

# *User manual*

*Multimode IP radio for Ham Radio Amateurs*



*The Swiss army knife for Digital Voice*

**DVMEGA Cast**

<i>General</i> .....	3
<i>Device registration</i> .....	3
<i>Introduction Digital Voice</i> .....	4
<i>ID registration</i> .....	4
<i>Preparations</i> .....	5
<i>Connect device</i> .....	6
<i>Get started</i> .....	7
<i>Radio configuration</i> .....	8
<i>Host configuration</i> .....	9
<i>Wireless configuration</i> .....	14
<i>System settings</i> .....	15
<i>Operating instructions</i> .....	19
<i>D-Star linking</i> .....	20
<i>DMR linking</i> .....	21
<i>Fusion linking</i> .....	23
<i>MIC buttons</i> .....	24
<i>Update instructions</i> .....	25
<i>Specifications</i> .....	29
<i>Maintenance and cleaning</i> .....	29

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## **General**

Dear DVMEGA-Cast user,

Congratulations with your new device.

In this manual we will show you how to register, configure, and use your DVMEGA Cast.

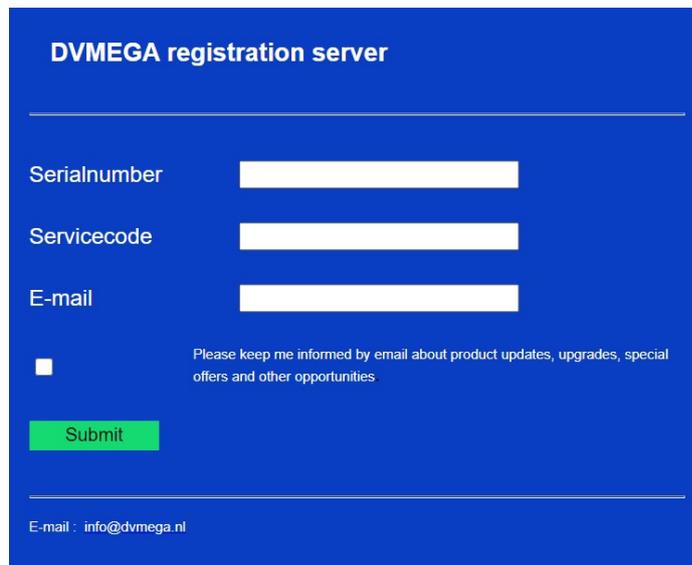
Read the user manual completely and carefully before use. The user manual is part of the product and contains important information for correct use.

Keep this user manual. The user manual must be available for uncertainties and passing the product.

### **Device registration**

Registration is required to get your latest firmware for your device. In the past the firmware was online as download, but with this system you can download updates with your Serialnumber and Servicecode.

Please open <https://dvmega.nl/registration> and fill in the fields.



The image shows a screenshot of the DVMEGA registration server interface. The background is blue with white text. At the top, it says "DVMEGA registration server". Below this, there are three input fields: "Serialnumber", "Servicecode", and "E-mail". Each field has a white rectangular input box. Below the "E-mail" field, there is a small white square checkbox followed by the text "Please keep me informed by email about product updates, upgrades, special offers and other opportunities." Below the checkbox is a green "Submit" button. At the bottom of the form, there is a horizontal line and the text "E-mail : info@dvmega.nl".

Serialnumber and servicecode can be found at the rear-panel, and on the registration-card you received together with this unit. Once registered you will receive a confirmation via email.

## **Introduction Digital Voice**

Digital Voice is different to FM in that you need to first set up your radio with callsigns for yourself, other stations and reflectors, rooms or talkgroups.

If you are setting up your DVMEGA Cast for the first time then make sure you use your manual together with these notes. These notes are intended to be generic so there may be variations between different modes.

If you are new to Digital Voice i recommend to read the information on next websites and documents :

*D-Star reference manual :*

[http://www.tmrahamradio.org/D-STAR\\_for\\_Dummies\\_v4.pdf](http://www.tmrahamradio.org/D-STAR_for_Dummies_v4.pdf)

*Linking to reflectors :*

<http://www.mdarc.org/activities/repeaters/dstar/linking>

*DMR reference manual :*

<http://www.dmrfordummies.com/>

## **ID registration**

Beside a Callsign you need a Radio ID. A Radio ID is a unique number assigned to you (and your callsign) like a telephone number or IP address, your Radio ID identifies you as a unique radio user on the various digital networks around the world.

If you do not have a Radio ID follow next link to get one :

<https://register.ham-digital.org/>

If you have questions about ID registration you can contact one of the people on next list :

<https://register.ham-digital.org/contacts.php>

## Preparations

Front :



- A : Illuminated speaker.
- B : 2.4" Touch screen.
- C : Microphone connector
- D : Rotary encoder with push button.

Back :



- A : External speaker / headphone connection, 3.5 mm jack.
- B : 12 V DC connector, 2.1 mm , central positive.
- C : Type plate with serial number and service code.
- D : RJ 45 LAN connection.
- E : USB port with WIFI dongle installed.
- F : Spare USB port.

## Connect the device

### *Wired LAN Connection.*

Before you can use the WIFI option of the device you have to set the WIFI credentials using the wired LAN connection. You need a network router or switch to connect the device to the internet. Use a router or a switch with high-speed (broadband) connection to the internet. Plug your LAN cable in connection D on the back of the device.

### *Microphone.*

To get the most out of your DVMEGA Cast a MH-48 compatible microphone is advised. A pin compatible microphone will also do. The microphone has to be connected to connection C at the front of the device.

### *Apply power.*

Power the device by a 12 V DC PSU (2.1 mm central positive) Take care to use a good and clean powersupply, some powersupplies can generate interference/noise. Make sure to use a PSU that can handle 1 or more Amps. Power supply has to be connected to connection B at the back of the device.

Now you will get a screen that shows it is connecting, and then the first screen appears.

### **Important !**

**Before you can make a QSO or listen to other stations you have to configure the Radio and Host settings first. And a network connection must be established before the device will boot.**

Radio and Host settings are explained in a later chapters.

## Get started

Before you enter the world of Digital Voice you need some basic knowlegde and be aware of some rules.

First you need a Callsign or a radio ID. A Radio ID is a unique number assigned to you (and your callsign) like a telephone number or IP address, your Radio ID identifies you as a unique radio user on the various digital networks and repeaters around the world.

On every available network you can connect to reflectors, rooms or talkgroups. A talkgroup, reflector or room is simply a way of grouping many Radio ID's into a single digital contact. Or put another way, a talkgroup, reflector or room is a method of organizing radio traffic specific to the users that all want to hear the same thing and not be bothered by other radio traffic on a network that they are not interested in hearing. D-Star uses reflectors, DMR talkgroups and Fusion rooms.

The way to connect to a network or talk via reflectors, talkgroups or rooms is different for each mode. This will be explained in a later chapter.

It is very important to know that world wide repeaters and hotspots are connected to the same network as the DVMEGA Cast is connected to. This means that your conversation will be heard and transmitted by all connected repeaters. So it is possible that when you press the MIC you switch maybe a hunderd repeaters to TX with in total a couple of Kilowatts RF. A licence or registered callsign is realy needed.

A voice stream is going through the internet to reflectors, talkgroups and rooms where the stream is distributed to connected devices. To solve network latency, the connected devices have a buffer. The delay from your voice to the endpoint speaker can be up to 1 sec. A rule of good practice is to keep a space of 3 seconds between each over in a QSO. This space give the devices the time to empty the buffers. It is also important to leave space for people to sign in the going QSO or change from reflector, talkgroup or room. Otherwise it is impossible for a listener to interrupt the voice stream of a talker. **This behaviour is inherent to the networks.**

## Radio configuration

Press MENU



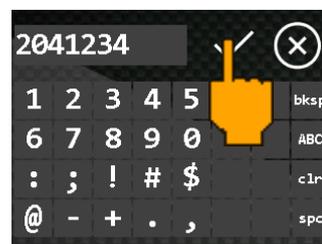
Press CALLS



Press on the ID text field



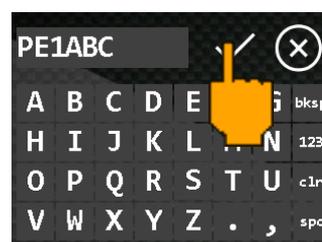
Enter your ID and press enter



Press on Call text field



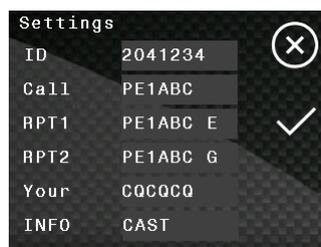
Enter your Call and press enter



Replace PE1ABC with your own call

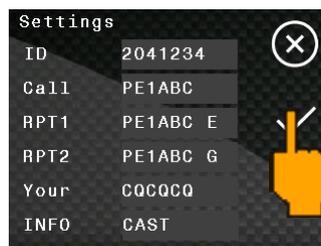
Radio configuration

RPT1, RPT2 etc will be filled in automatically with default value.



You can change these fields individually if you like. The advise is to leave these fields by default values.

When all fields are filled in correctly then press enter.



Done !

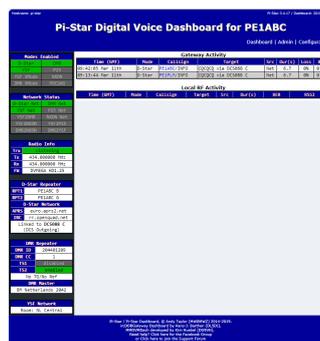


## Host configuration

The host configuration is easy accessible with a standard browser. Just enter "pi-star" in your URL bar.

the next screen will be shown.

It is possible that the hostname can not be resolved in your network. Then you have to go via the IP address.



You can find the assigned IP address on the INFO screen on your DVMEGA Cast.



Press MENU, then INFO to show IP Info.



Now enter the shown IP (192.168.2.1 as an example) in your URL bar.



Click Configuration to go to the Configuration page.

The browser can ask you to login.

Login : pi-star  
Password : raspberry



Pi-Star: 3.4.17 / Dashboard: 20190205

## Pi-Star Digital Voice - Configuration

Dashboard | Admin | Expert | Power | Update | Backup/Restore | Factory Reset

### Gateway Hardware Information

Hostname	Kernel	Platform	CPU Load	CPU Temp
pi-star	3.4.113-sun8i	sun8i based Pi Clone	1.77 / 0.94 / 0.36	37°C / 98.6°F

The Configuration page is divided in configuration blocks per function. Each function is explained in a separate paragraph.

The header gives you some information about the PI-Star version, CPU load and CPU temperature.

On top you find some links. Not all links relate to the DVMEGA Cast. Only the related settings are described in this manual.

If you are an experienced user you can advice the detailed manual of PI-Star : [https://amateurradionotes.com/images/1-Playing\\_with\\_Pi-Star.pdf](https://amateurradionotes.com/images/1-Playing_with_Pi-Star.pdf)

## You need to know !

Some settings must be exactly as indicated. Others can be set as desired. Settings with a red dot means exactly set as indicated. A green dot means set as desired. It is recommended to apply the settings after every block change.

## Control Software

Control Software	
Setting	Value
Controller Software:	<input type="checkbox"/> DStarRepeater <input checked="" type="radio"/> MMDVMHost (DV-Mega Minimum Firmware 3.07 Required)
Controller Mode:	<input type="checkbox"/> Simplex Node <input type="radio"/> Duplex Repeater (or Half-Duplex on Hotspots)

## MDVMHost Configuration

MMDVMHost Configuration	
Setting	Value
DMR Mode:	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
D-Star Mode:	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
YSF Mode:	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
P25 Mode:	<input type="checkbox"/> <input type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
NXDN Mode:	<input type="checkbox"/> <input type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
YSF2DMR:	<input type="checkbox"/> <input type="checkbox"/>
YSF2NXDN:	<input type="checkbox"/> <input type="checkbox"/>
YSF2P25:	<input type="checkbox"/> <input type="checkbox"/>
DMR2YSF:	<input type="checkbox"/> <input type="checkbox"/> Uses 7 prefix on DMRGateway
DMR2NXDN:	<input type="checkbox"/> <input type="checkbox"/> Uses 7 prefix on DMRGateway
POCSAG:	<input type="checkbox"/> <input type="checkbox"/> POCSAG Paging Features
MMDVM Display Type:	<input checked="" type="checkbox"/> CAST Port: /dev/ttyAMA0 Nextion Layout: G4KLX

Modes can be enabled or disabled individually. If more than 1 mode is enabled the device will start to scan the enabled modes. When activity is detected, or via MIC PTT or network, scan stops and device will lock on this mode. When there is no activity via MIC PTT or network, after the hangtimers time delay, then the device restarts a scan. MMDVM Display Type has to be set to Cast.

## General Configuration

General Configuration	
Setting	Value
Hostname:	<input checked="" type="checkbox"/> pi-star Do not add suffixes such as .local
Node Callsign:	<input checked="" type="checkbox"/> PE1ABC
CCS7/DMR ID:	<input checked="" type="checkbox"/> 2044012
Radio Frequency:	<input checked="" type="checkbox"/> 434.000.000 MHz
Latitude:	<input checked="" type="checkbox"/> 50.00 degrees (positive value for North, negative for South)
Longitude:	<input checked="" type="checkbox"/> -3.00 degrees (positive value for East, negative for West)
Town:	<input checked="" type="checkbox"/> Town, L0C4TOR
Country:	<input checked="" type="checkbox"/> Country
URL:	<input checked="" type="checkbox"/> http://www.mw0mwz.co.uk/pi-star/ <input type="checkbox"/> Auto <input checked="" type="radio"/> Manual
Radio/Modem Type:	<input checked="" type="checkbox"/> DV-Mega Cast Base Radio (Main Unit)
Node Type:	<input checked="" type="checkbox"/> Private <input type="radio"/> Public
System Time Zone:	<input checked="" type="checkbox"/> Europe/London
Dashboard Language:	<input checked="" type="checkbox"/> english_uk

**Node Callsign** : This is your own Callsign. Do not add any suffix like /P /M etc.

**CCS7/DMR ID** : This is your own DMR ID.

**Radio Frequency** : Radio Frequency is not used.

**Latitude / Longitude** : This is your GPS position.

**Attention !** When you enter invalid data format, you are not able to log into Brandmeister.

**Town / Country** : Your Town and Country.

**URL** : If the switch is on manual then the text in the textbox is send. When the switch is on auto your QRZ address is send.

**System Time Zone / Dashboard Language** : Set at your preference.

### DMR Configuration

DMR Configuration	
Setting	Value
DMR Master:	<input type="checkbox"/> BM_United_States_3101
Hotspot Security:	<input type="checkbox"/>
BrandMeister Network:	Repeater Information   Edit Repeater (BrandMeister Selfcare)
DMR ESSID:	<input type="checkbox"/> 2044012_09
DMR Colour Code:	<input type="checkbox"/> 1
DMR EmbeddedLCOnly:	<input type="checkbox"/>
DMR DumpTAData:	<input checked="" type="checkbox"/>

**DMR Master** : Select the master that is closest to your location.

**Hotspot security** : This is optional and can differ per Master.  
For more info : [http://wiki.pistar.uk/Pi-Star\\_Brandmeister\\_Hotspot\\_Security](http://wiki.pistar.uk/Pi-Star_Brandmeister_Hotspot_Security)

### D-Star Configuration

D-Star Configuration	
Setting	Value
RPT1 Callsign:	<input type="checkbox"/> PE1ABC E
RPT2 Callsign:	PE1ABC G
Remote Password:	<input type="checkbox"/> .....
Default Reflector:	<input type="checkbox"/> DCS088 C <input type="checkbox"/> Startup <input type="radio"/> Manual
APRS Host:	<input type="checkbox"/> euro.aprs2.net
ircDDBGateway Language:	<input type="checkbox"/> English_(UK)
Time Announcements:	<input checked="" type="checkbox"/>
Use DPlus for XRF:	<input type="checkbox"/> Note: Update Required if changed

**Default Reflector** : Select the reflector you like to be connected to at startup.

**APRS Host** : Select the APRS Host that is closest to your location.

**ircDDBGateway Language** : Set at your preference.

**Time Announcements** : Enable or disable time announcements.

### Yaesu System Fusion Configuration

Yaesu System Fusion Configuration	
Setting	Value
YSF Startup Host:	<input type="checkbox"/> YSF96455 - NL Central - Centraal NL
APRS Host:	<input type="checkbox"/> euro.aprs2.net
UPPERCASE Hostfiles:	<input type="checkbox"/> <input type="checkbox"/> Note: Update Required if changed
WiresX Passthrough:	<input type="checkbox"/> <input type="checkbox"/>

**YSF Startup Host** : Select the YSF Host you like to be connected to at startup.

**APRS Host** : Select the APRS Host that is closest to your location.

### Firewall Configuration

Firewall Configuration	
Setting	Value
Dashboard Access:	<input checked="" type="checkbox"/> Private <input type="checkbox"/> Public
ircDDBGateway Remote:	<input checked="" type="checkbox"/> Private <input type="checkbox"/> Public
SSH Access:	<input checked="" type="checkbox"/> Private <input type="checkbox"/> Public
Auto AP:	<input type="checkbox"/> On <input checked="" type="checkbox"/> Off Note: Reboot Required if changed
uPNP:	<input checked="" type="checkbox"/> On <input type="checkbox"/> Off

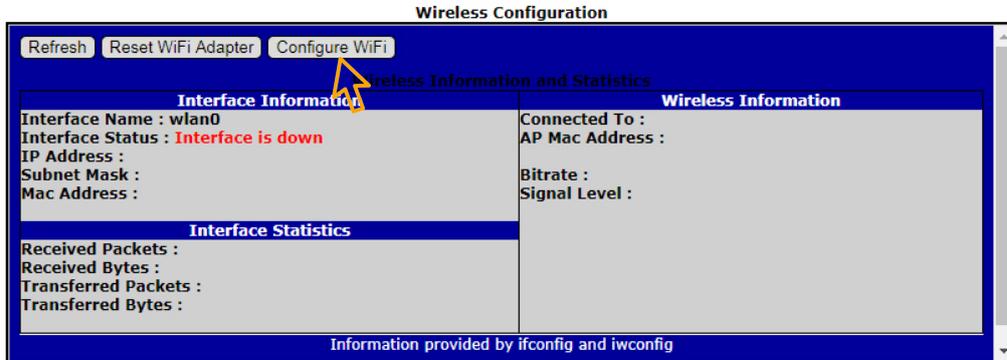
### Remote Access Configuration

Remote Access Password			
User Name	Password		
pi-star	<input checked="" type="checkbox"/> Password:	<input type="text"/>	Confirm Password: <input type="text"/> <input type="button" value="Set Password"/>
WARNING: This changes the password for this admin page AND the "pi-star" SSH account			

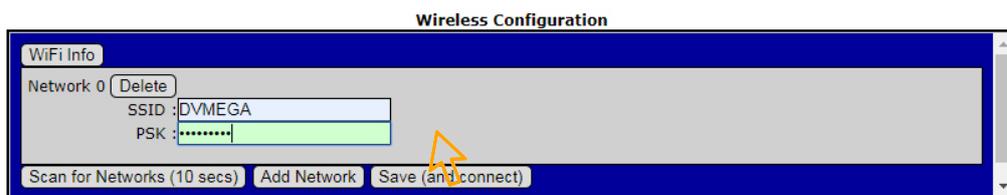
## Wireless Configuration

The WIFI settings are only visible when a dongle is present.

Click Configure WiFi

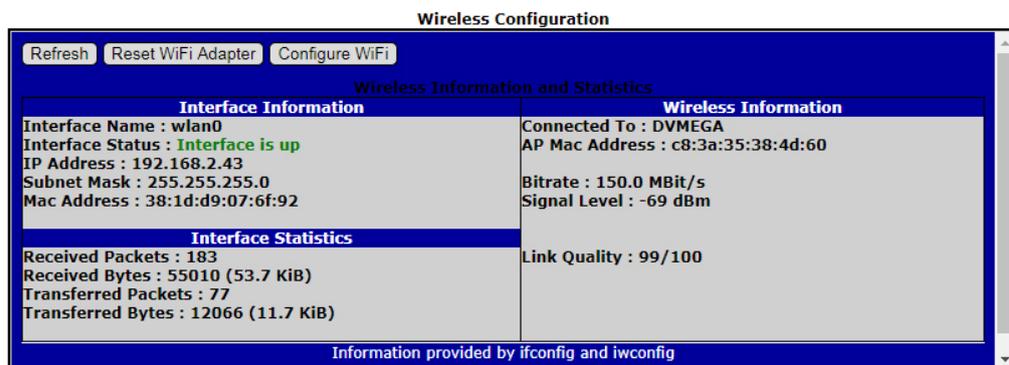


Enter your SSID and Password of the WiFi network you like to connect to. Then click Save (and connect)



Then power cycle the device.

Wireless Configuration screen will show the connected network.



Now you can unplug the LAN cable.

After a power cycle the DVMEGA Cast will connect via WiFi.

## System settings, led brightness

Press MENU



Press SYSTEM



Press UP or DOWN to adjust led brightness.



Press SAVE to store setting.



Press EXIT when done



System settings

## System settings, boost MIC level

Press MENU



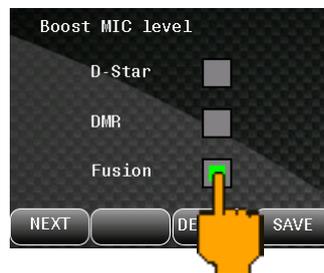
Press SYSTEM



Press NEXT.



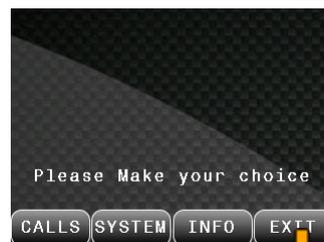
Set the desired levels.



Press SAVE.



Press EXIT to return to MAIN screen



System settings

## System settings, enable modes

Press MENU



Press SYSTEM



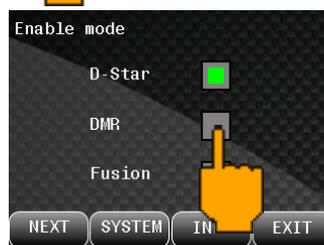
Press NEXT.



Press NEXT.



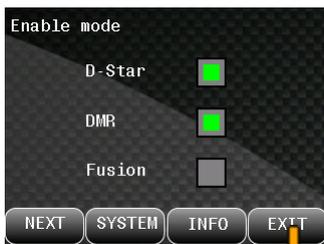
Enable or disable the desired Mode.



The following message appears.



Press EXIT to return to MAIN screen



## System settings, Hotspot control

Important ! This function only works when a radio Hotspot module is installed.

Press MENU

Press SYSTEM

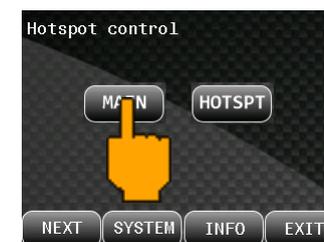
Press NEXT.

Press NEXT.

Press NEXT.

Select MAIN or Hotspot.

The following message appears. And the device will restart.



## Operating instructions

**Volume** : Volume can be adjusted with rotary encoder D at the front of the device.

**Mute** : You can mute the audio by a short press on rotary encode D at the front of the device.

**Set curent volume as default** : Give a long press on the rotary encoder D at the front panel. The text MUTE will be shown in the display. Keep rotary encoder pressed until MUTE disappear. The current set volume is now stored and set as default.

**Change Mode** : Change mode is only possible when device is idle. The mode button is greyed out when device is not idle. Top left on the screen the curent set mode is shown.

**Scanning** : When more than 1 mode is enabled in the MMDVMHost Configuration the device will scan all enabled modes, when idle.

Device is idle when MODE button is white.

If you press PTT the mode shown on the top left of the display will be the active mode. Device is now no longer idle and MODE button is greyed out.

If the device is in scan mode the first stream coming from the network will lock the device in the relevant mode.

**Power off** : Press the PWR button to switch off the device.

**Power on** : Press rotary encode D at front of the device to power on the device.

**INFO** : A press on the INFO button will give you the firmware version numbers and the assigned IP address.

<b>Speaker LED</b> :	Blue	-	Waiting for RX / TX
	Red	-	TX
	Green	-	RX

## D-Star linking

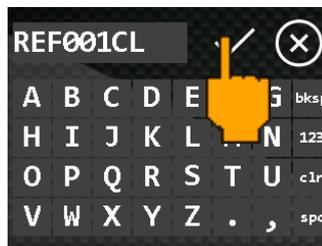
In D-Star the Your Call field is used to send the link and unlink commands. The Your Call field must contain the link command when linking and should contain CQCQCQ during a QSO. Linking is only possible when radio is idle.

### Example : link to REF001C

Press the CQCQCQ text field.



Enter the link command for REF001C. Remember the total characters of the link command must be 8. The L must be on the last (8th) position. Then press enter.



You are now ready to send the link command. Press PTT to send the link command to the reflector.

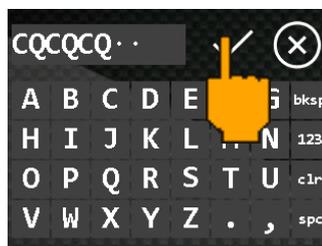


The voice server will announce the linked status.

Before you can talk on the linked reflector you have to set Your Call to CQCQCQ. Press the text REF001CL. \*



Enter CQCQCQ . Remember the total characters must be 8. Add 2 spaces. CQCQCQ [space] [space]



Then press enter.

Now you are fully linked and ready to talk on REF001C.



\* You can also press the CQ button, this is a predefined key.

## DMR linking

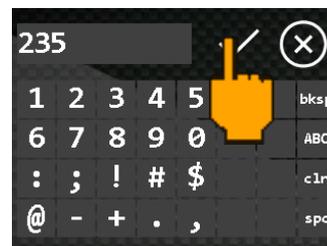
DMR linking is different from D-Star. The DMR talkgroup you want to talk to is embedded in the voice stream.

### **Example : Group call to TG235**

Press the Talkgroup text field.



Then enter the desired Talkgroup and press enter.



Now press PTT once and you are linked to TG235.

You are ready to talk.



### **Example : Private call to ID 2041234**

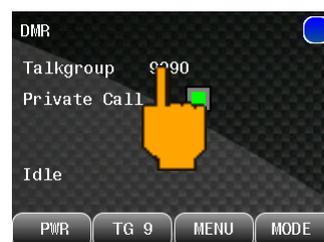
A private call is a 1 to 1 conversation in private to the entered ID.

Press Private Call check box.



Private call will be enabled. The check box is green when checked.

Then press the To ID text field.



Then enter the desired ID you want to talk to and press enter.



Now you can talk to ID 2041234 via a Private Call.



Note : Operator with ID 2041234 has to be available and connected to the Network.

To go back to the Group Call function you can simply uncheck the Private Call check box. You are set to the last used talkgroup. Press PTT to get connected before you are ready to talk.



## Fusion linking

Fusion linking is different from D-Star and DMR. You can choose a different room via the dashboard.

Enter the Dashboard as described under Host Configuration.

Click Configuration.



Scroll down to the Yeasu System Fusion Configuration.

With the drop down box YSF Startup Host you can select another room.

Click Apply Changes when ready, you will be automatically connected to selected room.

Yaesu System Fusion Configuration	
Setting	Value
YSF Startup Host:	<input type="checkbox"/> YSF96455 - NL Central - Centraal NL
APRS Host:	<input type="checkbox"/> euro.aprs2.net
UPPERCASE Hostfiles:	<input type="checkbox"/> <span>Note: Update Required if changed</span>
WiresX Passthrough:	<input type="checkbox"/>

## MIC buttons

### General

Down (1)	Volume down
Up (2)	Volume up
P1 (4)	Toggle Mode
D	Mute / Unmute

### D-Star

A	Preset CQCQCQ
C	Preset U
B	Set Edit Mode link command

### Edit Mode link command D-Star

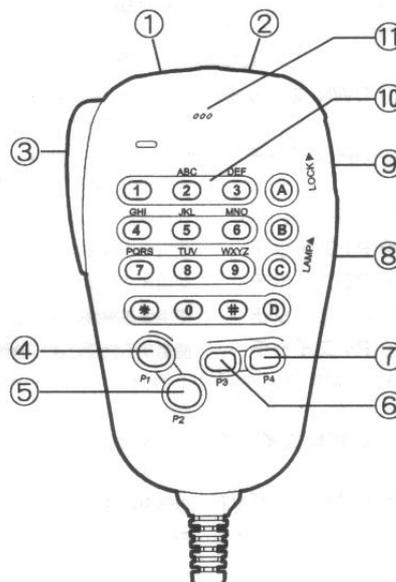
0 - 9	Numeric input
A	XRF -> REF -> DSC -> XRF -> etc.
B	AL -> BL -> CL -> ..... ZL -> AL -> etc.
*	Backspace
#	Enter (Okay)

### DMR

A	Priv call / Grp call
B	Edit TG or ID

### Edit Mode TG or ID DMR

0 - 9	Numeric input
*	Backspace
#	Enter (Okay)



**MIC buttons**

## Update instructions

Important ! Read the release note that you will receive with the update carefully.

DVMEGA Cast must be power on at any time while doing updates.

### DVMEGA Cast Display update

Click Configuration.



Click on Expert.



Click on FW update.



Click on Select File.



Update instructions

You receive the update files in .zip format. Do not extract the received zip files. A browser window will open. Go to the location you have saved the received files. Select the Display update file and confirm. You will be returned to the update screen. Check that the correct file is selected (red marked)

Click Upload Firmware in the Display section now.

Pi-Star:3.4.17 / Dashboard:CAST 20200512

### Pi-Star Digital Voice - Upgrade Firmware

**DVMEGA-Cast Mainboard**  
Select Firmware-file to upload to the DVMEGA-Cast unit  
DO NOT UNZIP THE FILE, UPLOAD AS IS

Bestand kiezen | Geen bestand gekozen

Upload Firmware

---

**DVMEGA-Cast Display**  
Select Firmware-file to upload to the DVMEGA-Cast Display  
DO NOT UNZIP THE FILE, UPLOAD AS IS

Bestand kiezen | **BlackCast1.25.zip**

Upload Firmware

Then click Run Upgrade.

Pi-Star:3.4.17 / Dashboard:CAST 20200512

### Pi-Star Digital Voice - Confirm the Upgrade

Please click the button to update the Display.

Run Upgrade

As soon as the update finishes, the display restarts

Notice that the display is going into update mode. You see the update progress on the display.

Follow the instructions in the web browser.

Pi-Star:3.4.17 / Dashboard:20190205

### Pi-Star Digital Voice - Update is Ready

Your update has been done

**\*\*\*UPDATE HAS BEEN PROCESSED\*\*\***

Your unit has been updated, and will reboot now. We will revert to the dashboard in 50 seconds.

Pi-Star / Pi-Star Dashboard, © Andy Taylor (MW0MWZ) 2014-2019.  
ircDBGateway Dashboard by Hans-J. Barthen (DL5DJ),  
MMDVMDash developed by Kim Huebel (DG9VH).  
Need help? Click here for the Support Group  
Get your copy of Pi-Star from here.

The system will restart, within 60 sec the Dashboard is back.

## DVMEGA Cast Mainboard update

Click Configuration.



Click on Expert.



Click on FW update.



Click on Select File.



You receive the update files in .zip format. Do not extract the received zip files.

A browser window will open. Go to the location you have saved the received files.

Select the Mainboard update file and confirm. You will be returned to the update screen. Check that the file is selected (red marked)



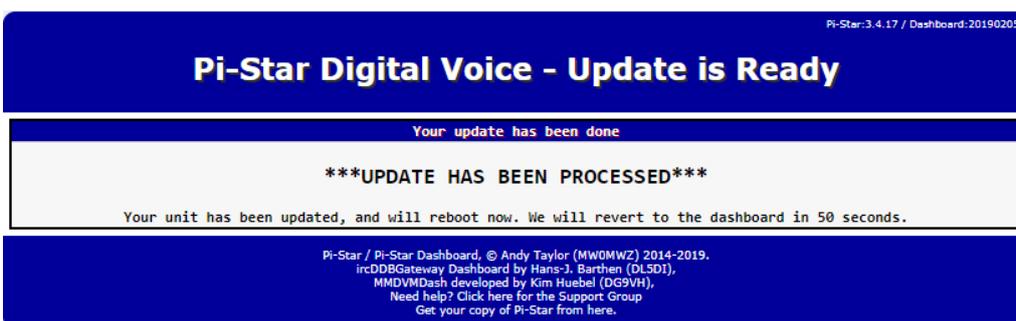
Click Upload Firmware in the Mainboard section now.

Then press rotary encode D on front of the device and keep pressed while you click Run Upgrade.

Release the rotary encoder D at front of device when LED in the speaker goes dark or wait at least 20 sec.



Wait until update is ready.



The system will restart, within 60 sec the Dashboard is back.

Power cycle the DVMEGA Cast now.

## **Specifications**

- Cabled (RJ45) or Wifi to internet connected.
- No RF connection or repeater needed!
- Webinterface based configuration option.
- 2.4" touch screen for setup and control.
- Support Yaesu MH-48 with keypad for control.
- Rotary encoder for volume and multi-functionality.
- Embedded high-end CPU on dedicated mainboard.
- Support D-Star, DMR, and C4FM mode.
- Integrated Original DVSI AMBE3000.
- Easy to use web-based upgrade utility.
- Support a DVMEGA-pi radio for Hotspot functionality.
- Supports an internal DVStick30 for AMBE-server.
- low powerconsumption 12VDC (2.1 mm Barrel Connector).
- Colorfull speaker indicator for status.
- 3.5mm external speaker connection.
- High performance 3 watt speaker
- Extra USB-connections available for future use.
- Solid full-metal powder coated housing
- Lifetime free Software updates.

## **Maintenance and Cleaning**

- Clean only with a dry, soft cloth.
- Do not use cleaning agents and chemicals.
- Store cool and dry.
- Store the product a dry and dust-protected ambience when not in use.
- Keep and use the original packaging for transport.

Made in the Netherlands.

Website : [www.dvmega.nl](http://www.dvmega.nl)  
E-mail [info@dvmega.nl](mailto:info@dvmega.nl)