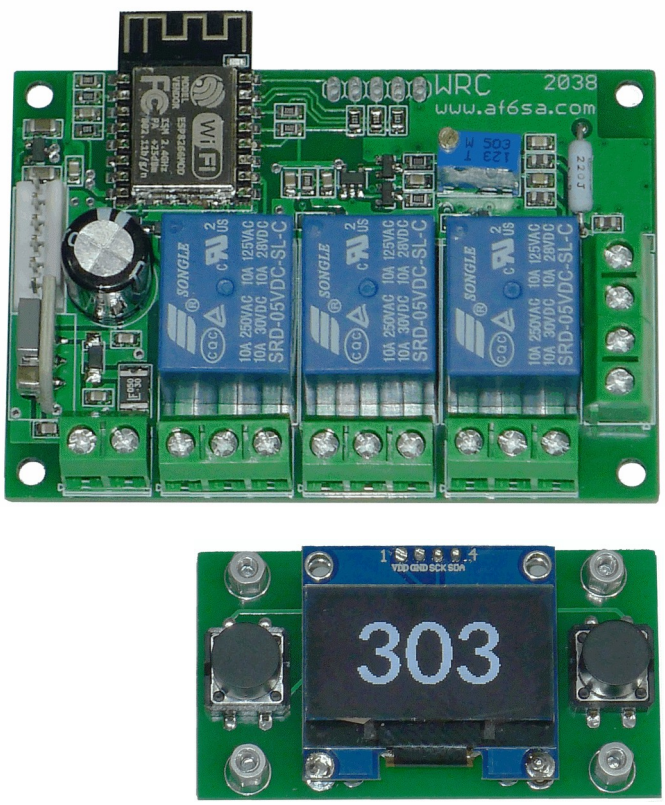
# Wi-Fi Rotor Controller (WRC)

## User Manual

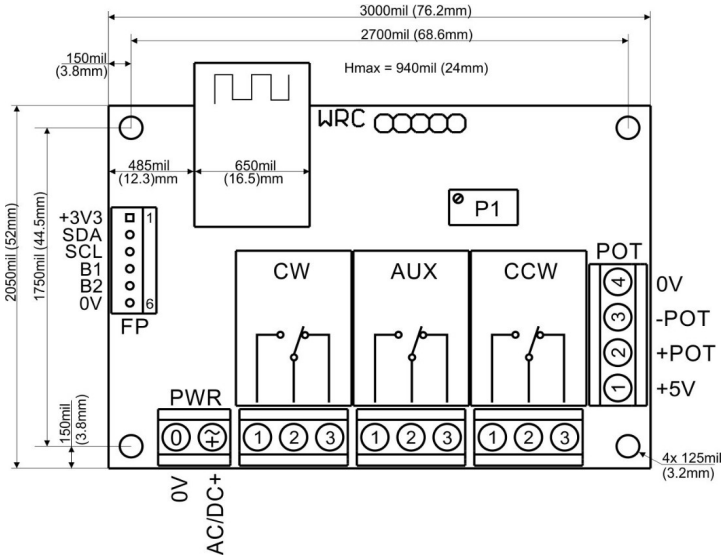


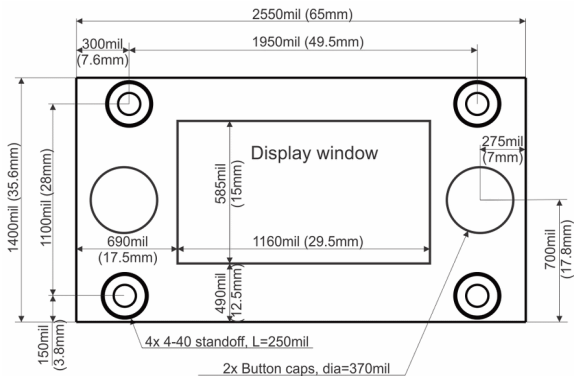

## FEATURES

- Can be mounted inside rotator controller or used as a standalone replacement.
- Local or remote control can be done by any device with a WEB browser like PC, tablet, smartphone, etc.
- OLED display and front panel controls are optional.
- Powered by 8 to 24V AC/DC. Current 0.15Amax
- Analog input for position reading.
- 3x 10A SPDT relays.
- Wi-Fi 802.11n 2.4GHz network interface.
- Can be used as Access point or connected to existing Wi-Fi network.
- WEB browser interface for local or remote point-and-shoot control.
- Point to QRA grid locator.
- Telnet interface - compatible with PstRotator program.
- UDP packet listener - compatible with N1MM logger and DXLab suite.

# 1 Setup / Installation

WRC can be used as a standalone rotor controller with a OLED display or integrated with an existing rotor controller.




## Terminals

**PWR** is used to power the WRC. It can be powered with 8VDC to 30VDC (- to 0V and + to AC/DC+ terminal) or with 8VAC to 20VAC directly from a transformer secondary. Current requirement is 0.05A idle and 0.15A max while moving. When installed inside it can be powered from existing AC/DC power or with an external adapter.

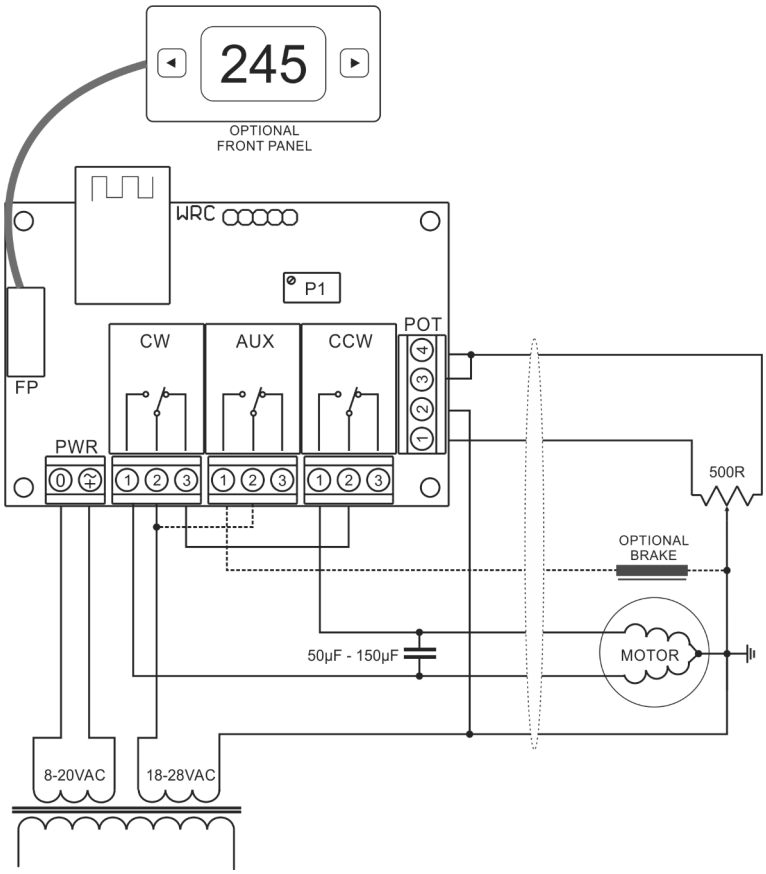
**Relays (CW, CCW, AUX)** are three independent SPDT relays, each rated at 10A. **CW** and **CCW** are activated when rotating Clockwise / Counter-clockwise. **AUX** relay can be used to release the rotor brake OR it can be configured to control the rotor speed on some rotors.

**POT** is connected to the rotor potentiometer to read the antenna heading. In standalone installations +5V regulated power output can be used for the potentiometer.

**FP** connects the optional front panel module with 1.3in OLED display and two buttons.

## Standalone wiring

Rotors with AC or DC motors and linear potentiometer position feedback are supported.



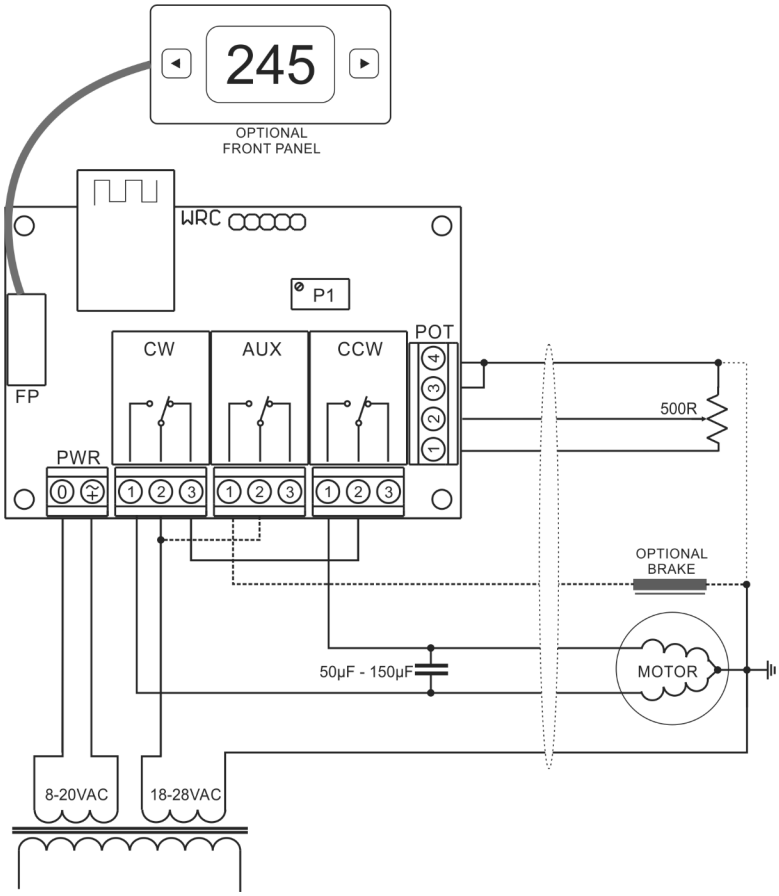

Rotors with AC motors and potentiometer wiper wired to motor center / ground.

**HAM-IV, T2X, CD-44, CD-45, Alliance T-45** etc.

These rotors needs a separate transformer winding or isolated 8VDC to 30VDC power supply wired to PWR.

Some rotor models have integrated start / run capacitor. Check the manual for capacitor value and if you need external one. Motor start/run capacitors are usually 50 - 150µF, bipolar rated at 35-50V

Alliance T-45 potentiometer is 157 Ohm and needs 22-33 Ohm in series on terminal +5V. Motor is 18VAC and cap is 100µF.

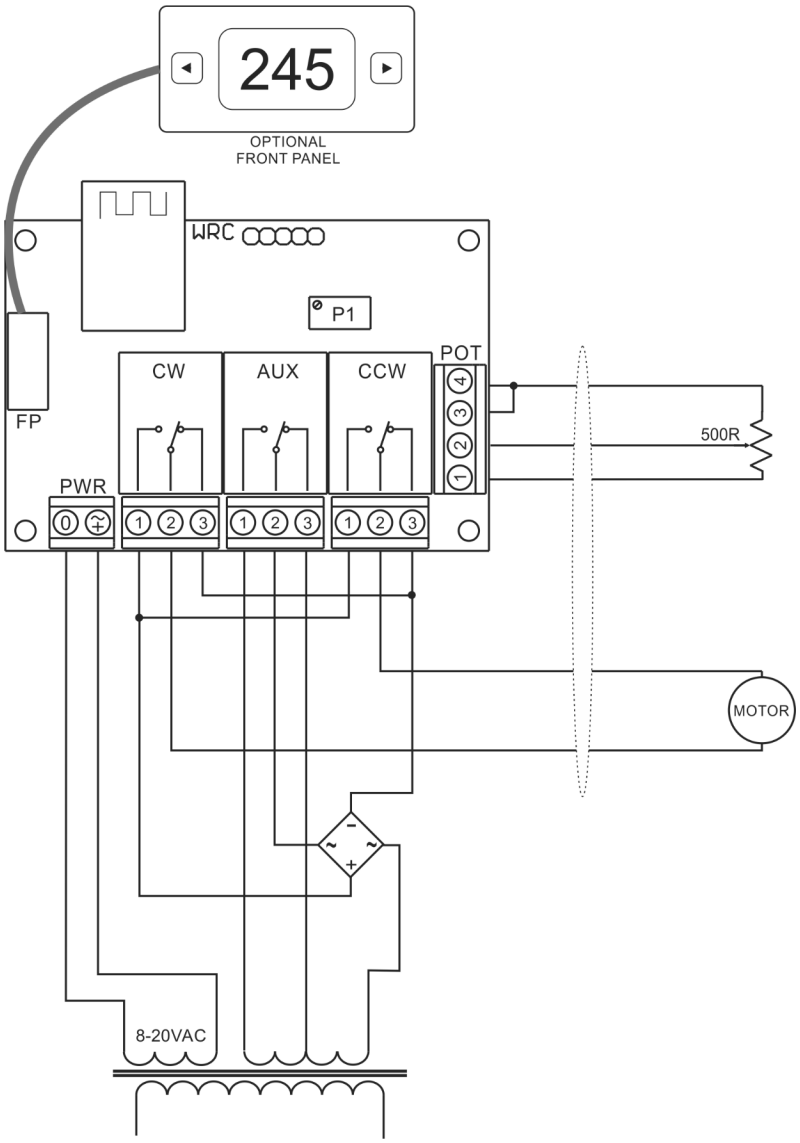



Rotor with AC motors and insulated potentiometer or one side wired to motor center / ground.

**Yaesy rotors G-400, G-450A, G-600, G-650A** with AC motors.

Some rotor models have integrated start / run capacitor. Check the manual for capacitor value and if you need external one.

A separate isolated 8VDC to 30VDC power supply can be used to PWR.




Rotor with DC motors, like **Yaesu G-800DXA, G-1000DXA, G2800DXA**

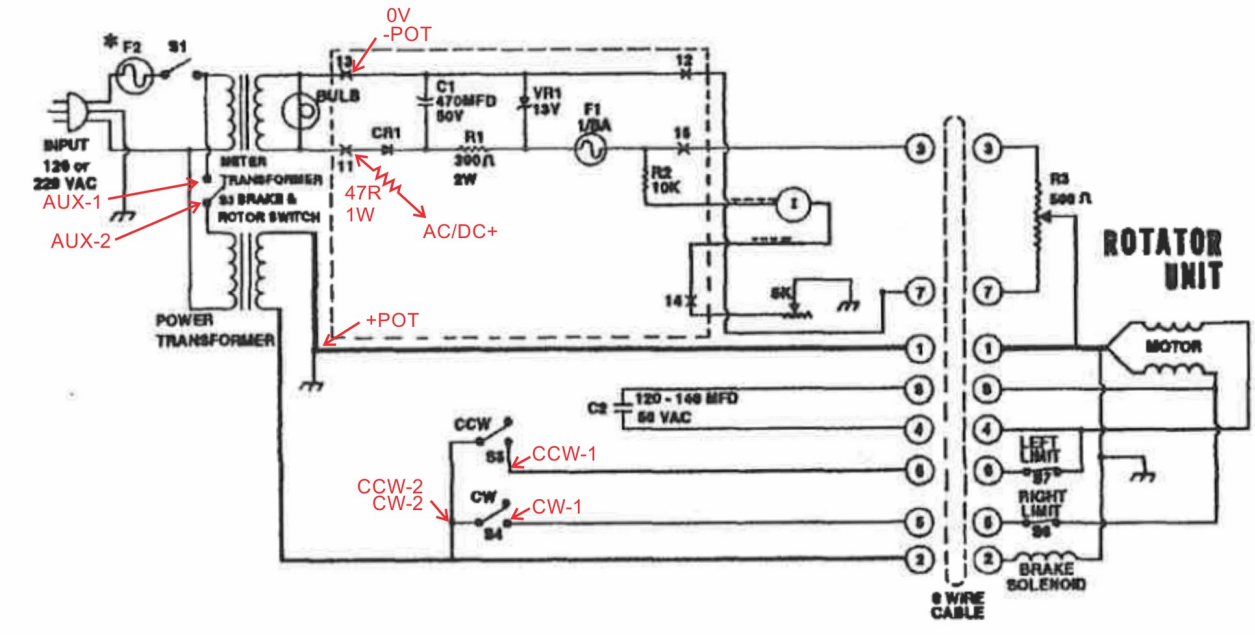
Transformer for the motor is 24VAC /2A  With a center tap.

Speed can be controlled by switching between taps on the transformer secondary.

A separate isolated 8VDC to 30VDC power supply can be used for PWR.

## Integrating

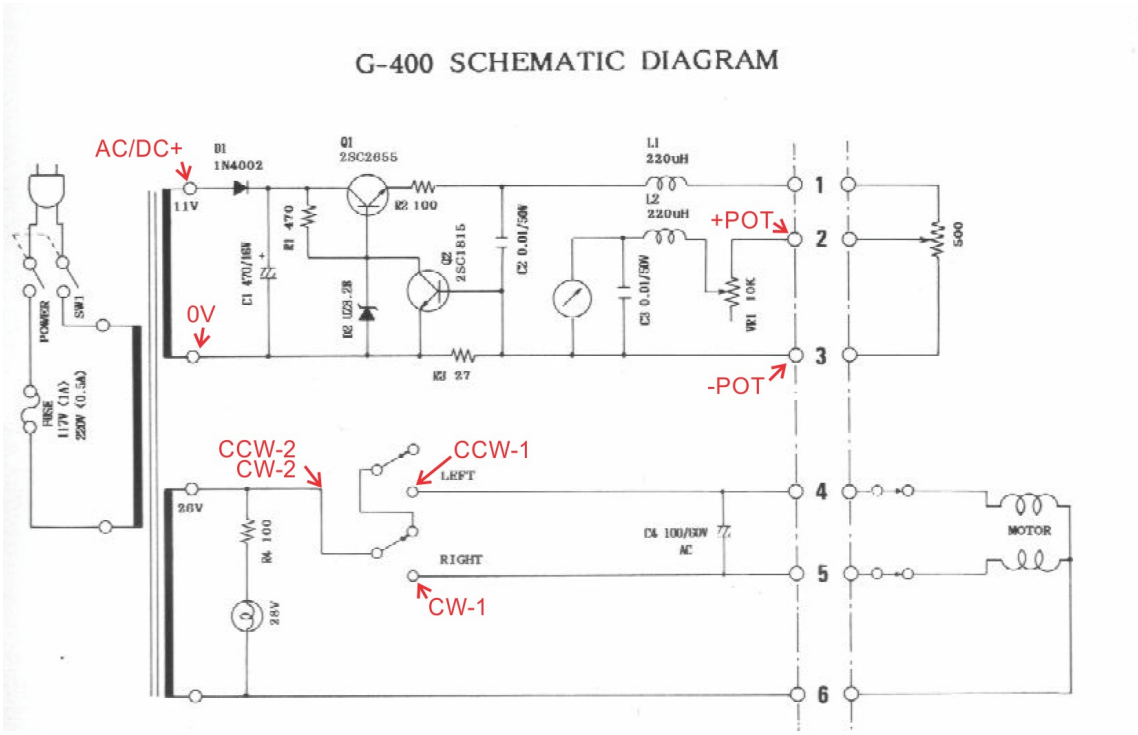
**Telex/Hy-Gain HAM-IV, T2X, CD-44, CD-45** and similar rotor's with potentiometer wiper wired to ground.



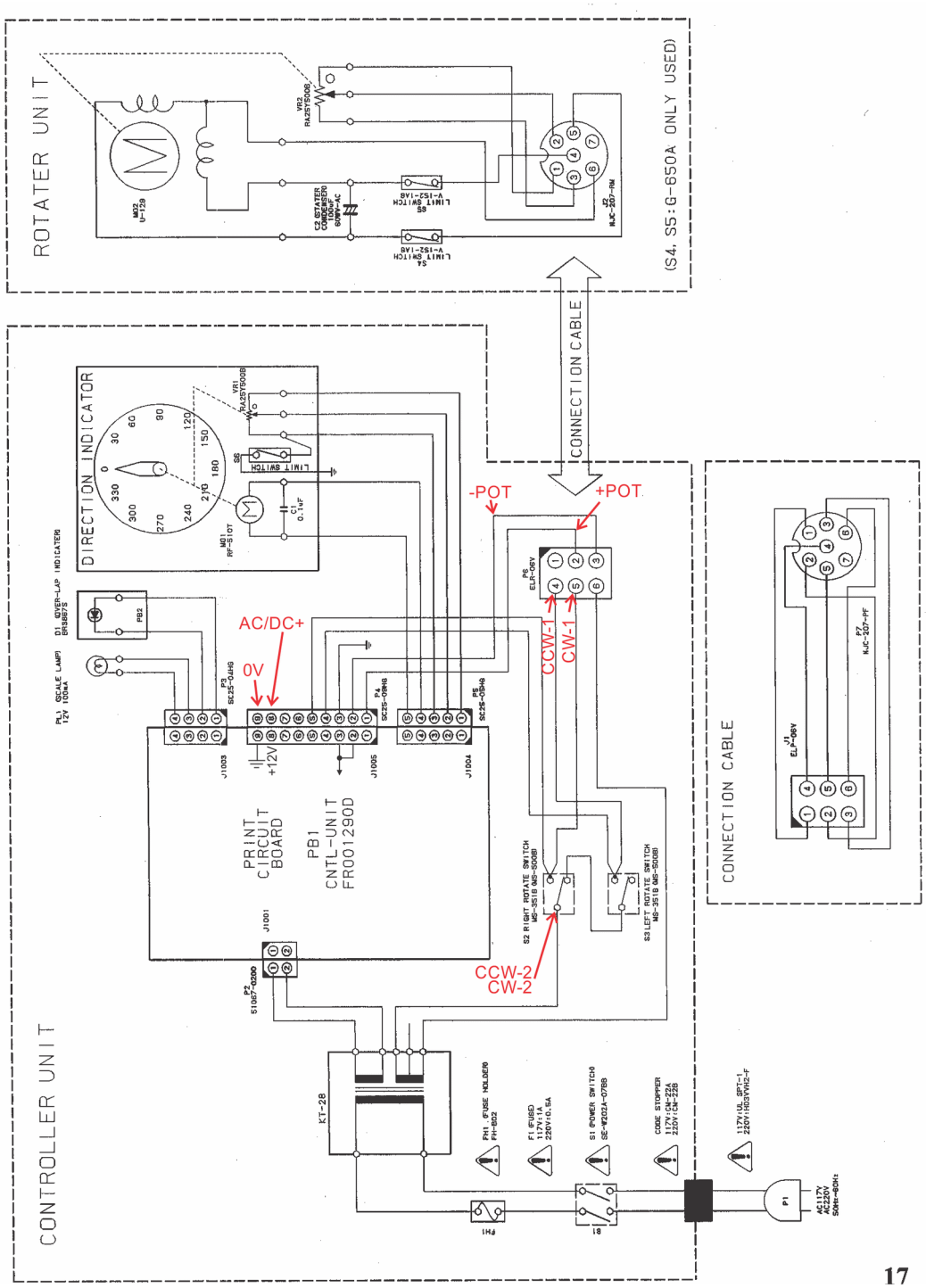

Check voltage on meter transformer secondary. Use 47 Ohm/1W resistor in series if its above 20VAC.

**WARNING:** AUX relay is operating on main AC voltage! Use caution and wires with proper insulation.

**Yaesu G-400, G-500, G-500A, G-550, Kenpro KR-500** and similar.



**Yaesu G-450A, G-650A**

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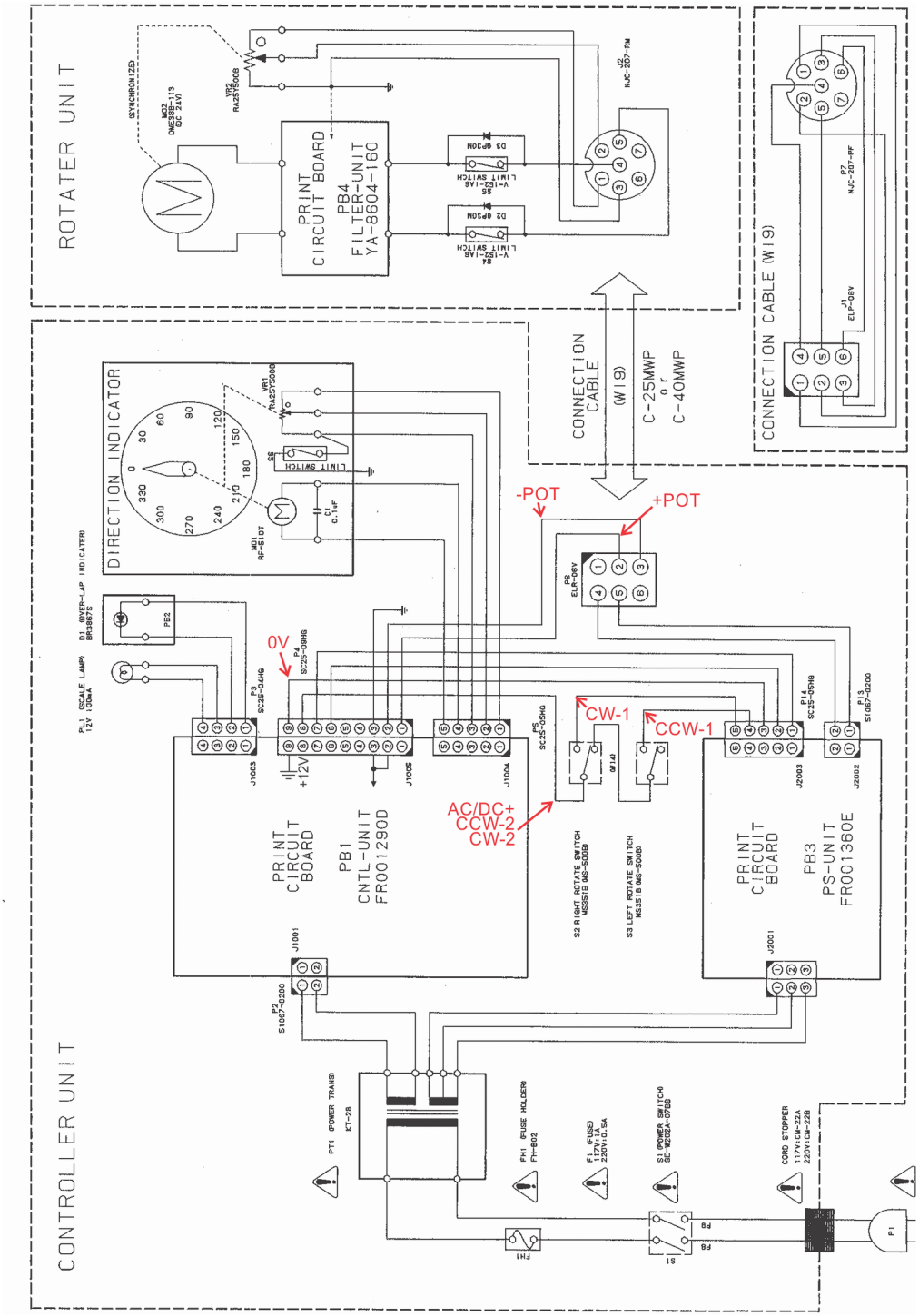
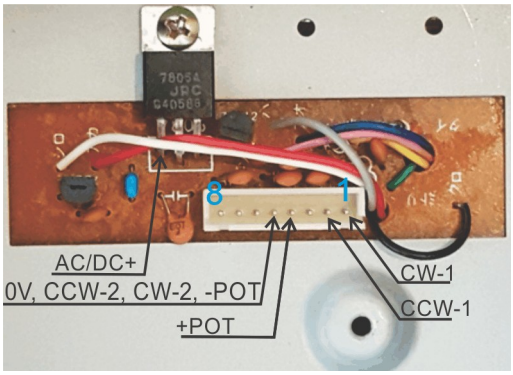
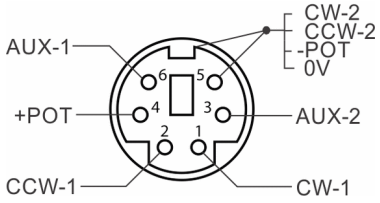

ROTATER UNIT
PRINT CIRCUIT BOARD
PB4
FILTER-UNIT
YA-8604-160
CONNECTION CABLE (W19)
CONNECTION CABLE (W19)
C-25MWP or C-40MWP
CONTROLLER UNIT
DIRECTION INDICATOR
-POT
+POT
0V
+12V
CW-1
CCW-1
AC/DC+
CCW-2
CW-2
PRINT CIRCUIT BOARD
PB1
CNTL-UNIT
FR0012900
PRINT CIRCUIT BOARD
PB3
PS-UNIT
FR0013600

**Yaesu G-800SDX, G-1000SDX** rotors have 8pin connector inside.

| SDX rotor | WRC | Signal |
|---|---|---|
| 1 | CW-1 | Rotate CW when grounded |
| 2 | CCW-1 | Rotate CCW when grounded |
| 4 | +POT | Position feedback |
| 5 | 0V, CCW-2, CW-2, -POT | Ground |
| 7805 pin1 | AC/DC+ | Solder wire to 7805 pin1 |




**Yaesu G-800DXA, G1000DXA, G-2800DXA** rotors have a 6pin mini-DIN connector for remote control. WRC can be used without opening the rotor controller. External power supply 8VDC to 30VDC / 0.2A is needed to power WRC in this case.



# 2 Wi-Fi Setup

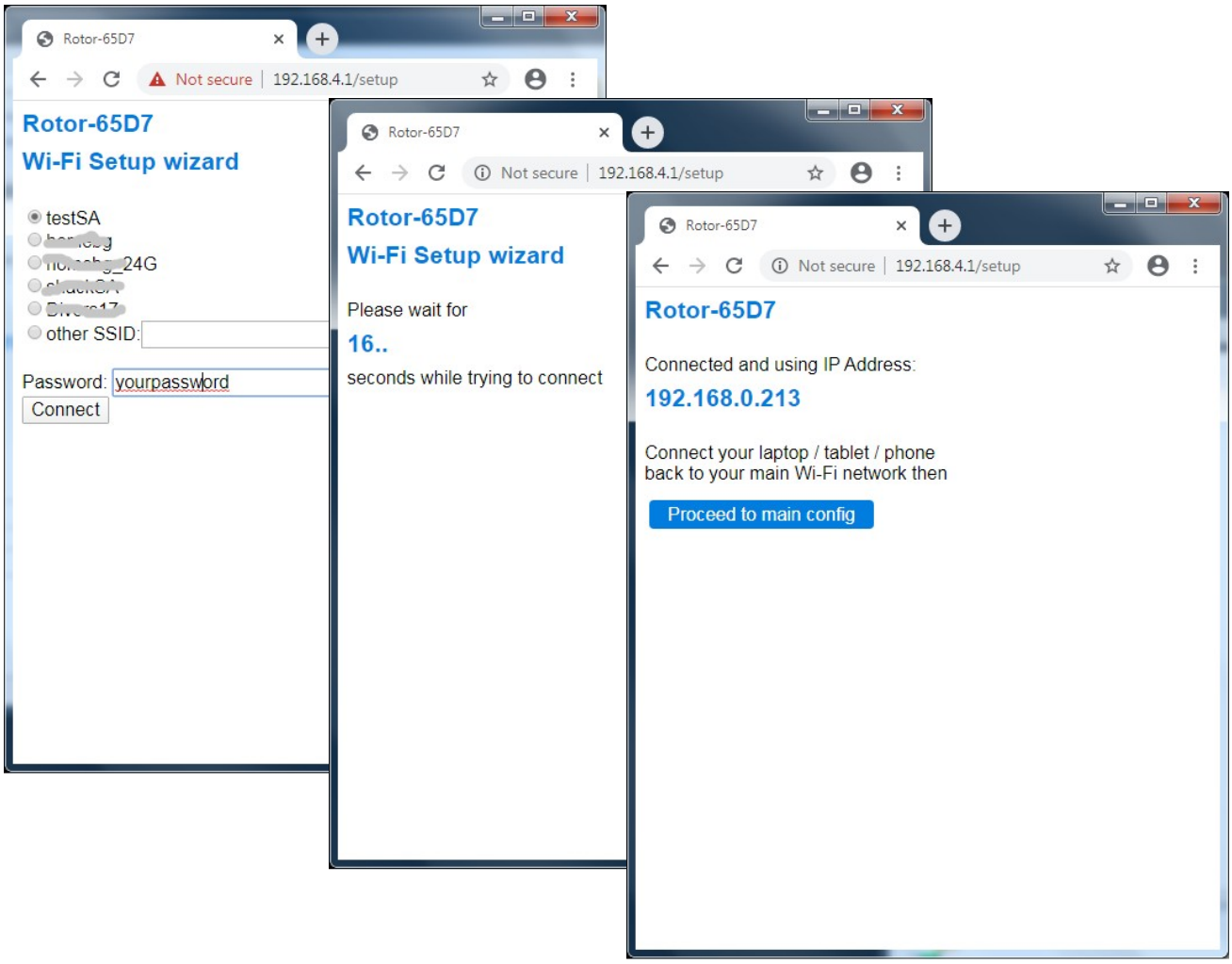
WRC can be set and operated in two modes:

**Access point (AP)** mode will provide access to a Wi-Fi network with DHCP for up to 5 devices. You can connect your device (laptop / tablet / smartphone) to operate while portable or use it to enter credentials to your existing Wi-Fi network. Blue LED blinks once per second to indicate AP mode.

In **Station (STA)** mode WRC will connect to an existing 2.4GHz Wi-Fi Access point and network using DHCP or fixed IP address. You need to enter name (SSID) and password (key) of the network you wish to connect. When connected, blue LED blinks twice per second. If it can't establish the connection, it will switch to **AP** mode, while trying periodically to reconnect.

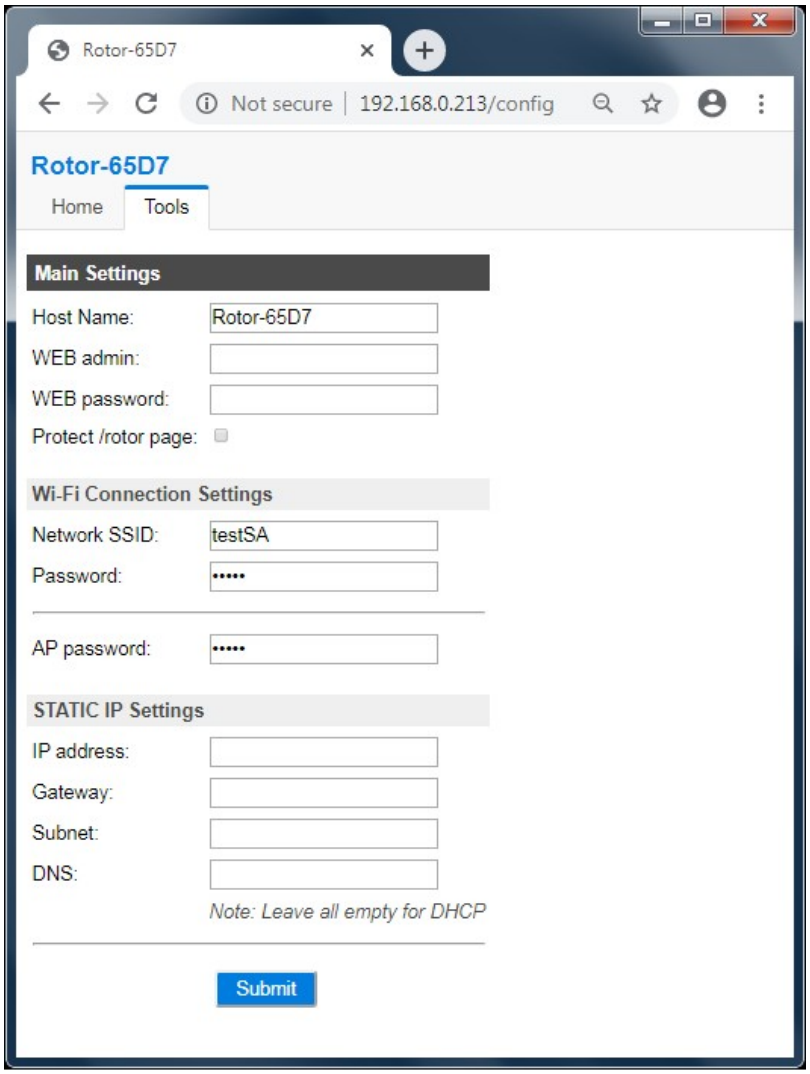
When started for the first time WRC will be in **AP** mode. Connect your laptop / tablet / smartphone to a Wi-Fi network named ***Rotor-xxxx***, using password ***2config4***, then open a browser and go to IP: 192.168.4.1/setup.

WRC will scan for Wi-Fi networks and present a list. Select the desired network or write its name, enter the password and press Connect.




After establishing the connection, a page with the new DHCP assigned IP address will be present.

Connect your laptop / tablet / smartphone back to the same Wi-Fi network and press the button to connect and continue to main Wi-Fi configuration page.




***Host Name*** field is used to identify this device in the network. Host name defines the name in your network, Network SSID in AP mode, and Rotor name in UDP packets. Max. 26 chars, no spaces.

***WEB admin*** and ***WEB password*** – protects access to the WEB interface with an username and password. Leave it empty for free access.

***Protect /rotor page*** – the /rotor page can be left unprotected and used without knowing the WEB admin account credentials.

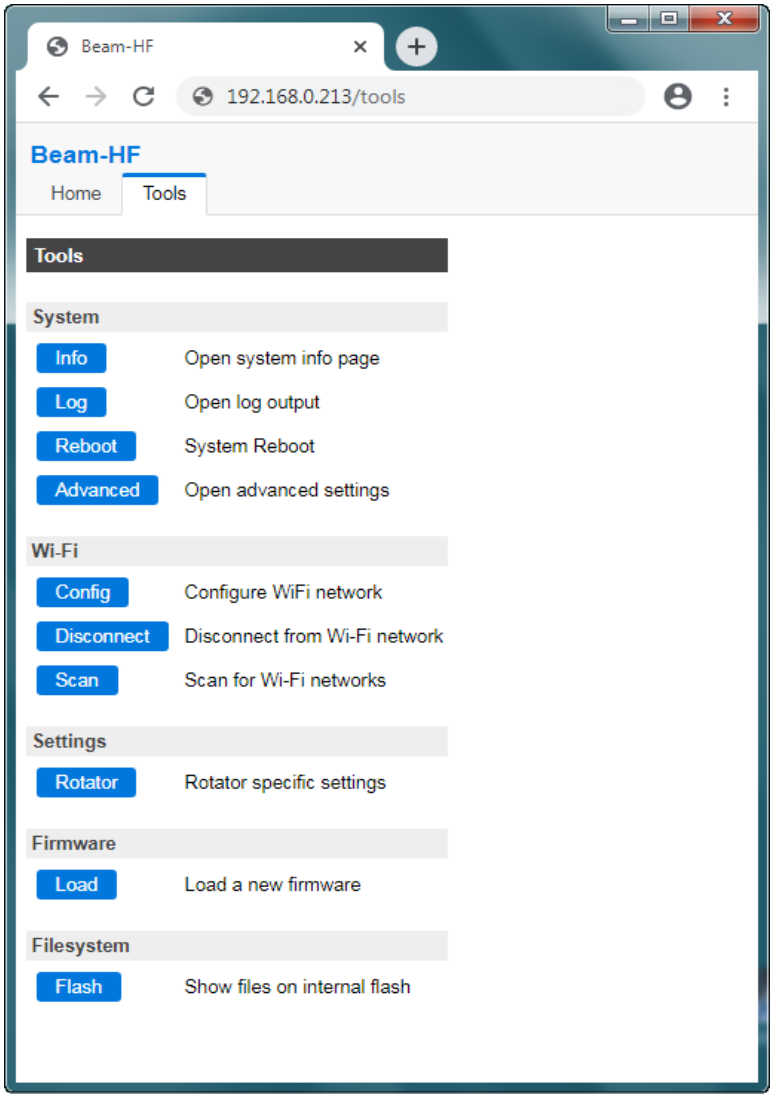
***Network SSID*** – name of the Wi-Fi network to connect to in STA mode. Leave it empty for AP mode.

***Password*** – STA mode password (key). Minimum 8 chars.

***AP password*** – access point mode password. Default is ***2config4.*** Minimum 8 chars.

***Static IP Settings*** – fill-out this section to use fixed IP address and restart. Leave it empty to use DHCP dynamically assigned IP address. (STA mode only)

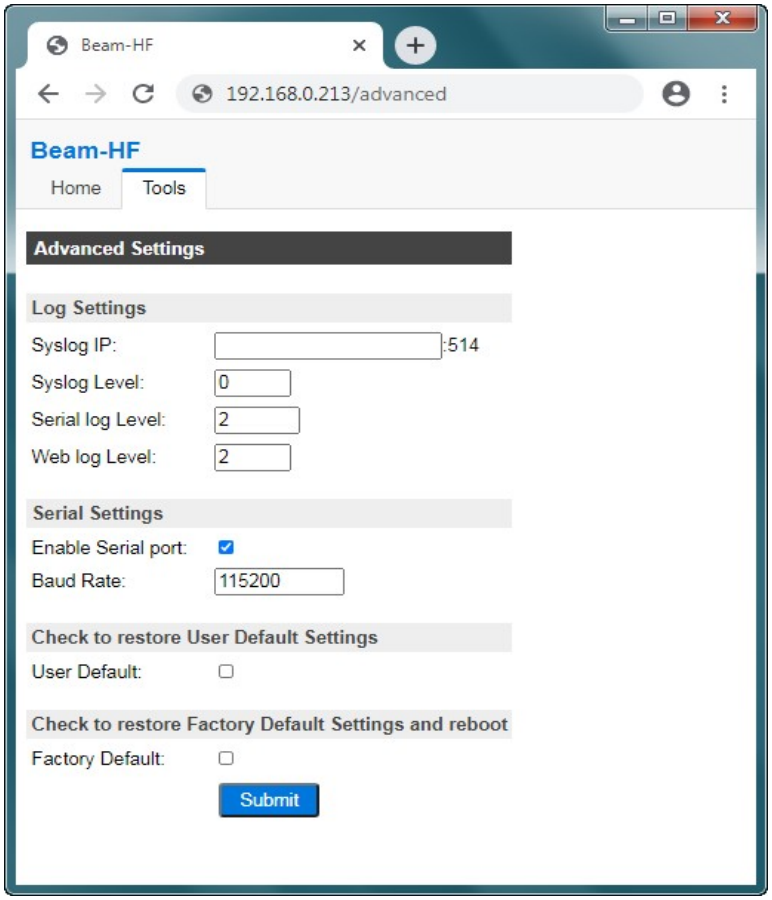
**Tools** tab reveals access to other pages and settings.




Firmware can be updated by uploading it through the WEB interface. Suspend other communications (UDP and telnet) before starting the update. Major updates may clear User Settings to their defaults.

Files can be stored the internal flash file system and downloaded through the WEB interface.

**Advanced Settings** tab




***Syslog IP*** – UDP log messages can be sent to this address on port 514

***Syslog Level*** – [0..4] 0 – no messages sent

***Serial log Level*** – [0..10] Serial port messages level: 1= only errors, 2= +info, 3= +debug1 4= +debug2

***Web log Level*** – [0..4] Web interface Tools→Log messages level.

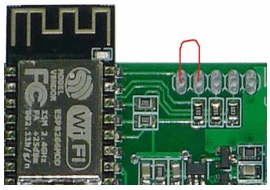
***Enable Serial port*** – output program status and debugging information at specified **Baud Rate**.

***User Default*** – restore all user settings to their defaults and reverts rotor.html file to default. Will not disconnect or change Wi-Fi network name and password.

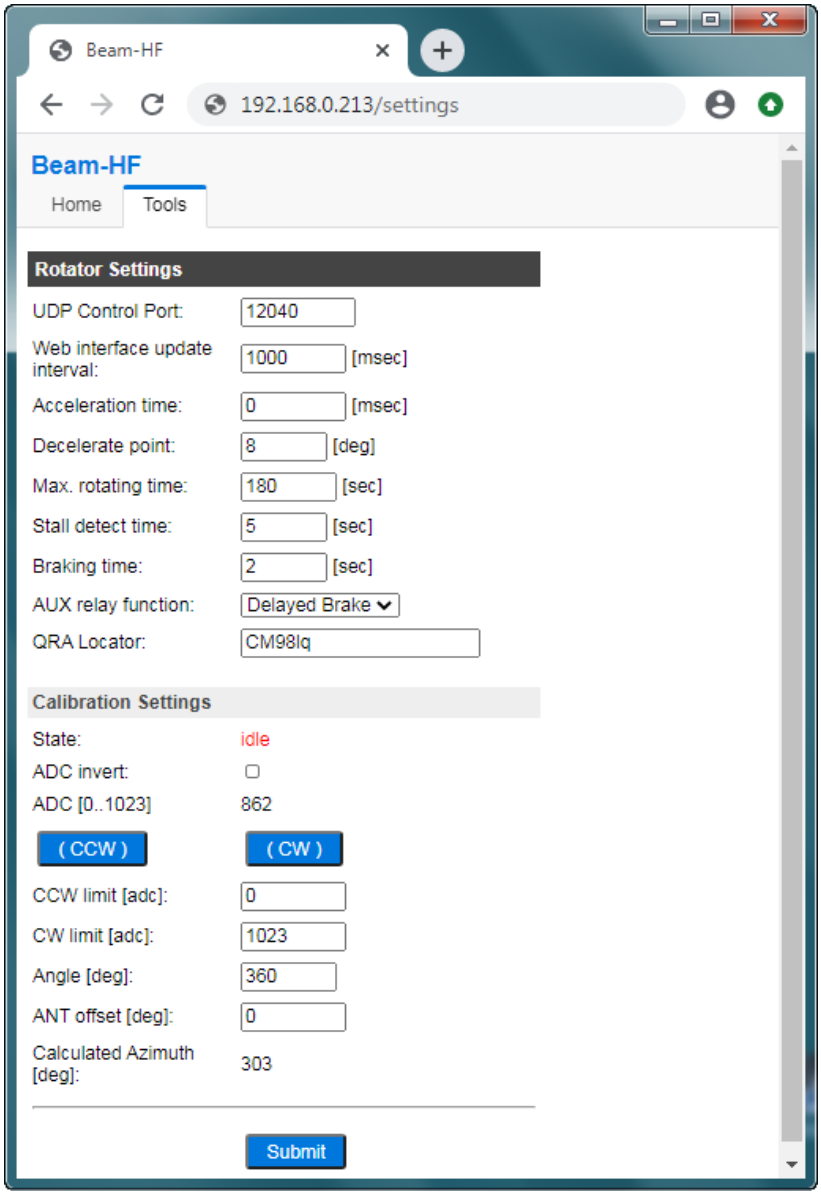
***Factory Default*** – restores all User Default settings, re-format file system and clear Wi-Fi network name and password. System will reboot in Wireless Access Point mode.

If WEB interface is not accessible, factory defaults can be restored with a jumper:

- turn off rotor power and place a jumper between two pads as shown
- turn power on. When the blue LED starts to rapidly blink remove jumper
- wait about 30-40 sec, the LED should begin to slowly blink
- Rotor is now reset and ready in Wireless Access Point mode.



# 3 Rotator Settings




***UDP Control port*** is where N1MM and DXLabs sends rotator data. Default port is 12040. See N1MM Rotator Control page on how to setup.

***Web interface update interval*** sets the rotor web page update rate.

***Acceleration time*** is the time between starting a rotation and closing the AUX relay to rotate at high speed.

***Decelerate point*** is the stopping point before reaching the target heading. Set it so the rotor will stop at target without overshooting.

***Max. rotating time*** is the time allowed to rotate without stopping to cool-down.

***Stall detect time*** interval allowed to rotate without position feedback change.

***Braking time*** is the brake delay time after stopping. Rotation request in opposite direction will be started after this delay.

***AUX relay function*** Choose between ***Delayed Brake*** for rotors with mechanical brake solenoid. ***AUX*** relay will be activated before starting rotation and deactivated when rotor has stopped and the ***Braking time*** *has* expired. When ***Speed control*** is selected the ***AUX*** relay will close after ***Acceleration time*** and open at ***Decelerate point*** to slow down before stopping.

***QRA Locator*** - enter your grid square in 4 or 6 letter format to calculate bearing and distance to another grid entered in the Web interface.

Calibration settings are interactive – changing a setting is applied immediately. Type new value in the field, then click/tap on another filed or outside. When finished calibrating press ***Submit*** to store all rotor settings.

***State*** displays the current rotor state.

***ADC*** is the current 10bit analog readings in 0 ..1023 range. Checking ***ADC invert*** will change its direction.

***CCW limit*** and ***CW limit*** sets the minimum and maximum analog readings at each rotation limit.

***Angle*** is the rotation angle in degrees between the ***CCW limit*** and ***CW limit*** rotation limits.

***ANT offset*** is the ***CCW limit*** azimuth in degrees.

Pressing and holding the (CCW) and (CW) buttons will close the corresponding relay. Reversing the direction is allowed after ***Braking time*** *has passed*.

Antenna will rotate between ***CCW limit*** and ***CW limit***, rotating ***Angle*** degrees in total. ***Calculated Azimuth*** is the displayed heading between ***ANT offset*** and *(**ANT offset** + **Angle***).

# 4 Calibration

1. Select ***AUX relay function*** accordingly.
2. Set all other parameters to their defaults as shown, then press ***Submit*** to store them.
3. Using (CCW) and (CW) buttons rotate the antenna. Visually check if it goes in the right direction. Check wiring, exchange CCW and CW relays wires if rotor is not moving as expected.
4. Turn rotor fully CW. ADC readings should increase smoothly.

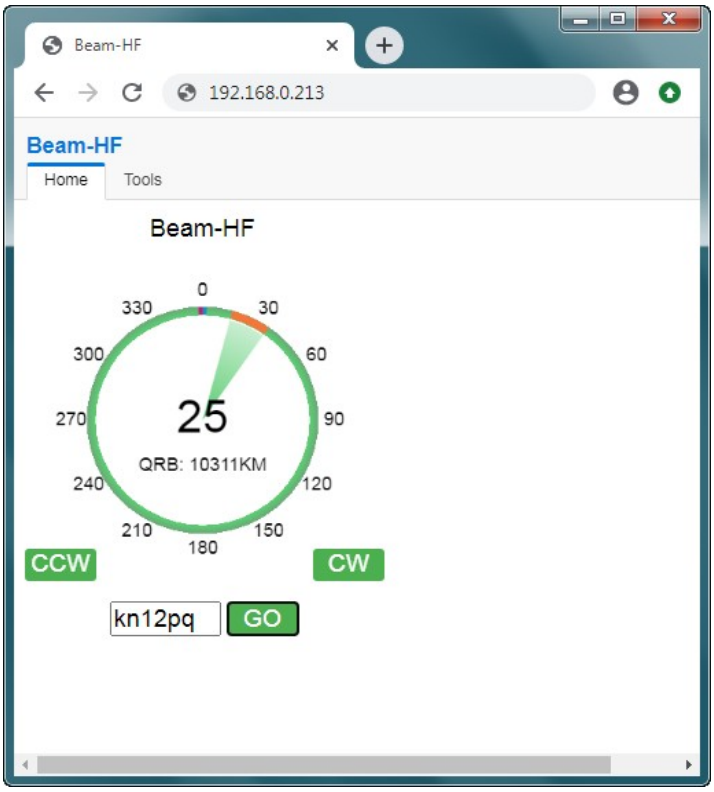
   If ADC readings are decreasing jump to the ADC inverted section.
5. Use the multi-turn pot P1 to set readings as high as possible, but below 1023 at CW end of rotation.
6. Set this reading as ***CW limit***.
7. Turn rotor fully CCW. ADC should decrease smoothly to a low value.
8. Set this reading as ***CCW limit***.
9. Measure and set the actual antenna heading as ***ANT offset.***
10. Now ***Calculated Azimuth*** should display the actual antenna heading. Rotate and check the heading.
11. Finally press ***Submit*** to store the calibration values.

**ADC inverted** calibration is needed when ADC reading are in opposite direction.

1. Check ***ADC invert*** - reading will go in opposite way.
2. Turn rotor fully CCW. ADC readings should decrease smoothly.
3. Use the multi-turn pot P1 to keep readings as low as possible, but above 0 at CCW end of rotation.
4. Set this reading as ***CCW limit***.
5. Turn rotor fully CW. ADC should increase smoothly to a high value.
6. Set this reading as ***CW limit***.
7. Turn back fully to CCW. Measure and set the actual antenna heading as ***ANT offset.***
8. Now ***Calculated Azimuth*** should display the actual antenna heading. Rotate and check the heading.
9. Finally press ***Submit*** to store the calibration values.

# 5 Operating

**WEB page interface** can be accessed from PC, tablet, smartphone or other device with a Web browser on local network or remotely as a Web page by entering its IP address. For security, Web access can be protected with an username and password. The web page on http://xxxxx/*rotor* address, serves same features, but without the menu tab and it can be left unprotected by the WEB admin password for easy user access.




The blue marker is the rotator ***CCW limit***. The red marker is the rotator ***CW limit***. Green sector shows antenna heading and it will change color while rotating. Orange section shows the target heading. Distance to target in kilometers will be displayed when target was selected using QRA grid locator.

Click / tap around the green circle to point-and-shoot. Click / tap and hold on the buttons to rotate, release to stop.

Enter target heading in degrees or a QRA grid locator and click GO or press ENTER.

Click / tap on center to stop rotation.

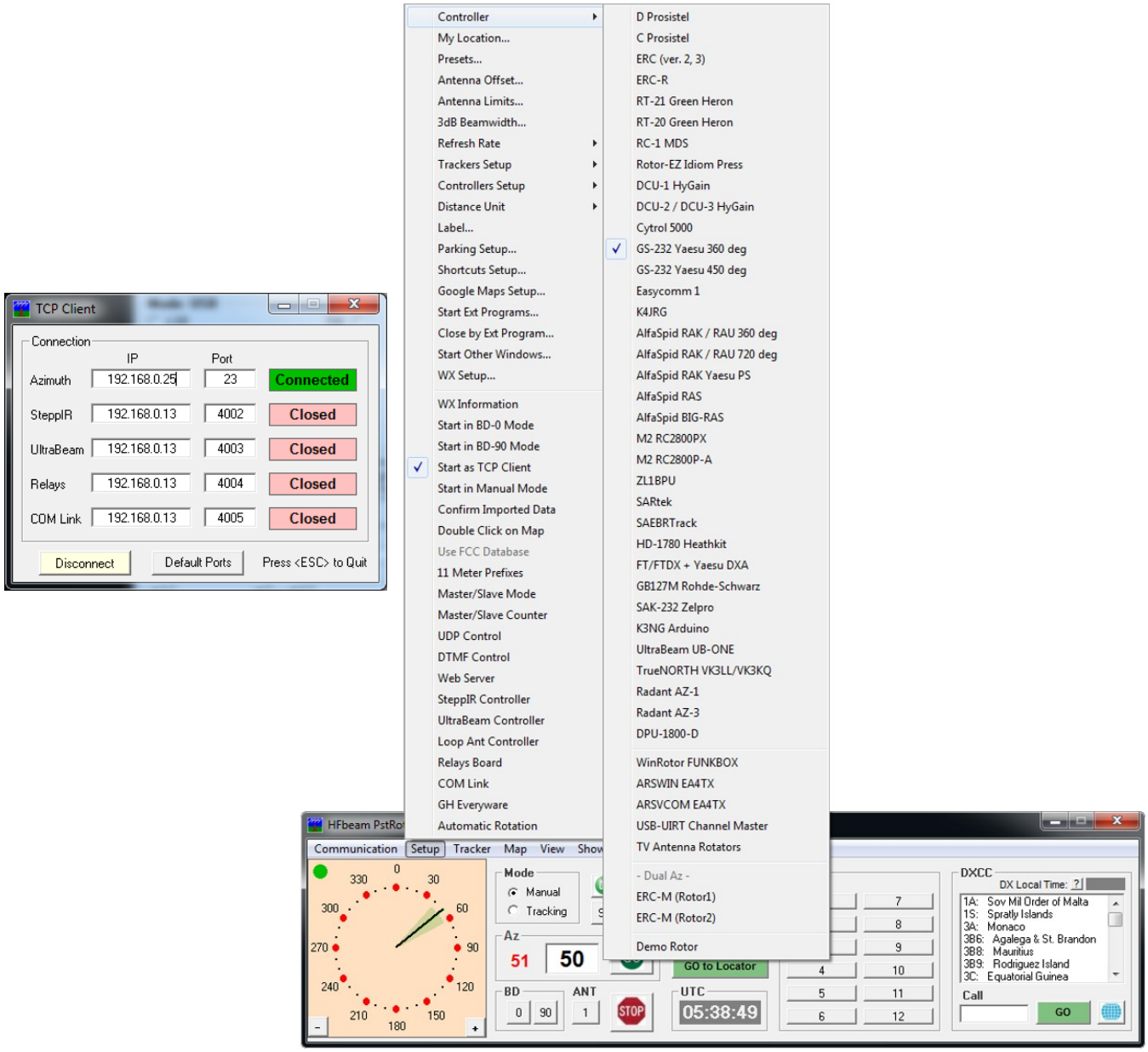
WEB interface can be completely customized by downloading, modifying and uploading file: *rotor.html* from the internal flash filesystem.

## **N1MM logger** setup

Follow the N1MM Rotator Control page on how to setup and use it.

Use the **Host Name** (Beam-HF in this example) in Config >Configure Ports, Antennas tab>Rotor Description field.

## **PstRotator** setup




Download and install [PSTRotatorAz]

Open Setup > Controller and check **GS-232 Yaesu 360 deg** as communication protocol.

Open Communication >TCP Client menu and set the Azimuth connection by entering the rotator IP address and port (23 is default), then press Connect.