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For additional information, contact:

Digital Watchdog®

16220 Bloomfield Avenue,

Cerritos, California 90703 USA

Phone: +1 888 446-3593

Web: www.digital-watchdog.com

E-mail: [dw-tech@digital-watchdog.com](mailto:dw-tech@digital-watchdog.com)

**VMAX® IP G4™ PLUG-N-PLAY PoE+ NETWORK VIDEO RECORDER**

**DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

**28 20 00 Video Surveillance**

**28 23 00 Video Management System**

**28 23 29 Video Surveillance Remote Devices and Sensors**

**Notes to Specifier:**

1. Where several alternative parameters or specifications exist, or where, the specifier has the option of inserting text, such choices are presented in **<bold text>.**
2. Explanatory notes and comments are presented in **colored** text.
3. Include related sections as appropriate if embedded digital video recorder system is integrated to other systems
4. CSI MasterFormat 2016 incorporates numerous significant changes affecting electronic safety and security. This document is written to provide flexibility in using either format, although the adoption of MasterFormat 2016 is encouraged. The following is a guide to the MasterFormat numbers relevant to the product referenced in this specification.
5. MasterFormat 2014 Specification Category:

**VMAX IP G4 PLUG-N-PLAY PoE+ NETWORK VIDEO RECORDER**

1. **GENERAL**
   1. **SECTION INCLUDES**
      1. Product – An H.265, H.264 Network Video Recorder with PoE+ Ethernet connectivity system for video surveillance, including design, supply, installation, and commissioning.
      2. Related Requirements
         1. Section 26 05 00: Common Work Results for Electrical, for interface and coordination with building electrical systems and distribution.
         2. Section 28 05 13: Conductors and Cables for Electronic Safety and Security, for cabling between system servers, panels, and remote devices.
         3. Section 28 05 28: Pathways for Electronic Safety and Security, for conduit and raceway requirements.
         4. Section 28 23 13: Video Surveillance Control and Management Systems.
         5. Section 28 23 16: Video Surveillance Monitoring and Supervisory Interfaces.
         6. Section 28 23 23: Video Surveillance Systems Infrastructure.
         7. Section 28 23 29: Video Surveillance Remote Devices and Sensors.
   2. **REFERENCES**
      1. Reference Standards: Provide systems that meet or exceed the requirements of the following publications and organizations as applicable to the work of this Section.
         1. Conformity for Europe (CE).
         2. Electronic Industry Association (EIA).
         3. Federal Communications Commission (FCC).
         4. Restriction of the Use of Certain Hazardous Substances (RoHS).
         5. Underwriters Laboratories Inc. (UL)
   3. **SYSTEM DESCRIPTION**
      1. The Network Video Recorder with Ethernet connectivity shall require minimal training for the end-user. The unit shall be operated as a conventional multiplexer and VCR with local display monitors for live and playback viewing while the system continues to record new images for 1-9 IP cameras, up to 4K in resolution. It shall be an integrated security system, capable of time-division multiplexing and real-time recording multiple cameras, storing their digitized and compressed images on local hard drives for fast search and retrieval either locally at the unit, or from a remote workstation using a Graphical User Interface (GUI).
      2. Also, the network video recorder shall have local ethernet input to power and control up to 4 IP cameras. The PoE ports shall power the cameras and offer direct camera network management from the system.
      3. The system shall provide automated alarm handling. Upon receipt of an alarm, the system shall be able to automatically change display and record speed, provide relay output operation, PTZ control, and send an email alert. During investigations, it shall be possible to search and retrieve stored video data by date, time, camera, and alarm.
      4. The network video recording system shall use H.265 and H.264 compression, include from 2 TB to 32 TB of hard disk drive internal storage. It shall have simultaneous TRUE HD/VGA outputs, with two USB ports and an internal 10/100/1000 Gbps network adapter as standard equipment.
   4. **SUBMITTALS**
      1. General: Submittals shall be made following the Conditions of the Contract and Submittal Procedure Section.
      2. Manufacturer’s Product Data: Submit manufacturer’s data sheets indicating systems and components proposed for use, including instruction manuals.
      3. Shop Drawings: Submit installation drawings, including connection diagrams for interfacing equipment, a list of connected equipment, and locations for major equipment components. Shop drawings shall indicate surrounding construction as provided for the Project.
      4. Project Record Drawings: Indicate the location of equipment and wiring on project record drawings. Submit an electronic version of the project record drawings not later than Substantial Completion of the Project.
      5. Operation and Maintenance Data: Submit manufacturer’s operation and maintenance data customized to the system installed. Include operator manuals.
   5. **QUALITY ASSURANCE**
      1. Qualifications: Manufacturers shall have a minimum of 10 years of full-time experience in manufacturing and maintaining digital video recorder systems. The manufacturer shall provide toll-free technical assistance and support available Monday thru Friday, 8:00 AM to 8:00 PM EST. Installers shall have a minimum of 2 years of experience installing similar systems and shall be acceptable to the manufacturer of the digital video recorder system.
      2. Regulatory Requirements:
         1. Emissions: FCC, Part 15, Class A; CE (EN 55022).
         2. Immunity: CE (EN 50130-4).
         3. Safety: UL/CSA 60950-1; CE (EN 60950-1).
         4. Power Requirements: Input voltage shall be 48 V DC, 1.25 A.
   6. **DELIVERY, STORAGE, AND HANDLING**
      1. Packing and Shipping: Deliver products in the manufacturer’s labeled packages.
      2. Storage and Protection: Store and handle products following manufacturer’s requirements in the facility where environmental conditions are within recommended limits.
   7. **PROJECT CONDITIONS**
      1. Environmental Requirements: Comply with environmental requirements and recommendations of the manufacturer for the proper installation of products.
      2. Temperature Criteria: Do not install digital video recorder system unless the temperature is between 32° F (0° C) to 113° F (45° C).
   8. **WARRANTY**
      1. Manufacturer’s Guarantee: two (2) years for labor and two (2) years for parts from the manufacture date code under normal use and service for the digital video recorder system, five (5) years for hard drives.

END OF SECTION

1. **PRODUCTS**
   1. **EQUIPMENT**
      1. Manufacturer: Digital Watchdog, Inc.

16220 Bloomfield Avenue. Cerritos,

California USA 90703 USA

Phone: (866) 446-3595

Web: www.digital-watchdog.com

E-mail: dw-tech@digital-watchdog.com

* + 1. Models DW-VG412xT8P
    2. Alternates:

DW-VG4128P No internal storage

DW-VG4122T8P 2TB internal storage

DW-VG4124T8P 4TB internal storage

DW-VG4126T8P 6TB internal storage

DW-VG4128T8P 8TB internal storage

DW-VG41210T8P 10TB internal storage

DW-VG41212T8P 12TB internal storage

DW-VG41216T8P 16TB internal storage

DW-VG41220T8P 20TB internal storage

DW-VG41232T8P 32TB internal storage

* 1. **GENERAL DESCRIPTION**
     1. The Network video recorder (NVR) system shall function as a standalone unit. It shall not require the use of a personal computer, special monitors, or other peripheral devices for either programming or operation. Live and recorded playback of video images shall display on conventional CCTV monitors.
     2. The NVR shall record video and audio from up to 8 network video cameras powered directly from the NVR and up to 12 network video cameras total, to a hard disk and enable playback of video and audio.
     3. The NVR shall be capable of displaying onscreen text and menus in more than one language. This shall be user-selectable via the menu system.
     4. Status LEDs
        1. Power: A steady green light indicates the recorder is working correctly.
        2. Station: STA light is on when the system is being accessed remotely.
        3. Record: REC indicator blinks red when data is being read from or written to the HDD. A steady red light indicates an HDD exception or error.
        4. Network status: Flashing indicates a normal network connection. No light indicates that it is not connected to a network.
     5. Cabling: The recorder shall be provided with a built-in power supply to prevent susceptibility to power spikes, surges, harmonics, and other common electrical disturbance phenomena associated with the installation environment.
     6. PoE Power Sources:
        1. The network video recorder shall include 8 local built-in PoE+ ports for cameras.
        2. The PoE+ camera interfaces shall use RJ45 connectors and shall support a data connection of 10 Mb or 100 Mb.
        3. The PoE budget per port shall be self-adaptive. The user must be able to adjust the budget manually.
        4. A PoE port shall support up to 802.3at POE+ (Class4), up to 30W per port.
        5. The total budget for the 8-channel recorder it shall be 96 W.
        6. There will be a dynamic tracking of PoE power consumption. This will be visualized in the OSD and via the web GUI.
     7. The NVR shall receive text data from external devices and overlay it on live as well as recorded video. It shall also provide search for text data and list all video with previews that is relevant to the search queries. The text shall include but not limited to the following.
        1. Text from PoS devices, namely the texts printed on the receipt of transactions
        2. Text from automatic number plate recognition software
        3. Text from automated teller machines (ATM)
     8. The NVR shall provide easy configuration of mobile and web viewer. The mobile viewer shall be freely available, and connection shall be established by simply scanning QR code from a mobile device.
  2. **OPERATIONAL REQUIREMENTS**
     1. Hardware:
        1. That NVR shall provide up to 8 PoE video inputs.
        2. The NVR shall provide True HD and VGA outputs at up to 4K (3840×2160) resolution.
        3. The NVR shall provide as standard equipment 1 USB port in the front and 1 USB port in the back
        4. The NVR shall provide an internal 10/100/1000 Gbps network adapter.
        5. The NVR shall support operation using the USB mouse.
        6. The NVR front panel shall include the following items:
           1. USB port for saving video clips to external storage devices.
           2. LED status indicators, including indicators for power, hard disk drive activity, and network activity.
        7. The NVR rear panel shall include the following items:
           1. 8x PoE RJ45 network camera inputs
           2. RCA audio output.
           3. RS-485 PTZ control interface.
           4. Alarm inputs and relay outputs, NO/NC.
           5. True HD monitor output
           6. VGA monitor output.
           7. USB port for connecting a mouse.
           8. RJ-45 10/100/1000 Base-T Ethernet port.
           9. Low voltage DC power supply jack.
     2. General properties:
        1. Camera search and discovery: The NVR shall have the capability to search the network for connected compatible cameras.
        2. Recording and playback functions:
           1. Support recording from CIF up to 4K (8 MP) per channel
           2. 80 Mbps network camera recording throughput
           3. Simultaneous playback capability up to 12 video channels in local and network monitoring
           4. H.265, H.264, and MJPEG compression support
           5. View status of connected storage hardware
           6. Set recording schedules
        3. The NVR shall be preconfigured with a DHCP-enabled IP address and subnet mask for quick integration within existing IT structures.
        4. The NVR shall support streaming video via RTSP protocol.
        5. The NVR shall be ONVIF profile S compliant.
        6. The NVR shall have log view screens to show the entire system status at a glance.
        7. The NVR shall support Auto Install to do the following:
           1. Automatically detect loss of video sync, with onscreen indicators. If video loss is detected during recording, the NVR will warn by an onscreen message, sending a message to remote, sounding a buzzer, and switching a relay.
        8. The NVR shall be one unit of rack space in height (1U) and capable of being rack-mounted (EIA 19-inch standard), with rack mount hardware that was designed by the manufacturer to support the units.
        9. The NVR shall provide PTZ dome control—including multiple pan, tilt, zoom, and focus speeds, iris control (including return to auto-focus), programming presets, and viewing presets—through the RS-485 port.
        10. The NVR shall support alarm sensor in and relay out functions, motion detection, and video loss detection, and shall include alarm monitoring software.
        11. The NVR shall include a system log that records and displays information relating to alarm events, reboots, and other system information. The user shall have the ability to export the log information.
        12. The NVR shall be equipped with self-diagnostic functions, including the S.M.A.R.T. disk health check.
        13. The NVR shall adjust for Daylight Saving Time changes, with no loss of video when the clock advances one hour. When the clock is adjusted backward when Daylight Saving Time ends, the NVR shall record both hours, allowing the user to select which hour to playback.
        14. The NVR shall include a user management console that allows the administrator to create, edit, and delete user accounts.
        15. The NVR shall support Digital Zoom in a user-defined area in both live and playback.
        16. The NVR shall include a bandwidth throttle to ensure that images and system messages are delivered as quickly as possible within network bandwidth limits.
        17. The NVR shall prevent unauthorized program tampering through the use of at least sixteen users and passwords, with settings including:
            1. Local user privileges
            2. Remote user privileges
            3. Local play privileges
            4. Remote play privileges
            5. Remote view privileges
        18. The NVR shall display video in full screen or multi-screen format, with the camera number, a user-definable camera name, and the camera’s recording/alarm status displayed for each camera.
        19. The NVR shall support continuous, event, and combined continuous/event recording that is user-configurable by channel and shall support manual recording overrides of the recording schedule.
        20. The NVR shall include playback controls that allow the user to playback recorded video forward or backward at multiple speeds.
        21. The NVR shall include backup viewer software that allows the user to playback exported video in its proprietary format on a PC.
        22. The NVR shall allow the user to perform index-based searches of recorded video.
        23. The NVR shall support adjustments to the picture resolution, brightness, contrast, color, motion sensitivity, and images per second during recording, and these settings shall be user-configurable by channel.
        24. The NVR shall display status icons on the connected monitors. Camera status icons shall be used for each camera. There shall be an icon for:
            1. Alarm detection by the camera channel
            2. Recording of the camera channel
            3. Motion detection by the camera channel
            4. There will be a message in case of video loss for each channel
        25. The NVR shall allow the user to select whether the hard drive recording should automatically overwrite data (starting with the oldest data first), or if the recording will stop when the hard drive is filled.
        26. The NVR shall have image quality settings that are adjustable on a per-camera basis by the end-user, including the following:
            1. CIF, D1, 1.3MP, 2.1MP, 5MP, 4K
        27. Available recording settings by channel for standard and event-based recording types:
            1. Profile (codec)
            2. resolution
            3. frame rate
            4. bitrate control
            5. I-frame and full frame recording
        28. Available streaming bandwidth:
            1. User selectable from 128-16384 Kb
        29. The NVR shall allow the user to manually or automatically customize the record rates per camera for events and motion detection.
        30. The NVR shall allow the installer to setup a substream for streaming Video and Audio over Network without affecting the record rate, quality, and resolution of recorded video.
        31. Multiscreen
            1. The NVR shall be a multiplex type unit, allowing simultaneous recording, playback, and live multiscreen viewing at the unit, with no need for additional hardware.
            2. The NVR shall provide the following displays in live mode: full screen, sequencing,   
               4-way, 6-way, 9-way or 12-way.
            3. The NVR shall incorporate the following display options:

Title display enable/disable, per channel

Time/date formatting

Time/date enable/disable, per channel

* + - * 1. The NVR shall provide image update rates for live and record modes of up to 30 fps per channel.

The NVR shall have two monitor outputs as follows:

The NVR can use the True HD and VGA outputs independently.

One True HD connector

Shall be able to display all cameras live or in sequence mode

Shall display live, playback, and programming functions

One VGA multiscreen output

Shall display live, playback, and programming functions

Shall be able to display all cameras live or in sequence mode

* + - 1. Video motion detection
         1. The NVR shall support the following video motion detection, with on-screen indications when motion is occurring:
         2. Motion detection, which shall be treated as an event and follow the event encoding settings.

The NVR shall support an onscreen setup scale to determine the optimum sensitivity setting for each camera input.

The NVR shall have 330 zones per camera, arranged in a 22 by 15 grid.

The NVR shall have 50 levels of sensitivity.

* + - 1. Alarms
         1. The NVR shall support up to 4 alarm inputs, programmable as normally open or normally closed from within the menus.
         2. The NVR shall have a fully programmable additional audible device to alert the user to alarms, motion detection, and video loss occurrences or operation failure.
         3. Set up triggered recording based on:

sensor (input) detection

camera event

video loss detection

* + - * 1. The NVR shall support alarm latching with two settings, which shall be manually set or programmable from the menus as follows:

Manual acknowledges – When an alarm is activated, the NVR shall be manually acknowledged to reset the COS back to normal condition.

Timed out – the alarm shall automatically reset after a user-defined elapsed time.

* + - * 1. The NVR shall have an automatic full screen associated alarm display that shall change as incoming alarms continue to arrive. As additional alarms arrive, the display monitor shall sequence between the cameras in alarm.
        2. The NVR shall provide status relays that shall link to alarms, motion detection, and video loss.
        3. The NVR shall have an alarm history display capable of showing the last 100 alarms received by the system.
        4. The NVR shall be supplied with push-in wire terminal connections to facilitate easy connection of alarms and other input/output signals.
        5. Events and Response Actions

Alarm input

Video loss

Camera event

Sensor

Video Analytics

* + - * 1. Response Actions:

email

event push

PTZ preset

Alarm out

Buzzer

Monitor out

* + - 1. Ethernet communications
         1. The NVR shall support LAN/WAN Ethernet access.
         2. The NVR shall support Ethernet bandwidths of 100 Mbps or 1000 Mbps.
         3. The NVR shall support simultaneous Ethernet access by not less than 10 workstations connected to the LAN/WAN.
         4. The NVR shall be provided with a Graphical User Interface (GUI) software for remote playback and viewing that shall support the Windows 7, 8, and 10 operating systems and full searching capabilities. It shall be possible to remotely set up the NVR unit using the remote viewing software.

Remote access:

Simultaneous unicast access by up to 10 users

Simultaneous multicast access by up to 20 users

Simultaneous search access by up to 3 users

* + - * 1. The NVR shall provide remote operation and configuration through remote viewing software, a web client, and mobile device applications (Apple and Android).

Supported platforms: Android, IOS

Supported remote users:

Live unicast: 10

Live multicast: 20

Playback: 3

* + - * 1. The NVR’s remote viewing software shall include, at a minimum, the following functions:

Viewing live video.

Searching recorded video.

Exporting still images (in JPEG format) and video clips (in PSF format).

Controlling PTZ cameras.

* + - * 1. The NVR shall not stop recording during any Ethernet access.
        2. The NVR shall allow the user full programming of Ethernet parameters, including the following:

DHCP (enable/disable)

DDNS

IP address

Default gateway

Subnet mask

HTTP port

Main port

* + 1. Archiving
       1. The NVR shall support the archiving of recorded images through the USB memory stick.
       2. The NVR shall support the archiving of recorded video and audio data through eSATA to an external eSATA HDD.
       3. The NVR shall have an option to select the type of archiving device connected when interfaced with the devices specified or approved equals.
       4. The NVR shall support selective archiving.
       5. The NVR shall have an on-screen progress indicator when selective archiving or restoration operations are accessing the archive device.
       6. The NVR shall have an override mode that may be enabled or disabled, preventing any video that is older than a user-defined period from being viewed or archived, when the unit is used in jurisdictions that mandate a finite storage time.
       7. Available actions upon reaching full HDD storage capacity (with automatic notifications to users):
          1. stop recording
          2. overwrite
          3. auto delete
    2. Recorder hard drives
       1. The NVR shall record video on a hard drive. No videotape or videotape recorders shall be required.
       2. The NVR shall offer the following internal hard disk drive (HDD) storage options:
          1. 2 TB
          2. 4 TB
          3. 6 TB
          4. 8 TB
          5. 10 TB
          6. 12 TB
          7. 16 TB
          8. 20 TB
          9. 32 TB
       3. The utilized hard drives shall support the latest SATA technology including SMART reporting.
       4. The utilized hard drives shall be specially developed for the Digital Video Archiving Industry.
  1. **SYSTEM HARDWARE**
     1. The network video recorder shall have the following mechanical specifications:
        1. OS Embedded Linux
        2. Unit Dimensions (D × W × H): 14.96" x 10.55" x 1.77" (380 x 268 x 45 mm).
        3. Unit Weight: 3.74 lbs without HDD drives installed.
        4. Construction:
           1. Housing: Steel chassis.
           2. Finish: Black matte finish.
     2. The digital video recorder shall have the following electrical specifications:
        1. Voltage: 48 V DC, 2.5A
        2. Power Consumption: 120 W total power budget (recorder + PoE ports)
        3. Total PoE power budget: 96 W
        4. Maximum power per port: 30W
     3. The network video recorder shall be designed to meet the following environmental conditions:
        1. Operating Temperature: 32° F (0° C) to 113° F (45° C).
        2. Relative Humidity: 10% to 90%, non-condensing.
  2. **MANUFACTURER SUPPORT**
     1. The manufacturer shall provide customer service, pre-sales application assistance, after-sales technical assistance, access to online technical support, and online training using Web conferencing.
     2. The manufacturer shall provide technical assistance and support using a toll-free telephone number at no extra charge Monday thru Friday, 8:00 AM to 8:00 PM EST.

END OF SECTION

1. **EXECUTION**
   1. **INSTALLERS**
      1. Contractor personnel shall comply with all applicable state and local licensing requirements.
   2. **PREPARATION**
      1. The network design and configuration shall be verified for compatibility and performance with the camera(s).
      2. Network configuration shall be tested and qualified by the Contractor before camera installation.
   3. **INSTALLATION**
      1. The contractor shall follow all Manufacturer published installation procedures and guidelines.
      2. Before permanent installation of the system, the system shall be factory tested in conditions simulating the final installed environment
         1. A report indicating successful test results shall be produced.
   4. **STORAGE**
      1. The H.265, H.264 embedded network video recorder system shall be stored in an environment where temperature and humidity are in the range specified by the Manufacturer.

END OF SECTION