VIVAX METROTECH

vCamModular User Handbook

Version 3.0 (English)

Table of Content

General Safety Instructions

Before using for the first time, please read the following carefully:

1. In general, the vCamModular can be used in either indoor or outdoor. (Do not operate with a mains input in wet or where there is risk of rain.)
2. To ensure safety and reliable operation – DO NOT subject this unit to extreme temperatures, shock or impact.
3. Avoid getting moisture/water inside the enclosure.
4. To avoid the risk of electric shock, do not open the sealed enclosure.
5. Nickel metal hydride (Ni-MH) rechargeable batteries pack
   a) Do not remove or attempt to access the rechargeable batteries.
   b) Use only specified charger for the rechargeable batteries. Use of an incorrect charger could result in damage to the vCamModular control module or excessive over-heating.
   c) Do not damage, crush or puncture batteries or subject to extreme heat or fire.
   d) Dispose of these batteries in accordance with your company procedure.
6. Storage temperature: -20℃ to +70℃ (-4℉ to 158℉).
7. Operating temperature: -10℃ to +50℃ (14℉ to 122℉).
8. The vCamModular cameras and termination kit are submergible to 0.6 Bar.
9. The vCamModular system complies with IP54 standard for water resistance.
10. Control module water resistance (lid closed) also comply to IEC 60529 (Light shower) and shock resistant (lid closed) comply with IEC 60069-2-31.

Service and Support

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Introduction

3.1 System Features

The vCamModular system provides video images from inside pipes, ducts, chimneys and other similar structures. The vCamModular-V is used to view the images from the camera; the vCamModular-R includes an internal digital recording/playback device and software for recording the images seen, adding data, text and audio. With this exception, the systems and the way they are used are the same. This handbook serves as user instructions for both.

Control Module

The control module houses the electronics and controls to operate the system and a LCD display for viewing. Also included in the control module are rechargeable batteries to power the system. The vCamModular can also be powered by an external 12V DC 3A source or by mains power.

The vCamModular-R includes a digital recorder for recording and playing back the video images and software that enables titles/date/time/distance and an audio commentary to be added to the images recorded.

Both vCamModular-V and vCamModular-R include a video out function enabling video to be recorded by an external recording device (VCR or video camera).

Cable Reel

The cable reel is used to store and deploy the pushrod reinforced cable. There are three sizes of cable reel – the standard reel (Type-C) is a cart type assembly in stainless steel, and holds up to 200ft/60m of cable, the mini reel (Type-M) is also manufactured in stainless steel and holds up to 100ft/30m of cable. The largest reel (Type-P) is of painted (powder coat) construction and is used for 400ft/120m lengths of pushrod cable.

This Epoxy/Kevlar reinforced pushrod cable enables the user to push the camera to considerable distances along a pipe, but retains sufficient flexibility to pass through tight bends and “P” traps. The cable comes in two diameters: 10mm – generally used for small diameter pipes (up to 4inch/100mm) and shorter distances (up to 100ft/30m); and 12mm – used for larger pipes and longer distances. Sensors to indicate how much pushrod cable is deployed are housed in the reel and the length deployed is displayed on the control module front panel and the display.

A spring “termination” assembly is used to mount the camera to the pushrod cable, and provides additional flexibility to push the camera around bends and through “P” traps. The “termination” assembly also includes a transmitting Sonde to enable it to be located from the surface using a pipe and cable locator with 512Hz, 640Hz or 33 kHz modes (some limitations with 33 kHz). The Sonde is positioned approximately 16inches/400mm behind the head of the camera.

Camera Module

All cameras are of stainless steel construction and house a color CCD camera module. There are four types of camera – standard and self leveling versions for each of the two (pushrod) cable sizes. Incorporated in the camera assembly are ultra bright LEDs to provide illumination. The number of LED varies depending on the diameter of the camera.

3.2 System Components

The systems include the following:

The vCamModular-V

- Control module including internal rechargeable batteries and power supply/charger
- Cable reel including pushrod cable, Sonde and camera
- Replaceable slide in modules
- Mains power cable
- Interconnect cable (for connecting cable reel to control module)
- Vivax-Metrotech User Handbook

The vCamModular-R

- All of the components of the vCamModular-V, plus
- Internal digital recorder and playback unit
- SD card (recording and transferring files to USB memory stick)
- Replaceable slide in modules
- Keyboard and titler system
- A CD containing the plug-in is required to view the video file or you can download it from the website: www.vivax-metrotech.com, under “Support >> Download library >> Other Download”.

3.3 Important Notes

- It is recommended that the unit is not left on charge for excessive periods of time. This will not damage the unit, but may shorten the batteries life. Recommended charging time is 4-6 hours. The charger should not be turned off/on again during the charging cycle – this could result in over charging and damage to the unit/batteries or reduction of the battery life.
- Power supply/battery charger is internal and operates on 100-240V AC, 1A, 50Hz/60Hz power systems. 100-240V AC 1A power source must be grounded (earthed).
- External 12V DC 3A power source will operate the unit (please note – it does not charge the internal batteries).
- Turn Off the auxiliary functions when not in use, this can extend the vCamModular's using time (on a single charge of batteries). The auxiliary functions include Sonde, microphone and camera lights. Using the unit in "CAMERA" mode (instead of digital recording mode) also uses less power.
- The Sonde in some circumstances can cause interference on the video being viewed/recorded. It is recommended that the Sonde is turned off unless it is actually being used for location. This also saves power.
- The USB memory stick slot on the front panel can be used for programming the digital player/recorder. It is also used for saving video files. It is possible to copy files from the hard drive to a USB memory stick.
- To upgrade software – turn off the vCamModular, then insert the memory stick with the upgrade software into the slot. Turn on the vCamModular, and wait until the main menu appears, then follow instructions. More detailed information is available further in the manual.
- Any computer with USB/SD card ports running Windows, Windows XP, Vista or 7 operating system can be used to import and play video files from the vCamModular.
- The vCamModular-R has two internal clock batteries. The first is for main vCamModular operating system, the second is for the digital recorder device clock. The vCamModular-V has only one internal clock battery. These batteries are similar to those used in a computer – they have a life expectancy of 3 to 5 years.

3.4 Model and Serial Numbers

For quality control and support purposes, each of the main modules of the vCamModular has its own model and serial number.

Control Module housing – the model and serial number label is on the base of the housing
Reel Assembly – the model and serial number label is on the reel frame
Camera – the model and serial number is etched on the body of the camera
Modules – The model and serial number is on the circuit board.

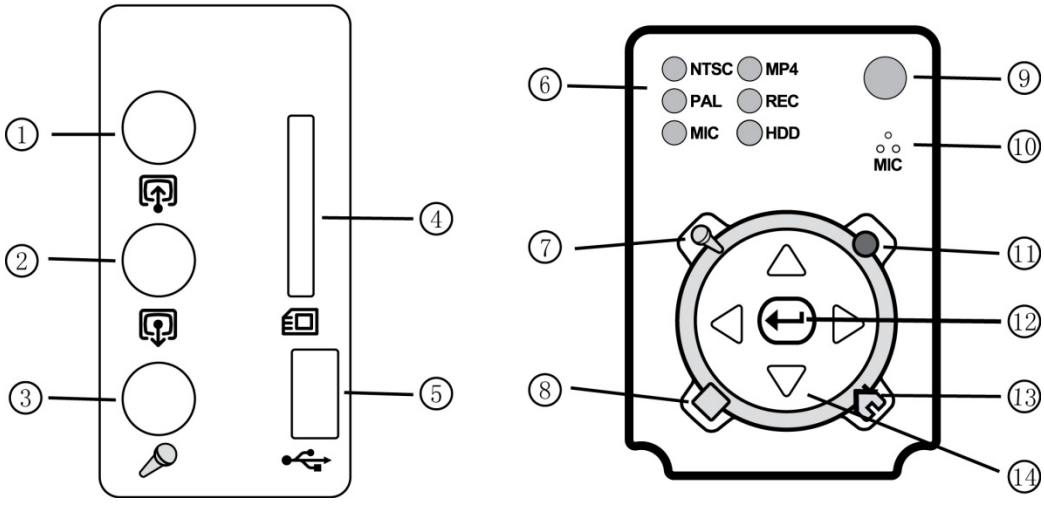
NOTE
Always quote the appropriate model and serial number(s) in all communication with the factory, or authorized service centers.

3.5 vCamModular-R Command Module, Display, Keyboard & Digital Recorder – Controls

The command module contains all of the controls for the operation of vCamModular system. The controls and connector panel are shown as below.

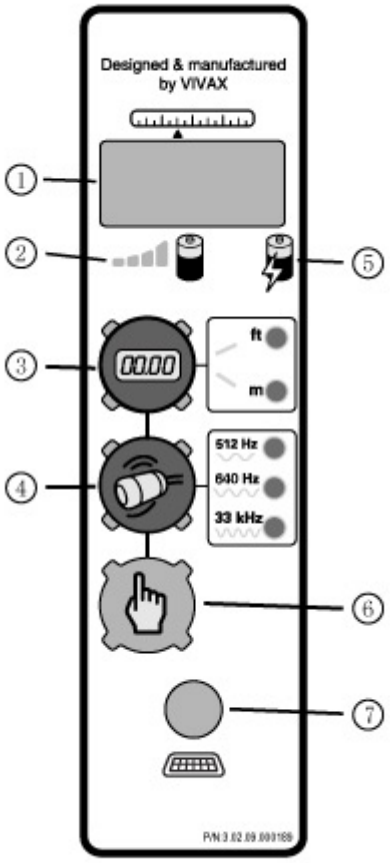
3.5.1 Command Module, Display, Keyboard & Digital Recorder Controls

HDD Module (Digital Recorder and hard drive)



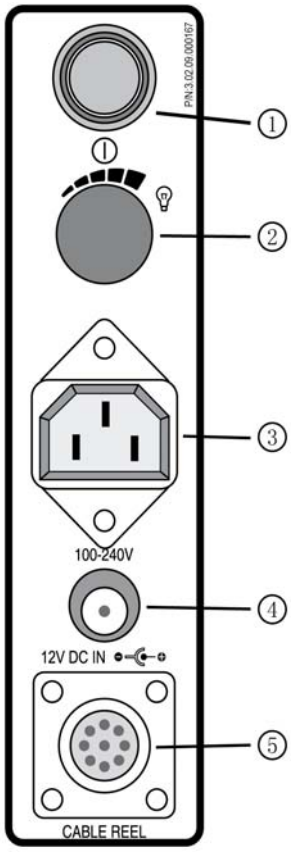
1	Video Input (AV)	8	Back Pushbutton
2	Video Output (AV)	9	Infrared Receiver (for Digital Recorder)
3	External Microphone Socket	10	Internal Microphone
4	SD Slot	11	Record Pushbutton
5	USB Data Port	12	Enter Pushbutton
6	Indicators	13	Main Menu Pushbutton
7	Microphone On/Off Pushbutton	14	Direction Arrows Pushbuttons

Counter Module (Distance Meter, Sonde and Battery Status)



1	Counter Display
2	Battery Status Indicator
3	Counter Reset Pushbutton
4	Sonde Pushbutton
5	Battery Charging Indicator
6	Fn (function key) Pushbutton
7	Keyboard Socket

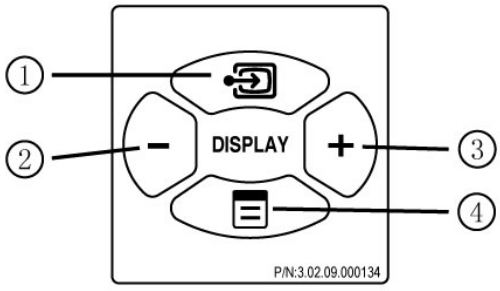
Power Module (Power Supply)



1	System Mains Power On/Off Switch
2	Dimmer Control Knob (for LED camera lights)
3	Mains Power (IN) Socket
4	12V DC Socket (for external 12V DC source – car)
5	Interconnect Cable Socket

3.5.2 LCD Controls

The LCD has its own controls. These are in the form of a pushbutton keypad located in the recessed area close to the display. They function as follows:



1	Toggle MPEG and Camera View
2	Decrease
3	Increase
4	LCD Menu

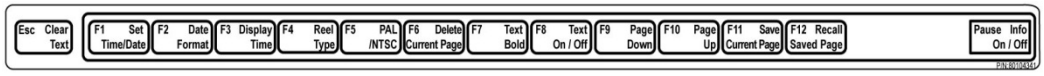
3.5.3 Items can be selected or set from the front panel

- Power on, power off
- Video System – The vCamModular is designed to be used with PAL or NTSC systems – The video/audio components in the vCamModular adjust the video format automatically to suit the camera fitted. PAL and NTSC can also be set manually, by pressing F5 on the keyboard or by holding down the “Hand” button and pressing the “Microphone” button.
- Counter mechanism. The counter is used to display the length of pushrod cable deployed. The counter can be reset to ZERO by pressing the “RESET COUNTER” key on the front panel (counter will count up or down, but will not display negative numbers) and the counter display can be toggled to either “feet” or “meters” by holding down the “Hand” button, then pressing “RESET COUNTER” on the front panel.
- Dimmer/off control for camera lights (ultra bright LEDs). This is used to dim or brighten the camera lights, or turn them off to save power when the camera is not in the pipe.
- LEDs on the middle panel confirm the settings of feet/meters and frequency (512Hz, 640Hz, 33 kHz).
- LEDs on the first panel confirm settings of NTSC/PAL, Digital Recorder active, Record active, HDD activity and Microphone on.

3.6 Keyboard Function Keys

The main software setup functions can be controlled by using the function keys on the keyboard. The keyboard can also be used as an alternative way to set some functions controlled by keypad buttons on the front panel.

Keyboard Function Key



Keys	Function	Description
ESC	Clear Text	Clear all text on the screen
F1	Set Time / Date	Date and time setting
F2	Date Format	Toggle date format (MM/DD/YYYY, DD/MM/YYYY, YYYY/MM/DD)
F3	Display Time	Clear / Restore date and time from display
F4	Reel Type	Selects reel type (Type-C, Type-P, Type-M) to ensure counter accuracy
F5	PAL / NTSC	Toggle between NTSC and PAL video systems
F6	Delete Current Page	Delete current page text and memory
F7	Text Bold	Add bold or background to text (makes it easier to read)
F8	Text On / Off	Toggle titler content On / Off
F9	Page Down	Page Down
F10	Page Up	Page Up
F11	Save Current Page	Save current page (page by page)
F12	Recall Saved Page	Recall back saved page
Pause	Info On/Off	Information On/Off (battery indicator, distance, reel type, date & time)

3.7 Cable Reel Components

The cable reel features are shown below:

1	Handle locking levers
2	Cable & reel
3	Camera
4	Adjustable handle (Height)
5	Shock absorbed system
6	Brake

3.8 Interconnect Cable

This cable is to connect the command module with cable reel. The 90 degrees plug fits to the cable reel (and is normally left connected). The straight plug fits the socket on the control module, and is locked in place by the knurled locking collar. Pull on collar when connecting and removing the plug from the socket.

3.9 WARNING – The Reel

WARNING

If the brake is released completely the pushrod cable will try and unwind itself. It can move very quickly.

WARNING

The brake should always be partially applied to slow down cable deployment. Care should be taken when stopping the cable deploying to avoid injury.

Using the vCamModular

4.1 Setup

4.1.1 Setting up the vCamModular system

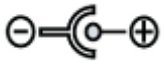
The control module can be placed on the ground and the handle can be rotated (by pulling out both of the contoured knobs, and moving the handle) to set a comfortable viewing angle. Alternately the control module can be mounted to the reel (Type-C) using the two brackets on the handle (optional) (ALWAYS position the handle downwards in parallel with the front panel when putting the control module on top of the reel – this allows the lid/keyboard to rest on the handle for easy use).

Open the lid of the system – this can be removed or left attached to the command module. (There is a storage space inside the lid under the keyboard)

Keyboard – plug the keyboard into the command module (the keyboard can also be removed from the lid, by sliding the release and lifting the metal plate on which it is mounted).

Interconnect cable – ensure that the interface cable plug is correctly connected at the reel, and connect the other end to the appropriate socket on the front panel. Ensure that the plug is aligned correctly before pushing into place – locate the plug into the socket using the index slot provided – pull the knurled ring to release the lock when plugging in or unplugging.

Power input – plug the main cable into the front panel of control module and the other end into an available (grounded) power source (100-240V AC). Alternately plug in a 12V DC power source capable of supplying at least 3A on a continuous basis. The center pin of the 12V DC “power in” socket is “+” and the outer ring is “-”. The 12V DC power input does NOT charge the internal batteries – it only serves to run the unit from a 12V DC external source.



Charging - Connect the mains cable as described above. The charging light near the mains plug will flash twice and then remain Red. It will stay red until charged, when the light will change to an amber color. Charging time for a completely discharged battery set will be approximately 4hrs.

Microphone (vCamModular-R only) – if an external microphone (optional) is being used, plug it in. However if no external microphone is connected, the internal microphone will be used. The microphone system has an on/off control – turn the microphone on only when required to avoid recording general “worksite” conversations. The microphone will only be active when the microphone switched on, and the microphone activated light is illuminated. If using the internal microphone – please get within 3 – 4 inches of the internal microphone when speaking. Always speak clearly and slowly. The audio will be recorded at the same time as the video (provided the microphone is switched on).

WARNING

NEVER FORCE ANY OF THE PLUGS – always ensure that each of the connections is connected before powering up the system.

It is a good idea to familiarize yourself with the Control module, user interface controls, plugs and sockets.

4.1.2 After setting up

a) Switch ON. Press to switch between “CAMERA” and “MPEG” mode.

b) Check that the display is set to “MPEG” mode.

c) To set the vCamModular system clock on the screen, press F1 on the keyboard.

d) To setup the clock on digital recorder (vCamModular-R only), press to go to Main Menu, select “Setting” by pressing . Use to select “Time” and press to set the clock on digital recorder.

e) Check the LED on the front panel to ensure that the settings you required for VIDEO, SYSTEM, SONDE FREQUENCY, SONDE ON/OFF and MICROPHONE ON/OFF are correct.

f) Then press to reset counter.

g) Partially release the brake on the vCamModular reel allowing the cable to be pulled off the cable reel. If the cable starts to come off the reel without pulling, tighten the brake slightly.

h) Push the camera a short distance inside the pipe and then use the dimmer control on the control module to adjust the lights to an appropriate brightness.

This is all it takes – it is extremely simple.

4.2 Titler

This feature is provided on the vCamModular-R. The “Titler” system enables the user to add information to the video images being recorded. Basic system information such as date, time, and length of pushrod cable deployed can be captured, and additional text – up to 10 pages of 8 lines with 24 characters per line can be added.

The titler is toggled on/off by pressing the “F8” key on the keyboard. The content of the titler can be erased by pressing “ESC” at any time the titler is on.

Text is entered using the keyboard. The “F7” key can be used to toggle on/off a feature that makes the text easier to read against the background.

WARNING

If the titler information can be seen on the vCamModular display, it will be recorded on the recorder. If it is not visible, it will NOT be recorded.

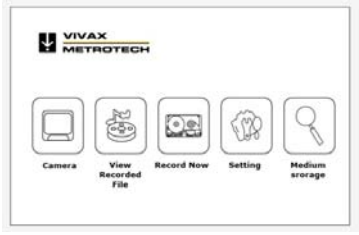
4.3 Recording and Playback – vCamModular-R

4.3.1 Recording video

It is possible to save video files either directly to the internal hard drive or alternatively, to an SD card.

If no SD card is inserted, the files will be saved to the internal hard drive. If an SD card is inserted, the files will be saved directly to the SD card. To ensure SD card recognition, insert the SD card BEFORE switching on.

In “MPEG” mode, activate the Digital Recorder/Player by pressing ⌂ until Main Menu appears on display.



To Record – from Main Menu:

1. Use ◁ ▷ to select “Record Now”.
2. Press ↵ (● will show on display).
3. Press ↵ to pause (❚❚ will show on display).
4. Press □ to stop and return to Main Menu.
5. The recorded file will be saved with a date time reference.
6. If no SD card is inserted, the files will be saved to the internal hard drive. If an SD card is inserted, the files will be saved directly to the SD card. To ensure SD card recognition, insert the SD card BEFORE switching on.

TIPS

It is possible to start a recording without entering the Main Menu. Press ● to record directly

4.3.2 Playback

To Play – from Main Menu:

1. Use ◁ ▷ to select “View Recorded Files”.
2. Press ↵ to display “Medium Storage”.
3. Use ▽△ to select “HDD”, press ↵ to display file format (“dav” for video and “jpg for snapshot”).
4. Use ▽△ to select “dav”, press ↵ to display folders by dates.
5. Use ▽△ to select date, press ↵ to select folder.
6. Use ▽△ to select file, press ↵ to play video file.
7. Press ⌂ to pause, press again to restart, □ to stop.
8. Press □ to return to Main Menu.

4.3.3 Snapshot

The number of continuous snapshots you want to take can be set before you start:

- Select “Setting” from Main Menu, press ↵.
- Use ▽△ to select “Record”, press ◁ ▷ to select “Snapshot”, then press ↵.
- Use ▽△ to select “Snap count”, press ◁ ▷ to set number of snapshots you want to take at one time (you can choose between 1 to 3 shots per time), then press ↵.

To Take Snapshot:

1. Use ◁ ▷ to select “Camera” from Main Menu, press ↵ to select “Camera”.
2. Press ↵ to take snapshots when viewing/recording from the camera.

To Take Snapshot – during playback:

1. Select “View recorded file” from the Main Menu, press ↵.
2. Use ▽△ to select “dav”, press ↵.
3. Use ▽△ to select folder, then press ▽△ to select file, press ↵ to play the file.
4. Press ↵ to take snapshot(s).

4.4 Copying Video

Transferring files to the memory stick or SD card:

1. With the power off, connect USB memory stick or the SD card to the Data port.
2. Power ON. Press ⏻ till the “MPEG” mode appears on display.
3. Press ⌂ to go to Main Menu.
4. From the Main Menu, use ◁ ▷ to select “Medium Storage”, then press ↵.
5. Press ▽△ to select “USB”.
6. Press to ◁ ▷ to select “USB Backup”, press ↵.
7. Transfer files:
   - To transfer **video** files: Press ◁ ▷ to select between “HDD->DAV” and “SD->DAV”, then press ↵.
   - To transfer **photo** files: Press ◁ ▷ to select between “HDD->JPG” and “SD->JPG”, then press ↵.
8. Press ▽△ to select a folder, press ↵.
9. Press ▽△ to select files, press ↵ to select / deselect files to backup. (Press ⌂ to select/deselect all files)
10. Press ▷ to select “Start”, press ↵ to start backup.

NOTE

Files are saved as .DAV files. Computers will most likely have drivers that enable the playing of .DAV files. If the files do not play, visit www.vivax-metrotech.com. Look in the “Support” tab and select a suitable driver for your machine.

4.5 Locating the Camera

The Counter provides a guide to the length of cable deployed, which helps to establish the approximate position of the camera. This length of cable (selectable feet or meters) is displayed on the command module counter. The counter can be set to “Zero” at any time by pressing the distance reset button next to the meter readout on the front panel. The counter will count forward and reverse, but will **NOT** display values that are negative (i.e. less than Zero).

Pipe & Cable Locator – the vCamModular is equipped with a Sonde transmitter to enable the exact position of the camera assembly to be located from the surface. This Sonde is located at the end of the camera spring assembly (about 16 inches/400mm) behind the camera. A pipe and cable locator is used to locate the position and depth of the camera.

This Sonde is activated by pressing the appropriate button on the front panel. It is recommended to keep the Sonde turned off when not in use, as in some circumstances it can cause interference on the video images being displayed. It also consumes power, which is relevant if running the system on the internal batteries.

Vivax-Metrotech manufactures the vLocCam locator specifically for using with the vCamModular. The vLocCam can locate the frequencies (512Hz, 640Hz, and 33 kHz) that the vCamModular transmits. It also has a “Power” mode for locating metallic pipes and cables that may be adjacent to the target pipe.

IMPORTANT
Always “Call Before You Dig” and follow your own company’s safety practices.
Always follow local, state and national regulations.

The vLocCam has been designed to use with the vCamModular systems. It can also be used with CCTV inspection camera systems supplied by other manufacturers using 512Hz/640Hz transmitting frequencies (as many do). In addition, the vLocCam also has 33 kHz and “Power” mode.

Camera Head Assembly and Disassembly

5.1 Required Tools and Spare Parts

Picture	Name	Part Number	Description	Comments
	Camera Head Removal Tool	3.02.01.000209	D/V - Camera removal tool	Enclosed in the equipment of the control unit
	Camera Test Cable	2.104.02.00043	D/V - Camera test lead	Enclosed in the equipment of the control unit
	Camera Head	1.104.06.00004	D/V - D46/SL (PAL) x 12mm cable (male plug, red standard skid)	For 12mm pushrod cable
		1.104.14.00001	D/V - D33/SL (PAL) x 12mm cable (male plug, black standard skid)	
		1.104.11.00002	D/V - D33/SL (PAL) x 10mm cable (male plug, green standard skid)	For 10mm pushrod cable
		1.104.10.00002	D/V - D33/STD (PAL) x 10mm cable (male plug, silver standerd skid)	
		1.104.19.00001	D/V – D25/STD (PAL)x 10mm cable (male plug, silver standard skid)	
	O-ring Retermination Kit	3.02.05.000007	O-ring 17*1.5mm	Required 2x
		3.02.05.000017	O-ring 15*1.5mm	

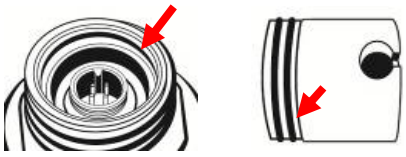
	Replaceable Curly Lead	2.104.24.00001	D/V - Curly cord assembly for standard termination kit (12mm cable)-detachable	
		2.104.24.00002	D/V - Curly cord assembly for short termination kit(7 inch) -12mm cable-detachable	
		2.104.25.00001	D/V - Curly cord assembly for standard termination kit (10mm cable)-detachable	
		2.104.25.00002	D/V - Curly cord assembly for short termination kit(7 inch) -10mm cable-detachable	

5.2 Checking the Camera Head

Before mounting the camera head,the following points should to be checked:

a) O-ring seals– Check for wear, damage and deformation. Replace if in any doubt.

- Fit on the O-rings.
- O-rings must be clean and a little silicon grease applied.

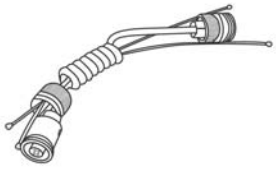


b) Front glass

- Check for chips and cracks. Replace if damaged. The glass is an integral part of the water sealing.

c) Wire ropes

- Check the wire land yards for wear and tear. Ensure the wire land yards do not interfere with the coiled connection cable.



d) Function check of picture and camera head LEDs

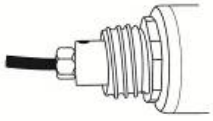
- With the help of the test cable, check the function of the camera and the LEDs before the head is installed.

5.3 Assembly of the Camera Head

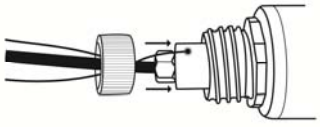
a) When connecting the camera head, pay attention that the camera head has a locating groove which the connector MUST align with. Failure to align correctly will result in damage to the camera and connector.


b) Feed the coiled cable, wire land yards thorough the spring and screw the spring onto the end of the rod. Only hand tighten.

c) Carefully connect the coiled lead to the camera taking note of a) above.



d) Attach the wire ropes in the eyelets and screw together using the screw collar.

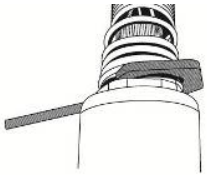


e) To prevent twisting around the wire land yards, turn the camera head about 5 full rotations anti-clockwise before screwing the spring to the camera. Only hand tighten.


5.4 Disassembly of the Camera Head

a) To dismantle the camera head, use only camera removal tool provided.

b) To dismantle the camera head, attach the removal tool as shown in picture below and turn the camera head anti-clockwise.



c) After the head is unscrewed completely from the collar, unscrew the securing collar on the camera connector.

NOTE

Clean and grease the O–rings of the camera head regularly to ensure the seal remains water tight. Worn or defective O–rings must be replaced immediately.

Module Removal/Replacement

The vCamModular system has been designed for quick and simple repair and maintenance. To facilitate this, the three main functions of the control box have been assembled into three removable modules. The functions of the modules are described in section 3.5.

If a module has been identified as faulty:

- Switch off the control module and remove any mains connectors.
- Unscrew the four Allen key screws located in the corners of the modules front panel.

- Use the small handle at the top of the module to carefully slide out the module.

- Apply the above in reverse to insert the replacement module.

Health and Safety

This equipment is primarily used for inspecting sewer pipes, by professionals operating in the sewer industry, and maintained by professionals familiar with the health risks on maintaining equipment that has been in a sewer.

Such professionals will be protected by their own company's recommendations and work practices. If for any reason they are not, or are not familiar with such practices, please email gavin.wong@vxmt.com.cn for a copy of the Health and Safety Document used by Vivax-Metrotech for employees involved in the demonstration, maintenance and handling of sewer camera systems.

Disclaimer: All product availability or product accessory information is subject to change without prior notice.

Notes:

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