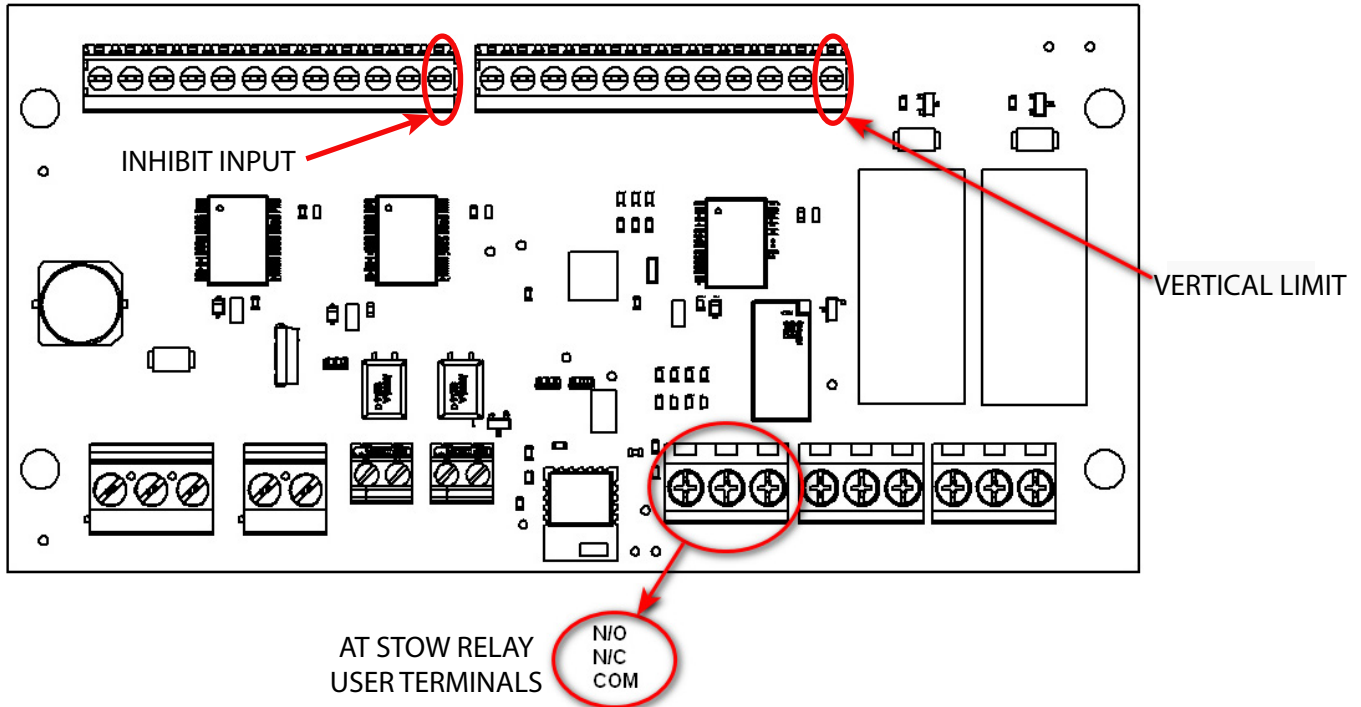


Figure 4.13.4

4.14 REMOTE AUXILIARY CONFIGURATION

The two relays on the circuit board can be individually configured as AUX1 or AUX2. Also, the actuation of each relay can be configured to be momentary or latching. See LIY-701 TFT SmartPlex APP manual for configuration instructions.

4.15 AERIAL INSTALLATION

Two versions of the RC monitor have been designed for installation on aerial device trucks, the “-L” and “-P” versions. The “-L” version is supplied with one cable for connecting discrete inputs into the electronics enclosure, typically connections to a CANbus output module or toggle switches located at the turntable. The “-P” version is supplied with two cables for connecting discrete inputs, one cable typically for controls located in the basket and one cable for controls located at the turntable.

4.15.1 ELECTRICAL WIRING

NOTICE

Modifying or replacing factory provided strain relief fittings is considered misuse of this product and will void the warranty.

On aerial devices, the installer will supply the required cables that run up the ladder or boom. Be sure to perform voltage drop calculations to verify that the supply voltage will remain at an acceptable level during monitor operation. Refer to Figure 4.9.2 for typical cable preparation.

4.15.2 LADDER OR PLATFORM INSTALLATION WIRING

The electronics enclosure converts discrete input signals into serial communications for controlling the monitor. The discrete input signals can be from a joystick, toggle switches, relay contacts or CANbus output module. The electronic interface accepts +12/24 VDC signals, but can be field changed to accept ground signals. The electronics enclosure is configured so that signals connected to the PRIMARY CONTROL cable will override any other operator stations.

NOTICE

To avoid excessive voltage drop at monitor operator station, do not lengthen factory supplied monitor cable. Power cable selection is critical. Voltage supplied to MONITOR should not fall below value listed in table when monitor is in operation.

	12VDC Nominal System	24VDC Nominal System
Minimum voltage @ Monitor	9 Volts	18 Volts
Monitor current draw	10 Amps	5 Amps
Factory supplied cable drop	3/4 Volts	1/3 Volts

**Max Length of Installer Power Cable in Addition to IFT Supplied Power Cable	
	Recommended Cable Gauge
Gauge	12VDC Nominal System
14AWG	217ft (66m)
12AWG	355ft (108m)
2-14AWG	433ft (132m)
10AWG	564ft (172m)
2-12AWG	710ft (216m)

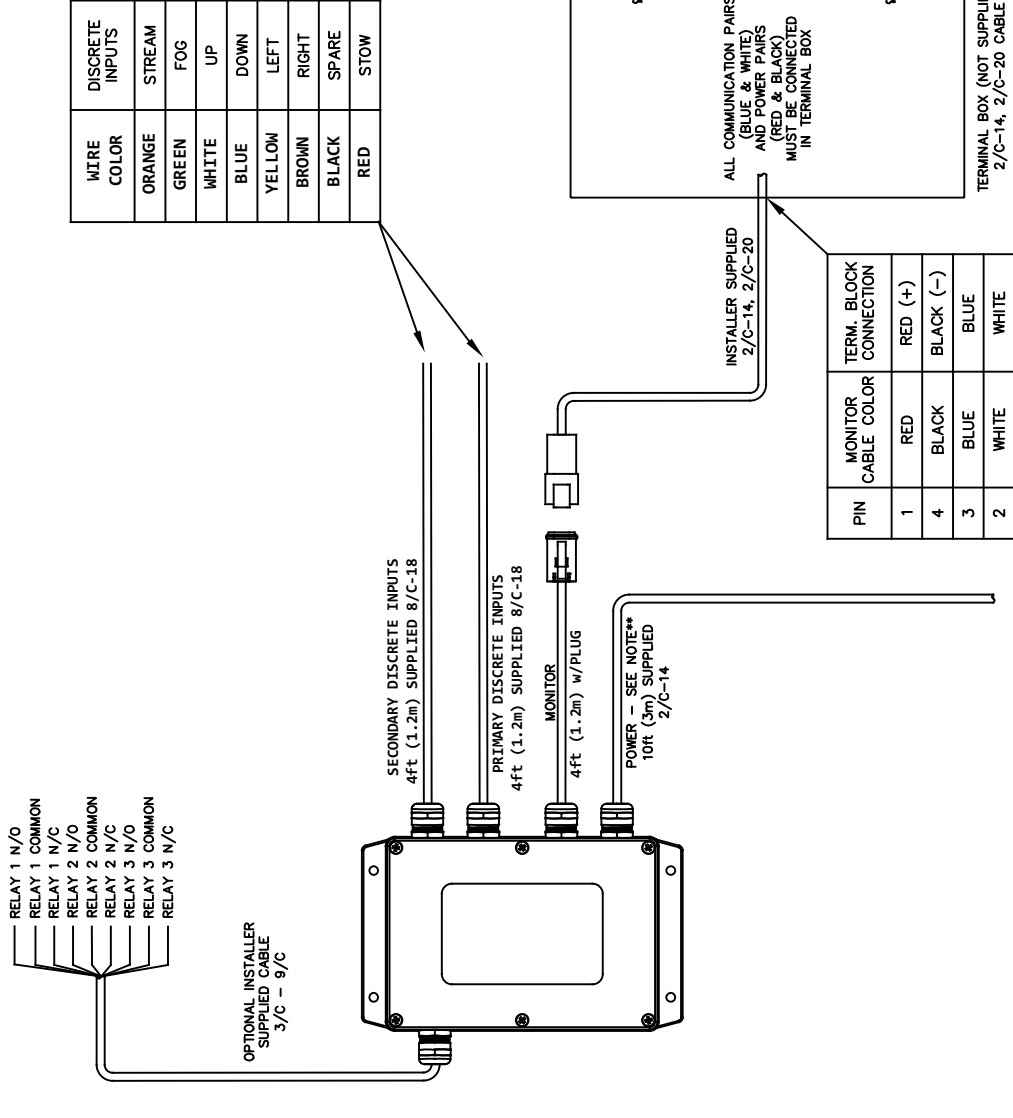


Figure 4.15.2

4.15.3 RECOMMENDED LADDER INSTALLATION CONFIGURATION

Various ladder & monitor installation configurations can lead to cab interference if the ladder is bedded with the monitor/nozzle not stowed or if the monitor is moved while the ladder is in the bedded position. Also, vibration due to various road conditions can lead to unintended monitor/nozzle movement. This unintentional movement can lead to interference with the cab roof if adequate clearance is not provided between the cab and monitor. To mitigate this potential interference, TFT has designed the following features into the control system:

1. A user programmed STOW pattern with up to 10 points of movement to verify that monitor/nozzle is in a known, favorable position to avoid contact with other structures.
2. A SIT-AND-STAY feature to correct monitor position if unintended movement due to road vibration occurs.
3. A monitor Inhibit signal to disable any operator station button commands or interface box movement commands when the monitor/nozzle is in a position where energizing the motors could damage the vehicle.

TFT recommends the following steps be taken to mitigate potential interference between the vehicle and monitor/nozzle package.

1. Monitor must be powered by Master On Switch to ensure monitor controls are active any time vehicle is in operation.
2. Integrate monitor AT STOW relay signal into logic to allow ladder bedding.
3. Activate INHIBIT INPUT signal when ladder is in the bedded position to disable any operator station button commands or interface box movement commands.

4.15.4 ELECTRICAL ENCLOSURE WITH AT STOW RELAY

The electronics enclosure provides feedback for the user that the monitor is in the AT STOW position. This electronics enclosure contains a circuit board that is equipped with a relay that is energized when the monitor is in use and de-energized when the monitor reaches its final STOW location. The contact rating of the relay is 1 amp @ 30VDC for resistive loads and 0.2 amps @ 30VDC for inductive loads. The AT STOW relay has one Form-C contact (common, normally open, normally closed) that can be used. See figure 4.6.4 for input location.

4.15.5 ELECTRICAL ENCLOSURE WITH INHIBIT INPUT

The electronics enclosure circuit board provides an input to INHIBIT any RC monitor movement. When active, this input will disable all movement commands to RC monitor. See figure 4.6.4 for input location. Requires a constant 12/24 VDC input signal in order to be active.

4.16 ELECTRIC NOZZLE ACTUATOR

The electrical nozzle actuator is factory installed on the nozzle and requires only to be plugged into the mating monitor connector. For nozzles with electric pattern control, a cable with a female, waterproof connector is provided at the outlet of the TFT RC Monitor which attaches directly to several of TFT's electric nozzles. The cable used is a dual-key, micro type plug assembly. Any other nozzle should have the corresponding male electrical connector installed. Do not cut off the female connector on the monitor. This connector is molded onto the cable and must remain in place to maintain the water tightness of the electrical system. Moisture infiltration into nozzles with cut-off connectors will not be covered under warranty.

4.16.1 WIRING

The electric RC monitor is designed to control and is factory wired for a TFT electric actuated nozzle. Task Force Tips nozzles are available with a male cord plug. After mounting the appropriate nozzle onto the monitor, plug the male cord from the nozzle into the female cord located on the outlet of the monitor. Make sure the two coupling nuts are tightened securely to ensure a proper watertight seal.

4.16.2 OPERATION OF FLUSH, FOG, STREAM

After connecting the nozzle to the monitor, press & hold the FOG button until the nozzle actuator motor current limits. Continue to hold button until you can hear that motor has stopped driving.

TFT Remote Controlled (RC) nozzles are equipped with a capability exclusive to TFT called "Smart Stream". Small movements of the outer stream shaper are needed to adjust fine fog while large movements are needed to see any change in straight stream. TFT accomplishes this by using a variable speed motor and sensors to tell the controls when the nozzle is in fog and when it is in straight stream.

"Smart Stream" automatically slows down the motor speed when the nozzle is operating in fog patterns. Slow changes in nozzle reaction can help maintain the stability of ladders and aerial platforms. On the back of every nozzle pattern actuator is a small knob that rotates when the nozzle is changing pattern. This knob not only serves the purpose of indicating motor rotation it also is used for manual override in the event of power failure to the monitor. This small knob will change speed as the nozzle moves through its various patterns. This is NORMAL! Observing this speed change is NOT an indication that the nozzle is binding or malfunctioning. Smart stream serves an additional function when used with nozzles that have flush capability built into the movement of the stream shaper.

4.16.2.1 NOZZLES WITH FLUSH

When nozzles of this type are used on bumper turrets in pump and roll operations it is very important that the operator of the unit not put the nozzle in flush accidentally. A slight over travel past full fog on competitive monitor nozzles will cause the nozzle to enter a partial or complete flush setting. When this occurs the flow of the nozzle can double or triple causing rapid exhaustion of the water supply carried on board the vehicle.

With "Smart Stream" technology the nozzle will automatically stop when it achieves the wide fog setting and the motor will cease turning. If the operator desires to flush the nozzle he must release the button and then press it again and the unit will travel into the flush position. Once understood, this capability is extremely valuable for conserving tank water. If this feature is not desired by the end user, contact TFT service for instructions on how to disable this feature.

5.0 MAINTENANCE

TFT products are designed and manufactured to be damage resistant and require minimal maintenance. However, as the primary firefighting tool upon which your life depends, it should be treated accordingly. The unit should be kept clean and free of dirt by rinsing with water after each use. Any inoperable or damaged parts should be repaired or replaced before placing the unit in service. To help prevent mechanical damage, do not drop or throw equipment.

Any equipment taken out of service due to failure should be returned to the factory for repair or replacement. If you have questions regarding the testing or maintenance of your equipment, please call Task Force Tips at 800-348-2686.

5.1 SERVICE TESTING

In accordance with NFPA 1962, equipment must be tested a minimum of annually. Units failing any part of this test must be removed from service, repaired and retested upon completion of the repair.

5.2 REPAIR

Factory service is available. Factory serviced equipment is repaired by experienced technicians, wet tested to original specifications, and promptly returned. Call TFT service department at 1-800-348-2686 to troubleshoot and, if needed, directions for return. A return for service form can also be obtained at tft.com/Support/Returning-an-Item-for-Service.

Repair parts and service procedures are available for those wishing to perform their own repairs. Task Force Tips assumes no liability for damage to equipment or injury to personnel that is a result of user service. Contact the factory or visit the web site at tft.com for parts lists, exploded views, test procedures and troubleshooting guides.

Performance tests shall be conducted on the equipment after a repair, or anytime a problem is reported to verify operation in accordance with TFT test procedures. Consult factory for the procedure that corresponds to the model and serial number of the equipment. Any equipment which fails the related test criteria should be removed from service immediately. Troubleshooting guides are available with each test procedure or equipment can be returned to the factory for service and testing.



It is the responsibility of service technicians to ensure the use of appropriate protective clothing and equipment. The chosen protective clothing and equipment must provide protection from potential hazards users may encounter while servicing equipment. Requirements for protective clothing and equipment are determined by the Authority Having Jurisdiction (AHJ).



Any alterations to the product or its markings could diminish safety and constitutes a misuse of this product.



All replacement parts must be obtained from the manufacturer to assure proper performance and operation of the device.

5.3 POWER LED DIAGNOSTIC BLINK CODES

There are (3) LED status lights located on every monitor hub that can be used for diagnostics.

- POWER (GREEN)
LOW VOLTAGE (RED)
CHECK APP (RED BLINKING)
- RECEIVING DATA (YELLOW BLINKING)
MODULE PRESENT (GREEN)
- BLUETOOTH® CONNECTED (BLUE)
BLUETOOTH® DISABLED (RED)

Figure 5.3

6.0 TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	REMEDY
No Power LED	Polarity reversed	Check wiring and reverse polarity
Power LED On But No Operation	Low voltage due to: - wire gauge too small - wire length too long - poor connection - inadequate apparatus electrical system	Monitor Electrical Controls Supplemental Instructions. Verify voltage is above 9 volts.
	Monitor Disable Interlock turned on	Raise TFT RC Extend-A-Gun
RED backlight flashing on Remote Operating Station	Very low battery	Return the Remote Operating Station to the Docking Station for charging.
Monitor will not operate from any station.	Bad Hub board	Check SmartPlex App. If error fault occurs, replace Hub.
During STOW pattern, monitor stops and STOW LED stays on solid.	Monitor has hit an obstruction before end of travel is reached.	Remove obstruction and run STOW pattern again.
	Manual override knob has been moved with power off.	Move monitor axis to each end stop making sure motor current limits. Run STOW pattern again.
One Axis Fails To Operate From Any Control Station	Loose motor wiring connection	Check SmartPlex App. If error fault occurs, check axis motor connection.
	Bad motor control board	Check SmartPlex App. If error fault occurs, replace motor.
	Bad motor	Check SmartPlex App. If error fault occurs, replace motor.
	Bad keypad	Check SmartPlex App. If error fault occurs, replace keypad / operator station.
Vertical/Horizontal axis will not speed up	Loose encoder wiring connection	Check SmartPlex App. If error fault occurs, check axis motor connection.
	Bad motor encoder	Check SmartPlex App. If error fault occurs, replace motor.
Vertical/Horizontal axis runs only in fast speed	Loose encoder wiring connection	Check SmartPlex App. If error fault occurs, check axis motor connection.
	Bad motor encoder	Check SmartPlex App. If error fault occurs, replace motor.
Vertical/Horizontal axis only runs ~5 seconds and then stops.	Loose encoder wiring connection	Check SmartPlex App. If error fault occurs, check axis motor connection.
	Bad motor encoder	Check SmartPlex App. If error fault occurs, replace motor.
First monitor LED indicator flashing RED.	Loose encoder wiring connection	Check SmartPlex App. If error fault occurs, check axis motor connection.
	Bad motor encoder	Check SmartPlex App. If error fault occurs, replace motor.
Monitor will not operate from Interface Box YC-COMM.	Incorrect wiring	Check blue & white communication wiring
	Incorrect INPUTS configuration	Verify INPUTS configuration setting matches system wiring (ON for voltage inputs, OFF for ground inputs).
Unable to program STOW pattern. (BLUE backlight when STOW/DEPLOY button is pressed)	One minute program enable timer expired.	Cycle power and enter STOW programming mode within 1 minute
Unable to program STOW pattern. (RASPBERRY backlight when STOW/DEPLOY button is pressed)	Hard stops are not set.	Check SmartPlex App and follow instructions to reset hard stops.

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7.0 WARRANTY

Task Force Tips LLC, 3701 Innovation Way, Valparaiso, Indiana 46383-9327 USA ("TFT") warrants to the original purchaser of its products ("equipment"), and to anyone to whom it is transferred, that the equipment shall be free from defects in material and workmanship during the two (2) year period from the date of purchase. TFT's obligation under this warranty is specifically limited to replacing or repairing the equipment (or its parts) which are shown by TFT's examination to be in a defective condition attributable to TFT. To qualify for this limited warranty, the claimant must return the equipment to TFT, at 3701 Innovation Way, Valparaiso, Indiana 46383-9327 USA, within a reasonable time after discovery of the defect. TFT will examine the equipment. If TFT determines that there is a defect attributable to it, TFT will correct the problem within a reasonable time. If the equipment is covered by this limited warranty, TFT will assume the expenses of repair.

If any defect attributable to TFT under this limited warranty cannot be reasonably cured by repair or replacement, TFT may elect to refund the purchase price of the equipment, less reasonable depreciation, in complete discharge of its obligations under this limited warranty. If TFT makes this election, claimant shall return the equipment to TFT free and clear of any liens and encumbrances.

This is a limited warranty. The original purchaser of the equipment, any person to whom it is transferred, and any person who is an intended or unintended beneficiary of the equipment, shall not be entitled to recover from TFT any consequential or incidental damages for injury to person and/or property resulting from any defective equipment manufactured or assembled by TFT.

It is agreed and understood that the price stated for the equipment is in part consideration for limiting TFT's liability. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above may not apply to you.

TFT shall have no obligation under this limited warranty if the equipment is, or has been, misused or neglected (including failure to provide reasonable maintenance) or if there have been accidents to the equipment or if it has been repaired or altered by someone else.

THIS IS A LIMITED EXPRESS WARRANTY ONLY. TFT EXPRESSLY DISCLAIMS WITH RESPECT TO THE EQUIPMENT ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. THERE IS NO WARRANTY OF ANY NATURE MADE BY TFT BEYOND THAT STATED IN THIS DOCUMENT.

This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state.