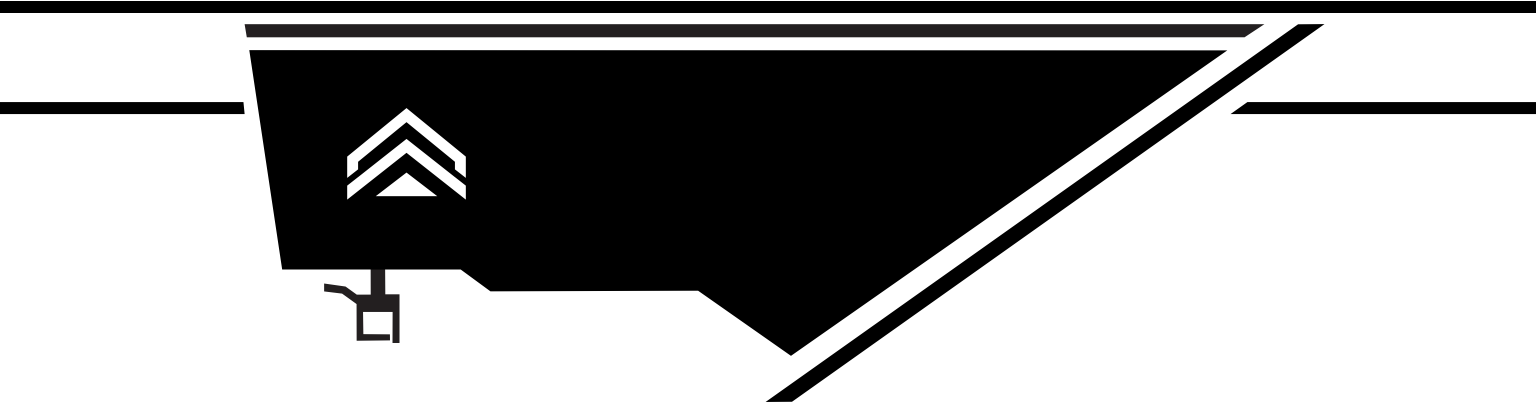
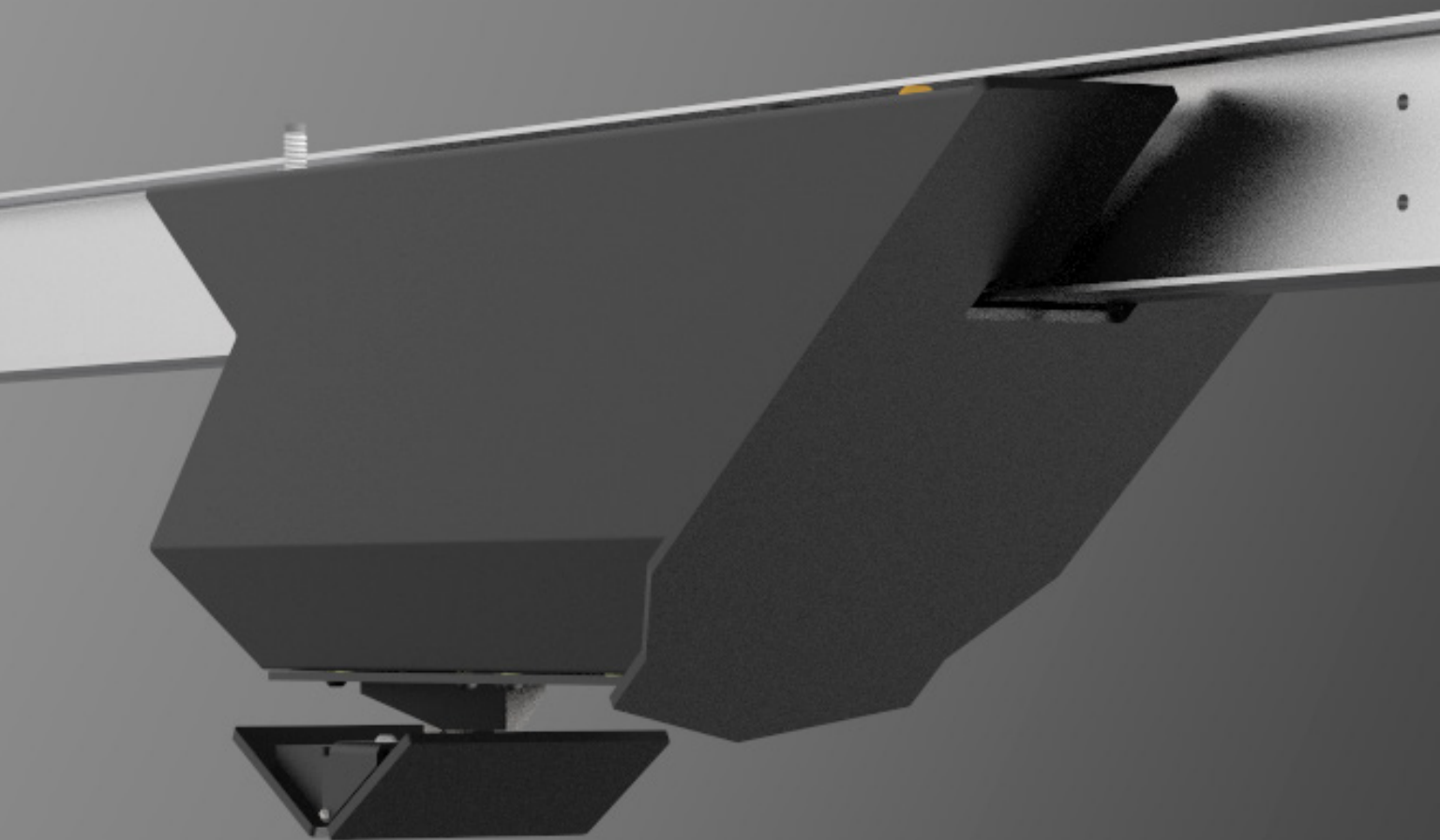


S U M M I T R I D G E TM



spireOSTM

R I D G E M A N U A L



1-800-761-1231



SUMMIT RIDGE™

spireOS™

OPERATIONS MANUAL

Version 1.1 | Spire Ranges © 2026



Our customers are the heroes who make our world, countries, and communities safer. At Spire, we create exceptional shooting range systems that prepare them for when duty calls.

OUR MISSION?

**EVERY HERO COMES
HOME SAFE.**



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SUMMIT RIDGE INTRODUCTION

The Summit Ridge is a motion-controlled, overhead, turning target system that is ideal for any range's customized training programs and courses of fire. The optional electric-powered turning motors quickly and quietly turn targets 90, 180, and 360° with random edging and friend/foe presentation. Targets can be controlled individually, or synchronized with a Spire master control touch screen and/or app. The Ridge system is proven durable, making it an ideal target system for all types of facilities and organizations; including law enforcement, military, government, commercial, and private ranges.

MASTER CONTROL CONSOLE OVERVIEW

The Master Control Console allows a range master to manually control drills for an individual position or for all of the positions simultaneously on the range. As an option, a phone app allows for the rangemaster to control the system from the firing line. Additionally, an optional wireless remote allows for the range master to control the system from the firing line.

LOCAL CONTROL CONSOLE OVERVIEW

The Local Control Console allows a range user to manually control drills for their individual position. The Local Control Console also comes pre-programmed with various games that can be started by the user.

IMPORTANT SAFETY INFORMATION



Maintenance and use must adhere to the guidelines in this manual. Improper use of any of the equipment can result in poor performance, product damage and even serious physical injury. Properly trained personnel should only operate the equipment within the range. For technical, mechanical and electrical maintenance, it is recommended that a trained professional be consulted. Protective headwear, eyewear and gloves should always be worn when performing any maintenance. Danger risks include, but are not limited to, electric shock, head injuries, limb or body crushing, and eye trauma.

WARRANTY OF EQUIPMENT

Refer to agreement documents for specific warranty details for your range. Consumables, negligence, and improper use of equipment (including firing armor-piercing rounds or calibers not approved for your range's ballistic rating) are excluded from all warranties.

All products provided and installed by Spire Ranges are warranted against defects in material or workmanship under normal use and service, subject to limitations detailed below. Warranty period begins at the conclusion of the original installation.

This warranty applies to the original installation only. This warranty does not cover damages caused by improper installation, misuse, or lack of proper maintenance. This warranty does not cover damages caused by alterations or repairs made by anyone who is not pre-authorized in writing by Spire Ranges to modify, alter, repair, or otherwise handle in any way the product.

Spire Ranges reserves the right to determine if any part is defective and to repair or replace parts as it elects. This warranty does not cover shipping costs of defective parts from the owner's site. Return shipping to the site is covered by Spire Ranges during the warranty period. This warranty covers on site labor, travel expenses and accommodations if applicable.

Damage of Spire Ranges equipment resulting in utilizing armor piercing (AP) ammunition or tracer rounds will not be covered under warranty. In addition, high velocity rounds (both ball and frangible) traveling at speeds more than 3000 fps may result in wear, dimpling and pocking of the 1/4" AR500 ballistic shields and target clamps depending on the angle of impact. Such wear, dimpling, and pocking under these conditions is not covered under warranty.

BALLISTIC RATINGS

Ammunition specs listed below are examples of energy and velocity only. Note, any use of Armor Piercing (AP), Steel Core, or Tracer Rounds will void the warranty.

PLATE RATING	MUNITIONS TYPE	MAX ENERGY	MAX VELOCITY
1/4" AR500	Pistol	1175 ft-lbs	1485 fps
3/8" AR500	Pistol/Rifle	3600 ft-lbs	3300 fps
TYP. AMMO	BULLET WEIGHT	MAX ENERGY	MAX VELOCITY
.22 LR	40 gr HP	140 ft-lbs	1400 fps
9MM LUGER	124 gr FMJ	460 ft-lbs	1293 fps
.357 MAG	158 gr JSP	663 ft-lbs	1375 fps
.44 MAG	240 gr SWC	1175 ft-lbs	1485 fps
5.56X45MM NATO	55 gr FMJ	1402 ft-lbs	3388 fps
7.62X51MM NATO	150 gr FMJ	3048 ft-lbs	3025 fps
.308 WIN	150 gr SPTZ	2800 ft-lbs	2900 fps
30-06	180 gr SPTZ	3360 ft-lbs	2900 fps
300 WM	190 gr BTHP	3548 ft-lbs	2900 fps

Spire Ranges products can handle .50 BMG in moderation; however, due to the large amounts of energy exerted from the round, the following applies:

Repeatedly using .50 BMG will shorten the life expectancy of the product and may void warranty.

Repeated impacts of .50 BMG fired in the same location of the product can cause damage in as few as 50 rounds.

Any armor piercing (AP) rounds, particularly those from .50 BMG will void any warranty.

LIMITATION OF LIABILITY

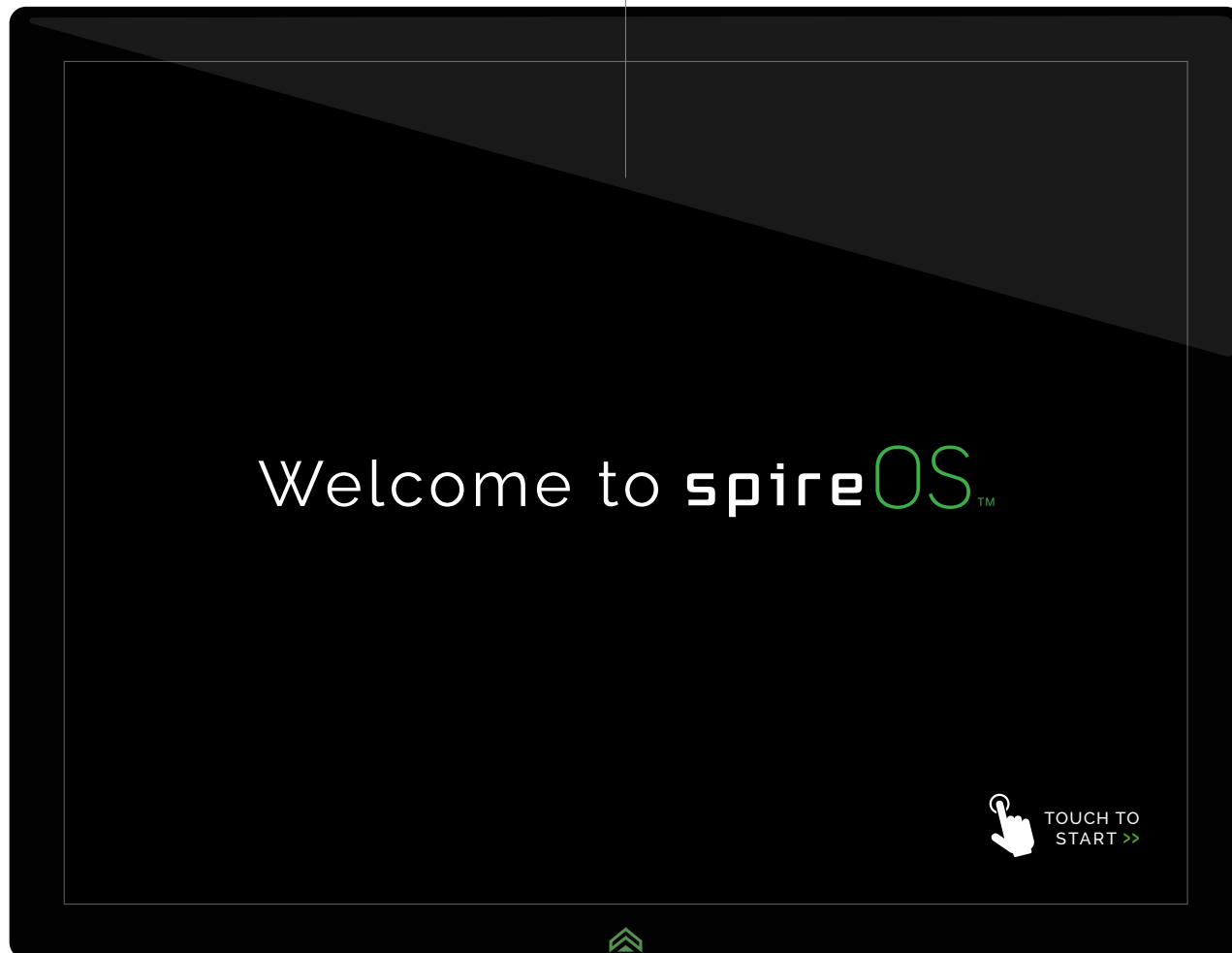
Neither Spire Ranges, nor any company affiliated with it, makes any warranties, representations or promise as to the performance or quality of the product other than what is specified in the original agreement between Spire Ranges and the range Owner. The liability of Spire Ranges to the Owner for damages arising out of the manufacture, sale, delivery, use of resale of this product shall be limited to and shall not exceed the cost of repair or replacement of defective parts. Spire Ranges shall not be liable for loss of use, inconvenience or any other incidental, indirect or consequential damages.

No representative of Spire Ranges has the authority to make any representation or promise on behalf of Spire Ranges or to alter or modify the terms or limitations of warranties in any way.

MASTER CONTROLS:

NAVIGATION

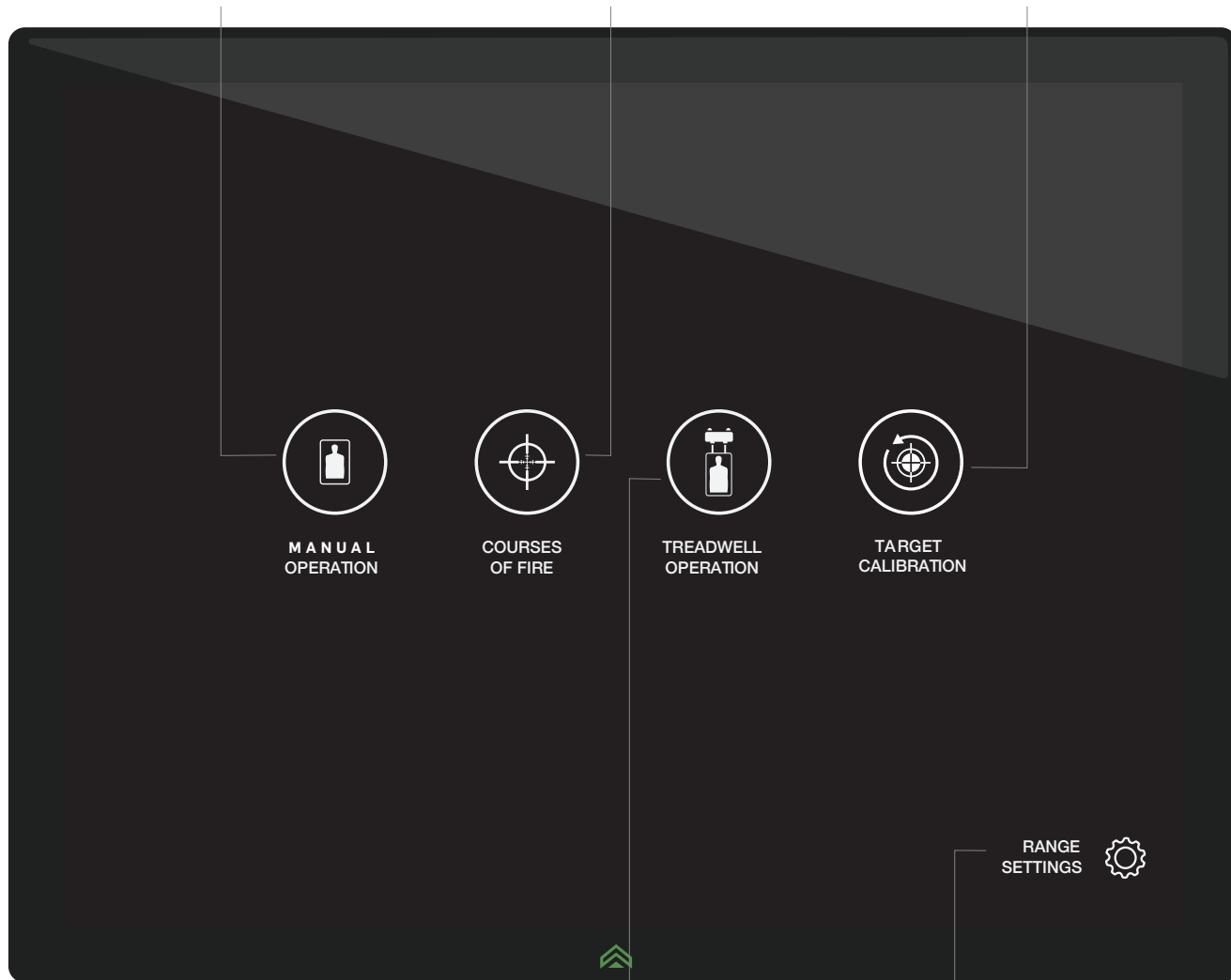
Start by touching anywhere



Manual Operation Screen
p. 18

Courses of Fire Menu
p. 22

Range Calibration
p. 33



MANUAL
OPERATION



COURSES
OF FIRE



TREADWELL
OPERATION



TARGET
CALIBRATION

RANGE
SETTINGS



Treadwell Operation
(optional)

Range Settings Menu
p. 31

MANUAL SESSION

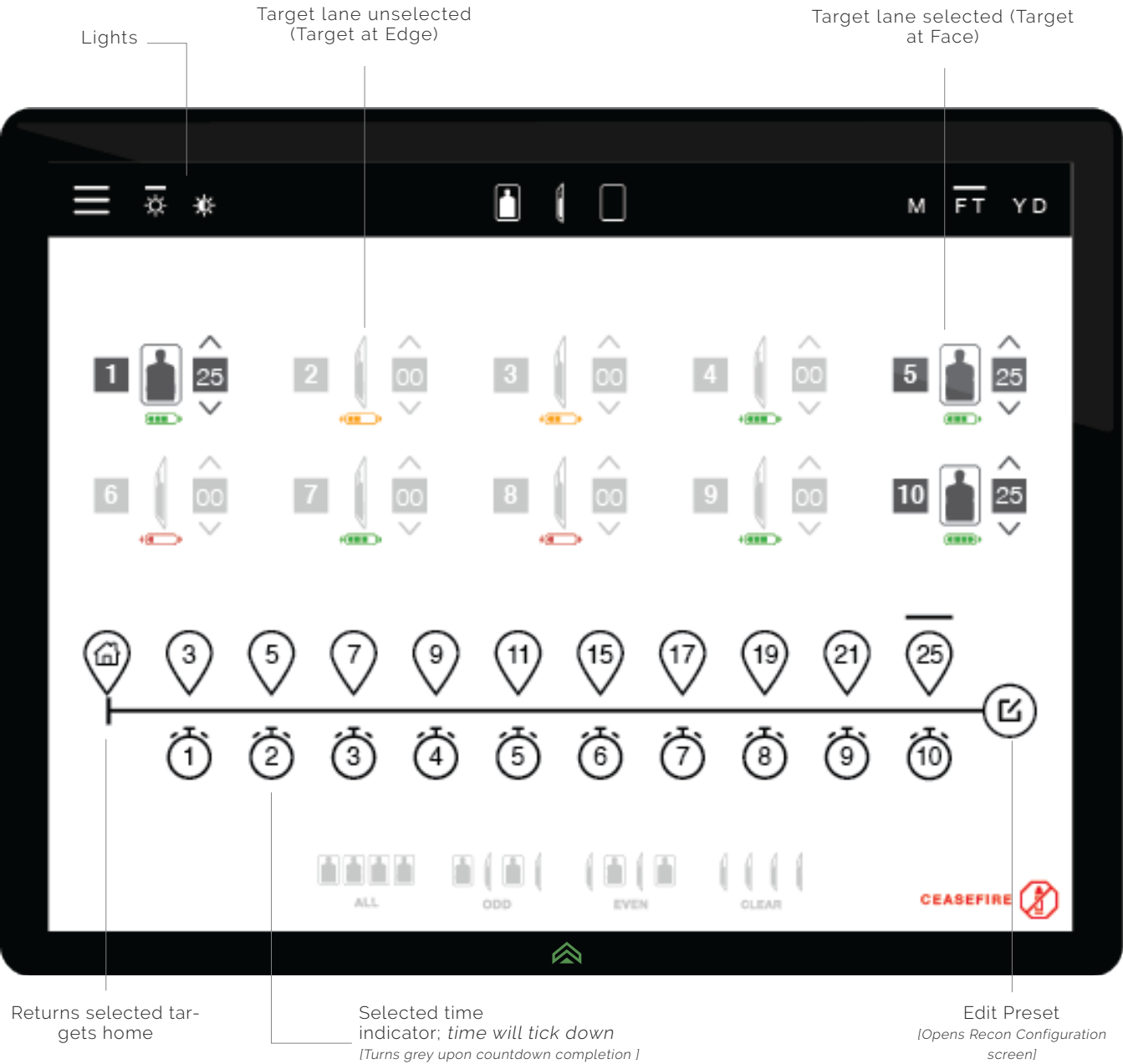
Navigation back to
Main Menu
p. 15

Target Face & Edge Control

Current distance of
individual target

Multi-lane quick-selection: All,
Odd, Even & Clear

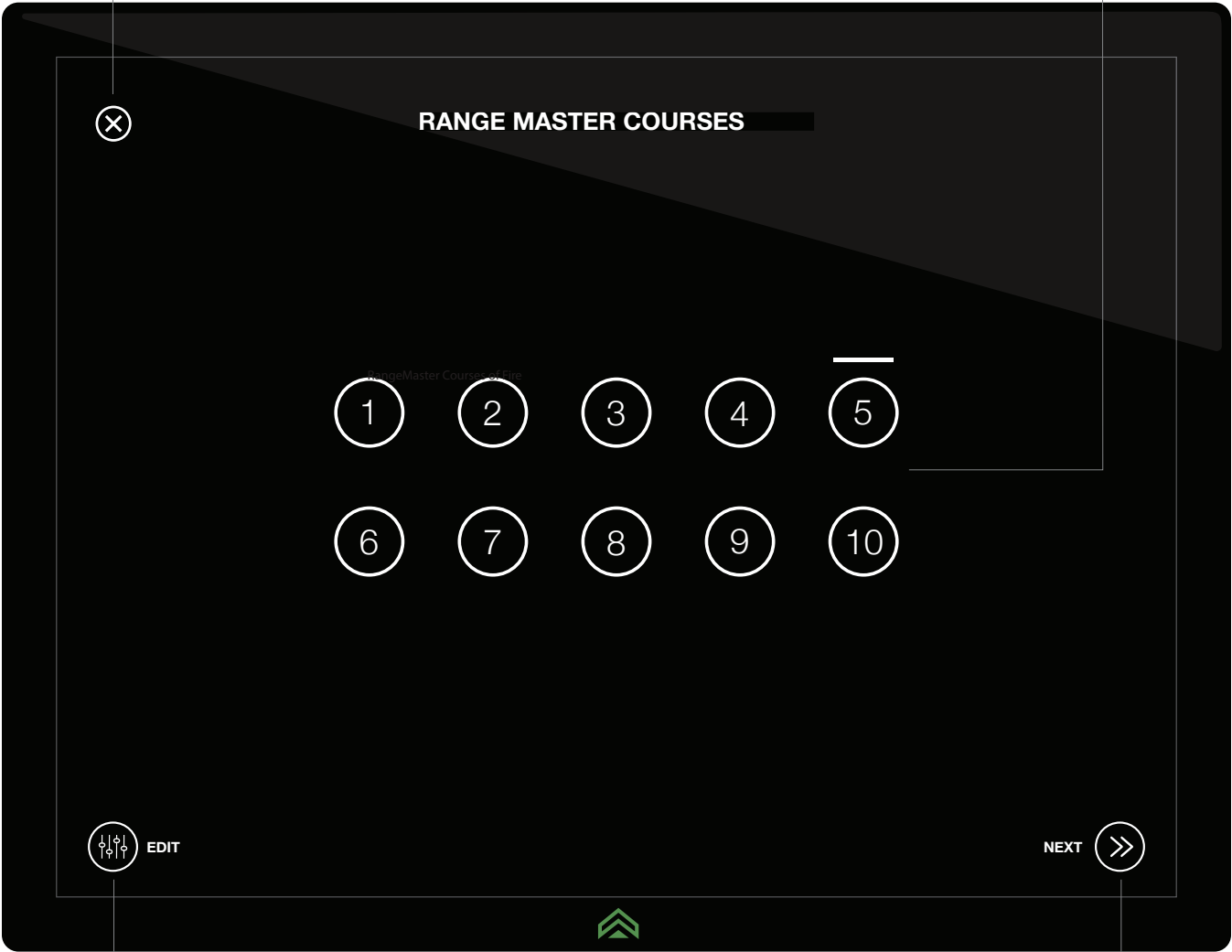
Multi-lane distance
selection



COURSE OF FIRE SESSION

Navigation back to Main Menu
p. 15

Ten courses of fire set
by the Range Master
[Course 5 Selected]



Edit selected course of fire
p. 27

Navigation to Target Selection
for selected course of fire
p. 23

Navigation back to
Courses of Fire Menu
p. 22

Target lane
selected

Target lane
selected

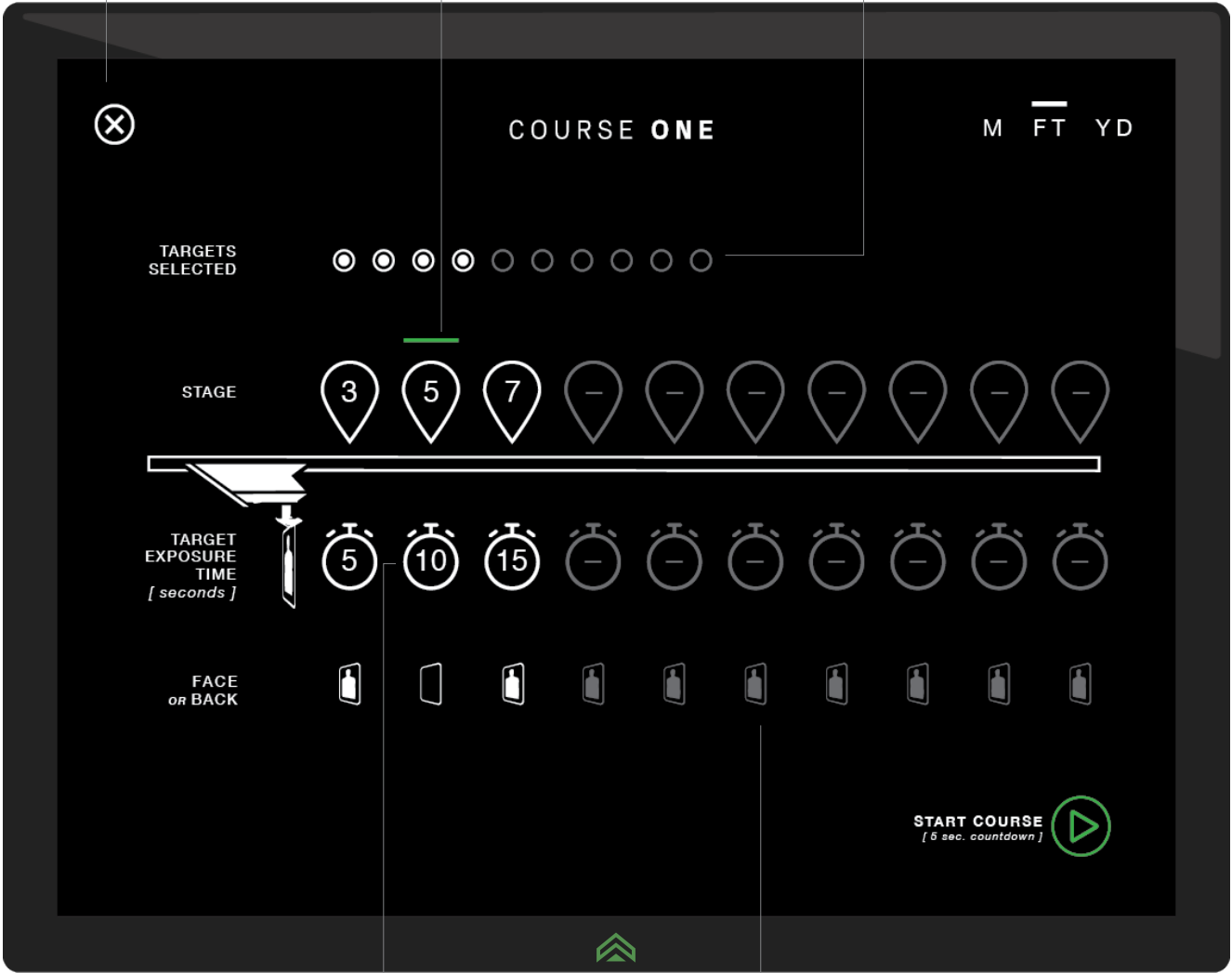


Navigation to Course In Play
p. 26

Navigation back to
Courses of Fire Menu
p. 22

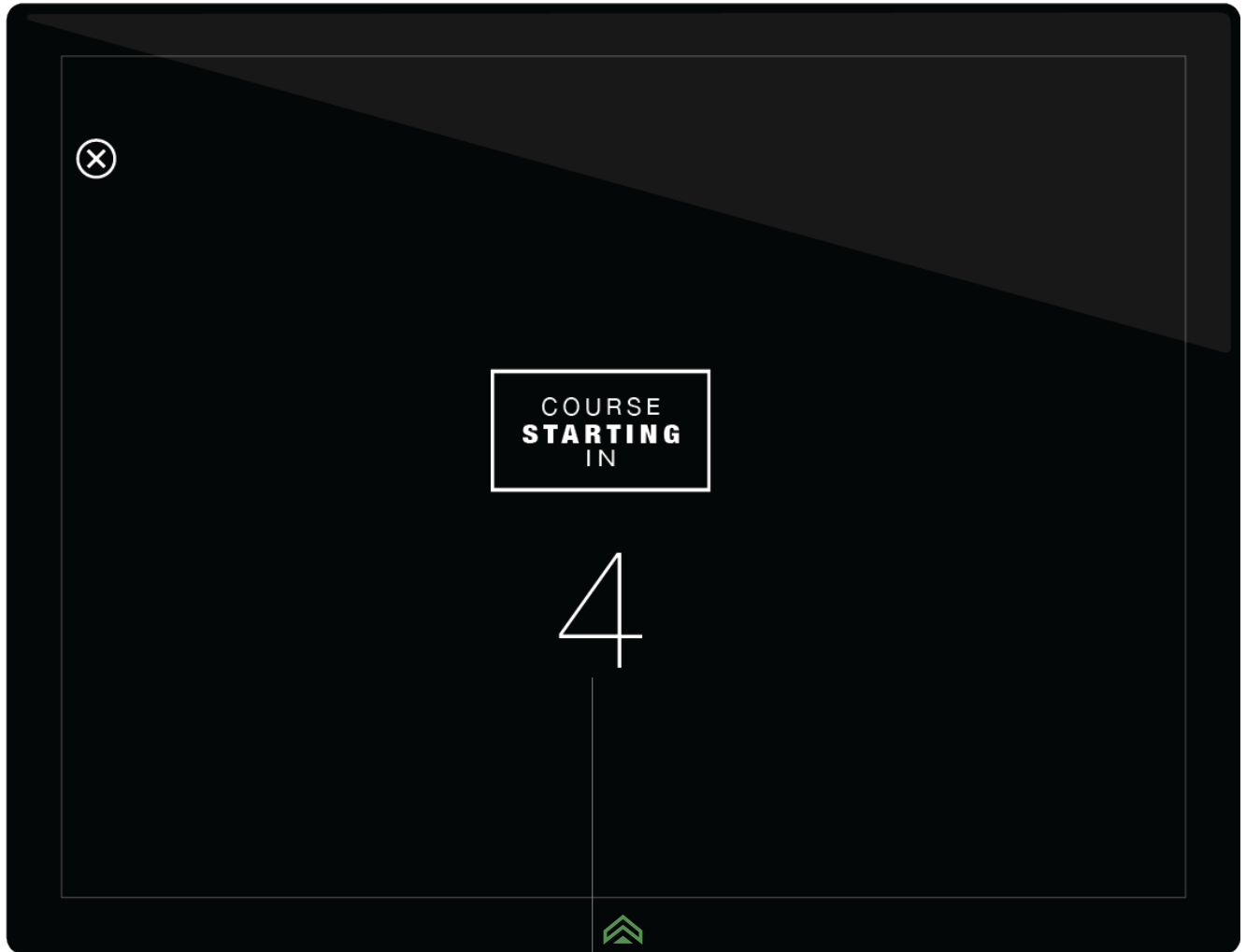
Distance pre-
sets in course

Selected targets indicators
[Filled dot indicates selected]



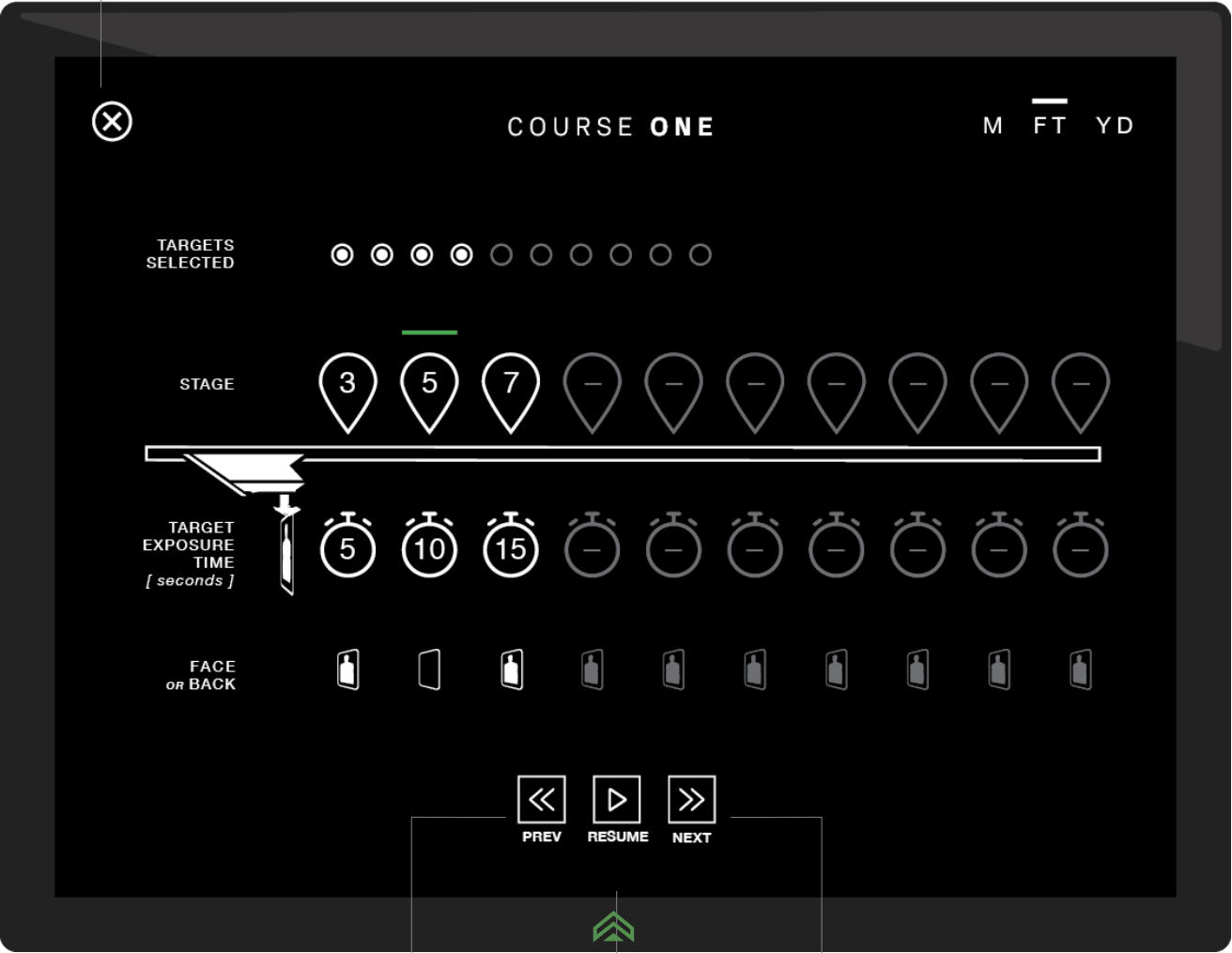
Exposure
times at stage

Target Exposure
at stage



Time till course begins

Back to Courses of
Fire menu
p. 22



Previous stage

Pause / start
stage

Next stage

⊗

COURSE ONE

TARGET
EXPOSURE
TIME
[seconds]



Target Exposure
[Front, Back, Edge]



SAVE

RIDGE CONFIGURATION



Opens Range
configuration
p. 31

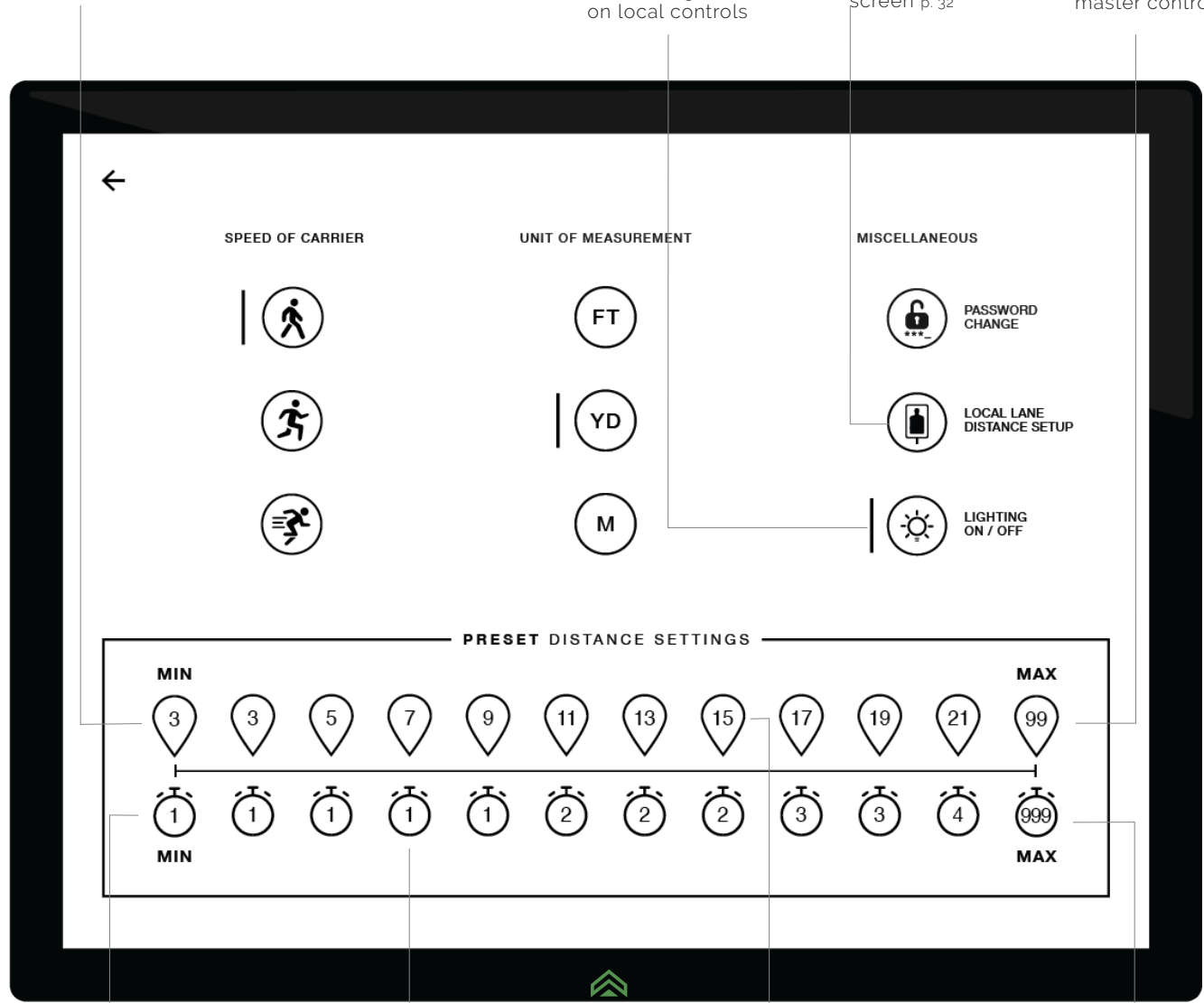
Spire Installers
only

Sets min distance on master control

Hides lights on local controls

Opens master to local settings screen p. 32

Sets max distance on master control

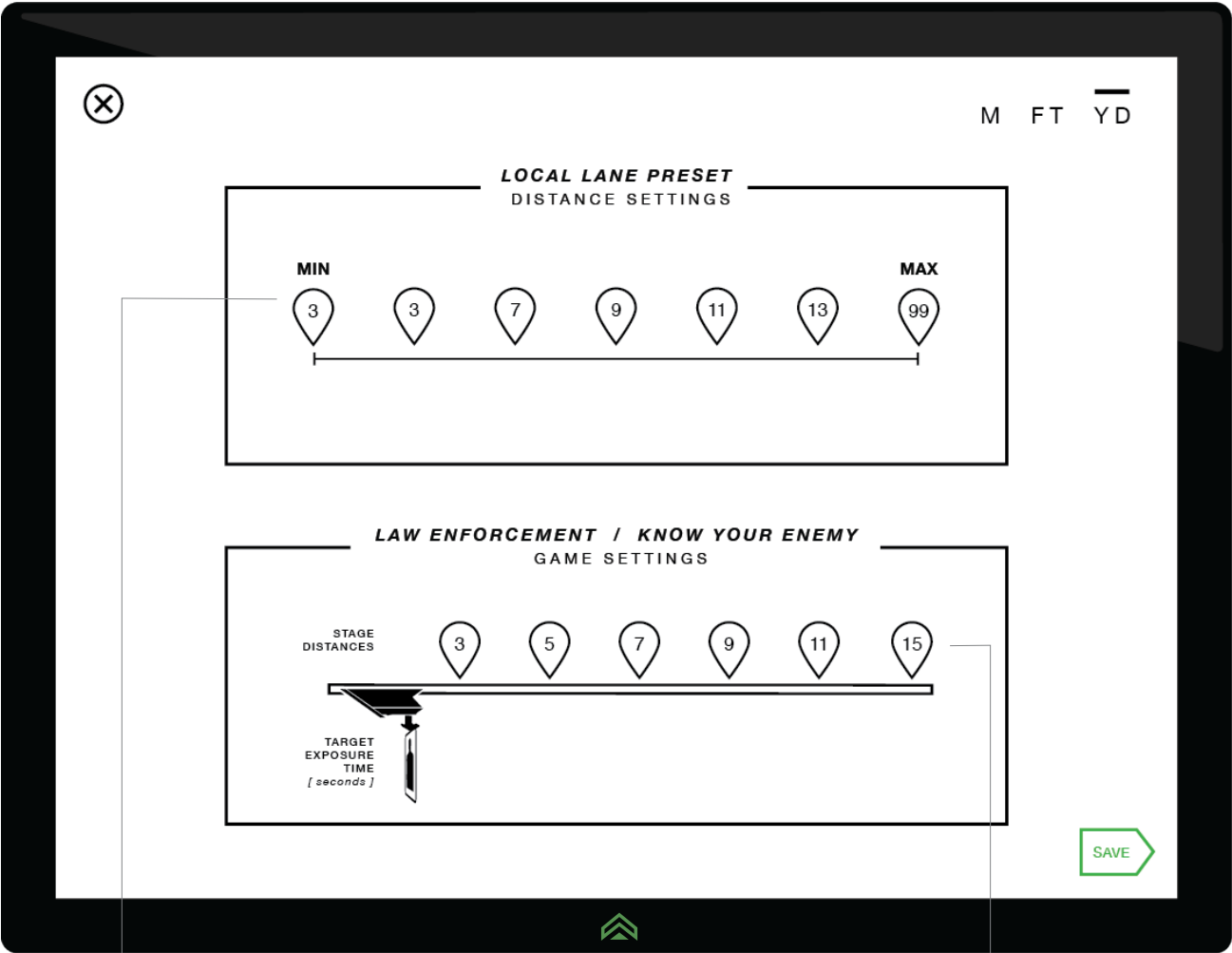


Sets min time exposure on master control

Sets preset time on master control

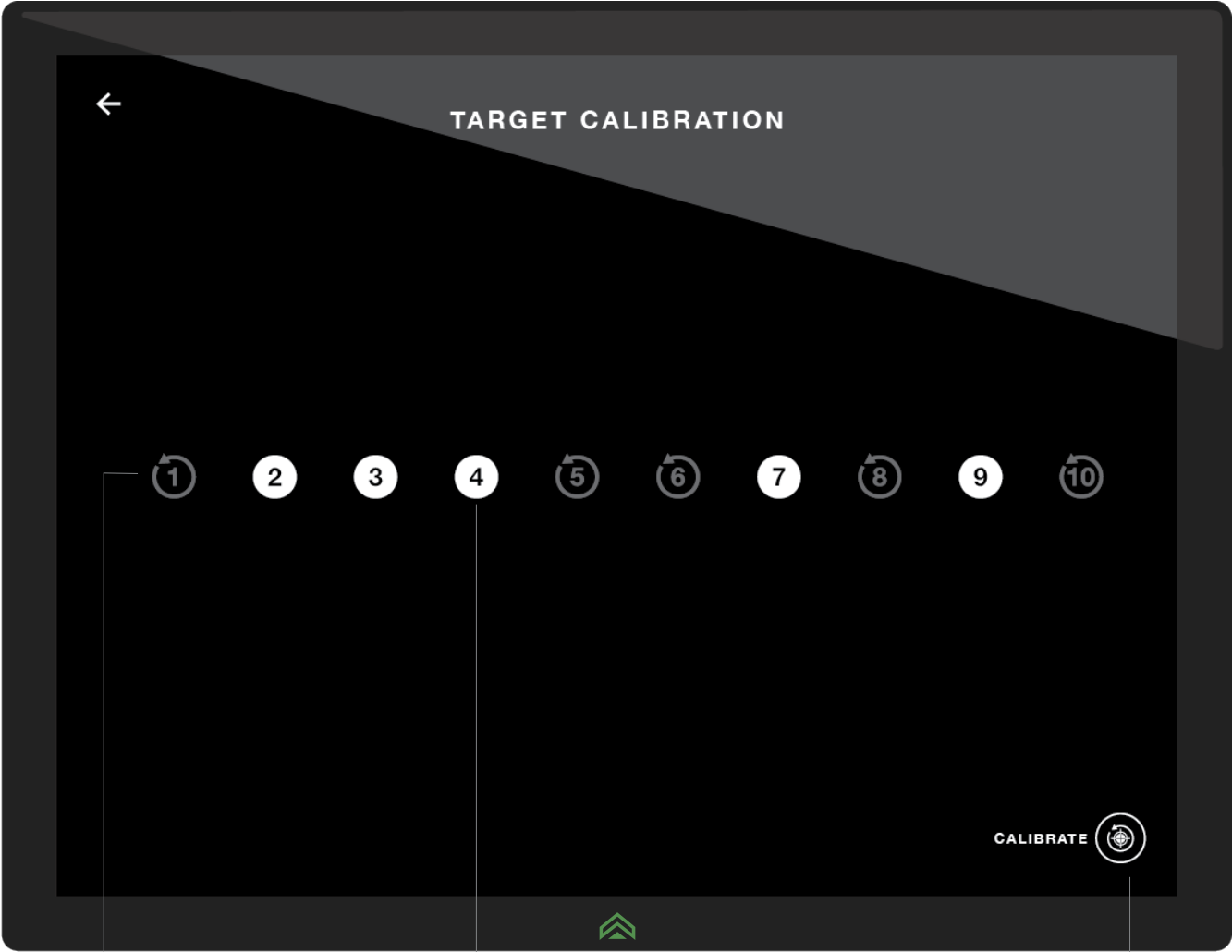
Sets preset distance on master control

Sets max exposure time on master control



Sets distance preset and min and max distance for local controls

Sets distance preset for local controls



Unselected target carrier to calibrate

Selected target carrier to calibrate

Calibrates selected targets

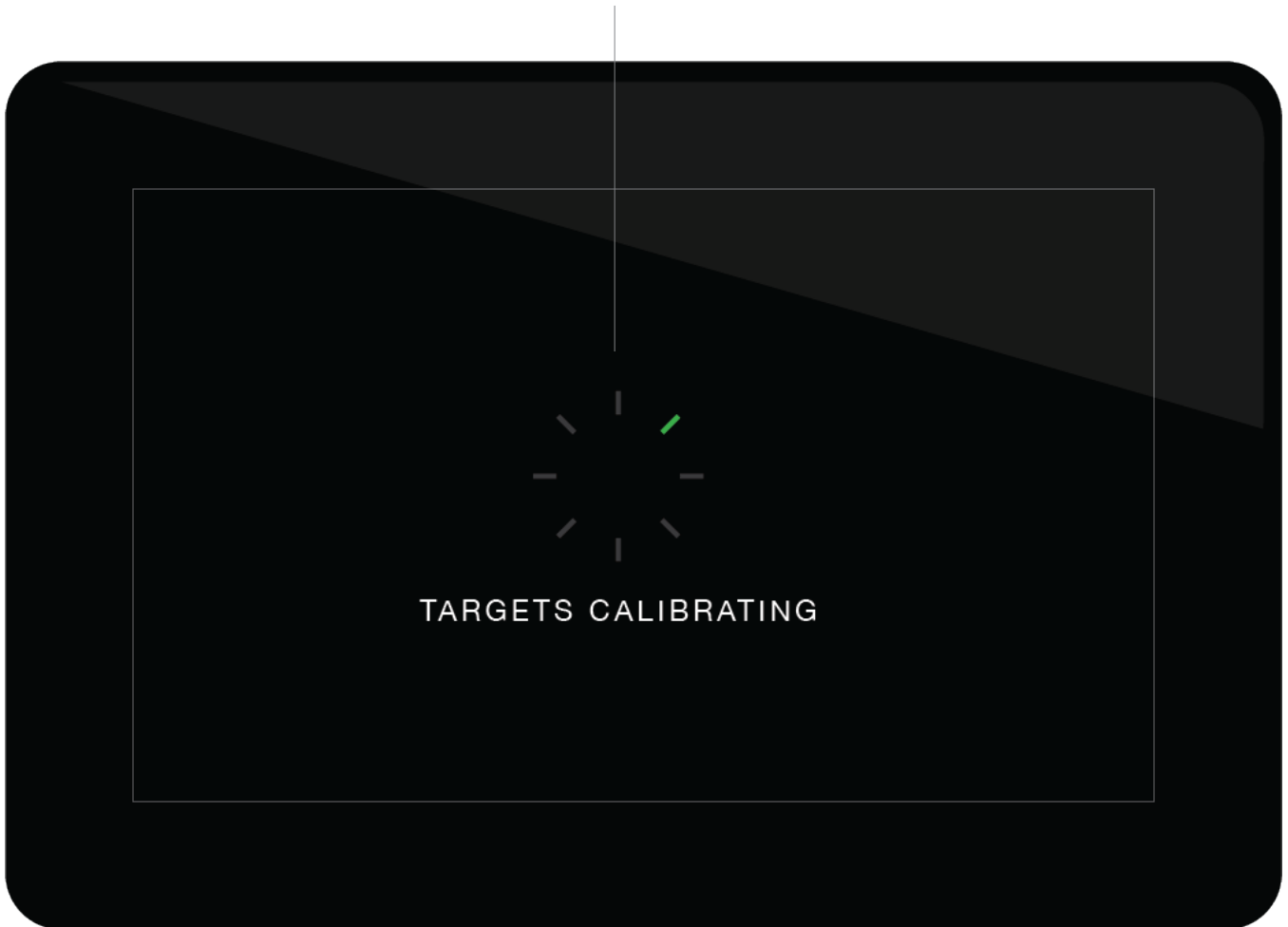
LOCAL CONTROLS:

NAVIGATION

Start by touching anywhere



Targets calibrate once powered on
If the screen get stuck here, press and hold on the center
of the screen for 15 seconds to bypass this screen. A
power cycle of the screen will also get it "unstuck".



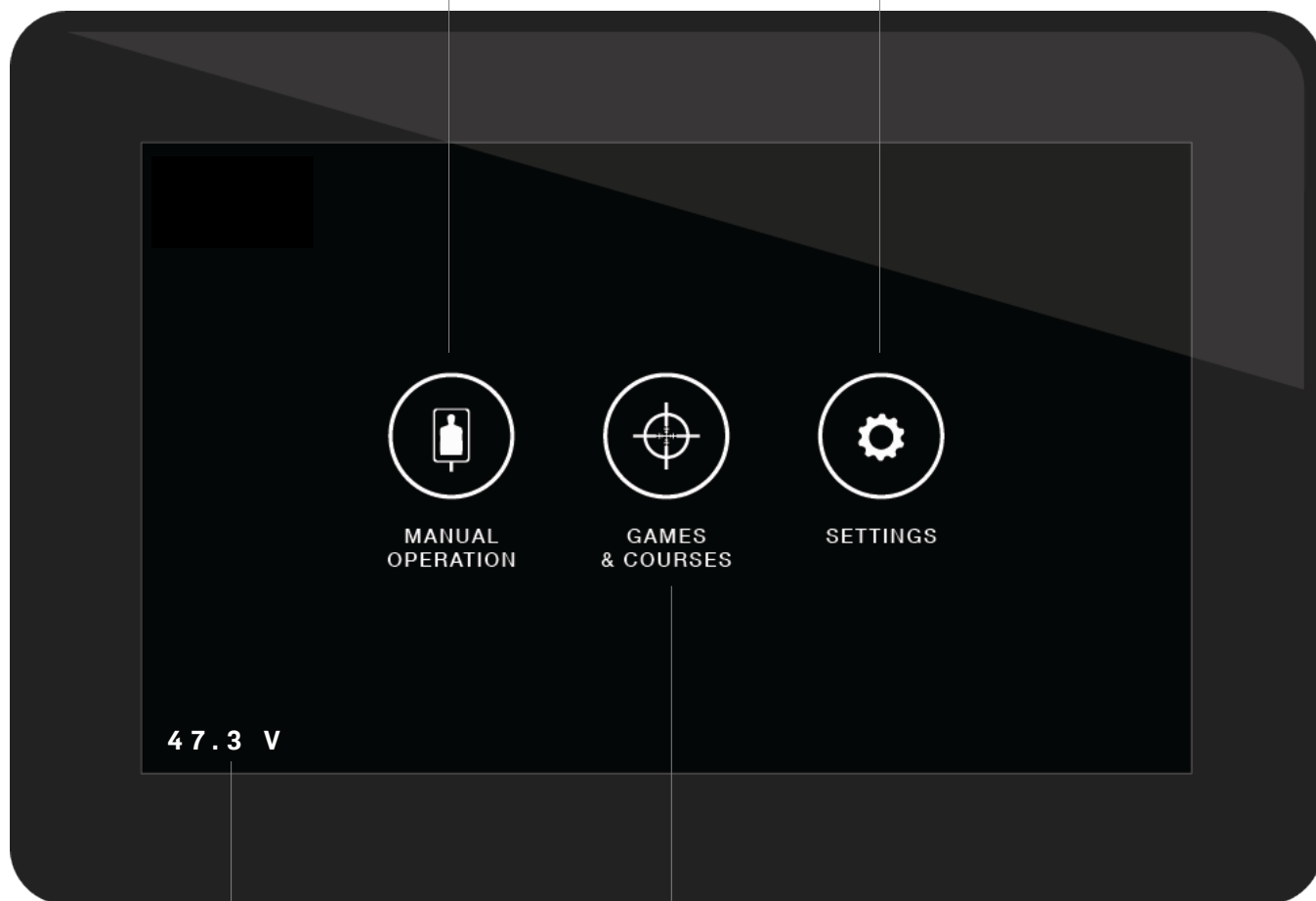


Current Battery
Voltage

If carrier battery voltage gets below a set point, the above screen locks controls until the 30:00 min charge time has completed. If the carrier voltage continues to be below the setpoint, the timer will restart and the charging bracket/wheels should be inspected for proper contact while at home.

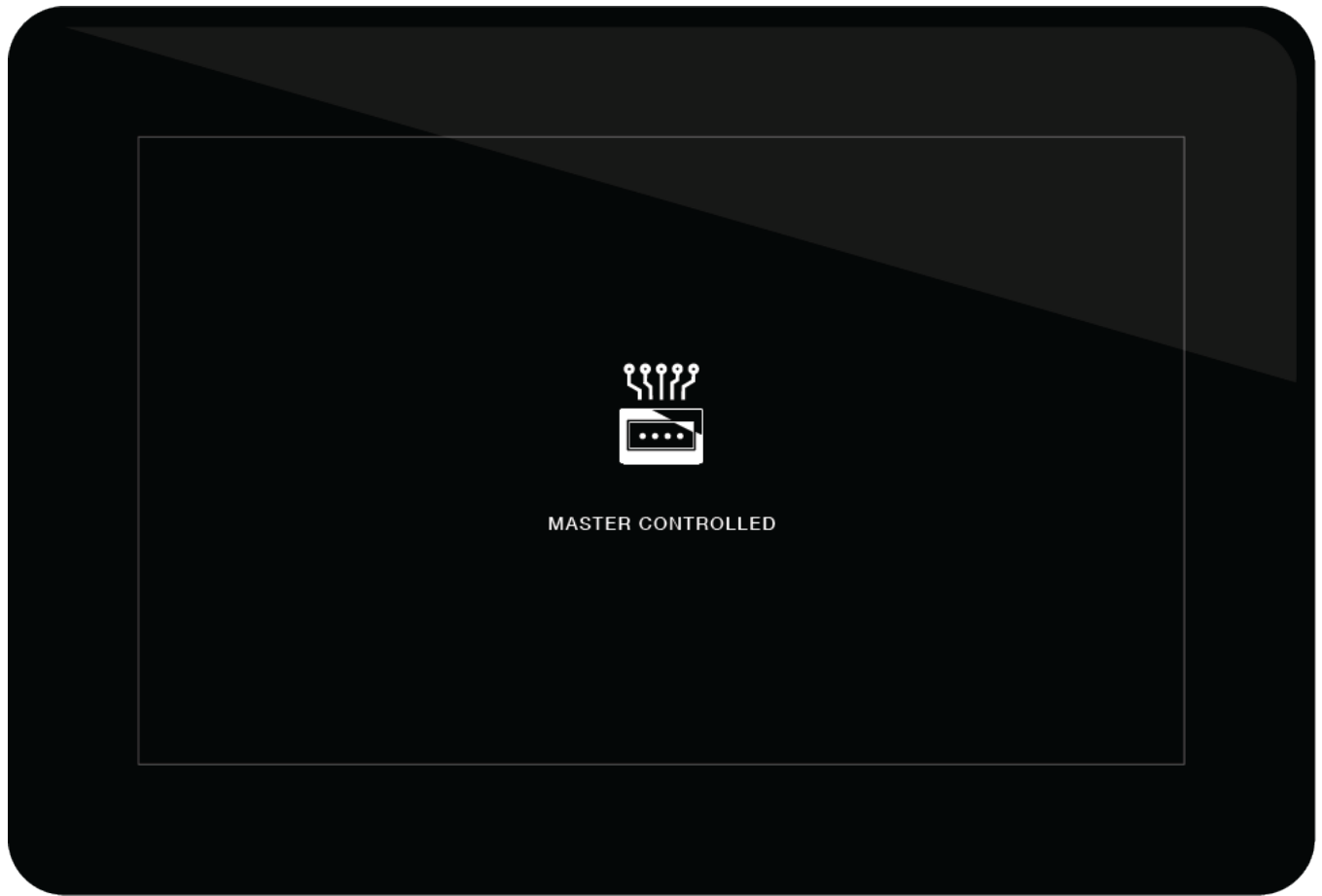
Manual Operation Screen
p. 44

Range Setting Menu
p. 48



Current Battery
Voltage

Games/Course of
Fire Menu



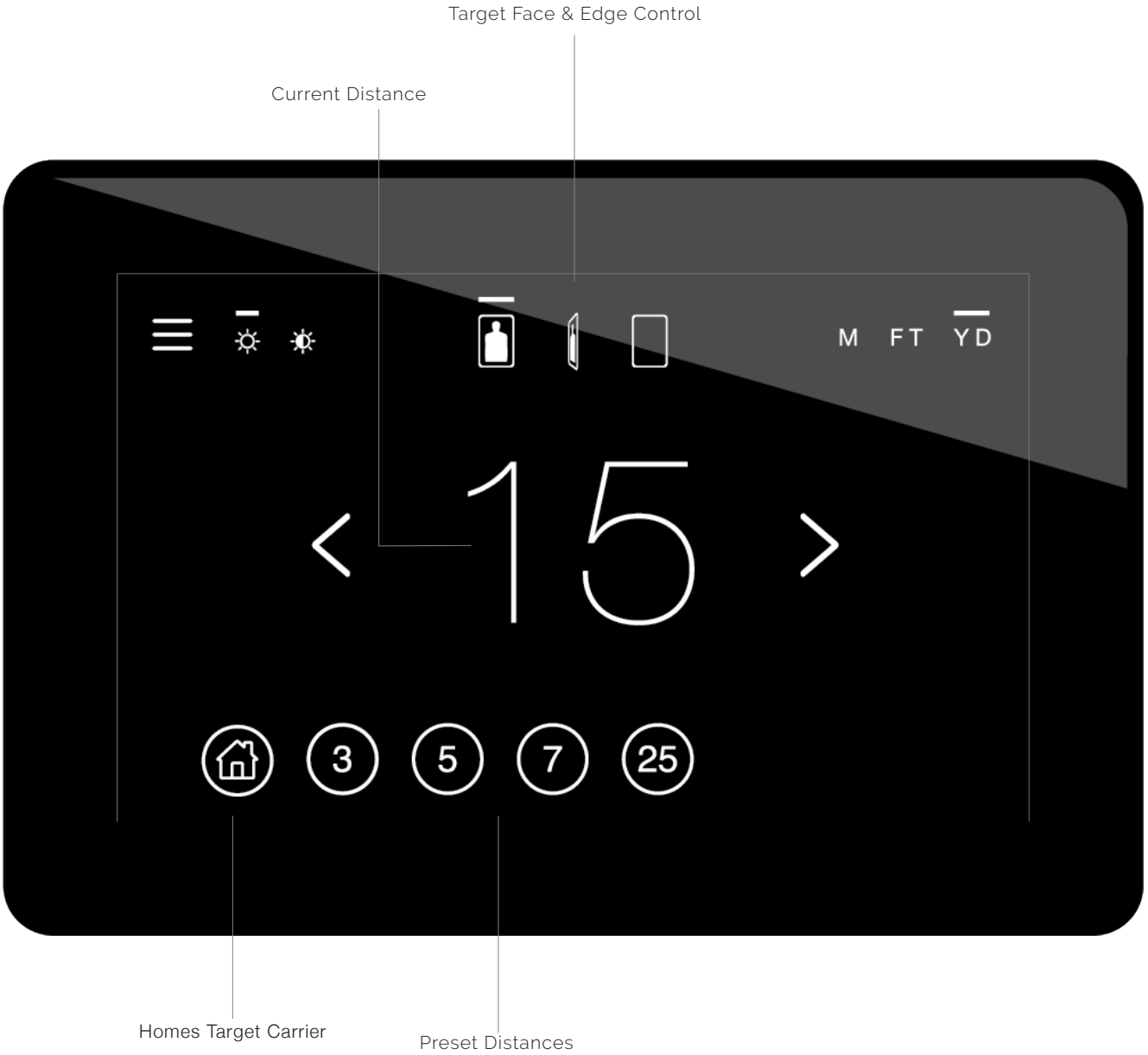
Master Controlled screen appears when target is selected by a master (15" HMI, iPad, or other mobile device).

If screen below appears, see the troubleshooting section of manual p. 130

! COMMUNICATION ERROR

- ↳ Check carrier for power.
- ↳ If powered without response, reset.
- ↳ If still nonresponsive, contact Spire:
1-800-761-1231

MANUAL SESSION

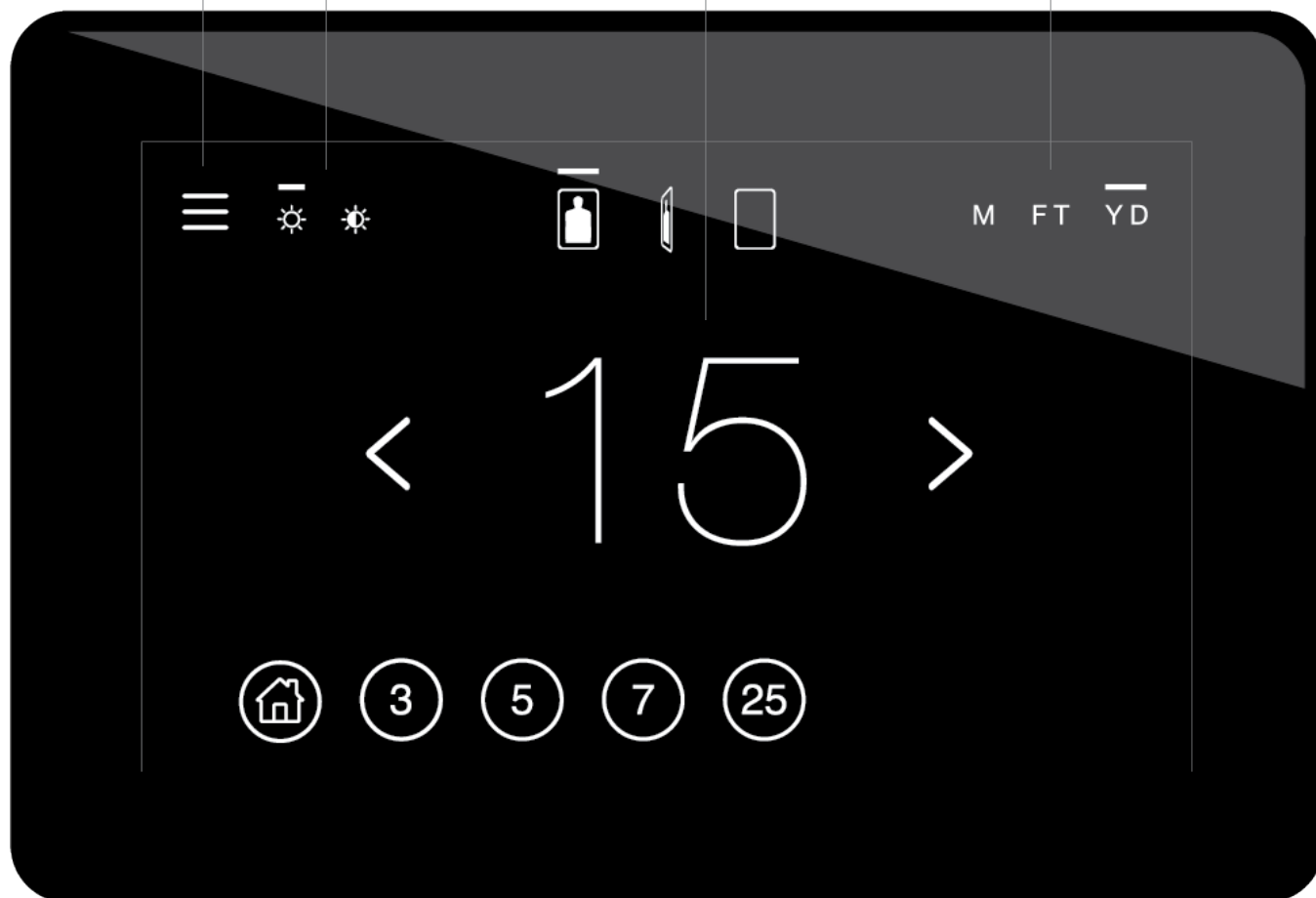


Back to
Main Menu
p. 39

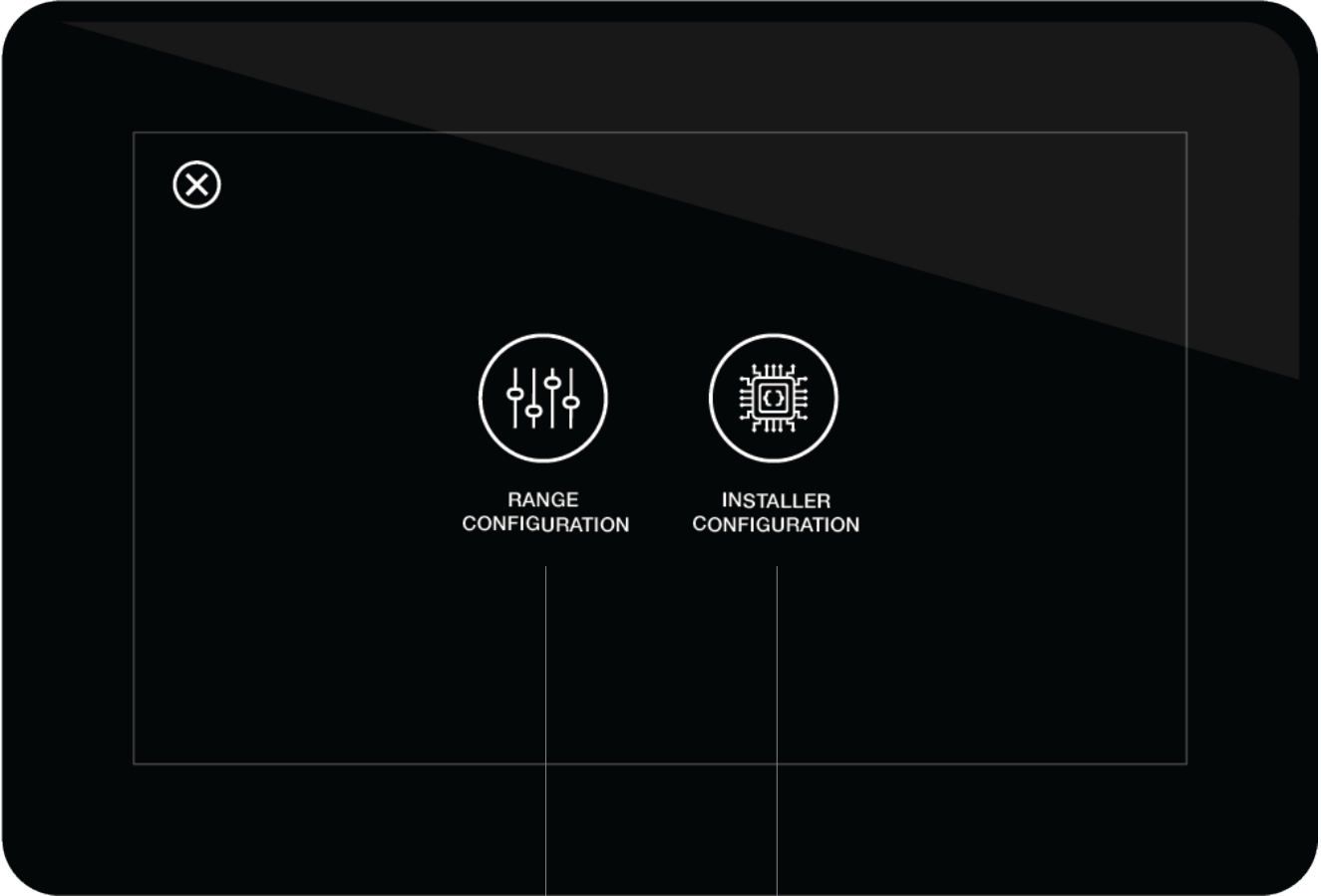
Target Light
Controls

Press and Hold Current Distance
to Calibrate the Clamp

Distance Units

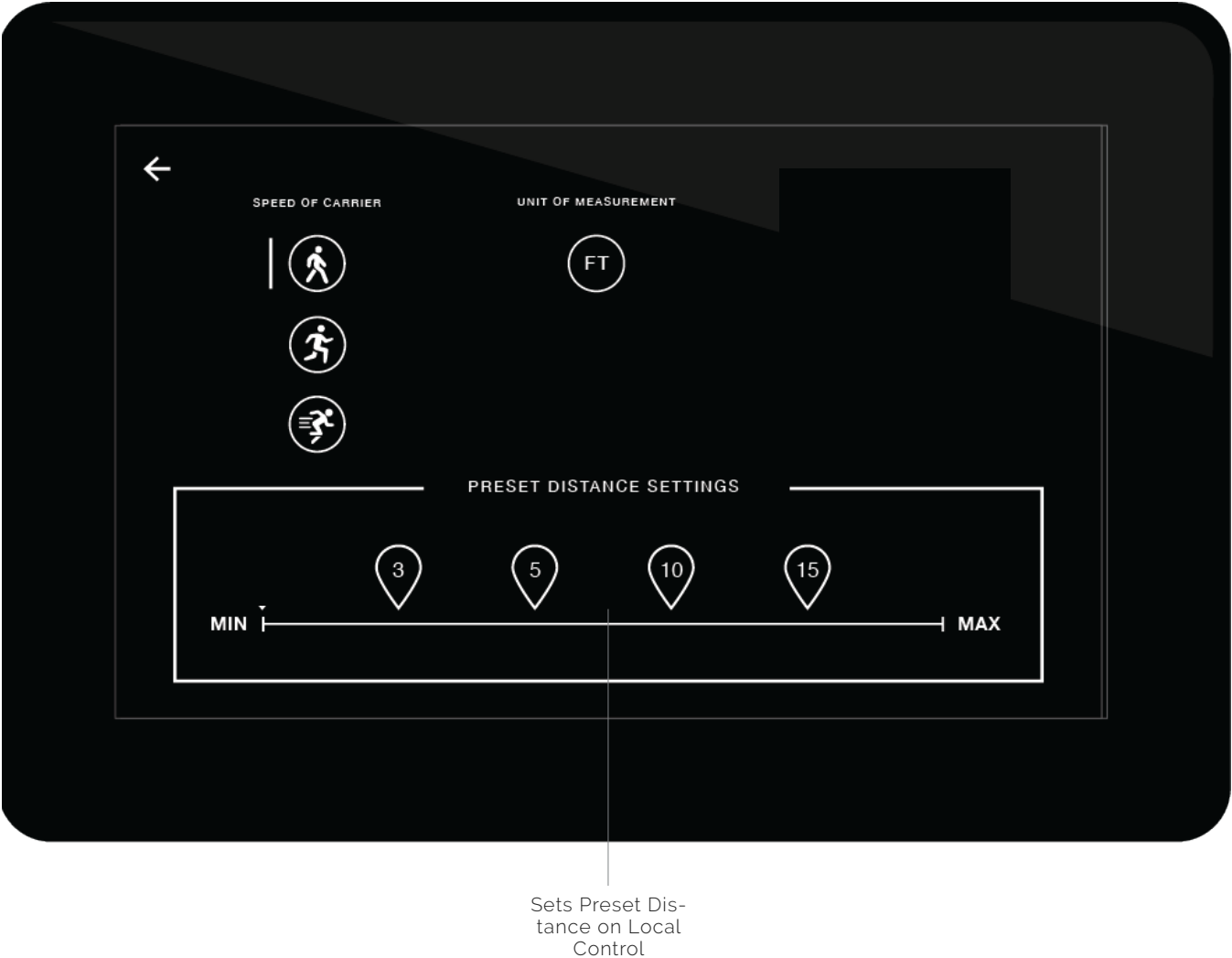


RANGE CONFIGURATION



Opens Recon Configuration
Screen
p. 49

Spire Installers
Only



MOBILE CONTROLS:

- [1] Download cMT Viewer App for the device.



Android



Apple



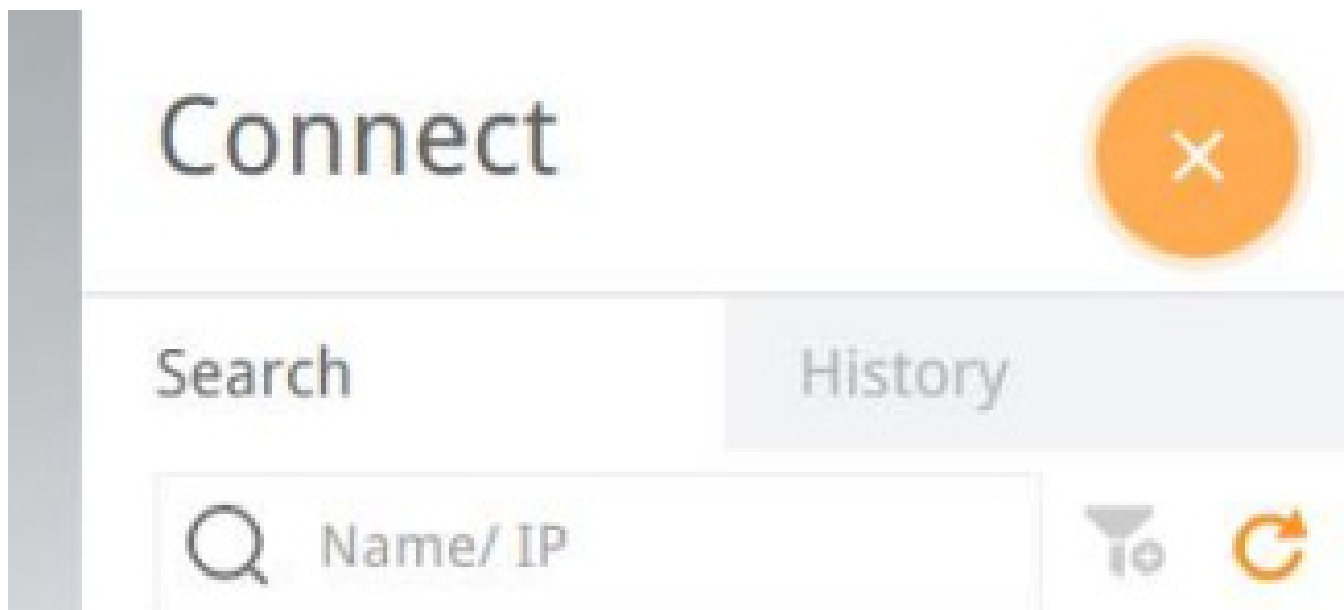
Windows

- [2] Connect to the range WiFi.

- WiFi: RangeAccess
- Password: spireranges

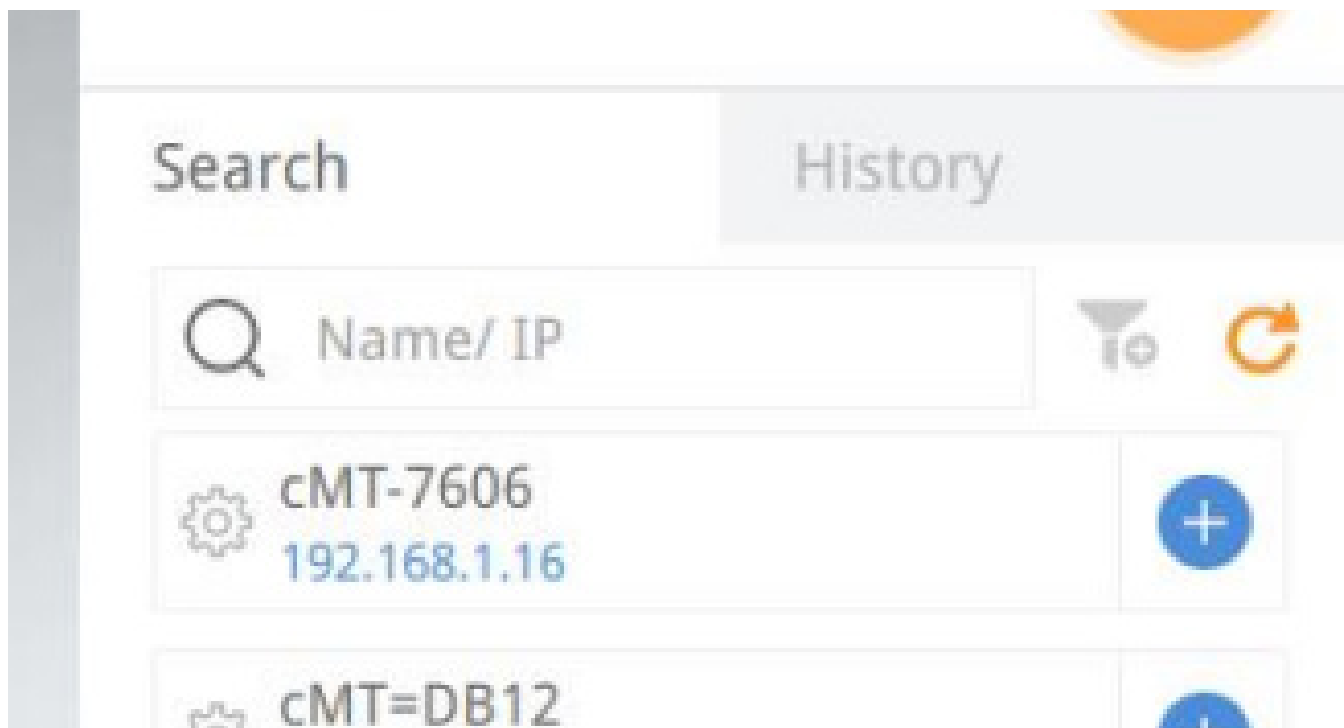
- [3] Open cMT Viewer.

- [4] Press the orange "+" at the top of the screen.



[5] The program should appear. Generally it will have the address of 192.168.1.61. Press the "+" button to add the program. Password is 111111 (six 1's).

- If the program does not appear automatically, try pressing the orange reload button.
- If it still does not appear, try typing 192.168.1.61 into the Name/IP field.
- **Note:** Generally the IP address for your range will be 192.168.1.61 as mentioned above. But, some ranges are unique and will have a different address. This is especially common when there are multiple bays in your range and each bay has a different master control. In that case, try the following addresses:
 - Bay 1: 192.168.1.61
 - Bay 2: 192.168.1.62
 - Bay 3: 192.168.1.63
 - etc.
- If those do not work, contact Spire.
- **Note:** If the Master Control screen is not working, then the app will generally not work either. Generally the app gets its program from the master screen.



[6] The Operations Screen should load if everything is working correctly.

MAINTENANCE:

ROUTINE MAINTENANCE

TIME TABLE	PROCEDURE
As Needed	1. Check clamp position when homed. If clamp is not homed properly, check sensor inside the carrier to ensure it is snug and hasn't moved. Reposition if necessary. 2. Clean out spent casings that may have travelled into the covers of the carrier and clamp assembly. 3. Adjust positive and/or negative charging wheels for correct contact if not charging.
Daily	1. Clean out spent casings on the track. 2. Ensure carrier is resting at home at the end of each day. This helps ensure a full charge for next day's operations. 3. At the end of operation, turn off lights on the carrier, lane number, and in the stalls. This will extend their life expectancy. 4. Inspect track for damage. Repair/replace as needed.
Monthly	1. Tighten any loose bolts/nuts on the track and track hangers. 2. Wipe down track and drive wheels (left side of carrier) when carrier is slipping. Excessive debris or dust will affect the carrier's ability to start/stop accurately. 3. Tighten set screws on drive motor and wheel gears. 4. Inspect guide wheels. Replace if damaged. Adjust spacing with spacer washers if needed.
Quarterly	1. Fully charge any spare batteries. 2. Check the condition of each wheel, belt, and gear if carrier slippage is suspected during normal operation. Adjust/repair if needed 3. Inspect touch screen screen-protectors and replace if desired. 4. Inspect track hangers for damage. Repair/replace as needed.
Biennially	1. Check that the batteries are maintaining their desired level of charge. Batteries are rated for 2000 cycles. The average range will hit ~2000 cycles every 2 years. After this cycle count it is expected that the batteries will have <80% their original capacity. Replace the batteries if desired to keep above their 80% capacity rating or if they are not performing as desired.

*Maintenance items are subject to change at Spire's discretion. Refer to latest user manual or Spire directly for latest list of maintenance items.

SERVICE PLANS:

OVERVIEW

At the core of Spire Ranges is our commitment to keep our installed equipment in each range running at its optimum performance. To maintain that standard, below is a list of the different service package levels available to our clients. We look forward to providing your range with a quote that is unique to your range.

LEVEL	TRIPS PER YEAR	PARTS DISCOUNT
Bronze	1	0%
Silver	2	5%
Gold	4	10%

SERVICES OFFERED WITH EACH SITE VISIT:

- Provided Refresher Training
- Software Update/Reconfiguration
- Test all Motors, Valves, Cylinders, Lights, & Proximity Switches
- Target Clamp Inspection/Adjustment
- Check/Secure Electrical Connections
- Verify Proper Voltages
- Verify Controller(s) (HMI's/Computer) Functionality
- Assess Cable Tension & Adjust
- Assess Track Health & Tighten/Replace any Loose/Missing Hardware
- Verify Proper Charging of Targets
- Stall/Bench Inspection
- Trap Inspection
- Overall Range Health Inspection

TROUBLESHOOTING:

Given below are possible causes and solutions for system problems. Within this section, you will find sequential steps that can be used to help troubleshoot a problem. If a problem persists after following these troubleshooting guidelines, please contact the Spire support team.

HMI TOUCH SCREENS (MASTER & LOCAL)

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
1.1 Dark Blank Screen	(1) Screen is in sleep mode	(1) Touch the screen to bring HMI out of sleep mode.
	(2) No power supplied to HMI	(1) Check the power supply connection. (2) If the 15" master, check the fuse on the back of the screen. (3) Check circuit breaker to see if tripped. (4) If problem persists, contact Spire for technical support.
1.2 Single Nonresponsive Button on Screen	(1) HMI screen error	(1) Check power supply to PLC. If PLC has power, cycle power to PLC. (2) If there is no indicator light for power to the PLC, check circuit breaker to see if tripped.
	(2) HMI calibration needed	(1) Power cycle the screen and (2) immediately touch the screen during startup. (3) Follow the on-screen prompts to calibrate.
	(3) HMI / PLC fault	(1) Contact Spire for technical support.
1.3 Entire HMI Touch Screen Nonresponsive	(1) HMI error	(1) Cycle power to HMI.
	(2) HMI / PLC fault	(2) Cycle power to the PLC.
1.4 Intermittent communication error that does not stay with a single lane (jumps between 2 or more lanes)	(1) Ethernet (RJ45) cable damaged	(1) Check all RJ45 connections in overhead charge box containing the Nanostation POE injector. (2) Check RJ45 connection to Nanostation. (3) Follow cables to ensure they are not smashed or damaged. (4) Replace cable. (5) If problem persists, contact Spire for support.
1.5 "08 Image problem (error:1)"	(1) External power event occurred	(1)Power cycle the touch screen. (2) If problem persists, contact Spire for a replacement.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
1.6 Communication error (single lane)	(1) Dead carrier battery	(1) Return carrier to home and check LED in overhead unit (charge box). (See Charge Box LED Status section.)
	(2) Ethernet (RJ45) cable unplugged or damaged	(1) Check all RJ45 connections in overhead charge box. (2) Check RJ45 connection to screen. (3) Follow cables up the stalls to ensure they are not smashed or damaged.
	(3) Bad antenna	(1) Inspect the antenna for damage. (2) Ensure the antenna has positioned so they have minimal line-of-sight of the Nanostation.
	(4) Bullet error	(1) Turn carrier power on. (2) Wait 3-5 min. (3) Check bullet for indication lights. (See Bullet Troubleshooting section.)
1.7 Communication error for entire bay	(1) Ethernet (RJ45) cable unplugged or damaged	(1) Check all RJ45 connections in charge boxes. (2) Check RJ45 connection to Nanostation.
	(2) Nanostation error	(1) Cycle Nanostation power (unplug and replug ethernet cable). (2) Wait 3-5 min. (3) Check nanostation for indication lights. (See Nanostation Troubleshooting section.)
	(3) Lane with Nanostation POE injector is off	(1) Check Nanostation POE injector for power.
1.8 Communication error for lane X to last lane	(1) Ethernet (RJ45) cable unplugged or damaged	(1) Check RJ45 connections in overhead charge box connecting lane X to the correctly operating lane next to it.
	(2) Lane X overhead charge box is off or breaker tripped	(1) Turn on lane X charge box. (2) Check breaker in lane X overhead charge box.
	(3) Bad ethernet switch	(1) If no lights on ethernet switch inside lane x overhead charge box, check power cables. (2) Contact Spire for a replacement ethernet switch.
1.9 "No memory space" / "Flash memory full"	(1) Touch screen needing power cycling	(1) Power cycle the HMI touch screen.

RIDGE TARGET UNITS

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
2.0 No power to carrier	(1) Dead battery	(1) See section 5.
2.1 Misaligned target(s)	(1) Alignment error	(1) Navigate to the Menu Screen on the HMI Touch Screen. (2) Press and hold (for 5 seconds) the target icon for recalibration. (3) If turner doesn't calibrate, carrier assumes it's currently in the home position. send turner to edge or back and repeat steps 1-2.
	(2) Homing sensor malfunction	(1) See section 9.0 - 9.1.
2.2 Nonresponsive target turner (not turning)	(1) Turning motor position error	(1) Navigate to the Manual Operation screen on the HMI touch screen. (2) Press and hold (for 5 seconds) the target icon for recalibration. (3) Retry target movement. (4) If the problem persists, cycle power to the carrier. (5) Once the system has rebooted, tap the control touch screen to begin.
	(2) Obstruction in drive system	(1) Power off the target. (2) Check the clamp and shaft for obstruction. (3) Check the clamp homing bracket inside carrier for obstruction. (4) Remove obstruction if one is present.
	(3) Disconnected motor cable	(1) Check motor cables (comms and power).
	(4) Turning motor fault	(1) Navigate to the Manual Operation screen on the HMI touch screen. Generally if a fault is present, it will be displayed on this screen. (2) Press and hold to clear the error. (3) If the problem persists, cycle power to the carrier. (4) Once the system has rebooted, tap the control touch screen to begin. (5) Contact Spire for technical support if the problem persists.

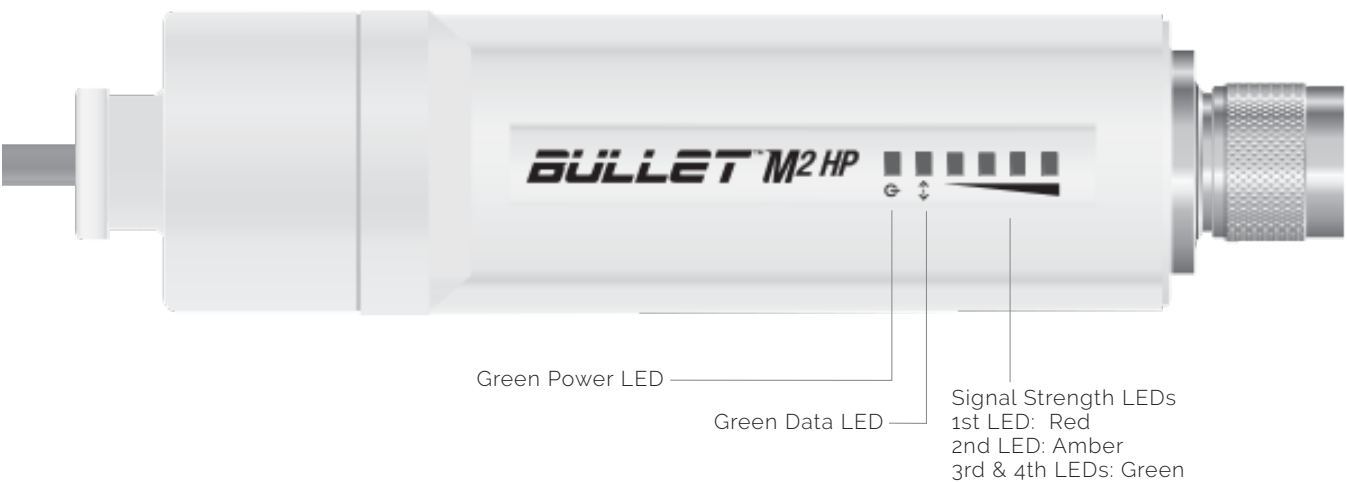
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
2.3 Nonresponsive target driver (not moving on the track)	(1) Motor position error	(1) Navigate to the Manual Operation screen on the HMI touch screen. (2) Press and hold (for 5 seconds) the target icon for recalibration. (3) Retry target movement. (4) If the problem persists, cycle power to the carrier. (5) Once the system has rebooted, tap the control touch screen to begin.
	(2) Obstruction in drive system	(1) Power off the target. (2) Check the drive wheels, belt, and track for obstruction. (3) Remove/repair obstruction if one is present.
	(3) Disconnected motor cable	(1) Check motor cables (comms and power).
	(4) Motor fault	(1) Navigate to the Manual Operation screen on the HMI touch screen. Generally if a fault is present, it will be displayed on this screen. (2) Press and hold to clear the error. (3) If the problem persists, cycle power to the carrier. (4) Once the system has rebooted, tap the control touch screen to begin. (5) Contact Spire for technical support if the problem persists.
2.4 Clamp Continues to Rotate After Turning Carrier On (Continuing to Calibrate)	(1) Sensor height changed	(1) Remove right side cover. (2) Sensor will light up when it detects metal and clamp will stop spinning. Adjust sensor height closer to clamp homing bracket.
	(2) Sensor damaged (not lighting up)/bad wire connections	(1) See section 9.0 - 9.1.
2.5 Carrier is Stuck Down-range	(1) Obstruction on track	(1) Check that track is clear of debris.
	(2) Track damaged	(1) Check that track bolts are tight. (2) Inspect track for damage and repair if necessary.
2.6 Running Into End Stops at Stall End (touch screen says at a distance of 0 or less)	(1) Homing bracket too far away	(1) Check homing bracket on track to ensure the gap between the bracket and the carrier is minimal. (2) Sensor will light up when it detects metal and has power.
	(2) Sensor damaged (not lighting up)/bad wire connections	(1) See section 9.0 - 9.1.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
2.7 Running Into End Stops at Stall End (touch screen says at a distance of greater than 0) or at track end (touch screen says at distance less than range length)	(1) Drive set screws loose	(1) Tighten set screws on drive wheel gears and driving motor gear.
	(2) Track and/or drive wheels are dirty	(1) Clean track. (2) Clean drive wheels.
	(3) Drive belt idler puller is loose	(1) Adjust idler pulley to tighten belt tension.
	(4) Drive belt is damaged	(1) Inspect drive belt for damage. (2) Replace if needed.
2.8 Not Responsive/Communication Error on Local Screen	(1) Dead carrier battery	(1) See section 1.4.
	(2) Ethernet (RJ45) cable unplugged or damaged	(1) See section 1.4.
	(3) Bullet error	(1) See section 3.
2.9 Battery Not Holding Charge/Dying Frequently (Lasts <30min)	(1) Intermittent charging	(1) See section 5.
	(2) Battery is old	(1) Batteries are rated for 2000 charge cycles. Replace battery.
2.10 Red & blue leds not functioning	(1) Target at home	(1) Red/Blue light do not operated while at home. move carrier away from home and check light operation.
	(2) Bad wiring	(1) Check light wiring. (2) Check light wiring to relay. (3) Compare PLC output lights to light on red/blue led relay. If light for the PLC output is lit and the relay is not, check wiring from relay to PLC.
	(3) Bad relay	(1) Compare PLC output lights to light on red/blue led relay. If light for the PLC output is lit and the relay is not, replace relay.
2.11 Red or blue or white led not functioning.	(1) Bad led	(1) Replace led.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
2.12 White led not functioning	(1) Bad led	(1) Replace led.
	(2) Bad wiring	(1) Check light wiring. (2) Check light wiring to relay. (3) Compare PLC output lights to light on white led relay. If light for the PLC output is lit and the relay is not, check wiring from relay to PLC.
	(3) Bad relay	(1) Compare PLC output lights to light on white led relay. If light for the PLC output is lit and the relay is not, replace relay.
2.13 Carrier losing power down range in same location multiple times (no low battery)	(1) Damaged track	(1) Inspect track near location of problem for damage. (2) Repair/replace if needed. (3) Power cycle the carrier.
	(2) Loose track hardware	(1) Inspect track bolts/nuts. If loose, can cause the carrier to catch. Can also cause the carrier positive charge wheel assembly to contact the track and short the carrier out. (2) Power cycle carrier.
2.14 Carrier making metal-on-metal rubbing sound when moving up and down track	(1) Negative charge wheel assembly adjusted incorrectly	(1) Turn carrier off and move home. (2) Inspect negative charge wheel assembly spacing. (3) Shift the front of the carrier to the left. (4) Loosen the nuts on the charge wheel assembly bracket long screw and adjust the screw until the negative charging disc (left side) just comes off the plastic. (5) Shift the front of the carrier to the right and ensure the charging disc doesn't touch the track. If it does, adjust the long screw to prevent that and recheck contact on to the charge bar when the carrier is shifted back to the left. If this adjustment is not possible within the carrier shift, the front right centering wheel needs a spacer added to tighten the carrier shifting (see 2.15.2). (6) Hold the long screw in place with a T25 torx wrench and tighten the nut with a 8mm wrench. (7) Turn carrier on.
	(2) Carrier front shield dragging on track	(1) Inspect carrier front shield for any points in contact with track. This can be the bottom, left, right, left-top, or right-top. (2) If left or right is touching, adjust wheel spacing accordingly (see 2.15.2). (3) If tops or bottom are touching, loosen front plate screws and adjust plate up/down to correct spacing.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
2.15 Carrier losing power always when moving down range or always when moving up range.	(1) Damaged guide wheels	(1) Inspect guide wheels for damage. (2) Replace if needed.
	(2) Guide wheels not spaced correctly	(1) Inspect guide wheels for damage. (2) Inspect guide wheel spacing from the track center. Wheels should be within an 1/8th in of the track at all times but should not always be in contact with the track. Constant contact with the track will cause premature wear and tear on the rubber wheel. (3) Adjust guide wheel spacing as needed.
	(3) Positive charge wheel assembly adjusted incorrectly	(1) Turn carrier off and move home. (2) Inspect positive charge wheel assembly spacing. (3) Shift the front of the carrier to the right. (4) Loosen the nuts on the charge wheel assembly bracket long screw and adjust the screw until the positive charging disc (right side) just comes off the plastic. (5) Shift the front of the carrier to the left and ensure the charging disc doesn't touch the track. If it does, adjust the long screw to prevent that and recheck contact on to the charge bar when the carrier is shifted back to the right. If this adjustment is not possible within the carrier shift, the front right centering wheel needs a spacer added to tighten the carrier shifting (see 2.15.2). (6) Hold the long screw in place with a T25 torx wrench and tighten the nut with a 8mm wrench. (7) Turn carrier on.

BULLET LED STATUS



PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
3.0 No Lights	(1) Bad RJ45 connection	(1) Check RJ45 cable for good connection. (2) If still bad, try replacing cable.
	(2) Bad carrier circuit board	(1) Replace carrier circuit board.
	(3) Bad Bullet	(1) Contact Spire for a replacement Bullet.
	(4) Bad 24V Power Converter	(1) Check for power at PLC. If no power present, contact Spire for a replacement Bullet.
3.1 Only Green Power LED	(1) Bad RJ45 connection	(1) Check RJ45 cable for good connection. (2) If still bad, try replacing cable.
	(2) PLC not powered	(1) Check to see if PLC is powered. (2) Check if LAN SD/RD light is on/blinking. (3) If not on/blinking, contact Spire.
	(3) Bad carrier circuit board	(1) Replace carrier circuit board.
	(4) Bad Bullet	(1) Contact Spire for a replacement Bullet.

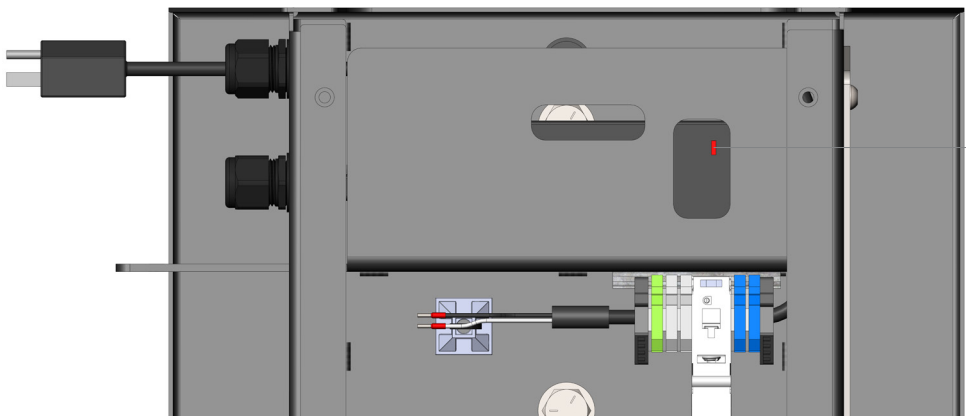
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
3.2 Green Power & Data LED (Steady or Flashing) But No Signal Strength LEDs	(1) Bad antenna	(1) Inspect antenna and antenna cable for damage. (2) Replace if needed.
	(2) Bad bullet	(1) Contact Spire for a replacement Bullet.
3.3 First & Fourth Signal Strength LEDs On	(1) Bad Bullet	(1) Contact Spire for a replacement Bullet.

NANOSTATION LED STATUS



PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
4.0 No Lights	(1) Bad RJ45 connection	(1) Check RJ45 cable for good connection. (2) If still bad, try replacing cable.
	(2) Bad POE power supply	(1) Swap RJ45 cable to another POE powered port (on ethernet switch or another 24VDC POE injector). (2) If problem persists, contact Spire for a replacement Nanostation.
	(3) Bad Nanostation	(1) Contact Spire for a replacement Nanostation.
4.1 Only Green Power LED	(1) Bad RJ45 connection	(1) Check RJ45 cable for good connection. (2) If still bad, try replacing cable.
	(3) Bad Nanostation	(1) Contact Spire for a replacement Nanostation.
4.2 Green Power & Data LED (Steady or Flashing) But No Signal Strength LEDs	(1) Bad Nanostation	(1) Contact Spire for a replacement Nanostation.
4.3 First & Fourth Signal Strength LEDs On	(1) Bad Nanostation	(1) Contact Spire for a replacement Nanostation.

CHARGE BOX LED STATUS

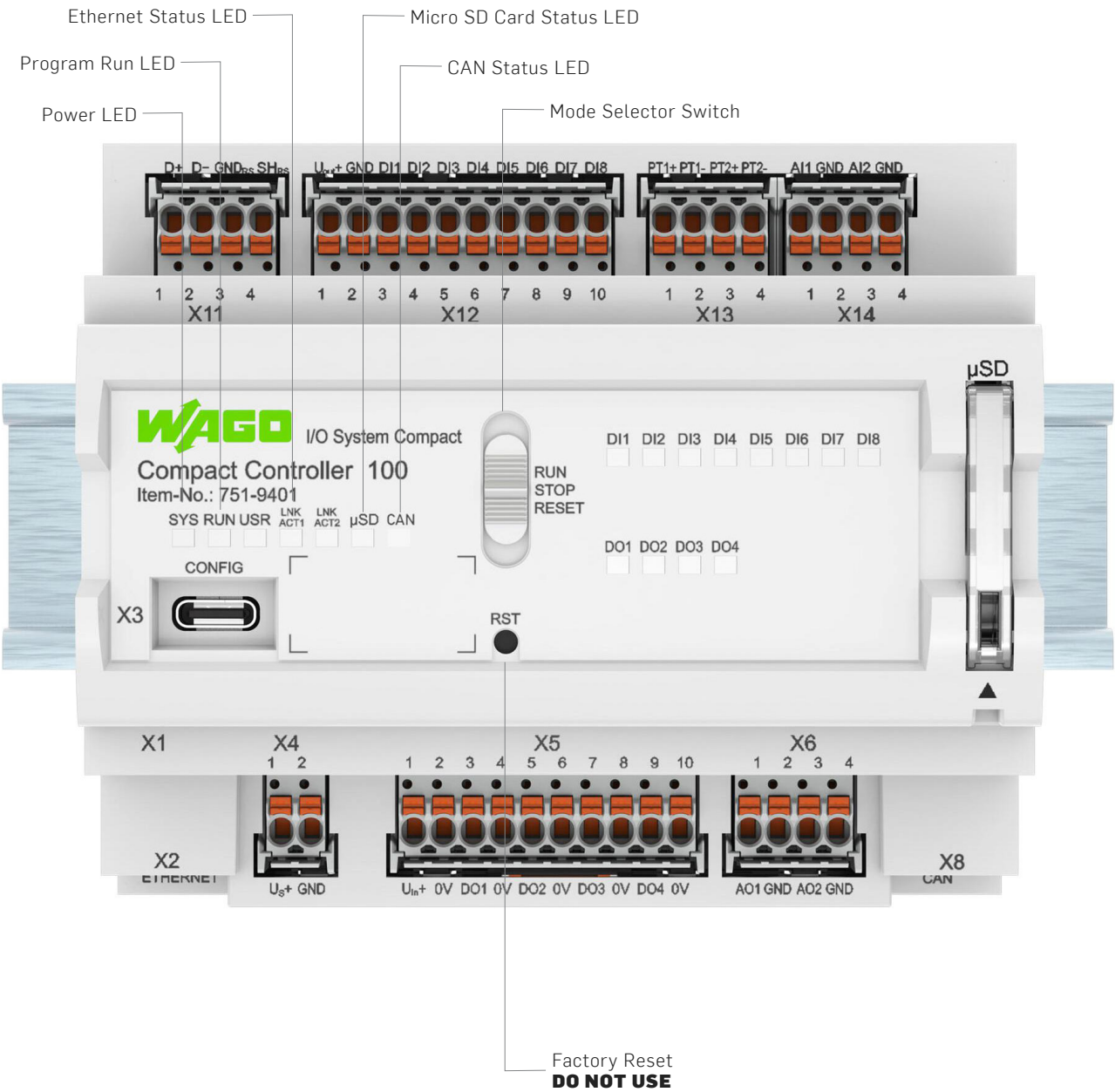


The diagram shows the internal components of a charging box. A power cord is plugged into the top left. A status LED is located on the right side, indicated by a red line and the label 'Status LED'. Below the LED, there are various electrical components, including a circuit breaker, a fuse, and a charger unit. The charger unit is connected to a bus bar with green and blue wires. A red wire is also visible, connected to a terminal block.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
5.0 No Light	(1) Charge box powered off	(1) Check power switch on the back of the charge box.
	(2) Circuit breaker flipped	(1) Check circuit breaker in charge box. (2) If problem persists, check wiring for any loose or damaged wires.
	(3) Bad charger	(1) Contact Spire for a replacement charger.
5.1 Steady Red Light	(1) Currently charging battery	(1) No problem. Functioning as intended.
5.2 Flashing Red Light	(1) Short to ground	(1) Check inside charge box for any loose or damaged wires. (2) Check cable to bus bar for loose or damaged wires. (3) Check carrier for loose or damaged charge wire.
	(2) Charger fault	(1) Replace charger.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
5.3 Green Light (Charger not charging the carrier battery)	(1) Battery is fully charged	(1) No problem. Functioning as intended.
	(1) Over charging timeout not completed	(1) No problem. Functioning as intended. When carrier reaches the max voltage setting, the carrier will turn off charging for a minimum of 3 minutes. After 3 min has passed, whenever the voltage drops below the max voltage setting, the carrier will resume charging.
	(2) Carrier charge wheels not contacting with charger bus bar	(1) See 2.14.1 & 2.15.3.
	(3) Bad carrier charging relay	(1) Replace carrier charging relay.
	(4) Bad battery	(1) Replace battery.
	(5) Low charger voltage (<46VDC)	(1) Check voltage on charging bracket when carrier is not home and if <46VDC then replace charger.
	(6) Loose wire connection	(1) Inspect ring terminal on positive charging wheel assembly and rewire to ensure good crimp. (2) Inspect the rest of the wiring from the ring terminal to the charging relay to the battery. (3) Inspect ring terminal connected to chassis ground and rewire to ensure good crimp. (4) Replace 48VDC wiring harness.
5.4 Alternating Red/Green Light	(7) Carrier doesn't think it's at home	(1) Check HMI touch screen. If distance is showing >0, see 2.7. (2) Power cycle carrier.
	(1) Intermittent connection	(1) See 2.14.1 & 2.15.3.

PLC LED STATUS

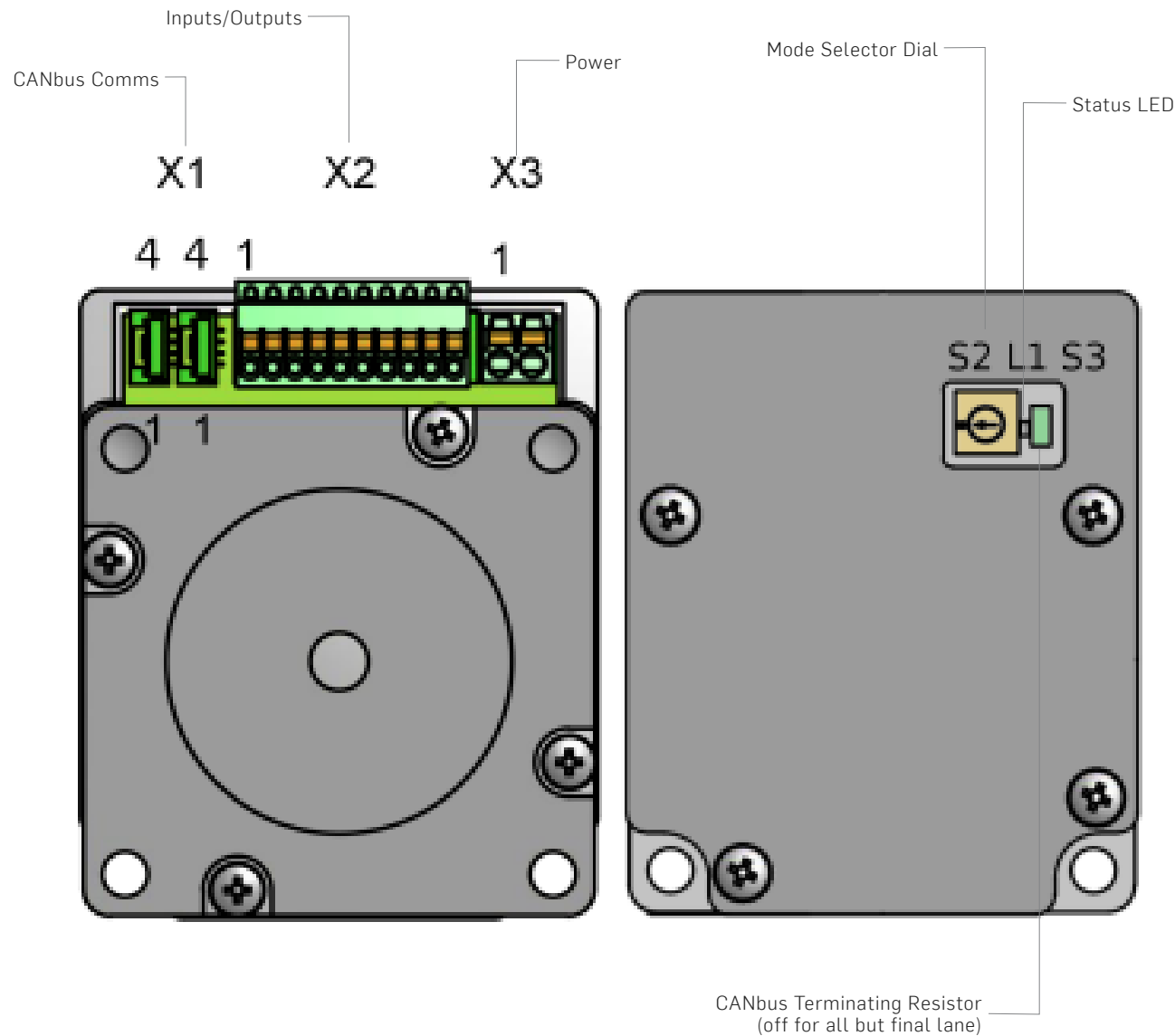


PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
6.0 No SYS (Power) Light	(1) Bad power cable connection/damaged cable	(1) Inspect the PLC power cable (cable coming out of the bottom of the PLC in connector X4) for damage. (2) Ensure that the PSU in the control box has power and that no breakers are flipped.
	(2) Bad PLC	(1) Contact Spire for a replacement PLC.
6.1 Orange SYS Light	(1) Device is in startup/boot process	(1) Wait 5 min and check again. (2) If it continues to stay in this state, power cycle the controller.
	(2) Bad PLC	(1) Power cycle the controller. (2) Contact Spire for a replacement PLC.
6.2 Orange Flashing SYS Light	(1) "Fix IP Address" mode (temporary setting until the next reboot due to RST button press)	(1) Connect to the device via the standard address (192.168.1.17) or restart the device to restore the original value set.
	(2) Bad PLC	(1) Power cycle the controller. (2) Contact Spire for a replacement PLC.
6.3 Green/Red Flashing SYS Light	(1) Firmware update mode	(1) Wait 30 min and check again. (2) If it continues to stay in this state, contact Spire.
	(2) Bad PLC	(1) Power cycle the controller. (2) Contact Spire for a replacement PLC.
6.4 Green Flashing RUN Light	(1) No application and now boot project loaded	(1) Power cycle the controller. (2) Contact Spire for a replacement PLC.
6.5 Red RUN Light	(1) Applications loaded and all in the "STOP" status	(1) Set the mode selector switch to "RUN" to start the application
6.6 Green/Red Flashing RUN Light	(1) At least one application in the "RUN" status and one in the "STOP" status	(1) Power cycle the controller. (2) Contact Spire for a replacement PLC.
6.7 Red (goes out briefly) RUN Light	(1) Warm start reset completed	(1) Wait 5 min and check again. (2) If it continues to stay in this state, power cycle the controller.
6.8 Red (goes out longer) RUN Light	(1) Cold start reset completed	(1) Wait 5 min and check again. (2) If it continues to stay in this state, power cycle the controller.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
6.9 Red Flashing RUN Light	(1) At least one application after in the "STOP" status after exception (e.g., memory access error)	(1) Start the application with a reset via the mode selector switch. (2) Power cycle the controller. (3) Contact Spire for a replacement PLC.
6.10 Orange/Green Flashing RUN Light	(1) Load above threshold value 1	(1) Power cycle the controller. (2) Contact Spire for a replacement PLC.
6.11 Orange RUN Light	(1) Runtime system in debug state (break-point, single step, individual cycle)	(1) Start the application with a reset via the mode selector switch (hold in reset position for 5 seconds then move back to RUN position). (2) Power cycle the controller. (3) Contact Spire for a replacement PLC.
6.12 No RUN Light	(1) No runtime system loaded	(1) Power cycle the controller. (2) Contact Spire for a replacement PLC.
6.13 No Green LNK ACT 1 (Ethernet Status) Light	(1) Bad/damaged ethernet cable	(1) Replace ethernet cable.
	(2) Bad/damaged ethernet switch	(1) Swap PLC ethernet cable to another port on the switch.
	(3) Bad PLC	(1) Contact Spire for a replacement PLC.
6.14 No mSD Light	(1) No memory card access	(1) Some ranges may not have a micro SD card. If this is the case, then disregard the missing light.
6.15 No CAN Light	(1) The CAN interface has not been configured	(1) Power cycle the controller. (2) Contact Spire for a replacement PLC.
6.16 Alternating red 50 ms / green 50 ms CAN Light	(1) Configuration in progress	(1) Wait 5 min and check again. (2) If it continues to stay in this state, power cycle the controller.
6.17 Alternating red 200 ms / green 200 ms CAN Light	(1) Configuration invalid	(1) Power cycle the controller. (2) Contact Spire for a replacement PLC.
6.18 Green 200 ms / off 800 ms CAN Light	(1) The CANopen interface has the status "Stop"	(1) Wait 5 min and check again. (2) If it continues to stay in this state, power cycle the controller.
6.19 Green 200 ms / off 200 ms CAN Light	(1) The CANopen interface has the status "Preoperational"	(1) Wait 5 min and check again. (2) If it continues to stay in this state, power cycle the controller.

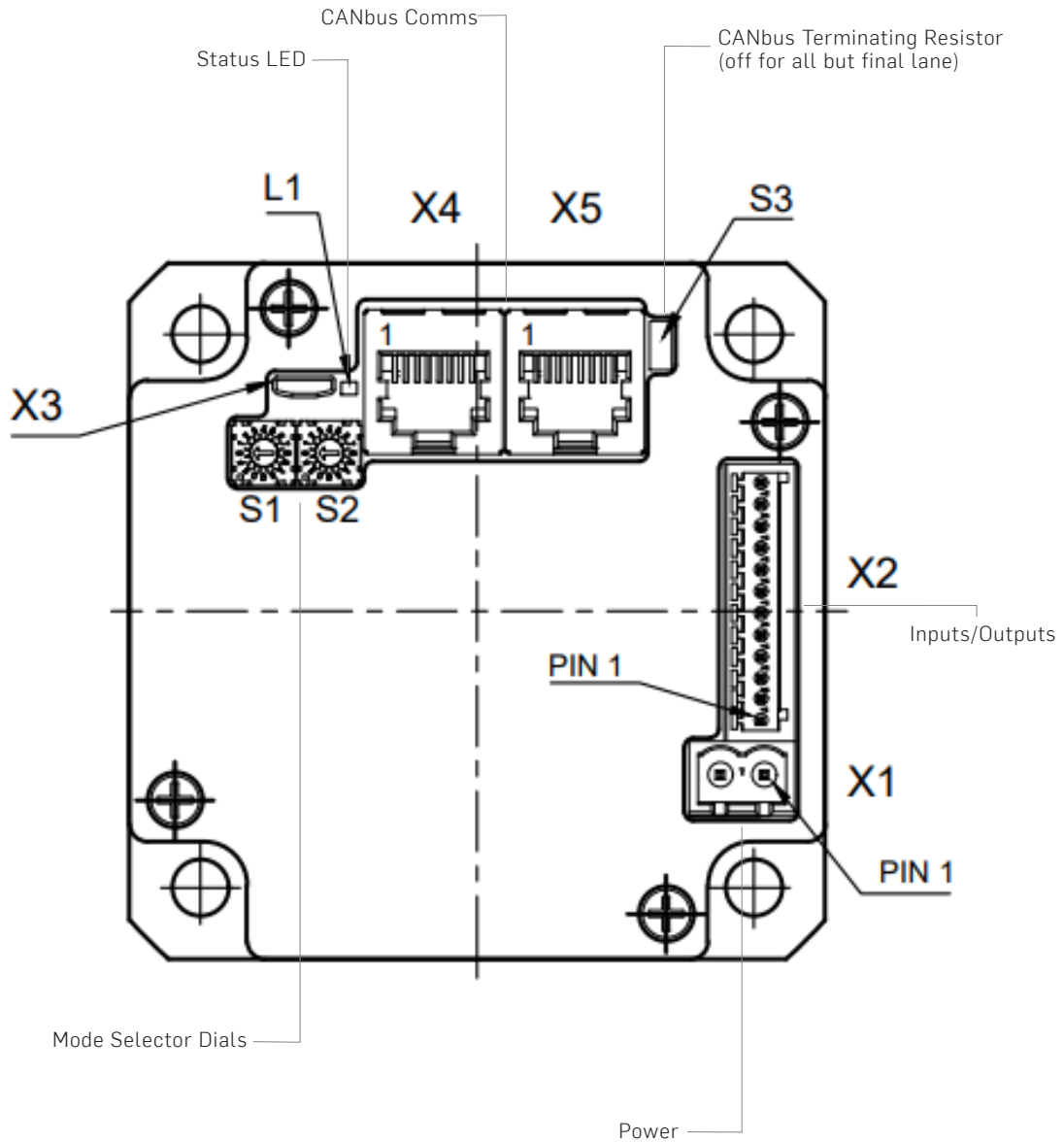
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
6.20 Red CAN Light	(1) The CANopen interface has the status "Bus Off" (short-circuit or other major fault)	(1) Check the CANbus connections (comms cable). Wait 5 min and check again. (2) If it continues to stay in this state, power cycle the controller.

TURNING MOTOR LED STATUS



PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
7.0 No Light	(1) Bad power cable connection/damaged cable	(1) Inspect the motor power cable (X3) for damage. (2) Ensure that the PSU has power and that no breakers are flipped.
	(2) Bad motor	(1) Contact Spire for a replacement motor.
7.1 Blinking Green Light (1sec interval)	(1) Device is operating normally	(1) N/A
7.2 One On, One Off Green Light	(1) General error	(1) Recalibrate the motor.
7.3 Two On, One Off Green Light	(1) Voltage error	(1) Check that capacitor is in place on the PSU and recalibrate the motor. (2) Ensure the PSU is supplying 48V DC to the motor.
7.4 Three On, One Off Green Light	(1) Temperature error	(1) Power down the system and let it cool down for 10-15 minutes.
7.5 Four On, One Off Green Light	(1) Overcurrent error	(1) Check that there are no debris in the clamp or motor housing.
7.6 Five On, One Off Green Light	(1) Controller error	(1) Power cycle the system. (2) Contact Spire for a replacement motor.
7.7 Six On, One Off Green Light	(1) Watchdog-Reset error	(1) See 6.0 - 6.20. (2) Contact Spire for a replacement motor.

DRIVING MOTOR LED STATUS



PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
8.0 No Light	(1) Bad power cable connection/damaged cable	(1) Inspect the motor power cable (X3) for damage. (2) Ensure that the PSU has power and that no breakers are flipped.
	(2) Bad motor	(1) Contact Spire for a replacement motor.
8.1 Blinking Green Light (1sec interval)	(1) Device is operating normally	(1) N/A
8.2 One On, One Off Green Light	(1) General error	(1) Recalibrate the motor.
8.3 Two On, One Off Green Light	(1) Voltage error	(1) Check that capacitor is in place on the PSU and recalibrate the motor. (2) Ensure the PSU is supplying 48V DC to the motor.
8.4 Three On, One Off Green Light	(1) Temperature error	(1) Power down the system and let it cool down for 10-15 minutes.
8.5 Four On, One Off Green Light	(1) Overcurrent error	(1) Check that there are no debris in the clamp or motor housing.
8.6 Five On, One Off Green Light	(1) Controller error	(1) Power cycle the system. (2) Contact Spire for a replacement motor.
8.7 Six On, One Off Green Light	(1) Watchdog-Reset error	(1) See 6.0 - 6.20. (2) Contact Spire for a replacement motor.

HOMING SENSOR LED STATUS



PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
9.0 No Green Light	(1) Bad cable connection/damaged cable	(1) Inspect the cable for damage. (2) Ensure that the PSU has power and that no breakers are flipped.
	(2) Bad PSU	(1) Contact Spire for a replacement PSU.
	(3) Bad sensor	(1) Contact Spire for a replacement sensor.
9.1 No Yellow Light	(1) Clamp homing bracket not detected	(1) Adjust the sensor position to be closer to the travel location of the clamp homing bracket. (2) Recalibrate the lane.
	(2) Bad sensor	(1) Place a piece of metal over the sensor area temporarily to determin if sensor is operational. If not detected, contact Spire for a replacement sensor.

GLOSSARY OF TERMS:

TERM	DEFINITION
Calibration	Adjusting the various parts of the system precisely for their particular function.
Consumable Components	Products that are expected to wear out and that get used up throughout the lifetime of the product (will need to be replaced on a regular basis).
Course (of Fire)	The programmed set of actions for each shooting target.
Edge	The side of the shooting target (not face or back).
Error / Warning / Alarm	A minor problem with the system, but the system will still run.
Exposure Times	The amount of time the face (not the edge) will be positioned toward the shooter.
Fault	A major problem with the system. The system will not run.
HMI	A human-machine interface, which is a feature of any device that enables humans to engage and interact with machines. Common examples include touchscreens and keyboards.
Loctite	A brand of adhesives that is used to prevent loosening of metal fasteners caused by vibrations.
PLC	A programmable logic controller, which is a computer control system, that controls other devices based on various information available to it.
Range Master	The person in charge of any given session.
Stage	A step in the Course (of Fire).

SYMBOL	DEFINITION
	Power (On/Off).
	Ethernet LED. Will light steady when an active Ethernet connection is made and flash when there is activity.
	Signal Strength.
	Caution.
	Risk of Electrical Shock.
	Risk of Hot Surface.
	Grounding Point/Terminal.



THE PINNACLE OF SHOOTING RANGES™