

# **Yacht Devices**

## **User Manual**

**NMEA 2000 Run Indicator YDRI-04N**

Firmware version

1.00

**2019**

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## Package Contents

Device	1 pc.
This Manual	1 pc.
Screws	2 pcs.
NMEA 2000 Cable	Not supplied

## Introduction

This Manual contains information on how to install, configure and operate the Yacht Devices NMEA 2000 Run Indicator YDRI-04 (hereinafter the Device). The Device is intended for use in NMEA 2000 marine electronics networks.

The Run Indicator is designed for visualizing and monitoring electrical current and voltage in up to four independent DC circuits connected to Device's terminals. Voltage and current data can be viewed on NMEA 2000 displays to check the state of manually switched loads (e.g. navigation lights) and to ensure that equipment that is turned on is actually functioning (current flows through the load).

Data can be displayed on modern MFDs as digital switching circuits; on legacy chartplotters, loads can be displayed as (up to) four batteries. The Run Indicator allows configuration of the individual type of each load (Battery, Solar Panel, Wind Generator, etc.), but this is not widely supported in NMEA 2000 displays. In any case, the Device is well-suited to digitize the performance of solar panels and wind generators (up to 200W per channel).

Current and voltage data can be used to configure the Device to manage the channels of an NMEA 2000 digital switching system. For example, to raise a sound alert or to turn some equipment on or off (see Chapter III). The Device can also report how long a load was on, how often the load was switched over a specified period or whether switching falls within a specified frequency – which is useful for analysing the operation of fresh water or bilge pumps and to detect leaks or flooding.

On a rented boat, the Run Indicator can extend the life of equipment by alerting about low battery charge, or about dry operation of pumps, or problems with intake or discharge pipes.

To configure the Device, PC software with NMEA 2000 gateway may be required (from ActiSense, Maretron or Yacht Devices; see Chapter V). The firmware of Run Indicator can be updated with a gateway and software from Yacht Devices only.

The Device is equipped with a DeviceNet Micro Male connector. For NMEA 2000 networks with proprietary connectors (e.g. Raymarine SeaTalk NG, or Simrad SimNet), a cable adapter is required.

Thank you for purchasing the Run Indicator, and Bon Voyage to you!

## Warranty and Technical Support

1. The Device warranty is valid for two years from the date of purchase. If a Device was purchased in a retail store, the sale receipt may be requested when applying for a warranty claim.
2. The Device warranty is terminated in case of violation of the instructions in this Manual, case integrity breach, or repair or modification of the Device without the manufacturer's written permission.
3. If a warranty claim is accepted, the defective Device must be sent to the manufacturer.
4. The warranty liabilities include repair and replacement of the goods and do not include the cost of equipment installation and configuration, nor include shipping of the defective Device to the manufacturer.
5. Responsibility of the manufacturer in case of any damage as a consequence of the Device's operation or installation is limited to the Device cost.
6. The Manufacturer is not responsible for any errors or inaccuracies in 3rd party guides and instructions.
7. The Device requires no maintenance. The Device's case is non-dismountable.
8. In an event of a failure, please refer to Appendix A before contacting technical support.
9. The manufacturer accepts applications under warranty and provides technical support only via e-mail or from authorized dealers.
10. The contact details of the manufacturer and a list of the authorized dealers are published online: <http://www.yachtd.com/>.

## I. Product Specification

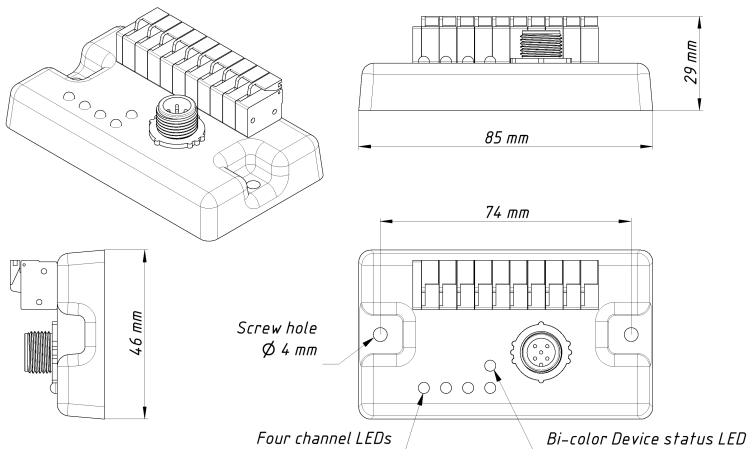



Figure 1. Drawing of YDRI-04

The Device is supplied with a NEMA 2000 Micro Male connector commonly used by a wide range of manufacturers.

<b>Device parameter</b>	<b>Value</b>	<b>Unit</b>
Supply voltage (from NMEA 2000 interface)	7..16	V
Consumption current (NMEA 2000 interface), average / peak	55/65	mA
Load Equivalency Number	2	LEN
Number of monitored DC circuits	4	—
Internal shunt resistance	0,005	Ohm
Maximum DC current on inputs (continuous / peak)	± 10 / 15	A
Current measurement accuracy (below 7A / above 7A)	± 50 / 100	mA
Maximum allowed DC voltage on inputs (in respect to GND input)	40	V
Voltage measurement accuracy	0,1	V
Breakdown voltage between NMEA 2000 network interface and inputs	5000	V <sub>RMS</sub>
Device case dimensions (LxWxH)	85 x 46 x 29	mm
Weight	85	g
Operating temperature range	-20..55	°C

 Yacht Devices Ltd declares that this product is compliant with the essential requirements of EMC directive 2004/108/EC.

 Dispose of this product in accordance with the WEEE Directive. Do not dispose of electronic refuse with domestic or industrial waste.

## II. Device Installation and Connection

The Device requires no maintenance. When deciding where to install the Device, choose a dry mounting location. Despite the fact that the Device's case is waterproof, its wire terminals are open, and seawater can cause corrosion or a short circuit. Do not place the Device where it can be flooded by water, get wet in rain or be sprayed by water.

The Device has two mount holes (see Chapter I), 4 mm in diameter. Use the supplied screws to fix the Device on a flat surface. The orientation is not important. The locations of Device connectors, LEDs and terminals are shown in Appendix C.

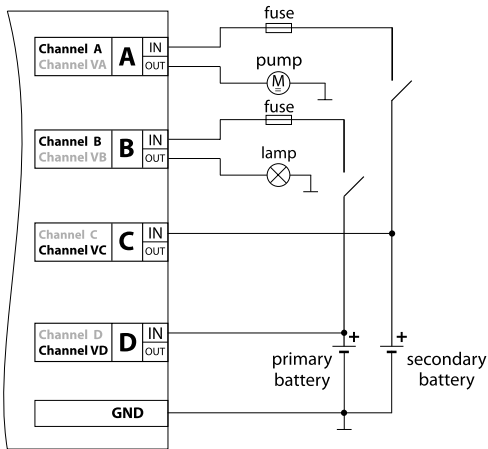
### 1. Understanding the Basics

The Device has 4 physical inputs (channels A, B, C and D) to which you can connect your boat's DC circuits and/or batteries. Each input has two measurement channels: for current (A, B, C, D), and for voltage (VA, VB, VC, VD). Since current and voltage measurements differ by their nature, their wiring differs, too (see Figure 1).

The primary use of the Run Indicator is monitoring amperage and voltage via connected MFDs, PCs or mobile gadgets. To make your system more flexible and scalable, we have added an expert option: managing of NMEA 2000 digital switching equipment by user-defined rules.

Depending on measurement results, the Device can automatically turn on or off any of 28 «virtual» channels in its own bank (which can be read by other NMEA 2000 devices to check the state) and/or in banks of other devices, e.g. to raise a sound alert or turn on/off some other equipment (see Chapter III).





*Figure 1. An example connection to DC current loads and voltage sources; note the common ground wire connected to GND input.*

You can program rules to manage other equipment using a set of command strings (see Chapter V). Each of the eight measurement channels may contain up to 8 rules, each rule can be modified and set to be active or inactive.

The factory default rules set the Run Indicator to detect the flow of the current (above 0.2A or below -0.2A) in DC circuits connected to the Device's four input channels. The result is mapped to channels 1-4 of the Device's own digital switching bank, which can be read by other devices, and visualized by channel status LEDs (see Chapter V.1).

## 2. Connecting to monitored DC circuits



*Device inputs have no internal overcurrent protection. Each circuit should have a 15 A (max) rated slow-blow fuse (or circuit breaker). To keep the Device's measurement circuits from damage, please establish a reliable connection between a common ground wire and the GND terminal of the Device. A failed common ground connection can damage the Device.*

Before connecting the Device to DC circuits, turn off their power supply.

Device has four input channels: A, B, C and D. Each channel has an input and output terminal. Each input channel has two measurement channels, one for current and one for voltage.

You must connect DC circuits to the clamp terminal block (see Appendix C). It is recommended to crimp a lug on the wire end before connecting. Choose a wire gauge according to the load current. Always use a marine grade power cable with proper voltage, current, temperature, and water/oil resistance ratings.

The Device measures current between the input and output terminals. Both positive and negative currents can be measured. Positive current values correspond to the current flow direction indicated by the arrows on the Device label (from IN to OUT, see Appendix C).

All monitored DC circuits must share a common ground, which must be connected to the Device's GND terminal. Each load should be connected between the Device's output terminal and the common ground.

Voltage is measured between the measurement channel's input and the common ground.

In the example given in Figure 1, channels A and B are measuring current in pump and lighting circuits, respectively. Channels C and D are wired for measuring voltage of primary and secondary batteries that are feeding both of the loads independently.

### **3. Connecting to NMEA 2000 Network**

The Device should be connected to the NMEA 2000 network backbone with a NMEA 2000 drop cable (not supplied with the Device). The Device is equipped with a DeviceNet Micro Male connector. For NMEA 2000 networks with other connector types, you will need an appropriate adapter cable.

Before connecting the Device, turn off the bus power supply. If you have any questions regarding the use of connecting cables, terminators or connectors, please refer to the following documents:

- Technical Reference for Garmin NMEA 2000 Products (190-00891-00) for standard NMEA 2000 networks;
- SeaTalk NG Reference Manual (81300-1) for Raymarine networks.

After connecting the Device, close the lock on the connector to ensure its water resistance and reliability.

After you power on your NMEA 2000 network, the Device status LED gives a short green blink confirming a successful initialization. Three further green flashes indicate a successful connection to the NMEA 2000 network. See the full list of Device's LEDs signals in Chapter VI.

NMEA devices						Pause display
Address	Name	Serial	Version	Frames	Rollcall	NMEA messages
38	Engine Gate...	00030180	1.17 02/09/2...	1	YES	Start recording
40	NMEA 2000 ...	00601035	1.26 03/04/2...	1	YES	
43	Run Indicator...	01230001	1.00 DEV 31/ ...	405	YES	Save to:
49	NMEA 2000 ...		1.25 06/02/2...	30	YES	SD 1
4f	Voyage Rec	00020024	1.24 09/02/2...	1	YES	
bb	Tank Adapter...	00760026	1.04 23/05/2...	1	YES	Refresh

*Figure 2. NMEA devices list on a Raymarine Axiom MFD*

The Device information will appear in the list of NMEA 2000 devices (SeaTalk NG, SimNet, Furuno CAN), or in the common list of external devices on your MFD (see picture above). In most models, you can access this list via the «Diagnostics», «External Interfaces», or «External devices» menu.

### **III. NMEA 2000 Digital Switching Support**

The Run Indicator supports NMEA 2000 digital switching equipment (managed with Standard PGN 127501 and 127502). The Device can send commands to turn on/off electrical loads connected to external NMEA 2000 two-state devices (e. g. relay banks).

The Device also has its own internal «virtual» digital switching bank with 28 two-state channels. Their statuses are available to other NMEA 2000 devices, and may be used, for example, for indication purposes.

Products described in this chapter may become a valuable addition to your digital switching system.

#### **1. Yacht Devices NMEA 2000 Circuit Control YDCC-04**

Circuit Control has one bank of four latching (bi-stable) relays capable of switching direct current (DC) and alternating current (AC) loads. Run Indicator can be used to monitor amperage in DC loads connected to the YDCC-04, and turn them ON and OFF depending on user rules. For example, you can set up the Run Indicator to switch the load OFF in case of over-current, or switch to a backup battery if the main battery voltage drops below the set threshold.

#### **2. Yacht Devices Alarm Button YDAB-01**

The Alarm Button is a digital switching «music box»; it has powerful sound amplifier inside and connection to a sound speaker. The Run Indicator can turn ON any of 28 alarm sounds (or even voice messages uploaded by a user) of the Alarm Button. For example, you can activate an alarm when the bilge pump has been running for too long.

#### **3. Yacht Devices NMEA 2000 Wi-Fi Gateway YDWG-02 or Wi-Fi Router YDNR-02**

The Gateway or Router can establish its own Wi-Fi network, or connect to the boat's existing Wi-Fi to transfer marine data to mobile devices and laptops. Both have an internal web server with a special web page called «Web Gauges», which allows viewing vessel data from a standard web browser.



Figure 1. Web Gauges screenshot

Run Indicator's data can be displayed with circular gauges or text databars used for batteries (see Figure 1), or as states of digital switching channels (upper bar is green – ON, lower bar is red – OFF). If you have external access to your boat's network, Web Gauges is an ideal solution for remote monitoring of your boat.

The Gateway or Router is also required to update the firmware of Run Indicator (see Chapter VII), and can be used to configure it.

#### **4. Third-party NMEA 2000 Digital Switching equipment**

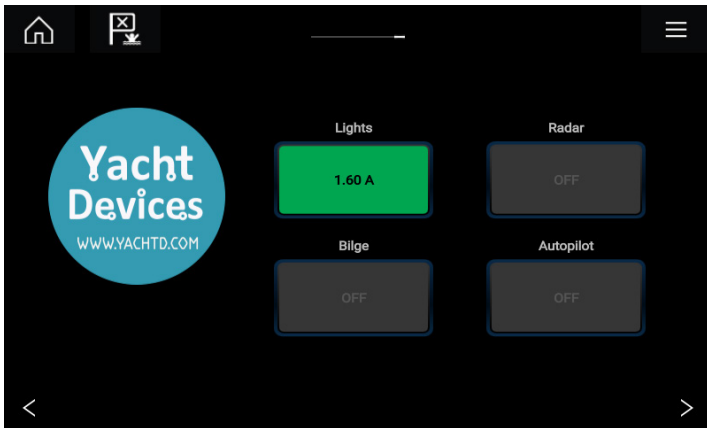
The Run Indicator can turn ON and OFF electrical loads connected to third-party NMEA 2000 digital switching equipment managed with NMEA 2000 Standard PGN 127501 and 127502. The Device is compatible with Oceanic Systems, Offshore Systems, Maretron and Carling Tech relay modules (a special setting is required for Maretron and Carling Tech products, see Table 1 in Chapter V).

The Device cannot be used to control CZone or EmpirBus modules; they use proprietary protocols and cannot be managed with Standard NMEA 2000 messages. However, the Run Indicator uses CZone protocol to visualize electrical loads on MFDs (see IV.1).

## IV. Typical Use of the Device

The cases below do not comprise a comprehensive list of possible uses of the Device. They just give you an overview of the Device's capabilities in a number of real-life applications.

### 1. Monitor DC circuits on modern MFDs



*Figure 1. Run Indicator loads on Raymarine Axiom*



Figure 1. Run Indicator Chapter VIII describes how to generate a configuration file with your own labels and upload it to your MFD. Support for CZone protocol can be turned off with the YD:CZONE OFF command in Device's settings.

## **2. Monitor loads on legacy displays**

For compatibility with legacy displays, the Device sends measurement data in PGN 127508 «Battery Status» which is supported by most NMEA 2000 displays on the market. In this case, loads are visualized as four «virtual» batteries. You can turn off the transmission of PGN 127508 in the Device's settings.

## **3. Monitor performance of solar panels and wind generators**

In the Device's settings, the load type can be set to «Solar Panel» or «Wind Generator», or to any other type supported by NMEA 2000 Standard. In this case, PGN 127506 containing type data will be sent along with PGN 127508 «Battery Status» which contains voltage and current measurements data. In theory, it can lead to displaying of a load in a customized way on an MFD. For example, on a page called «Solar Panels» instead of on a page «Batteries».

However, at this moment we do not know of a chart plotter or display which behaves like this. All known models just ignore the type of DC source, and display solar panels and wind generators as ordinary «batteries».

## **4. Receive alerts on fresh water system leaks**

If there is a leak in the fresh water system, the pump turns on periodically to restore the pressure in the system.

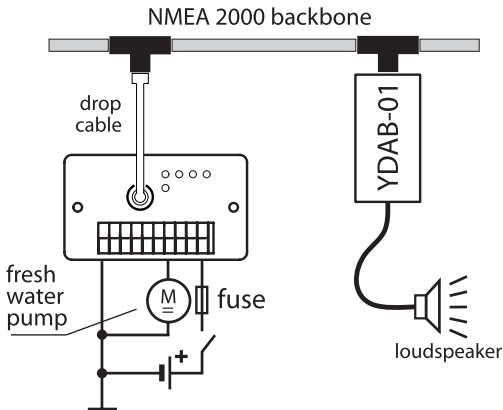
The following is an example command string which programs the Run Indicator to automatically detect current peaks over 0.5 A that happen at least once in each 10-minute interval over the course of an hour:

```
YD:RULE A 1 ON 0 1 >~0.5 3600 INTERVAL 6
```

By this command, rule #1 is set for measurement on channel A: if the current exceeds 0.5 A in absolute value (you need not worry that you mixed up the in and out Device terminals or wires) at least once during

each 3600/6 second (i.e. 10 minutes) interval over a time period of 3600 seconds (i.e. 1 hour), turn on channel #1 at the digital switching bank #0 (see Chapter V.1 for details).

This rule may effectively detect large leaks but may accidentally trigger, say, during lunch, when water is actively used. It is better to use 7200 or 9000 second period with the same interval setting (it will be 20 or 25 minutes).



*Figure 2. Basic digital switching system that provides alerts on fresh water leaks*

If the vessel has a NMEA 2000 Alarm Button (see Chapter III) configured for bank #0 (see Figure 2), the rule will cause an audio alert. The Alarm Button allows uploading of user sounds or voice messages.

## 5. Preventing malfunction of a shower pump

On most boats, sailors need to save water and do not to spend much time in the shower. Shower pumps are usually automatically activated, and drain the water in a few minutes. If the pump is on for too long, it can mean that there is a problem with intake or drain pipes, and it can lead to a malfunction.

Let's configure a rule that is triggered if the pump is continuously working for over 20 minutes:

```
YD:RULE B 1 OFF 0 2 >~1.0 1200.00
```

By this command, rule #1 is set for measurement channel B: if the current exceeds 1.0 A in absolute value for a time interval of 1200 seconds, turn OFF channel #2 on bank #0. If you have the Circuit Control (see Chapter III) configured to bank #0 with the shower pump connected to relay #2, the pump will be turned off by this rule.

```
YD:RULE B 2 ON 1 2 >~1.0 1200.00
```

And if you have an Alarm Button (configured to bank #1), the rule #2 (above) will trigger the sound alert the same time that the Circuit Control stops the pump.

## 6. Discover short cycling of a bilge pump

In normal conditions, a bilge pump is rarely seen in operation. An excessively short operating cycle may be a sign of hull leakage or other major problems. If your bilge pump switches on too frequently, a properly programmed Run Indicator can switch on an alarm.

The programing is similar to case 4, but the bilge pump may have no periodic intervals due to heeling and rolling through the waves:

```
YD:RULE A 1 ON 0 1 >~0.5 3600 COUNT 10
```

```
YD:RULE A 2 ON 0 1 >~0.5 600
```

Rules #1 and #2 above are triggered when the pump switches on at least 10 times within an hour (3600 seconds), or is continuously switched on for more than 10 minutes (600 seconds).

## 7. Get the status of ON/OFF switches and voltage-output sensors and transducers

Run Indicator can be used to get the status of the ON/OFF switches, such as jamb switches installed on boat's doors or portholes. You will need to connect one of the switch poles to the fused power source positive rail, the second switch pole to one of the Device's input terminals, and connect Device's GND terminal to the power source ground rail to close the circuit. Power source voltage can be as low as 3.3 Volts. Configure the corresponding Device's voltage measurement channel rules to trigger when the switch is closed (power source voltage is present on the input) or open (no voltage is present). It is recommended to set the voltage threshold approximately at half of the power source voltage level. For example, if +12 Volt power source is used for the door switch, the following rules:

```
YD:RULE VA 4 ON 1 2 >6 1.00
```

```
YD:RULE VA 4 OFF 1 2 <6 1.00
```

Will switch ON the channel 2 at bank 1 if voltage on channel VA is higher than 6 volts (when door switch is ON), and will switch OFF the same channel and bank if the voltage drops below 6V for 1 second (when door switch is OFF).

## V. Setup and Programming



*Important! Please do not attempt to program the Device while at sea.*

Installation description strings are stored in device ROMs; normally, they are written by installers to specify the device location or to leave notes or contact information. This can be done with professional PC software (with a hardware gateway to NMEA 2000 network) from Yacht Devices, ActiSense or Maretron, and it may be supported by some models of chart plotters. Please refer to your software or chart plotter documentation for details.

Address Claim	
Address	67 HEX: 43
Update	
Unique number	1230001
Manufacturer code	717
Device instance	1
System instance	0
Class / function	35 / 170
Industry	Marine
Self-configurable	Yes
Update	

Product Information	
Database version	2.100
Product code	25511
Model version	Run Indicator / YACHTD.COM
Model ID	YDRI-04
Software version	1.00 DEV 07/11/2019
Serial	01230001
Certification	Not applicable
LEN (mA)	2 [100 mA]

Configuration Information	
Installation description 1	
Installation description 2	YD:DEV 1 DONE
Manufacturer information	Yacht Devices Ltd., www.yachtd.com
Update	

Heartbeat	
<input checked="" type="checkbox"/> CAN1	<input type="checkbox"/> CAN2 <input checked="" type="checkbox"/> Equipment
Updated	16:30:57.262

Refresh

Figure 1. Programming with CAN Log Viewer

To program the Device, enter a special string starting with «YD:» to the installation description field 2 in the Device properties. For example, «YD:DEV 1» (without quotes) will change the NMEA 2000 device instance of the Device to 1. If the command (except «YD:RESET») is accepted by the Device, it will add «DONE» to the entered text and «YD:DEV 1 DONE» will be displayed in the case of our example.

In Figure 1 on the previous page, you can see the process of programming the Device with free CAN Log Viewer software (to open this window, select the item «NMEA 2000 Devices» in the «View» menu, refresh the list of devices, select the Device and click «Properties» button). You can download this free program (runs on Microsoft Windows, Mac OS X and Linux) at <http://www.yachtd.com/downloads/>, Yacht Devices NMEA 2000 Wi-Fi Gateway, Yacht Devices NMEA 2000 Wi-Fi Router or Yacht Devices NMEA 2000 USB Gateway is required to connect the PC with a NMEA 2000 network.

The full list of special strings is in Table 1. Parameters in square brackets can be omitted to get the current value of the setting from the Device.

*Table 1. Special strings (commands)*

Syntax	Examples	Description
Device control strings		
YD:RESET	YD:RESET	Resets the Device to factory settings. This command also clears both installation description strings (no answer with «DONE»).
YD:DEV [0..255]	YD:DEV 1	Sets NMEA 2000 Device Instance (0–255). Factory setting: 0.
YD:SYS [0..15]	YD:SYS 2	Sets NMEA 2000 System Instance (0–15). Factory setting: 0.

Table 1 continued

YD:PGN <pgn> [OFF   0   100..60000]	YD:PGN 126993 60000 YD:PGN 127501 10000 YD:PGN 127506 1500 YD:PGN 127508 1500 YD:PGN 127751 1500	Sets the transmission interval for PGNs: 126993, 127501, 127506, 127508 and 127751 (see Appendix B). Values from 100 to 60 000 ms (1 minute) are allowed. Zero value or OFF disables periodic transmission of PGN. Factory settings are shown in the Examples column.
Channel control strings		
YD:DAT <A..D> [0..252]	YD:DAT A 0 YD:DAT B 1 YD:DAT C 2 YD:DAT D 3	Sets the Battery Instance in the «Battery Status» PGN (0–252) for a specified Device channel (A–D). Factory settings are shown in the Examples column.
YD:TYPE <A..D> [BATTERY   ALTERNATOR   CONVERTER   SOLARCELL   WINDGEN   UNKNOWN]	YD:TYPE C WINDGEN YD:TYPE A UNKNOWN	Specifies DC Type for PGN 127506 «DC Detailed Status» message. Factory setting for all channels is «UNKNOWN».
Digital Switching related commands		
YD:BANK [0..252]	YD:BANK 0	Sets the digital switching bank number for the Device's own bank (0–252). Factory setting is 1. (See Note 1.)
YD:MARETRON [OFF   ON]	YD:MARETRON OFF	Sets compatibility mode for Maretron and Carling Tech products. Factory setting is OFF.
YD:CZONE [OFF   ON   AUTO]	YD:CZONE AUTO	Activates CZone support. Factory setting is AUTO. See Chapter VIII.
YD:RULE parameters	See V.1	Sets channel rules, see V.1 below
YD:ON parameters	See V.2	Quick command to set rules, see V.2 below

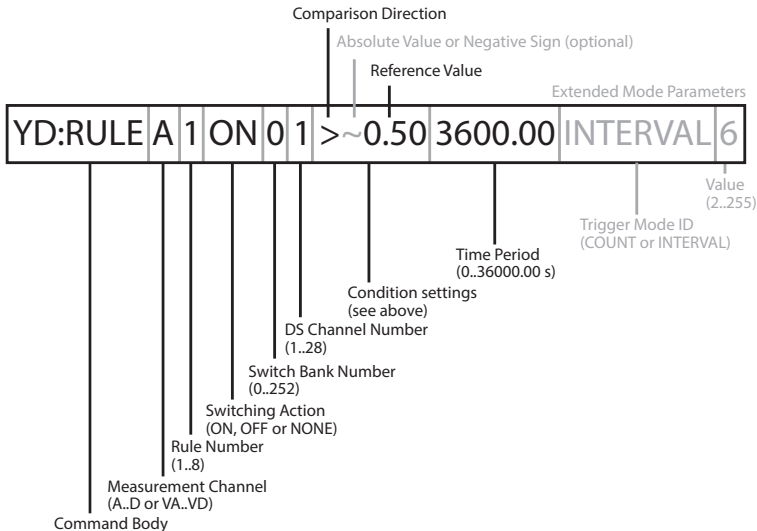
*Note 1: If you set another bank for the Device, all rules that have been set for the old bank number are automatically changed to the new bank number.*

## **1. Setting channel rules**

`YD:RULE` command sets rules to turn digital switching channels ON and OFF. Each of the four Device input channels has two measurement channels: for current (A, B, C, D) and for voltage (VA, VB, VC, VD), see Figure 1 in Chapter II.

Command string syntax is explained in Figure 2. In this example, rule #1 is set for measurement channel A: if amperage exceeds in absolute value 0.5 A (less than -0.5A or above 0.5 A, current is present and flows in any direction) at least once in each 3600.00/6 second interval, turn ON channel #1 in bank #0.





*Figure 2. Syntax example of a command for setting channel rules; non-obligatory parameters are greyed out.*

The Device does not measure negative voltage values. Therefore, the absolute value sign (~) is ignored in any conditions related to voltage measurement (in rules for channels VA..VD).

In extended mode, two additional keywords with a numeric value are used:

- INTERVAL allows you to detect periodic fluctuations in amperage or voltage. The rule is triggered only if the condition occurs (at least) once within each segment of a specified time period. Duration of a segment is calculated as time period divided by the value (numeric parameter).
- COUNT parameter allows you to trigger an action if the condition occurs specified number of times within the specified time period.

The example:

```
YD:RULE VA 4 OFF 1 2 <5 5.00
```

This rule switches OFF the channel 2 at bank 1 if voltage on channel VA drops below 5V for 5 seconds.

More examples are available in Chapter IV.4-IV.6. To check the rule (to get the rule's text from the Device), type the command with measurement channel name and rule number only. For the example above:

```
YD:RULE VA 4
```

In factory settings, for each of the Device's measurement channels a pair of rules is set that allow the Run Indicator to detect current or voltage in DC circuits connected to the Device's four input channels. Detection results for measurement channels A-D are indicated with channel status LEDs.

Table 2. Default rules for Device's channels

Device input channel	Measurement channel	Default rules
A	A	YD:RULE A 1 ON 1 1 >~0.20 0.10 YD:RULE A 2 OFF 1 1 <~0.20 0.10
B	B	YD:RULE B 1 ON 1 2 >~0.20 0.10 YD:RULE B 2 OFF 1 2 <~0.20 0.10
C	C	YD:RULE C 1 ON 1 3 >~0.20 0.10 YD:RULE C 2 OFF 1 3 <~0.20 0.10
D	D	YD:RULE D 1 ON 1 4 >~0.20 0.10 YD:RULE D 2 OFF 1 4 <~0.20 0.10
A	VA	YD:RULE VA 1 ON 1 5 >~5.00 0.10 YD:RULE VA 2 OFF 1 5 <~4.00 0.10
B	VB	YD:RULE VB 1 ON 1 6 >~5.00 0.10 YD:RULE VB 2 OFF 1 6 <~4.00 0.10
C	VC	YD:RULE VC 1 ON 1 7 >~5.00 0.10 YD:RULE VC 2 OFF 1 7 <~4.00 0.10
D	VD	YD:RULE VD 1 ON 1 8 >~5.00 0.10 YD:RULE VD 2 OFF 1 8 <~4.00 0.10

Another format of the YD:RULE command allows you to reset or clear all rules for the specified measurement channel, or all channels at once:

```
YD:RULE [V]<A..D | ALL> <RESET | CLEAR>
```

Select a single measurement channel (A..D or VA..VD), or all channels (ALL), then specify RESET parameter to reset all rules to factory defaults, or CLEAR to delete all rules. In the second case, the status LED of the channel will always be unlit (see Chapter VI).

## 2. Quick commands

quick command (see Figure 3 on the next page) sets a pair of rules (which can also be set or modified later with YD:RULE command) for a specified measurement channel: #1 for switching the channel ON, #2 for OFF. With this option, you can quickly set upper and lower current or voltage thresholds to turn on and off the target digital switching channel.

When executed, a quick command clears all existing rules (with numbers #2..#6, if they exist) for the specified measurement channel. For example, the command

```
YD:ON A 0 1 5 3 180 COUNT 4
```

clears rules 2-6 for channel A and sets the following rules:

```
YD:RULE A 1 ON 0 1 >~5.00 180.00 COUNT 4  
YD:RULE A 2 OFF 0 1 <~3.00 180.00
```

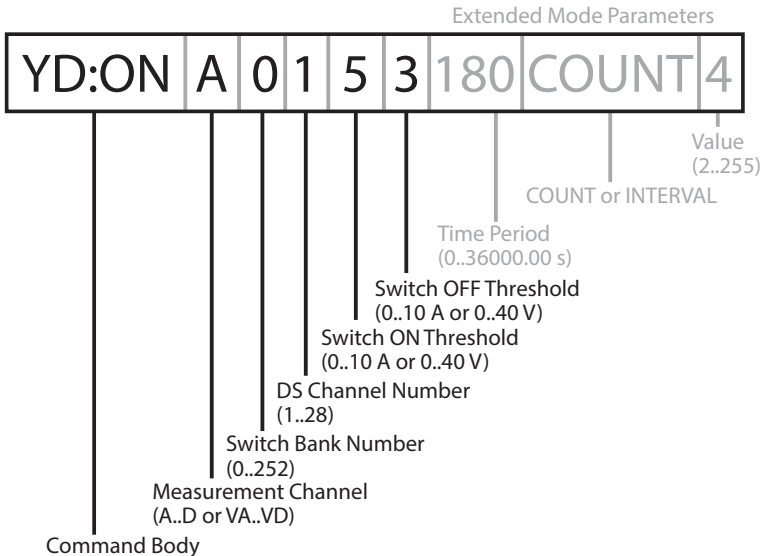
This is how it works: when the current in the channel A exceeds 5A in absolute value (less than -5A or above 5A) four times within a 180-second interval, rule #1 switches on channel #1 at bank #0. If the current is below 3A in absolute value for a period of 180 seconds, rule #2 switches OFF the specified channel.

Another example command:

```
YD:ON A 6 2 5 4 1600
```

Resulting rules:

```
YD:RULE A 1 ON 6 2 >~5.00 1600.00  
YD:RULE A 2 OFF 6 2 <~4.00 1600.00
```



*Figure 3. Syntax example of a quick command; non-obligatory parameters are greyed out*

## VI. LED Signals

The Run Indicator incorporates a bi-color Device status LED and four channel status LEDs. Their locations are pictured in Appendix C.

### 1. Device status LED: powering on

One GREEN flash after powering on the Run Indicator confirms its successful initialization. Further, three successive GREEN flashes indicate that the Device is successfully connected to the NMEA 2000 network.

Constant RED flashes (one second on, one off) indicate a failure to obtain an NMEA 2000 network address.

### 2. Device status LED: normal operation

During normal operation, the Device's status LED blinks on transmission of each «Binary Status Report» message (PGN 127501). The default transmission interval setting for this message is 10 seconds, but that can be changed in the Device's settings (see Chapter V).

### 3. Channel status indication

In the factory settings, the default channel rules make LEDs indicate the presence of electric current of more than 0.2A or less than -0.2A in connected DC circuits.

In fact, channel LEDs are indicating the state of the first four Digital Switching channels of the Device's own bank, and LEDs behaviour can be changed with channel rules (see Chapter V.1).

### 4. Signals during firmware update

The LEDs' behaviour during firmware updates is described in the next Chapter.

## VII. Firmware Updates

Firmware updates can be done with free CAN Log Viewer software (version 1.31 or later) running on Microsoft Windows, Mac OS X and Linux:

[http://www.yachtd.com/products/can\\_view.html](http://www.yachtd.com/products/can_view.html)

The program must be connected to an NMEA 2000 network with a Yacht Devices USB Gateway YDNU-02, or a Wi-Fi Gateway YDWG-02, or a Wi-Fi Router YDNR-02. You can download the latest firmware version for the Run Indicator from our website:

<http://www.yachtd.com/downloads/>

Open the downloaded .ZIP archive with the update and copy the YDRIO4.BIN file to the disk. The README.TXT file inside the archive can contain important information regarding the update.

1. Click the «NMEA 2000 Devices» item in the «View» menu.
2. Click the «Refresh» button (see Figure 1 at the next page) in the opened window and wait for the Device to appear in the list.
3. Select the Device and click the «Firmware Update» button.
4. Locate and select the YDRIO4.BIN update file on the disk.
5. Wait while the firmware is uploading.

If in doubt, see the video with the update procedure on our web site. During the firmware upload, the Device's status LED flashes RED very fast. When the firmware is updated, the Device status LED gives off five RED half-second signals and the CAN Log Viewer also informs you that the update is successfully done.

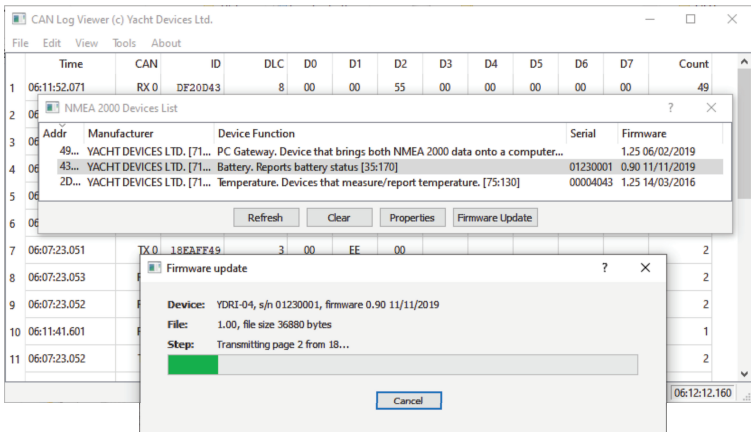


Figure 1. Firmware update with CAN Log Viewer



## VIII. How to Configure an MFD with CZone Support

You can monitor DC circuits connected to the Run Indicator from most modern chart plotters with CZone support. This includes Garmin, Lowrance, Simrad, B&G, and Furuno chart plotters and recent models from Raymarine (Axiom, eS and gS series); see Figure 1 in Chapter IV.1.

To obtain a customized configuration file for your MFD, do the following:

1. Visit the product's page on our website and follow the link to related article.
2. Fill the form with your desired load labels, and download the personalized configuration file for your MFD.
3. Turn on CZone support on your MFD, and configure the Dip Switch setting (not required on Raymarine MFDs).
4. Import the configuration file into your MFD (usually, from MicroSD card). Furuno chart plotters do not support upload from an MicroSD card and the configuration file can be uploaded with the CAN Log Viewer.

Note: if you already have CZone equipment installed, you will overwrite the exiting CZone configuration with our file and your CZone equipment will not function correctly. Please contact with us for assistance in this case.

Make sure to activate CZone support for your Run Indicator with a control string (refer to Table 1 in Chapter V). The factory default setting (YD:CZONE AUTO) automatically activates CZone support upon uploading the configuration file from our web site to your MFD.

## Appendix A. Troubleshooting

Issue	Possible causes and solutions
Device status LED does not signal after the Device is turned on.	<p><b>1. No power supply on the NMEA 2000 bus.</b> Check if the bus power is supplied (an NMEA 2000 network requires a separate power connection, it can not be powered from a chart plotter or another device connected to the network).</p> <p><b>2. Loose connection in the NMEA 2000 power supply circuit.</b> Apply contact cleaner spray to the Device connector, and/or plug the Device into another outlet.</p>
No three green blinks on powering on, the status LED flashes red. Device does not appear in the list of external devices on the plotter. No data comes from the Device.	<p><b>1. Loose connection in the data circuit.</b> Apply contact cleaner spray to the Device connector, and/or plug the Device into another outlet.</p> <p><b>2. NMEA 2000 network problems.</b> The network segment is not connected to the plotter, or some terminator(s) are missing in the network. Plug another device into the selected connector, and make sure it appears in the list of devices on the plotter.</p>
Missing, unstable or inaccurate current/voltage readings.	<p><b>1. Loose connection in the monitored circuit.</b> Check the connections, apply contact cleaner spray where necessary.</p> <p><b>2. Improper wiring.</b> Double check connected circuits, particularly for having a common ground wire connected to the Device's GND terminal. Refer to Chapter II.</p>
No current/voltage data on a chartplotter	<p><b>1. Incompatible chartplotter.</b> Your chartplotter does not support PGN 127508 nor PGN 127751. Check for a firmware update for your MFD, or check whether it supports CZone protocol.</p>

<b>Issue</b>	<b>Possible causes and solutions</b>
Digital switching rules do not work as expected	<ol style="list-style-type: none"><li data-bbox="373 148 1113 197"><b>1. Wrong bank number.</b> Check and match bank numbers across connected devices.</li><li data-bbox="373 210 1113 260"><b>2. Incorrect settings or rules.</b> Check Device settings and active rules with Can Log Viewer (see Chapter V.1).</li></ol>

## Appendix B. NMEA 2000 Messages

Message name	PGN #	Receive	Transmit	Transmission interval, sec	Note
Acknowledge	59392	Yes	Yes	—	
ISO Request	59904	Yes	Yes	—	
ISO Transport Protocol (DT)	60160	Yes	—	—	
ISO Transport Protocol (CM)	60416	Yes	—	—	
ISO Address Claim	60928	Yes	Yes	—	
ISO Commanded Address	65240	Yes	—	—	
NMEA Group Function	126208	Yes	Yes	—	
PGN List	126464	—	Yes	—	
Heartbeat	126993	—	Yes	60	1
Product Information	126996	—	Yes	—	
Configuration Information	126998	—	Yes	—	
Binary Status Report	127501	Yes	Yes	10	1
Switch Bank Control	127502	Yes	Yes	—	
DC Detailed Status	127506	—	Yes	( 1.5 )	1, 4
Battery Status	127508	—	Yes	1.5	1, 2
DC Voltage / Current	127751	—	Yes	( 1.5 )	1, 3

*Note 1: You can set the transmission interval for this message (see Chapter V).*

*Note 2: Supports complex request messages by Battery Instance.*

*Note 3: Disabled by default, set non-zero interval with YD:PGN to enable.*

*Note 4: Transmitted only for channels with the type (YD:TYPE) other than UNKNOWN.*

## Appendix C. LEDs, Connectors and Terminals

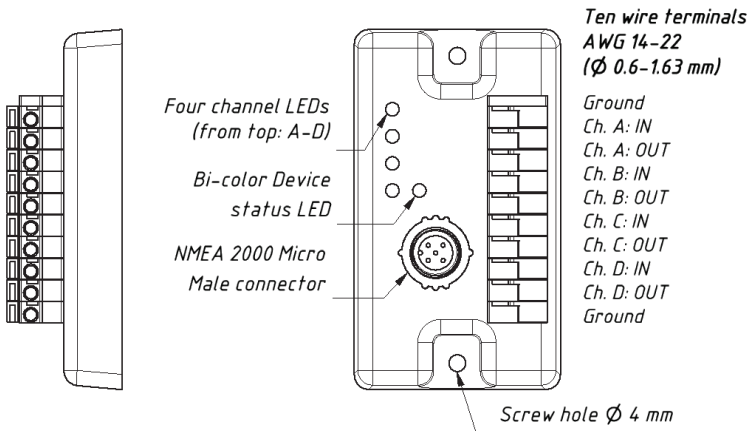


Figure 1. Diagram of the Run Indicator YDRI-04



