

## DNR-MIL

### 12-Slot, Military-Grade I/O Rack

- Military/Rugged 38999 connectivity
- 100% COTS solution
- Supported by over 50 standard DNR-series I/O boards
- 5 g vibration, 100 g shock, sealed to IP66
- Dual GigE ports (control and diagnostic)
- Designed for MIL-STD-461/810/1275 compliance
- Extensive built-in system diagnostics
- PowerDNR, UEIPAC, UEISIM & UEIMODBUS configs.
- No rotary cooling devices
- Extensive software support including Windows, Linux, QNX, RTX and more
- VxWorks support available in embedded or hosted configurations.

10-Year  
Availability  
Guarantee



The new DNR-MIL provides 12 I/O slots and uses standard DNR-series I/O boards (e.g. DNR-AI-217). It is available in the standard PowerDNR configuration or as a UEIPAC or UEISIM.

### General Description

The DNR-MIL is the latest deployment of UEI's popular RACKtangle® architecture. Though the original RACKtangles are quite rugged, the DNR-MIL series takes ruggedness to the extreme. Designed for use in the toughest environments, the new DNR-MIL is an ideal solution for military and aerospace deployments. The form factor is also ideal for a huge assortment of commercial applications including use on oil drilling platforms and refineries, heavy machinery, outdoor test stands and any other I/O application that will be exposed to the elements. All connectivity is through ROHS compliant 38999 connectors.

Electronically, the DNR-MIL is identical to the standard DNR Series RACKtangle except for hold-up and protection circuitry added to the power supply inputs. (This power supply conditioning is required in order to meet MIL-STD-1275.) This means the DNR-MIL uses our standard DNR-series board (e.g. DNR-AI-217 or DNR-1553-553). With over 50 unique I/O boards and 12 slots available there's sure to be a configuration perfectly matching your application.

The new DNR-MIL is designed to meet the most commonly required elements of MIL-STD-461 and -810 and is sealed to at least IP66/NEMA6 standards. All this is housed in a compact 17.5" x 8.125" x 7" chassis, weighing less than 22 pounds and typically consuming less than 40 Watts. In addition, no rotary cooling fans are used in the design which maximizes MTBF and mechanical reliability. All internal printed circuit boards are conformal coated to ensure the highest reliability.

The DNR-MIL is available in four different deployment options. In PowerDNA, UEIPAC, UEISIM and UEIMODBUS.

#### PowerDNA: DNR-MIL

In PowerDNA mode, the RACKtangle operates as a slave I/O device, running under the control of a host PC. All application code in this mode is created and run on the host. PowerDNR mode offers almost unprecedented software support including:

- All popular operating systems including Windows, Linux, VxWorks, QNX, RTX and InTime
- All popular programming languages including VB, VB.NET, C, C#, C++, JAVA
- All popular application packages including MATLAB, Simulink, LabVIEW, DasyLAB and more.

#### UEIPAC 1200-MIL

When deployed as a UEIPAC, the standard firmware running on a RACKtangle is replaced by either a Linux or VxWorks operating system. The user then writes the Linux/VxWorks application that runs on the DNR-MIL. In this mode the DNR-MIL can run fully stand-alone, or may be linked to a SCADA host via the Ethernet.

#### UEISIM 1200-MIL

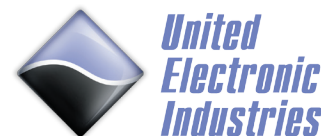
Simulink users will appreciate the ability to build models in Simulink, compile them in Embedded Coder and then deploy them on the UEISIM hardware. It's an ideal platform for testing models on actual hardware. Once the model is proven, it can be deployed using the exact same hardware.

#### UEIMODBUS 1200-MIL

Users needing a compact, rugged Modbus TCP I/O slave will appreciate UEIMODBUS. The rugged, IP66/NEMA6 sealed DNR-MIL allows you to deploy your I/O system in the field, without any additional enclosure and protection.

The DNR-MIL platform is 100% COTS, made in the USA and supported by UEI's family of over 50 compatible analog, digital and interface I/O boards, including analog inputs up to 24-bits, thermocouples, RTDs, ICP/IEPE, ARINC-429/453/708, MIL-STD-1553, CAN, RVDT/LVDT, synchro/resolver, RS-232/422/485, strain gauge, quadrature encoder, high-voltage analog outputs (up to 115 VDC) with high drive analog output (up to 200 mA), function generator outputs and more.

Whether your application is on a ship or boat, in an aircraft, in a rocket, on an outdoor test cell, on an oil platform or simply going to be left outside and exposed to the elements, the DNR-MIL is an ideal solution. Of course if you need fewer I/O, you should consider the 4-slot 4.45" x 6.75" x 7.35" DNA-MIL Cube which offers many of the same features and options, but offers slots for up to 4 I/O boards in a much smaller chassis.



# Technical Specifications

## DNR-MIL (Power DNA mode)

| Computer Interface           |  | PPCx-1G series GigE RACKtangles |
|------------------------------|--|---------------------------------|
| Primary Ethernet Port        | 10/100/1000Base-T, 38999 connector   |                                 |
| Diagnostic Port              | 10/100/1000Base-T, 38999 connector   |                                 |
| Config/Serial Port           | RS-232, 38999 connector  |                                 |
| Sync                         | 1. DNR-SYNC-1G series cables and boards provide both clock and trigger sync signals.<br>2. DNR-IRIG-650 board provides IRIG and GPS time synchronization |                                 |
| I/O Board Support            |  |                                 |
| Series supported             | All DNR-series boards  |                                 |
| Processor/system             |  |                                 |
| CPU                          | Freescale 8347, 400 MHz, 32-bit  |                                 |
| Memory (RAM)                 | 256 MB   |                                 |
| Memory (Flash)               | 32 MB  |                                 |
| Host Communications          |  |                                 |
| Distance from host           | 100 meters max, CAT5 cable   |                                 |
| Ethernet data transfer rate  | 20 megabyte per second   |                                 |
| Analog data transfer rate    | >6 megasample per second. Capable of sustained transfer in any RACKtangle  |                                 |
| DMAP I/O mode                | update >1,000 I/O channels at 4 kHz, guaranteed  |                                 |
| Physical Dimensions / Weight |  |                                 |
| 12 I/O slots                 | DNR-MIL: 17.5" x 8.1" x 7.0" / 22 lbs.   |                                 |
| Environmental*               |  |                                 |
| Electrical Isolation         | 350 Vrms   |                                 |
| Temp (operating)             | -40 °C to 70 °C  |                                 |
| Temp (storage)               | -40 °C to 85 °C  |                                 |
| Humidity                     | 0 to 95%, non-condensing   |                                 |
| Vibration                    |  |                                 |
| (IEC 60068-2-64)             | MIL-STD-810G plus the IEC specs below  |                                 |
| (IEC 60068-2-6)              | 10–500 Hz, 5 g (rms), Broad-band random  |                                 |
| Shock                        |  |                                 |
| (IEC 60068-2-27)             | MIL-STD-810G plus the IEC stds below   |                                 |
|                              | 100 g, 3 ms half sine, 18 shocks at 6 orientations;  |                                 |
|                              | 30 g, 11 ms half sine, 18 shocks at 6 orientations   |                                 |
| Altitude                     | 70,000 feet, maximum   |                                 |
| EMI / RFI                    | Designed to meet MIL-STD-461   |                                 |
| Power Requirements           |  |                                 |
| Voltage                      | 9 - 36 VDC (115/220 VAC adaptor available)   |                                 |
| Power                        | 12 Watts (not including I/O boards)  |                                 |
| Power Quality requirement    | Designed to meet MIL-STD-1275  |                                 |
| Reliability                  |  |                                 |
| MTBF                         | >100,000 hours   |                                 |

## UEIPAC 1200-MIL

| Computer Interface          |   | PPCx-1G series GigE RACKtangles |
|-----------------------------|---|---------------------------------|
| Primary Ethernet Port       | 10/100/1000Base-T, 38999 connector  |                                 |
| Diagnostic Port*            | 10/100/1000Base-T, 38999 connector<br>*Alternatively can be teamed/bonded with primary port.  |                                 |
| Config/Serial Port          | RS-232, 38999 connector   |                                 |
| USB Port                    | USB 2.0 fully supported   |                                 |
| Synchronization Options     | 1. DNR-SYNC-1G series cables and boards provide both clock and trigger sync signals.<br>2. DNR-IRIG-650 board provides IRIG and GPS time synchronization<br>3. PTP client provides software implementation of IEEE-1588 |                                 |
| I/O Board Support           |   |                                 |
| Series supported            | All DNR-series boards   |                                 |
| Software / Operating System |   |                                 |
| Embedded OS                 | Linux, kernel 2.6.x (VxWorks Available)   |                                 |
| Real-time support           | Xenomai RTOS support  |                                 |
| Dev Language                | C/C++, Eclipse IDE support,   |                                 |
| Dev Environments            | Linux PC or Cygwin Windows environment  |                                 |
| EPICS CAS interface         | Yes   |                                 |
| SNMP Library                | Yes   |                                 |
| OS royalties                | none  |                                 |
| Processor/system            |   |                                 |
| CPU                         | Freescale 8347, 400 MHz, 32-bit   |                                 |
| Memory                      | 256 MB (128 MB avail for application SW)  |                                 |
| FLASH memory                | 32 MB (16 MB available for user apps)   |                                 |
| SD card interface           | SD cards up to 32 GB  |                                 |
| USB drive interface         | Standard USB 2.0 port   |                                 |
| Physical Dimensions         |   |                                 |
| 12 I/O slots                | 17.5" x 8.1" x 7.0" / 22 lbs.   |                                 |
| Environmental               |   |                                 |
| Electrical Isolation        | 350 Vrms  |                                 |
| Temp (operating)            | -40 °C to 70 °C   |                                 |
| Temp (storage)              | -40 °C to 85 °C   |                                 |
| Humidity                    | 0 to 95%, non-condensing  |                                 |
| Vibration                   |   |                                 |
| (IEC 60068-2-64)            | MIL-STD-810G plus the IEC specs below   |                                 |
| (IEC 60068-2-6)             | 10–500 Hz, 5g (rms), Broad-band random  |                                 |
| Shock                       |   |                                 |
| (IEC 60068-2-27)            | MIL-STD-810G plus the IEC stds below  |                                 |
|                             | 100 g, 3 ms half sine, 18 shocks at 6 orientations;   |                                 |
|                             | 30 g, 11 ms half sine, 18 shocks at 6 orientations  |                                 |
| Altitude                    | 70,000 feet, maximum  |                                 |
| EMI / RFI                   | Designed to meet MIL-STD-461  |                                 |
| Power Requirements          |   |                                 |
| Voltage                     | 9 - 36 VDC (115/220 VAC adaptor available)  |                                 |
| Power                       | 12 Watts (not including I/O boards)   |                                 |
| Power Quality requirement   | Designed to meet MIL-STD-1275   |                                 |
| Reliability                 |   |                                 |
| MTBF                        | >100,000 hours  |                                 |

**Also available in the  
UEIMODBUS Configuration!**

# Technical Specifications

## UEISIM 1200-MIL

| Computer Interface          |  | PPCx-1G series GigE RACKtangles  |
|-----------------------------|--|--|
| Primary Ethernet Port       |  | 10/100/1000Base-T, 38999 connector   |
| Diagnostic Port             |  | 10/100/1000Base-T, 38999 connector   |
| Daisy chain output          |  | n/a  |
| Optional Interface          |  | n/a  |
| Config/Serial Port          |  | RS-232, 38999 connector  |
| USB Port                    |  | USB 2.0 fully supported  |
| Sync                        |  | DNR-SYNC-1G series cables and boards provide both clock and trigger sync signals |
| I/O Board Support           |  |  |
| Series supported            |  | All DNR-series boards  |
| Software Requirements       |  |  |
| MATLAB                      |  | Version 2007b or greater   |
| Simulink                    |  | Version 7.0 or greater   |
| Real-Time Workshop          |  | Version 7.0 or greater   |
| Software / Operating System |  |  |
| Embedded OS                 |  | Linux, kernel 2.6.x, Xenomai RTOS support  |
| Dev Language                |  | C  |
| Dev Environments            |  | Simulink / RTW with Cygwin environment on a Windows PC                           |
| Processor/system            |  |  |
| CPU                         |  | Freescall 8347, 400 MHz, 32-bit  |
| Memory                      |  | 256 MB<br>(128 MB available for application SW)                                  |
| SD card interface           |  | SD cards up to 32 GB   |
| USB drive interface         |  | Standard USB 2.0 port  |
| Physical Dimensions         |  |  |
| 12 I/O slots                |  | 17.5" x 8.1" x 7.0" / 22 lbs.  |
| Environmental               |  |  |
| Electrical Isolation        |  | 350 Vrms   |
| Temp (operating)            |  | -40 °C to 70 °C  |
| Temp (storage)              |  | -40 °C to 85 °C  |
| Humidity                    |  | 0 to 95%, non-condensing   |
| Vibration                   |  |  |
| (IEC 60068-2-64)            |  | MIL-STD-810G plus the IEC specs below  |
| (IEC 60068-2-6)             |  | 10–500 Hz, 5 g (rms), Broad-band random  |
|                             |  | 10–500 Hz, 5 g, Sinusoidal   |
| Shock                       |  |  |
| (IEC 60068-2-27)            |  | MIL-STD-810G plus the IEC stds below   |
|                             |  | 100 g, 3 ms half sine, 18 shocks at 6 orientations;                              |
|                             |  | 30 g, 11 ms half sine, 18 shocks at 6 orientations                               |
| Altitude                    |  | 70,000 feet, maximum   |
| EMI / RFI                   |  | Designed to meet MIL-STD-461   |
| Power Requirements          |  |  |
| Voltage                     |  | 9 - 36 VDC (115/220 VAC adaptor available)                                       |
| Power                       |  | 12 Watts (not including I/O boards)  |
| Power Quality requirement   |  | Designed to meet MIL-STD-1275  |
| Reliability                 |  |  |
| MTBF                        |  | >100,000 hours   |

# Cables, Connectors and screw-terminal panel accessories.

## Connectors

All connections to the DNR-MIL are made through standard, COTS, nickel plated 38999 connectors. I/O board connections are made through 128-pin connectors where each I/O board utilizes up to 62 of the 128 pins. The Ethernet, USB, diagnostic Serial, Sync, and hardware reset connections are via 37-pin connectors. Power supply and an auxiliary synch bus connections are through a 13-pin connector.

## Cables

Though most customers will design custom cables for their deployed systems, customers working on prototypes and/or those building "one of" systems may desire the ability to connect to the DNR-MIL using more traditional, commercial connections (e.g. RJ-45 for the Ethernet ports).

For these customers UEI offers a complete array of cables and screw terminal panels that will provide direct access to all signals routed in and out of the chassis.

## LAN/Power Cables

### DNA-CBL-LAN-06 Communications cable

6 foot cable connecting the 37-pin LAN/COM/USB port connector to standard commercial connectors. Ethernet ports come out to RJ-45, the serial port to a DB-9 and the USB ports to standard USB jacks.

### DNA-CBL-1315-03 Power supply cable

Connects the 13-pin power/sync connector to a standard female DB-15 connector.

## I/O board cables

Each 128 pin I/O 38999 connector provides the I/O connectivity for two I/O slots within the DNR-MIL. UEI I/O boards utilize either 37- or 62-pin D connectors and these connectors are mapped as follows.

The left I/O slot (even slot #) maps to pins 1-62 on the 128 pin 38999. The right I/O slot (even slot #) is mapped to pins 65-126 on the 38999. Note that the 37-pin based boards simply do not use pins 38-62. For this reason, most applications can standardize on 62-pin cables and screw terminal panels and simply ignore "no connection" pins. The exception to this is the STP boards that have been specifically designed for use with 37-pin boards (e.g. DNA-STP-207TC). For these boards 37-pin are also available. Also, as some I/O slots may not be utilized in a given application, cables with a single 37-pin or 62-pin D connector are also available.

The following cables provide the same I/O connectivity as the standard, commercial DNA-CBL-37S and DNA-CBL-62 series cables.

DNA-CBL-12862-05: 5 ft male 128-pin 38999 to 2x DB-62M

DNA-CBL-12837-05: 5 ft male 128-pin 38999 to 2x DB-37F

DNA-CBL-6237M-05: 5 ft male RoHS 128-pin 38999 to 1x DB-37F and 1x DB-62M

DNA-CBL-62M-03: 3 ft male 128-pin 38999 to 1x DB-62M

DNA-CBL-37M-03: 3 ft male 128-pin 38999 to 1x DB-37F

## Screw Terminal Panels

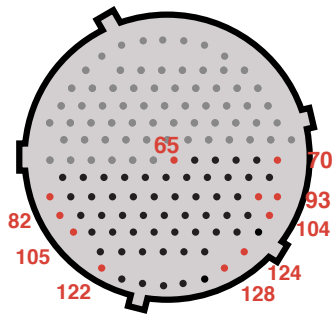
DNA-STP-37 Standard 37-pin screw terminal panel, suitable for use with all 37-pin I/O boards and cables.

DNA-STP-62 Standard 62-pin screw terminal panel, suitable for use with all 62-pin I/O boards and cables.

DNA-STP-3762 Standard 37-pin screw terminal panel, providing both 37- and 62-pin connectors and suitable for use with any combination of I/O board.

# 38999 Connector Pinouts

**128-pin I/O** — mating connector required: D38999/26FJ35PN



| Pin # | I/O slot | Board Pin |
|-------|----------|-----------|
| 1     | 1        | 1         |
| 2     | 1        | 2         |
| 3     | 1        | 3         |
| 4     | 1        | 4         |
| 5     | 1        | 5         |
| 6     | 1        | 6         |
| 7     | 1        | 7         |
| 8     | 1        | 8         |
| 9     | 1        | 9         |
| 10    | 1        | 10        |
| 11    | 1        | 11        |
| 12    | 1        | 12        |
| 13    | 1        | 13        |
| 14    | 1        | 14        |
| 15    | 1        | 15        |
| 16    | 1        | 16        |
| 17    | 1        | 17        |
| 18    | 1        | 18        |
| 19    | 1        | 19        |
| 20    | 1        | 20        |
| 21    | 1        | 21        |
| 22    | 1        | 22        |
| 23    | 1        | 23        |

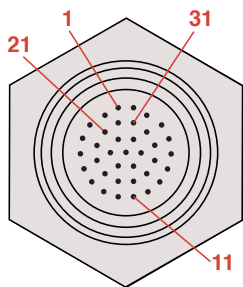
| Pin # | I/O slot | Board Pin |
|-------|----------|-----------|
| 24    | 1        | 24        |
| 25    | 1        | 25        |
| 26    | 1        | 26        |
| 27    | 1        | 27        |
| 28    | 1        | 28        |
| 29    | 1        | 29        |
| 30    | 1        | 30        |
| 31    | 1        | 31        |
| 32    | 1        | 32        |
| 33    | 1        | 33        |
| 34    | 1        | 34        |
| 35    | 1        | 35        |
| 36    | 1        | 36        |
| 37    | 1        | 37        |
| 38*   | 1        | 38        |
| 39    | 1        | 39        |
| 40    | 1        | 40        |
| 41    | 1        | 41        |
| 42    | 1        | 42        |
| 43    | 1        | 43        |
| 44    | 1        | 44        |
| 45    | 1        | 45        |
| 46    | 1        | 46        |

| Pin # | I/O slot | Board Pin |
|-------|----------|-----------|
| 47    | 1        | 47        |
| 48    | 1        | 48        |
| 49    | 1        | 49        |
| 50    | 1        | 50        |
| 51    | 1        | 51        |
| 52    | 1        | 52        |
| 53    | 1        | 53        |
| 54    | 1        | 54        |
| 55    | 1        | 55        |
| 56    | 1        | 56        |
| 57    | 1        | 57        |
| 58    | 1        | 58        |
| 59    | 1        | 59        |
| 60    | 1        | 60        |
| 61    | 1        | 61        |
| 62    | 1        | 62        |
| 63    | n/a      | n/a       |
| 64    | n/a      | n/a       |
| 65    | 2        | 1         |
| 66    | 2        | 2         |
| 67    | 2        | 3         |
| 68    | 2        | 4         |
| 69    | 2        | 5         |
| 70    | 2        | 6         |
| 71    | 2        | 7         |
| 72    | 2        | 8         |
| 73    | 2        | 9         |
| 74    | 2        | 10        |
| 75    | 2        | 11        |
| 76    | 2        | 12        |
| 77    | 2        | 13        |
| 78    | 2        | 14        |
| 79    | 2        | 15        |
| 80    | 2        | 16        |
| 81    | 2        | 17        |
| 82    | 2        | 18        |
| 83    | 2        | 19        |
| 84    | 2        | 20        |
| 85    | 2        | 21        |
| 86    | 2        | 22        |
| 87    | 2        | 23        |

| Pin # | I/O slot | Board Pin |
|-------|----------|-----------|
| 88    | 2        | 24        |
| 89    | 2        | 25        |
| 90    | 2        | 26        |
| 91    | 2        | 27        |
| 92    | 2        | 28        |
| 93    | 2        | 29        |
| 94    | 2        | 30        |
| 95    | 2        | 31        |
| 96    | 2        | 32        |
| 97    | 2        | 33        |
| 98    | 2        | 34        |
| 99    | 2        | 35        |
| 100   | 2        | 36        |
| 101   | 2        | 37        |
| 102   | 2        | 38        |
| 103   | 2        | 39        |
| 104   | 2        | 40        |
| 105   | 2        | 41        |
| 106   | 2        | 42        |
| 107   | 2        | 43        |
| 108   | 2        | 44        |
| 109   | 2        | 45        |
| 110   | 2        | 46        |
| 111   | 2        | 47        |
| 112   | 2        | 48        |
| 113   | 2        | 49        |
| 114   | 2        | 50        |
| 115   | 2        | 51        |
| 116   | 2        | 52        |
| 117   | 2        | 53        |
| 118   | 2        | 54        |
| 119   | 2        | 55        |
| 120   | 2        | 56        |
| 121   | 2        | 57        |
| 122   | 2        | 58        |
| 123   | 2        | 59        |
| 124   | 2        | 60        |
| 125   | 2        | 61        |
| 126   | 2        | 62        |
| 127   | 2        | n/a       |
| 128   | 2        | n/a       |

\*Pins 38-62 are not applicable if I/O slot 1 contains a 37-pin board

**37-pin LAN / COM port** — mating connector required: D38999/26WD35PN

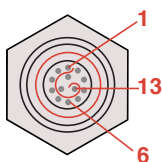


| Pin number | Pin designation |
|------------|-----------------|
| 1          | LAN0 TX+ / DA+  |
| 2          | LAN0 RX+ / DB+  |
| 3          | LAN0 nc / DC-   |
| 4          | LAN0 nc / DD+   |
| 5          | Shield          |
| 6          | Lan1 TX+ / DA+  |
| 7          | LAN1 RX+ / DB+  |
| 8          | LAN1 nc / DC-   |
| 9          | LAN1 nc / DD+   |
| 10         | Shield          |
| 11         | Reset In        |
| 12         | USB1 P+         |
| 13         | USB1 D+         |

| Pin number | Pin designation |
|------------|-----------------|
| 14         | USB2 P+         |
| 15         | USB2 P-         |
| 16         | USB2 D+         |
| 17         | USB2 D-         |
| 18         | LAN0 TX- / DA-  |
| 19         | LAN0 nc / DC+   |
| 20         | LAN0 RX- / DB-  |
| 21         | LAN0 nc / DD-   |
| 22         | LAN1 TX- / DA-  |
| 23         | LAN1 nc / DC+   |
| 24         | LAN1 RX- / DB-  |
| 25         | LAN1 nc / DD-   |
| 26         | Reset Out       |

| Pin number | Pin designation |
|------------|-----------------|
| 27         | USB1 P-         |
| 28         | USB1 D-         |
| 29         | Sync Clock Out  |
| 30         | Sync Trig Out   |
| 31         | RS232 TX        |
| 32         | RS232 RX        |
| 33         | RS232 GND       |
| 34         | Sync Clock In   |
| 35         | Sync Trig In    |
| 36         | Sync +5V        |
| 37         | Sync Gnd        |

**13-pin power connector** — mating connector required: D38999/26FB35PN



| Pin # | Pin Designation  |
|-------|------------------|
| 1     | GND              |
| 2     | GND              |
| 3     | GND              |
| 4     | Vcc (9-36 VDC)   |
| 5     | Vcc (9-36 VDC)   |
| 6     | Vcc (9-36 VDC)   |
| 7     | Sync In2 / reset |
| 8     | Sync In0         |
| 9     | Sync In1         |
| 10    | Sync Gnd         |
| 11    | Sync Out1        |
| 12    | Sync +5V         |
| 13    | Sync Out0        |