





Technical manual

Version BETA

VFC02-2019xxxx

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www.astrum.eu/vface.html







VFACE BASIC



VFACE TOUCH





GENERAL INFORMATION

ASTRUM Ltd. Şti.

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This manual will include all information and techniques about product, for installing and configuration. We reserve the right to make changes to the manual without prior notification.

You are allowed to make a single copy for backup purpose.

Please read and be familiar with instruction before getting started and keep the manual for later use.

You are always welcome to inform use of errors or make suggestions for improving the program.

Manual and the Software are protected by copyright. All rights are reserved.

Symbols and Notifications



Caution!

Important points need to take into account while configuration.



BOLD

Hint

Additional notes and information.

"......" Double quotes: Functions or step which user must perform.

Italic: Description for objects and pictures.

Bold: Illustrates names of buttons, menus or elements.





Warning & Safety Instructions

- Installation and configuration should be done by only qualified personnel.
- You can take support from your dealer or technical representative in your region for installing a device.
- All electrical execution must be performed by a technician and with accordance of the country legislation following the instructions in the Technical Manual.
- Make sure that all cables are secure, that recommended cables are used and that no external forces act on Terminal connections or cables.
- VFace mentioned for indoor use only. Disconnect power and all bus communication cable from VFACE while installation and mounting.
- Do not apply **AC power** to the VFACE BASIC / VFACE TOUCH.
- Based on modular structure different add-on modules are manufactured for each brand, do not try to use it for other brands. This may cause damage to add-on module and device itself.





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Technical specification

Hardware Information's

Power Supply:	12 VDC
Display:	Basic – None
	Touch – 7" with capacitive touchscreen
Standard Interface:	VRF port (1x)
	LAN RJ45 (1x) GbE Interface
	USB 2.0 (1x)
	Digital GPIO (2x) Input
Optional Interface:	Additional VRF port (1x) any brand
	RS232 / RS485 (1x) two-in-one module
	KNX (1x) TP
Reset Button:	Hardware button on the back side of the case
Housing Type:	Aluminum colored black
	Protection grade IP 20
Working Humidity:	5% - 90% at 25°C
Working Temperature:	-10°C - +35°C





Software Information's

Standard Technologies: Built-in web server Internet Upgradable Customizable web interface Connectivity: ASCII TCP/IP (Custom protocol) Modbus TCP Modbus RTU RS232 / RS485 (Optional) KNX (Optional) Web server implementation (via SDK) VRF Control: Full indoor unit control Monitor indoor and Outdoor units System diagnostic Controllable elements: On/Off status Set temperature Work mode Room temperature read only Fan speed Swing and diagnostic (regarding brand) Outdoor data read only (regarding brand) Web UI Functionality: Name and group indoor / outdoor units Define user rights Scheduling indoors Record indoor activity logs (optional) System logs for diagnostic Timer / Scheduling: Indoor full control Weekly or one-time commands Lock indoor units Time interval commands User Interface: Web/Html5 (All operating systems) Mobile app support (iOS / Android) **Browser Compatibility:** Chrome / Firefox / Safari Apple iOS / Google Android Mobile App: Client Amount: Unlimited clients (up to 16 parallel connections)





Setup and Maintenance

Configuration Interface:	Online / Offline through web interface
	Back / restore of the project
	Search units
	Unit list
	Select BMS / HA connectivity
Setup and Maintenance:	Network
	Date / Time
	Language support (soon)
	Selection of graphical elements
	Software Update
	Software License
Other Functions:	Emulator (Simulate VRF System)
	Watchdog (Protect system against crash)
	Rotate screen
Inputs:	Emergency Input (Closes all VRF indoor units)
	Search inputs (Start to scan VRF Bus)



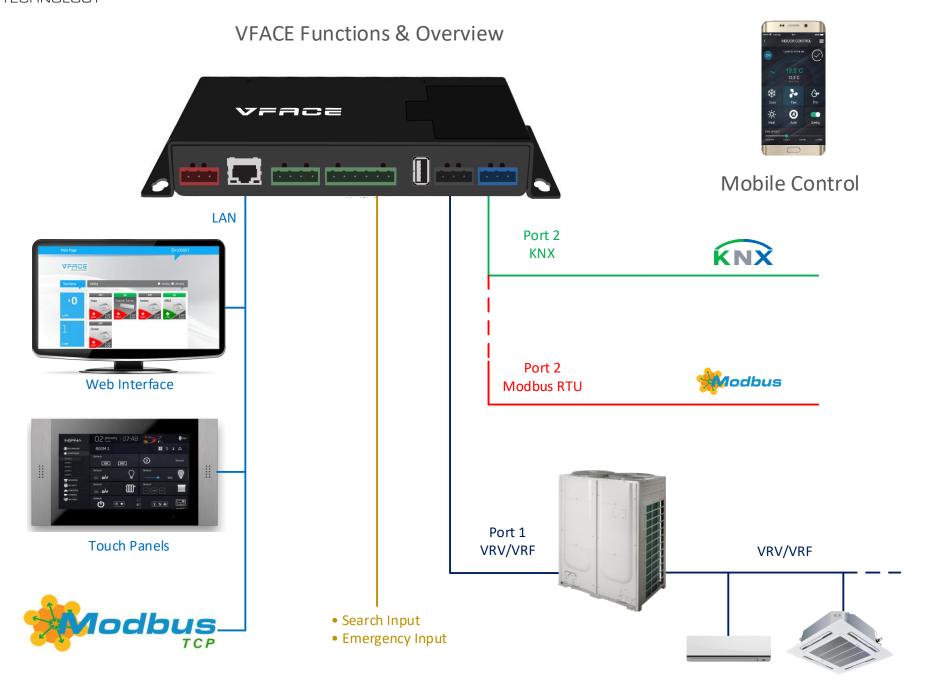


Supported Brands





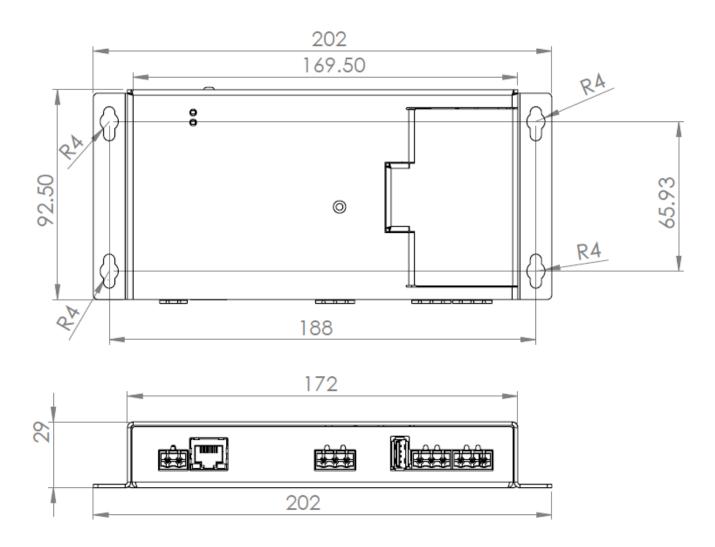








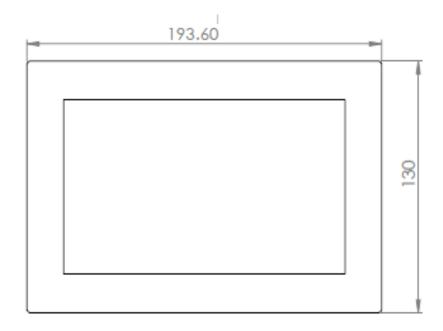
Dimension of VFACE BASIC

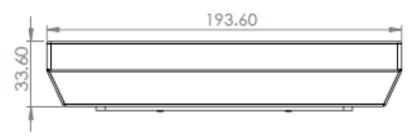


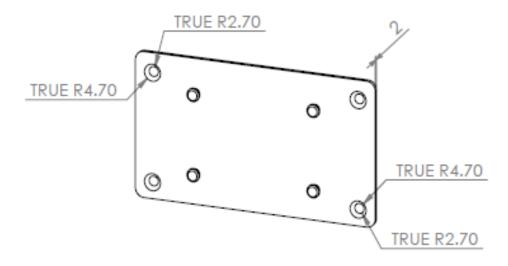




Dimension of VFACE TOUCH

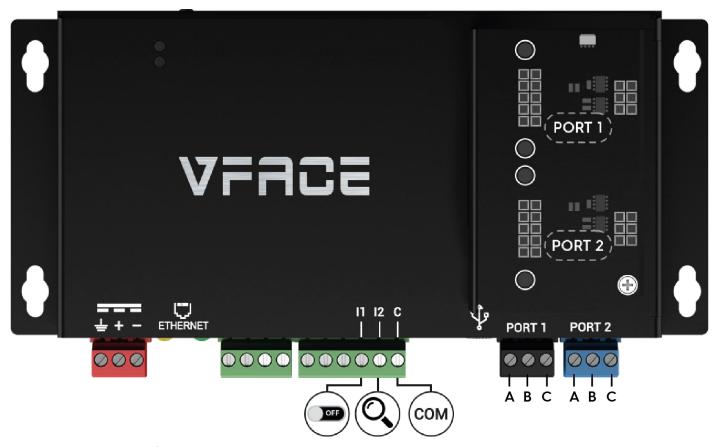








Connections



Power Supply: 12 VDC

Ethernet Port: 10M/1000M (IEEE 802.3)

Input 1 (I1) Turn OFF all Indoor units. (Emergency input)

Input 2 (I2) Search Indoor units.

Port 1: Add-on port for VRF module ONLY.

Port 2: Add-on port for BMS(Modbus/KNX) or VRF modules.





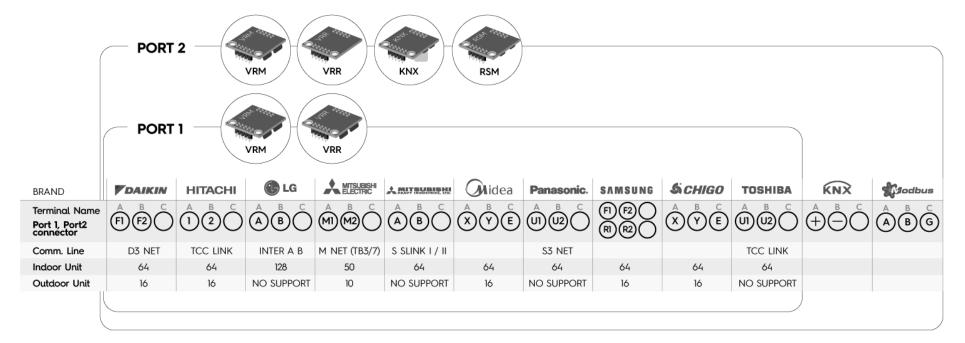
VFACE is based on modular structure, on the rear side of VFACE Touch / VFACE Basic under the cover you can see two add-on port.

By plugging specific add-on modules to those ports various combination of connectivity can be provided. Please check the table below.

PORT 1	PORT 2	OPERATION MODE
VRV/VRF	-	64 Indoor Control + Modbus TCP/IP
VRV/VRF	Modbus	64 Indoor Control + Modbus RTU
VRV/VRF	KNX	64 Indoor Control + KNX + Modbus TCP/IP
VRV/VRF	VRV/VRF	128 Indoor Control + Modbus TCP/IP

Outdoor Unit Connections

Each brand of HVAC has different communication terminals on outdoor unit. Please check below table for terminals connections.







Introduction

VFACE is a standalone interface for VRV/VRF systems which also let you easily integrate to Home Automation and Building Management Systems. VFACE supports various brands and provides end-users with full control of all indoor units enabling them with access to VRV/VRF's various functionalities including diagnostic.

VFACE is a plug and play device when installing device HVAC installers will not need to worry anymore about the complexity involved in various gateways and with 7" VFACE Touch Panel no need computer to setup.

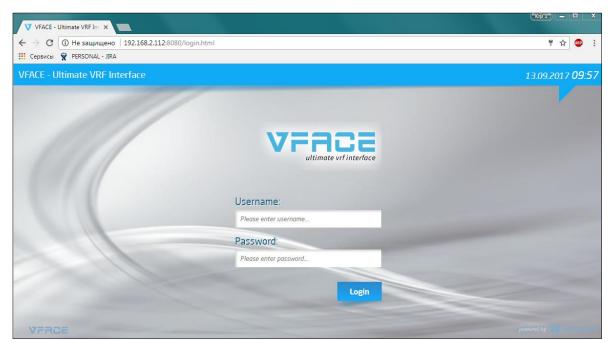
VFACE has an embedded web server which hosts a responsive web page that means various connectivity options such as PC, Tablet or Mobile and easy configuration via internet. VFACE also enables VRF installers to access all parameters required for diagnostic and service purposes.

Access to the System



Access to the system realizes through entering individual IP Address and Port number 8080 of the device to the Web Browser.

- Default IP Address of device is 192.168.2.100 and Default Port number is 8080.
- From VFACE Touch you can obtain IP Address through "Setting/Parameters/Network" page.
- In the case when DHCP server is set. You will need to find out which IP Address did device take through Scanning the Network. After finding IP address enter it to Browser.
- Recommended web browsers: Google Chrome / Safari / Firefox.



View from browser: Login page



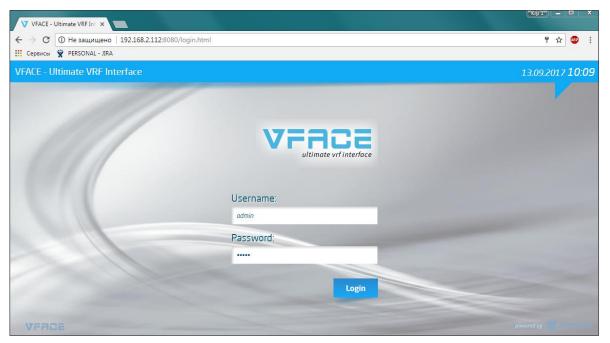


Types of the access:

- Local access: IP address of device inside local network is required.
- Remote access: You will need to redirect Local IP Address of the VFCAE to the public IP Address, through port forwarding.

Authorization to the system originates through two types of sessions:

Username	Password	Description	
admin	51GX19MH	Intended for integrators, has unlimited authorization to settings.	
user	user	Intended for end-use can monitor and control.	
guest	guest	Intended for end-use can monitor and control.	



View from browser: Login page

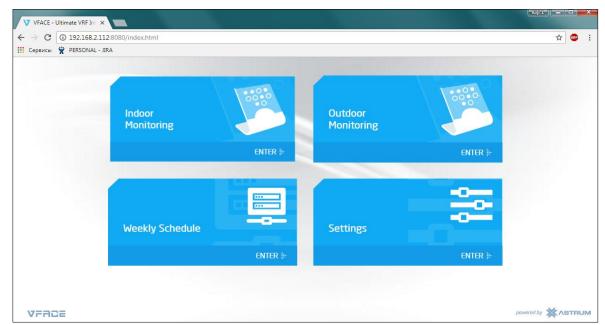


Web Interface of both VFACE BASIC and VFACE TOUCH are identical.



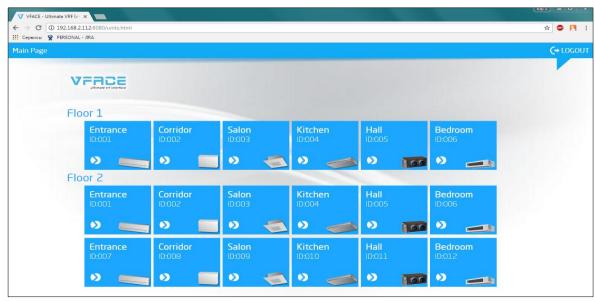


Main Page



View from browser: Main page of Admin client

- Indoor Monitoring: Full control and monitoring of all VRV/VRF indoor units.
- Outdoor Monitoring: Diagnostic information of the VRV/VRF outdoor units.
- Weekly Schedule: Creating schedules, rules for each indoor unit or for group, depending on time and season.
- Settings: Includes all parameters and configuration of device.



View from browser: Main page of User client



Authorization of User and Guest are limited, they can only monitor and control unit, but can't make a change.





Indoor Monitoring

Provide monitoring and control of all Visible Indoor units.



View from browser: Indoor Monitoring

- Sections: Indoor units can be divided into sections. Sections can be floor or parts of building according to the project.
- All units: Apply configuration to all units in whole sections.
- Section: Apply configuration to all units inside current section.
- Control:

On/Off: Enable or Disables the indoor unit.

Mode: Select the mode of indoor unit.

Fan Speed: Select the intensity of Fan speed.

Swing: Select the swing state.

Set Temperature: You can set the temperature by clicking the (+) and (-) buttons.

- APPLY: Save and apply each configuration by clicking Apply button.
- Info bar: Diagnostic information about indoor unit.



Same procedure can be applied on other sections with the same way, configuration and managing Sections and Units will be explained in upcoming chapters of manual.





Outdoor Monitoring

This section provides diagnostic information about the Outdoor units of VRV/VRF systems. Following information is just for monitoring, it's not allowed to make any changes.



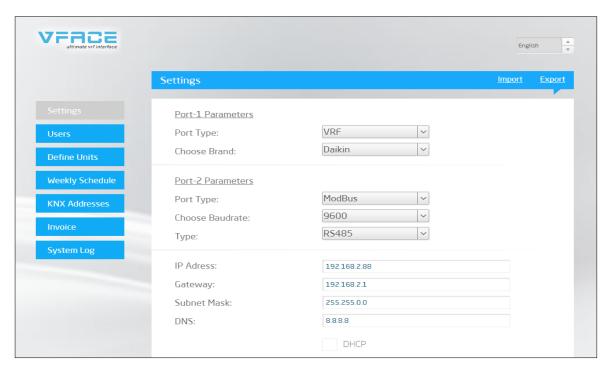
View from browser: Outdoor Monitoring

By the clicking Outdoor Unit on the Control bar you will be able to see all information about unit.





Settings



View from browser: Settings page

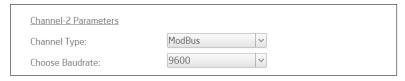
Port-1 Parameters

Port Type: Select type of protocol (VRF / Modbus / KNX)

Select Brand: Select brand of VRV/VRF from available list

Port-2 Parameters

Port Type: Choose type of protocol (VRF / Modbus / KNX)



If you select Modbus as a channel type you will have set Baud rate menu to set.



• Channel-1 or Port 1 is suggested to use for VRF Protocol. Each VRV/VRF Brand has it's specified add-on module. Do not try to use it for other brands. Do not change the DIP switch from original states.

Network Settings

Please set the Network configuration according to your system, don't miss any parts or leave it empty.

In a case that you set DHCP, device will take all network configuration from router and finding your device through scanning network will take a time. For that reason, Manual configuration of network is suggested.





Time: Date: 18/09/2017 Time Zone: Africa/Addis_Ababa Auto Time Update Auto Time Zone
Time Zone: Africa/Addis_Ababa
/ Inica// (ddis_/ tbdbd
Auto Time Update Auto Time Zone
Modbus TCP Port: 1502
Modbus Address: 1

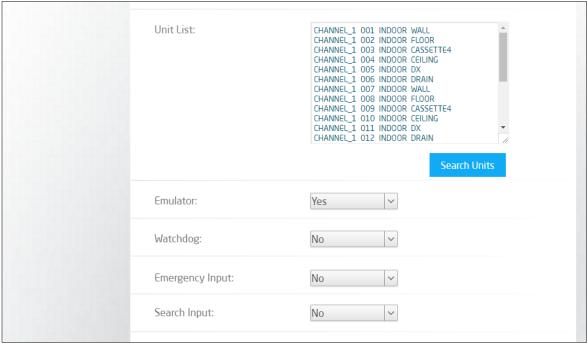
View from browser: Settings page

• Time and Date Settings

Date and Time can be set automatically or manual from following tabs.

• Modbus settings

Port and slave address configuration for Modbus TCP connection. Default states of them you can see it on picture above.



View from browser: Settings page





· Search Units

While wiring connection with Outdoor unit and VFACE is accomplished you can proceed to search. By clicking search you will be able to discover all indoor units which are connected to your system.

According to brands searching time may last up to 2 minutes.



Making a new search will delete all your present settings.

• Emulation

Simulation which creates virtual outdoor and indoor Units. The purpose of emulation is to create a platform for training, testing and introducing device. While Emulation is set all Units will be virtual and they have no any relation with real system.

Watchdog

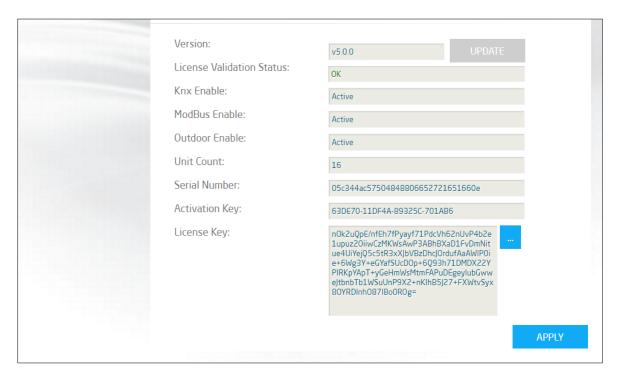
During system crash or fault device will be restarted automatically.

• Emergency Input

Digital input "It" is for emergency. It can be connected to the Security systems of building. During triggering with Common "C" system will turn off all units.

· Search Input

Digital input "12" is for Searching all Indoor/Outdoor units. After connecting all wiring part, you can trigger "12" as a result system will search all units inside the system and will appear on "Unit list".



View from browser: Settings page





• Version

Displays the software version of the device. In a case when new version available you can Update it with **UPDATE** button.

• License

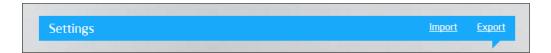
This section is generated during manufacturing and in an accordance of customer order. By contacting your dealer, you can upgrade your licenses.

License Key: Unique License Key of the device.

• APPLY

While configuring system you need always to save the changes by clicking **APPLY** button, otherwise your changes won't be saved and will remain the same.

• Import / Export



Import: If you want to upload the settings which is extracted from other device you can use import option and upload existed settings with .json file which you have.

Export: Creates and saves your current settings as .json file.

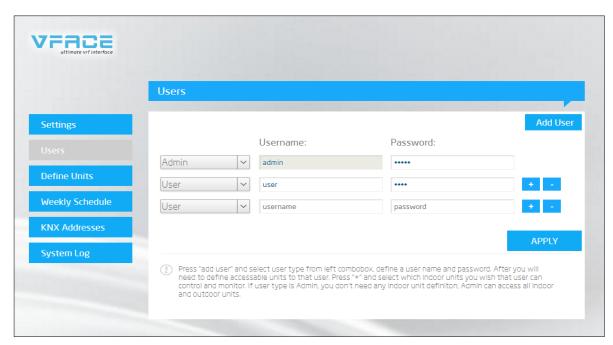


While importing different settings you need to take your own device backup. For that, firstly Export your current settings and save it, after you can import another setting.





User settings



 $\label{lem:view from browser: User Settings} % \[\[\] \] % \[\] % \[\] % \[\] % \[\] % \[\] % \[\] % \[\] % \[\] %$

Add User

• Add User: You can add new user and from account type, you can select the role of user as admin, use, guest.

User Type	Password	Description
admin	admin	System Administration: Can monitor, control and configure the system.
	(Default)	(Default)
user	***	Intended for end-user can monitor and control.
guest	***	Intended for end-user can monitor and control.

After selecting the account type enter "name" and "password" of new user and click apply button.

- Delete User: Permanently deletes the user from the system.
- **Select Sections:** Select the sections which then can be controlled by the new user.



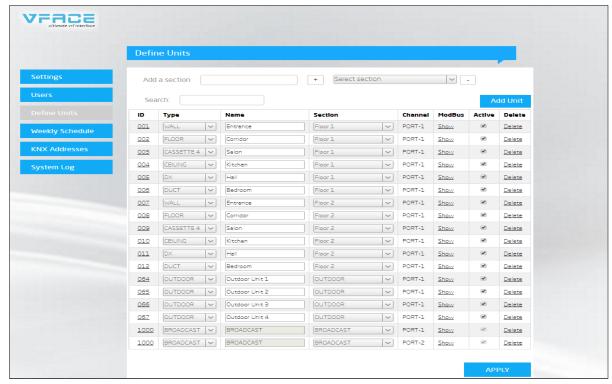
APPLY

• Apply: Save the configurations.



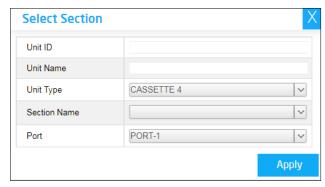


Define Units



View from browser: Define Units

- Add a section: Define name to new section and click 🗐. If you want to delete, select the section and click 🖃
- Search: Find the unit more easer by entering name of unit.
- Add Unit: Indoor unit can be added by entering its Unit ID and clicking apply button.



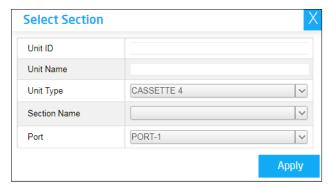
View from browser: Define Units/Add Unit

- Active: Makes visible on Indoor Monitoring page.
- Delete: Deletes the selected unit permanently.





• Unit Settings: By clicking ID of the indoor unit you'll be able to make configuration.



View from browser: Define Units/Add Unit

Unit ID: Set the unique ID of the unit.

Unit Name: Define name to the Unit.

Section Name: Select in which section you want to add following unit.

Port: Select to which Port unit is connected.

Unit Types: Select the type of Indoor Unit from table below.

CASSETTE	CEILING	FLOOR	WALL	DUCK	DX
		THE STATE OF THE S	- 10		

Modbus: Clicking the "Show" button provides list of Modbus addresses for integration with 3rd party products.

Modbus Address List			
Name	Slaveld	Туре	Address
CONNECTED	1	DISCRETE_INPUT	32
ON-OFF (FB)	1	DISCRETE_INPUT	33
ON-OFF	1	COIL	32
FAN	1	HOLDING_REGISTER	32
MOD	1	HOLDING_REGISTER	33
SWING	1	HOLDING_REGISTER	34
SET TEMP	1	HOLDING_REGISTER	35
ROOM TEMP	1	INPUT_REGISTERS	32
ERROR	1	INPUT_REGISTERS	33
FAN (FB)	1	INPUT_REGISTERS	34
MOD (FB)	1	INPUT_REGISTERS	35
SWING (FB)	1	INPUT_REGISTERS	36
SET TEMP (FB)	1	INPUT_REGISTERS	37
T2B	1	INPUT_REGISTERS	38
Protection	1	INPUT_REGISTERS	39
T2	1	INPUT_REGISTERS	40

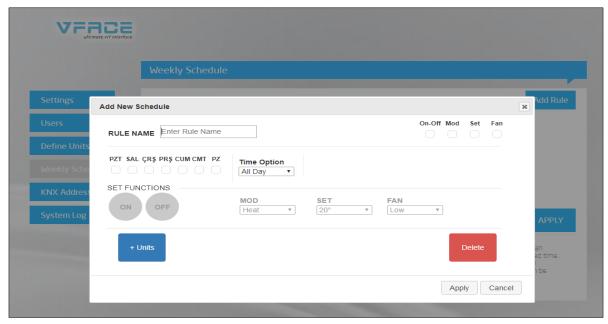
View from browser: Define Units/Show Modbus





Weekly Schedule

Following options will provide to control the units automatically by defining Rule, schedule and function lock.



View from browser: Weekly Schedule/Add Rule

- Rule name: Define name to the rule/schedule.
- Days: Select the week days which you want to run this rule/schedule.

• Set Functions: Select which type of function you want to activate and include to your schedule.

• Time Options: Set time when you want to run the rule/schedule.



Set Fan

On-Off Mod

Priority of "All Day" is higher than "Between" and "Single Time".



Mode: Define mode of AC.

Set: Set the temperature.

Fan Mode: Define the intensity of fan.



• Units: Add which units and sections you want to include in you rule.

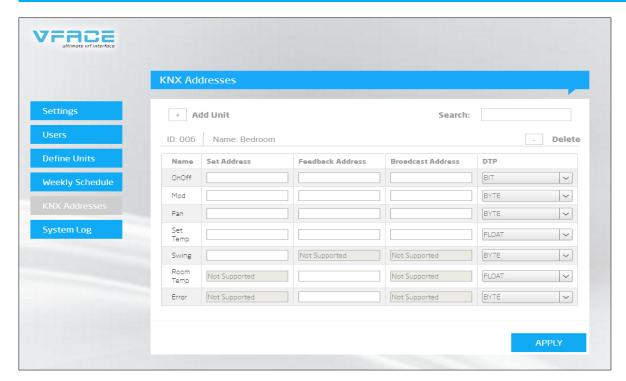


• Delete: Delete the Rule.





KNX Addresses



View from browser: KNX Addresses/Add Unit

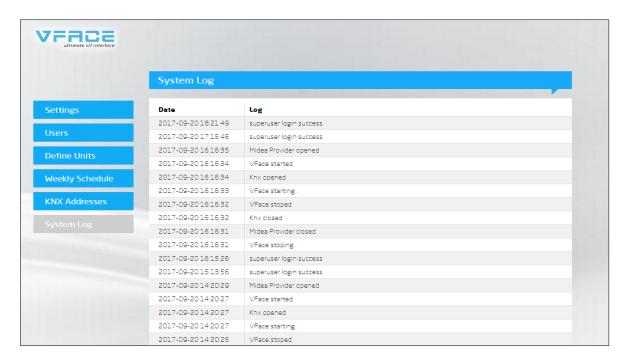
Before Adding KNX Addresses make sure that you have plugged KNX add-on module to port 2 and connection are properly accomplished.

According to the KNX Project, you need to enter Group Addresses to the table above. Each indoor unit will have such table need to be filled.





System Log



View from browser: Settings/System Log

This menu provides information about last Logs in the system and also displays the action which were made during session.





VFACE Touch Interface

VFACE Touch presents by itself 7" capacitive touchscreen, which changes conception of BMS Automation by simple monitoring and control from Touch panel.

With including all options which VFACE Basic had and more, brings comfort and secure to your site.

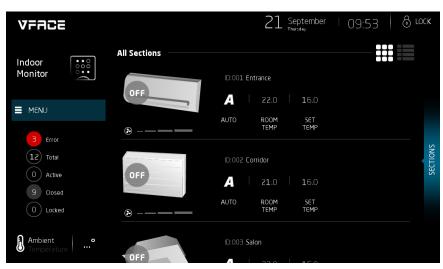
While power up the device you'll face with a Lock Screen.

Default password is 1234. Later password can be change from settings.



View from VFACE Touch: Lock Screen

After entering the password as a main page will bring you to the Indoor Monitoring page.



View from VFACE Touch: Main Page/Indoor Monitoring

Units List: Under the Menu there is a list of all units and condition of them.



View: From view option, you can select Icon or List.

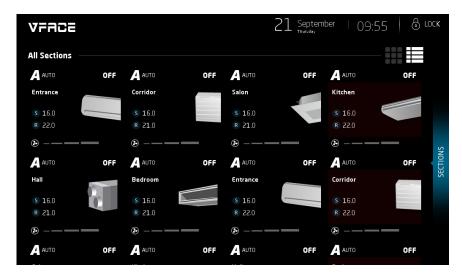
Lock: You can lock the screen any time you want.

Sections: By moving sections button to the left you can view indoor units section by section.





By selecting **Icon** from view you can see all indoor unit in a full screen



View from VFACE Touch: Main Page/Indoor Monitoring

You can click any indoor unit which you want to control.



View from VFACE Touch: Indoor Monitoring/Unit Configuration

On/Off: Enable or Disables the indoor unit.

Mode: Select the mode of indoor unit.

Fan Speed: Select the intensity of Fan speed.

Swing: Select the swing mode.

Set Temperature: You can set the temperature by clicking the (+) and (-) buttons.

Info bar: On the right-side diagnostic information of indoor unit is available.

Locked: If you apply All Day schedule the Locked button will be Enable.

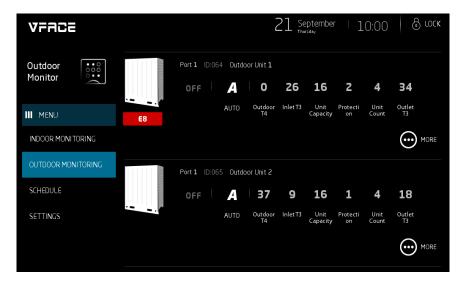
Schedule: Indicates if it's included to any Schedule and is that schedule active.





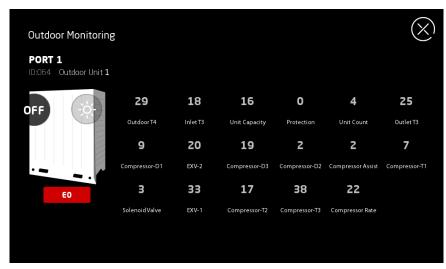
Outdoor Monitoring

This section provides diagnostic information about the Outdoor units of VRV/VRF systems. Following information is just for monitoring, it's not allowed to make any changes.



View from VFACE Touch: Outdoor Monitoring

For more information about Outdoor Unit press More button.



View from VFACE Touch: Outdoor Monitoring/More

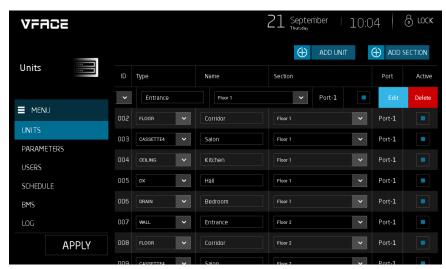




Settings

All the settings and configuration which were available in Web Interface also available in Settings of VFACE Touch.

Units



View from VFACE Touch: Settings/Units

Displays all indoor units which exist in a system.

Active: Makes visible on Indoor Monitoring page.

Port: Displays to which port is connected indoor unit.

Section: Select to which section you want to include indoor unit.

Name: Define name to the Unit.

ID: Unique ID of the unit.

Types: Select the type of Indoor Unit from list.

• For Editing or Deleting of unit scroll desired unit to the left.

Edit: Open a window of Unit Editing

Delete: Delete the selected unit permanently.



Add Unit: Indoor unit can be added manually by entering its Unit ID and clicking apply button.



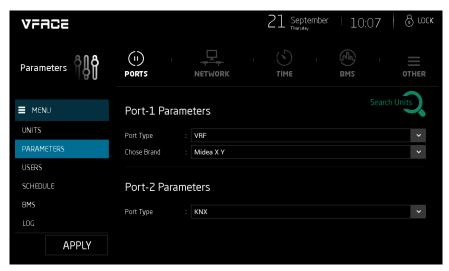
Add Section: Button brings you to the configuration of section, where you can Add/Edit/Delete the sections.





Parameters

PORTS



View from VFACE Touch: Settings/Parameters/Ports

Channel-1 Parameters

Channel Type: Select type of protocol (VRF / Modbus / KNX)

Choose Brand: Select brand of system from available list

Channel-2 Parameters

Channel Type: Select type of protocol (VRF / Modbus / KNX)

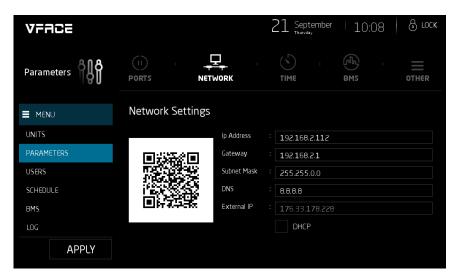
• If you select Modbus as a channel type you will have set Baudrate menu to set.



Search: While wiring connection with Outdoor unit and VFACE is accomplished you can proceed to search. By clicking search you will be able to discover all indoor units which are connected to your system.

According to brands searching time may last up to 2 minutes.

• NETWORK



View from VFACE Touch: Settings/Parameters/Network





Please set the Network configuration according to your network, don't miss any parts or leave it empty.

In a case that you set DHCP, device will take all network configuration from router and finding your device through scanning network will take a time. For that reason, Manual configuration of network is suggested.

IP Address: Set IP Address to device.

Gateway: Enter gateway address.

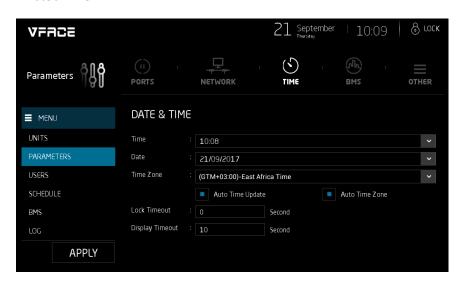
Subnet Mask: set subnet mask according to your network system.

DNS: Suggested default DNS server 8.8.8.8

External IP: Displays Static/External IP of the network.

QR Code: Download VFACE Mobile App to your mobile device and scan the QR Code for remote access.

• Date & Time



 $\label{thm:prop:prop:prop:prop:settings} \textit{View from VFACE Touch: Settings/Parameters/Time} \\$

Date and Time settings can be configurated in manual also you can be set Automatically.

Lock Timeout: Define the time interval before Locking the screen.

Display Timeout: Define the time interval before Display turns off.





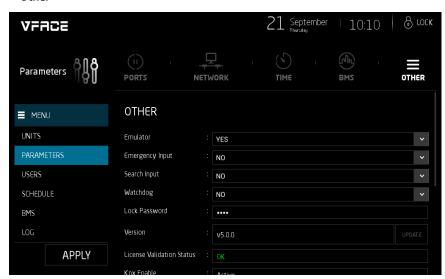
• BMS



View from VFACE Touch: Settings/Parameters/BMS

Port and slave address configuration for Modbus TCP connection. Default states of them you can see it on picture above.

• Other

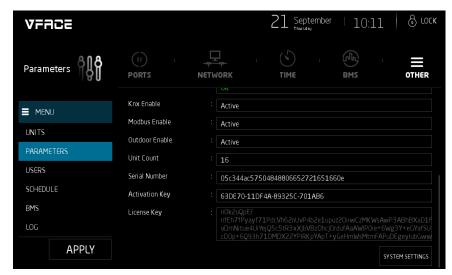


 ${\it View from VFACE Touch: Settings/Parameters/Other}$

Following settings are the same as in the Web interface. There only one deference is lock password.

Lock Password: Define the Lock screen password. Default password is 1234.





 $\label{thm:convergence} \mbox{View from VFACE Touch: Settings/Parameters/Other}$

This section is generated during manufacturing and in an accordance of customer order. By contacting your dealer, you can upgrade your licenses.

License Key: Unique License Key of the device.



System Settings: Brings to the operation system settings of touch panel.

Followings settings is for technical representative, don't make any changes it will cause failure in the entire device.

Users



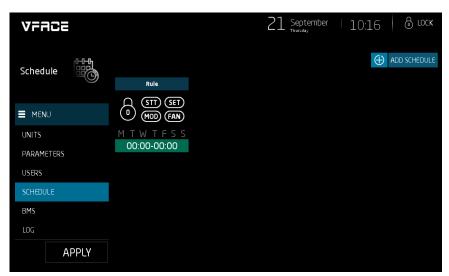
View from VFACE Touch: Settings/User

All type of users can be added and existed users can be Edited or Deleted through following section.



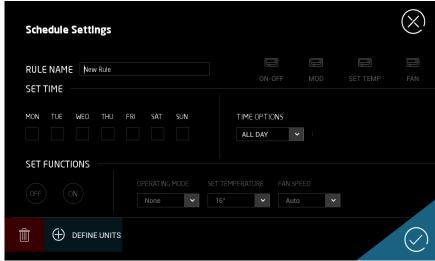


Schedule



View from VFACE Touch: Settings/Schedule

New schedule can be created by clicking add schedule and existed can be edited by clicking on it.



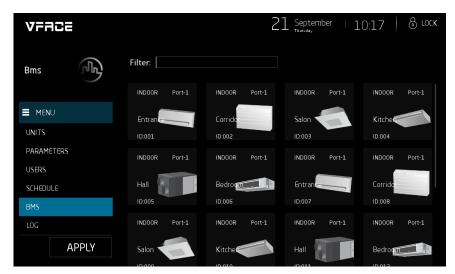
View from VFACE Touch: Settings/Schedule/Add Rule

Adding rule/schedule is similar to the Web Interface select actions, after define units which you want to control.



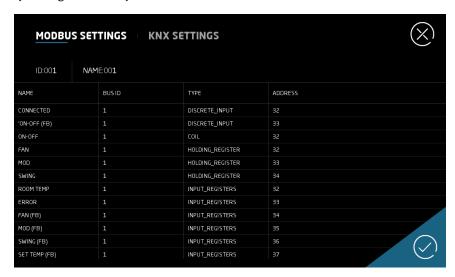


BMS



View from VFACE Touch: Settings/BMS

By clicking indoor unit you can reach the modbus and KNX table which needed to be filled for integration with other systems.

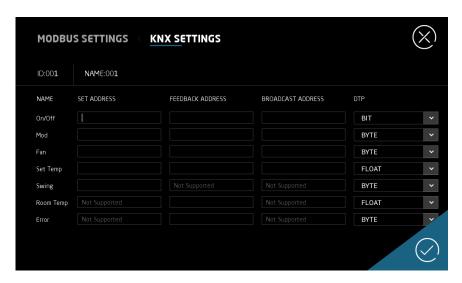


View from VFACE Touch: Settings/BMS/Modbus

Modbus addressing table per unit for integration with $3^{\rm rd}$ party devices.



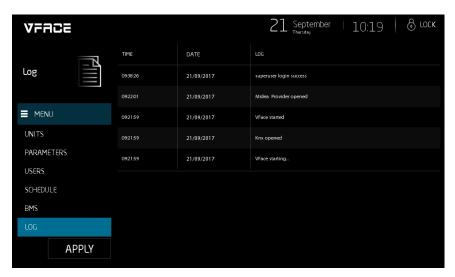




View from VFACE Touch: Settings/BMS/KNX

According to the KNX Project, you need to enter Group Addresses to the table above. Each indoor unit will have such table need to be filled.

LOG



View from VFACE Touch: Settings/Log

This menu provides information about last Logs in the system and also displays the action which were made during session.





VFACE Support List

	OUTDOOR	INDOOR
DAIKIN VRV	RXYQ-M/P (VRV II,VRV III) RXYQ (VRV-IV) RQYQ-P, RQCEQ (RQEQ), RYYQ-T (RYMQ), (VRV4) RQZQ-ABYN RXYK (VRV) RXYSQ-M/P (VRV Small) RXYSCQ RHXY RHXYQ RXY-M RWEYQ REYQ (REMQ), REYHQ REAQ RXYCQ-A RQQ RXYQ-T RXTQ	FJEKP FXCQ FXNQ FXLQ FXLQ FXFQ FXKQ FXZQ FXDQ FXDQ FXDVQ FXSQ FXAQ FXAQ FXHQ FXHQ FXHQ FQDP FQRP FQSP
HITACHI H link adapter (PSC-6RAD)	RAS-FSN RAS-FSXN RAS-FXNE	FZFP FZSP VKM FXDp FDYQN RCI RPC RPFI RCD RPK RPI RPF
MITSUBISHI ELECTRIC VRF	PUHY PURY PQHY PQRY PUMY	PKFY PFFY-PVKM PLFY-P-VCM PEFY-P-VMS1 PFFY-P-VLRM PCFY-P-VLMD PEFY-P-VLMD PEFY-P-VLEM PLFY-P-VBM PMFY-P-VBM PMFY-P-VBM PEFY-P-VMA PEFY-P-VMA PEFY-P-VMA-E PEFY-P-VMA-E PVFY-P
MITSUBUSHI ELECTRIC Split / Multi Split	PUHZ	PEAD SEZ-KD





PANASONIC	MFL	NWFL
	EFL	NDHP
	SPW_CO	NPFL
	SPW-C	NPFL
	SPW-CR	NDSLP
	SGP-EZ	NKFL
	SGP-EW	NFFL
	U-ME	NDLP
	J2	NK2FL
		NFMFL
		SPW-X
		SPW-XM
		SPW-ADR
		SPW-SR
		SPW-LDR
		SPW-FUR
		SPW-K
		SPW-FMR
		SPW-FTR
		SPW-FR
		SPW-KR
		SPW-UMR
		SPW-U
		S-MF
		S-MU
		S-MY
		S-ML
		S-MD
		S-MM
		S-MZ
		S-ME
		S-MT
		S-MK
		S-MP
		S-MR
SANYO	MFL	NWFL
SANTO	EFL	NDHP
	SPW_CO	NPFL
	SPW-C	NPFL
	SPW-CR	NDSLP
	SGP-EZ	NKFL
	SGP-EW	NFFL
	SGI -LVV	NDLP
		NK2FL
		NFMFL
		SPW-X
		SPW-XM
		SPW-ADR
		SPW-SR
		SPW-LDR
		SPW-FUR
		SPW-K
		SPW-FMR
		SPW-FTR
		SPW-FR
		SPW-KR





		SPW-UMR SPW-U
TOCHUDA	MCY-MAPHT	MMU-APH
TOSHIBA	MCY-MAPE	MMK-APE
	MMY-MAPT8	MML-APE
	MMY-MAPHT8	MMU-APYH
	MMY-MAPFT8	MMD-APSPH
	MINIT-MAL 10	MML-APH
		MMD-APHFE
		MMU-APMH
		MMD-APBH
		MMC-APH
		MML-APBH
		MMU-APWH
		MMD-APH
		MMK-APH
		MMF-APH
1.0	ARUB-LT	ARNU-GB1G
LG	ARU	ARNU-GCEA
	ARUN-LT	ARNU-GSEL
	ARUN-GS	ARNU-GSBL
	ARUN-LR	ARNU-GSER
	ARUN-BTE	ARNU-GSF
	ARUV-LT	ARNU-GTEC
	ARWB-BAS	ARNU-GTJC
	ARWN-BAS	ARNU-GB1G
	All Will BAS	ARNU-GBHA
		ARNU-GCFA
		ARNU-GCFU
		ARNU-GBGA
		ARNU-GTMC
		ARNU-GBRA
		ARNU-SCR
		ARNU-NJA
		ARNU-NKA
		ARN
		ARNBG
		ARNL
		ARNTP
		ARNTM
MITSUBISHI HEAVY	FDCA	FDTA
	FDC	FDUA
Super Link Interfaces (SC-		FDT
AND-E)		FDTCA
		FDQSA
		FDCT
		FDQS
		FDTQA
		FDKA
		FDTW
		FDK
		FDTSA
		FDEA
		FDTS
		FDE
		FDTWA





		FDFLA
		FDTQ
		FDFL
		FDUMA
		FDFUA
		FDU
		FDFU
SAMSUNG	AMo72FXVAFH/AA	AMoo9FN4DCH/AA
SAMSONG	AMog6FXVAFH/AA	AMo18FN4DCH/AA
	AM120FXVAFH/AA	AMo24FN4DCH/AA
	AM144FXVAFH/AA	AMo30FN4DCH/AA
	AM168FXVAFH/AA	AMo36FN4DCH/AA
	AM192FXVAFH/AA	AM048FN4DCH/AA
	AM216XVAFH/AA	AM009FNNDCH/AA
	AM240FXVAFH/AA	AM012FNNDCH/AA
	AM264FXVAFH/AA	AMo18FNNDCH/AA
	AM288FXVAFH/AA	AMozoFNNDCH/AA
	AM312FXVAFH/AA	AM007FN1DCH/AA
	AM336FXVAFH/AA	AM009FN1DCH/AA
	AM360FXVAFH/AA	AM0091 NIDCH/AA AM012FN1DCH/AA
	AM348FXVAFH/AA	AM036FNHDCH/AA
	AM408FXVAFH/AA	AM048FNHDCH/AA
	AM432FXVAFH/AA	AM076FNHDCH/AA
	AM072FXVAFR/AA	AM096FNHDCH/AA
	AM096FXVAFR/AA	AM018FNMDCH/AA
	AM120FXVAFR/AA	AM024FNMDCH/AA
	-	
	AM144FXVAFR/AA	AMO36FNMDCH/AA
	AM168FXVAFR/AA	AMO 48 EN MADOLI / A A
	AM192FXVAFR/AA	AMAGAFNMDCH/AA
	AM216XVAFR/AA	AMOO7FNLDCH/AA
	AM240FXVAFR/AA	AMOO9FNLDCH/AA
	AM264FXVAFR/AA	AM012FNLDCH/AA
	AM288FXVAFR/AA	AM024FNLDCH/AA
	AM312FXVAFR/AA	AMO30FNLDCH/AA
	AM336FXVAFR/AA	AMo36FNLDCH/AA
	AM360FXVAFR/AA	AM048FNLDCH/AA
	AM348FXVAFR/AA	AMoo7FNTDCH/AA
	AM408FXVAFR/AA	AM009FNTDCH/AA
	AM432FXVAFR/AA	AM012FNTDCH/AA
	AM072FXVAJH/AA	AMo18FNTDCH/AA
	AMo96FXVAJH/AA	AMo2oFNTDCH/AA
	AM120FXVAJH/AA	AMo24FNTDCH/AA
	AM144FXVAJH/AA	AMo18FNCDCH/AA
	AM168FXVAJH/AA	AMo24FNCDCH/AA
	AM192FXVAJH/AA	AM071FNMDEH
	AM216XVAJH/AA	AMo9oFNMDEH
	AM240FXVAJH/AA	AMo28FN1DEH
	AM264FXVAJH/AA	AMo71FN1DEH
	AM288FXVAJH/AA	AMo71FNCDEH
	AM312FXVAJH/AA	AMo15HNNDEH/EU
	AM336FXVAJH/AA	AMo15HNQDEH/EU
	AM360FXVAJH/AA	AMo22FNNDEH/EU
	AM348FXVAJH/AA	AMo28FNNDEH/EU
	AM408FXVAJH/AA	AMo17FNLDEH/EU
	AM432FXVAJH/AA	AM022FNLDEH/EU
	AM072FXVAJR/AA	AMo28FNLDEH/EU





AMo96FXVAJR/AA	AMo36FNLDEH/EU
AM120FXVAJR/AA	7 IIII O JOI INEE EI II E O
AM144FXVAJR/AA	
AM168FXVAJR/AA	
AM192FXVAJR/AA	
AM216XVAJR/AA	
AM240FXVAJR/AA	
AM264FXVAJR/AA	
AM288FXVAJR/AA	
AM312FXVAJR/AA	
AM336FXVAJR/AA	
AM360FXVAJR/AA AM360FXVAJR/AA	
AM348FXVAJR/AA	
AM408FXVAJR/AA	
AM432FXVAJR/AA AM036FXMDCH/AA	
AM048FXMDCH/AA	
AM040FXMDCH/AA AM053FXMDCH/AA	
AM080FXWANR/EU	
AM100FXWANR/EU	
AM120FXWANR/EU	
AM160FXWANR/EU	
AM180FXWANR/EU	
AM200FXWANR/EU	
AM220FXWANR/EU	
AM240FXWANR/EU	
AM260FXWANR/EU	
AM280FXWANR/EU	
AM300FXWANR/EU	
AM320FXWANR/EU	
AM340FXWANR/EU	
AM360FXWANR/EU	
AM380FXWANR/EU	
AM400FXWANR/EU	
AM420FXWANR/EU	
AM440FXWANR/EU	
AM480FXWANR/EU	
AM500FXWANR/EU	
AM520FXWANR/EU	
AM600FXWANR/EU	
AMo6oFXMDEH/EU	
AMo8oFXVAGH/EU	
AM240FXVAGR/EU	
AM140FXVAGR/EU	
AM180FXVAGR/EU	
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