User Manual

Revision 1.012
English

Modbus Master / Ethernet - Converter

(Order Code: HD67506 – HD67506M)

For Website information:
www.adfweb.com?Product=HD67506
www.adfweb.com?Product=HD67506M

For Price information:
www.adfweb.com?Price=HD67506
www.adfweb.com?Price=HD67506M

Benefits and Main Features:

⊕ Mountable on Rail DIN

⊕ TCP/UDP protocols changeable with software

⊕ Easy to use software configuration

⊕ Temperature range: -40°C/+85°C (-40°F/+185°F)

HD67506   HD67506M

For others Converter / Adapter:
Converters / Adapters
See also the following links:
www.adfweb.com?Product=HD67118 (Modbus RTU Slave)
www.adfweb.com?Product=HD67119 (Modbus TCP Master)
www.adfweb.com?Product=HD67120 (Modbus TCP Slave)

For others Gateways / Bridges:
Modbus RTU Master / Slave
See also the following links:
www.adfweb.com?Product=HD67001 (CANopen)
www.adfweb.com?Product=HD67502 (CANopen)
www.adfweb.com?Product=HD67011 (CAN bus)
www.adfweb.com?Product=HD67012 (CAN bus)

Modbus TCP Client to Modbus RTU Slave
See also the following link:

www.adfweb.com?Product=HD67510
Do you have an your customer protocol?

See the following link:
www.adfweb.com?Product=HD67003

Do you need to choose a device? do you want help?
Ask it to the following link:
www.adfweb.com?Cmd=helpme

INDEX:

UPDATED DOCUMENTATION:

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- ↓ Updated
- ↓ Related to the product you own

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With this "Document Code" go to web page www.adfweb.com/download/ and search for the corresponding code on the page. Click on the proper "Document Code" and download the updates.

REVISION LIST:

Revision	Date	Author	Chapter	Description
1.000	28/10/2008	Fl	All	First release version
1.010	10/11/2010	Fl	All	Software changed (v1.000)
1.011	07/02/2013	Nt	All	Added new chapters
1.012	28/02/2014	Fl	All	Revision

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SECURITY ALERT:

GENERAL INFORMATION
To ensure safe operation, the device must be operated according to the instructions in the manual. When using the device, legal and safety regulation are required for each individual application. The same applies also when using accessories.

INTENDED USE
Machines and systems must be designed so the faulty conditions do not lead to a dangerous situation for the operator (i.e. independent limit switches, mechanical interlocks, etc.).

QUALIFIED PERSONNEL
The device can be used only by qualified personnel, strictly in accordance with the specifications.
Qualified personnel are persons who are familiar with the installation, assembly, commissioning and operation of this equipment and who have appropriate qualifications for their job.

RESIDUAL RISKS
The device is state-of-the-art and is safe. The instruments can represent a potential hazard if they are inappropriately installed and operated by untrained personnel. These instructions refer to residual risks with the following symbol:

⚠️ This symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

CE CONFORMITY
The declaration is made by our company. You can send an email to support@adfweb.com or give us a call if you need it.

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CONNECTION SCHEME:

Connector1:
Power Supply

0V = Ground
+V = Positive wire

12 VAC (min 8v ; max 19v) – 4 VA
24 VDC (min 8v ; max 35v) – 4 Watt

Jumper1:
Termination ModBus Line

▣▣ = Open   ▣▣ = 120 ohm

Connector2:
ModBus on RS485
(Isolated Port)

S = Shield (to Isolated Ground)
B = Negative wire
A = Positive wire

0V +V   S B A

Led4:
Green
Boot Mode: Blink quickly;
Normal Mode: RUN

Connector4:
Ethernet Port
(RJ45 Plug)

Connector3:
Port RS232 (D-SUB9-Male)
(Isolated Port)

PIN2 = RX
PIN3 = TX
PIN5 = Shield (to Isolated Ground)

Used for:
- Programmation Port
- Modbus on RS232

To connect the device to the COM port of a PC in order to set it you have to use the programming cable AC34107.

Or a cable made as showed here:

CABLE   CABLE
Side A   Side B
FEM   FEM

Led3:
Green
Link Ethernet

Rail DIN Clamp

S -- +   -- +

Led2:
Yellow
Change state when receive a Modbus response

Led1:
Green
Change state when send a Modbus request

Jumper2:
Boot mode

▣ = Yes Jumper Boot Mode

▣ = No Jumper Normal Mode

Figure 1: Connection scheme HD67506

![ADFweb logo]

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Jumper2:
Boot mode

= Yes Jumper
Boot Mode

= No Jumper
Normal Mode

Led2:
Green
Change state
when receive a
Modbus response

Jumper1:
Termination ModBus Line

= Open   = 120 ohm

Connector2:
ModBus on RS485
(Isolated Port)

S = Shield (to Isolated Ground)
B = Negative wire
A = Positive wire

Led1:
Yellow
Change state when send a
Modbus request

A B S

Connector3:
Port RS232 (D-SUB9-Male)
(Isolated Port)

PIN2 = RX
PIN3 = TX
PIN5 = Shield (to Isolated Ground)

Used for:
 - Programmation Port
 - Modbus on RS232

To connect the device to the COM port
of a PC in order to set it you have to use
the programming cable AC34107.

Or a cable made as showed here:

-- +

Led4:
Green
Boot Mode:
Blink quickly;
Normal Mode:
RUN

+ -- S

Led3:
Green
Link Ethernet

0V +V

Connector4:
Ethernet Port
(RJ45 Plug)

CABLE
Side A
FEM

CABLE
Side B
FEM

Connector1:
Power Supply

0V = Ground
+V = Positive wire

12 VAC (min 8v ; max 19v) – 4 VA
24 VDC (min 8v ; max 35v) – 4 Watt

Figure 2: Connection scheme for HD67506M

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CHARACTERISTICS:

The configurable ModBus Master / Ethernet Converter allow the following characteristics:

- TCP/UDP Ethernet protocols changeable with software;
- Mountable on 35mm Rail DIN;
- Wide power supply input range: 8…19V AC or 8…35V DC;
- Wide temperature range: -40°C / 85°C [-40°F / +185°F].

CONFIGURATION:

You need Compositor SW67506 software on your PC in order to perform the following:

- Define the parameter of Modbus;
- Define the parameter of Ethernet;
- Update the device.

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POWER SUPPLY:

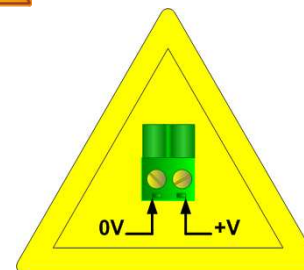The devices can be powered at 8…19V AC and 8…35V DC. For more details see the two tables below.

VAC 〜		VDC ▬▬▬	
Vmin	**Vmax**	**Vmin**	**Vmax**
8V	**19V**	**8V**	**35V**

Consumption at 24V DC:

Device	Consumption [W/VA]
HD67506	4
HD67506M	4

⚠️ **Caution: Not reverse the polarity power**

HD67506   HD67506M

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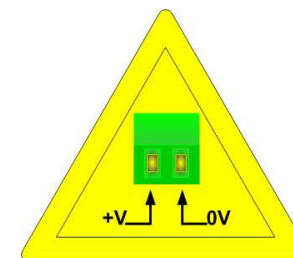
USE OF COMPOSITOR SW67506:

To configure the Converter, use the available software that runs with Windows called SW67506. It is downloadable on the site www.adfweb.com and its operation is described in this document. *(This manual is referenced to the last version of the software present on our web site)*. The software works with MSWindows (2000, XP, Vista, Seven, 8; 32/64bit).
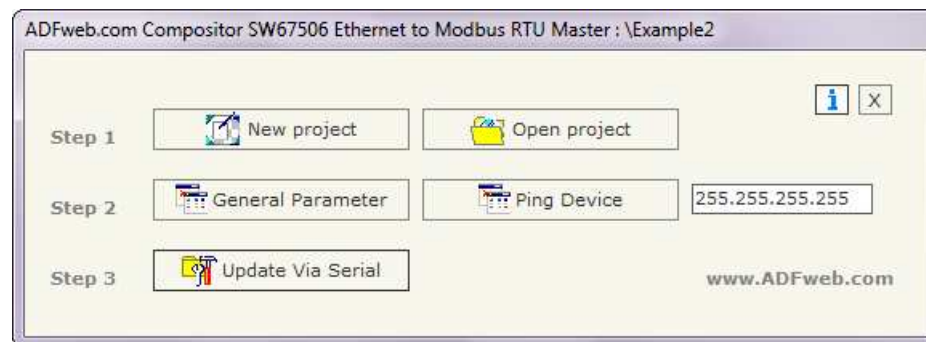
When launching the SW67506 the right window appears (Fig. 3).

Figure 3: Main window for SW67506

NEW PROJECT / OPEN PROJECT:

The "**New Project**" button creates the folder which contains the entire device configuration.
A device configuration can also be imported and exported:

- To clone the configurations of a orogrammable ModBus / Ethernet Converterin order to configure another device in the same manner, it is necessary to maintain the folder and all its contents;
- To clone a project in order to obtain a different version of the project, it is sufficient to duplicate the project folder with another name and open the new folder with the button "**Open Project**".

When a new project is created or an existent project is open, it will be possible to access the various configuration section of the Software.

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GENERAL PARAMETER:

This section define the fundamental communication parameter of two buses, Modbus and Ethernet.

By pressing the "**General Parameter**" button from the main window for SW67506 (Fig. 3) the window "General Paramater" appears (Fig. 4).

The window is divided in two section: one for the Ethernet and the other for the Modbus (Serial).

The means of the fields for Ethernet are:
- In the field "**IP ADDRESS**" insert the IP address;
- In the field "**SUBNET Mask**" insert the Subnet Mask;
- In field "**Gateway**" insert the Defualt Gateway IP address for use the gateway in WAN or Internet. For enable this feature is necessary to check the Gateway option;
- In the field "**Port**" insert the number of port;
- If the field "**TCP**" is checked the Ethernet protocol used is the TCP, otherwise if the field "**UDP**" is checked the Ethernet protocol used is the UDP.

The means of the fields for Serial are:
- In the field "**Baud rate**" the baudrate for the Serial is defined;
- In the field "**Parity**" the parity for the Serial is defined;
- In the field "**Timeout (ms)**" there is the maximum time that the device attends for the answer from the Slave interrogated.
- If the field "**RS232**" is checked, the serial line in use is the RS232; otherwise if field "**RS485**" is checked, the serial line in use is the RS485;
- In the subsection "Protocol" it is possible to select the protocol to use in Modbus line from the following:
  - **Modbus RTU**;
  - **Modbus ASCII**;
  - **JBUS**;
  - **Binary**: simple protocol defined by Us, whose functions are described in the document "Simple Protocol" downloadable at www.adfweb.com/download/filefold/Simple_Protocol_ENG.pdf;
  - **ASCII**: simple protocol defined by Us, whose functions are described in the document "Simple Protocol" downloadable at www.adfweb.com/download/filefold/Simple_Protocol_ENG.pdf.
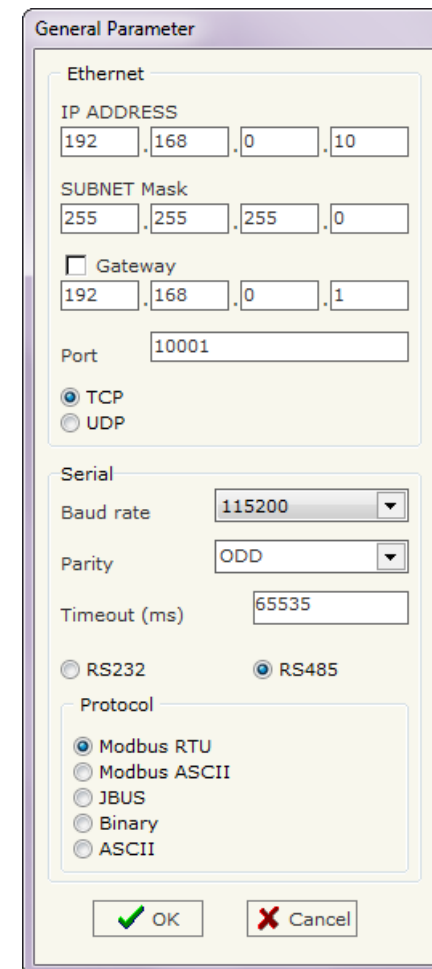

Figure 4: "Set Communication" window

PING DEVICE:

If is necessary to do a Ping on the net, before pressing the "**Ping Device**" button insert a value in the right field and then press the button.

UPDATE DEVICE VIA SERIAL:

Section "**Update Via Serial**" (Fig. 5):

In order to load the parameters or update the firmware in the gateway, follow these instructions:

- Turn off the device;
- Connect the Null Modem cable from your PC to the gateway;
- Insert the Boot Jumper (see the Fig. 1,2 for more info);
- Turn on the device;
- Check the "BOOT Led". It must to blink quickly (Seethe Fig. 1 for more info);
- Select COM port and press the "**Connect**" button;
- Press the "**Next**" button;
- Select operations you want to do. Can select only Firmware or only Project or both;
- Press the "**Execute update firmware**" to start the upload;
- When all the operations are "OK" turn off the device;
- Disconnect the Boot jumper;
- Turn on the device.

At this point the configuration/firmware on the device is correctly updated.

Figure 5: "Update Via Serial" windows

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Note:
When you install a new version of the software, if it is the first time it is better you do the update of the Firmware in the HD67506 or HD67506M device.

Note:
When you receive the device, for the first time, you also have to update the Firmware in the HD67506 or HD67506M device.

⚠ Warning:
If Fig. 6 appears when you try to do the Update try these points before seeking assistance:

→ Check if the serial COM port selected is the correct one;
→ Check if the serial cable is connected between the PC and the device;
→ If you are using a USB↔RS232 converter try with a native COM port or change the converter
→ Try to repeat the operations for the updating;
→ Try with another PC;
→ Try to restart the PC.

Figure 6: "Protection" window

CHARACTERISTICS OF THE CABLES:

ETHERNET:
Linking of Ethernet connector to a HUB must be carried out by a Category 5E cable. The cable has to conform to the T568 norms relative to connections in cat.5 up to 100 Mbps. The length cannot go beyond 100 meters.

Rs232:
The connection from RS232 socket to a serial port (example one from a personal computer) must be made with a Null Modem cable (a serial cable where the pins 2 and 3 are crossed).
It is recommended that the RS232 cable not exceed 15 meters.
The device is provided with a D-sub connector type DE-9 Male (also called DB-9). The cable must use a DE-9 Female connector.

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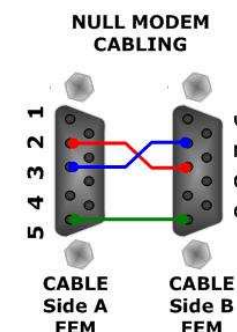
ETHERNET PROTOCOL:

This protocol is able to read and write frames in the ModBus net. This protocol is very simple; you must known only the "Type of Data", the "Device Address" and the "Number of Point". When the device responds the answere is transferred into the Ethernet.

<u>WRITE FRAMES:</u>

The transmission has a fixed structure that consist of seven bytes plus the data.

Byte Number	Description
1	Write Identifier (Write=0x02)
2	Type of Data
3	Device Address
4	Start Address Hi
5	Start Address Lo
6	Number of Point Hi
7	Number of Point Lo
8÷n+1	Data

n="Number of Point *2" if Type of Data is 0x10 or n="(Number of Point+7)/8" if Type of Data is 0x0F

The "Type of Data" (Byte Number 2) can have four values:

- 0x05: Write single Coil Status
- 0x06: Write single Holding Register
- 0x0F: Write multiple Coil Register
- 0x10: Write multiple Holding Register

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The Bytes that composed the respons are these:

Byte Number	Description
1	Status of operation

The "Status of operation" (Byte Number 1) can have these values:

- 0xFF: Ok;
- 0xFE: Different from Write;
- 0xFC: Writing but function different from 5,6,15,16;
- 0xFB: The slave interrogated hasn't replied in the TimeOut time;
- 0xFA: The reply CRC is wrong;
- 0xF9: Returned function is different from the one requested;
- 0xF7: Number of byte less than 9;
- 0xF6: Number of data to wrote is different from 1 or the frame length is wrong if the function is 5,6;
- 0xF5: Number of data to wrote is less than 1 or the frame length is wrong if the function is 15,16;
- 0x03: Illegal data value, the value referenced in the data field is not allowable in the addressed slave location;
- 0x02: Illegal data address, the address referenced in the data field is not an allowable address for the addressed slave device;
- 0x01: Illegal function, the message function received is not an allowable action for the addressed slave.

Examples:

1) We want to write two points with the following features:

- Type of Data: Holding Register; Device Address: 5; Start Address: 0x0115; Number of Point: 2; Data 1: 0x1122; Data 2: 0x3344.
So the string of hexadecimal numbers is:
REQ:[02][10][05][01][15][00][02][11][22][33][44]
RES:[FF]

2) We want to set to 1 the Coil Status at address 0x115:

- Type of Data: Coil Status; Device Address: 5; Start Address: 0x0115; Number of Point: 1; Data 1: 0xFF00.
So the string of hexadecimal numbers is:
REQ:[02][05][05][01][15][00][01][FF][00]
RES:[FF]

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READ FRAMES:

The transmission has a fixed structure that consist of seven byte.

Byte Number	Description
1	Read Identifier (Read=0x01)
2	Type of Data
3	Device Address
4	Start Address Hi
5	Start Address Lo
6	Number of Point Hi
7	Number of Point Lo

The "Type of Data" (Byte Number 2) can have four values:

- 0x01: Coil Status
- 0x02: Input Status
- 0x03: Holding Register
- 0x04: Input Register

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The Bytes that composed the respons are these:

Byte Number	Description
1	Status of operation
2÷n+1	Data

n="Number of Point *2" if Type of Data is 3,4 or n="(Number of Point+7)/8" if Type of Data is 1,2

The "Status of operation" (Byte Number 1) can have these values:

- 0xFF: Ok;
- 0xFE: Different from Read;
- 0xFD: Reading but function different from 1,2,3,4;
- 0xFB: The slave interrogated hasn't replied in the TimeOut time;
- 0xFA: The reply CRC is wrong;
- 0xF9: Returned function is different from the one requested;
- 0xF8: Number of byte different from 7;
- 0x03: Illegal data value, the value referenced in the data field is not allowable in the addressed slave location;
- 0x02: Illegal data address, the address referenced in the data field is not an allowable address for the addressed slave device;
- 0x01: Illegal function, the message function received is not an allowable action for the addressed slave.

Example:

1) We want to read two points with the following features:

- Type of Data: Holding Register; Device Address: 5; Start Address: 0x0115; Number of Point: 2.

So the string of hexadecimal numbers is:
REQ:[01][03][05][01][15][00][02]

The slave respond with two data: the first is 0x1122 and the second is 0x3344.

RES:[FF][11][22][33][44]

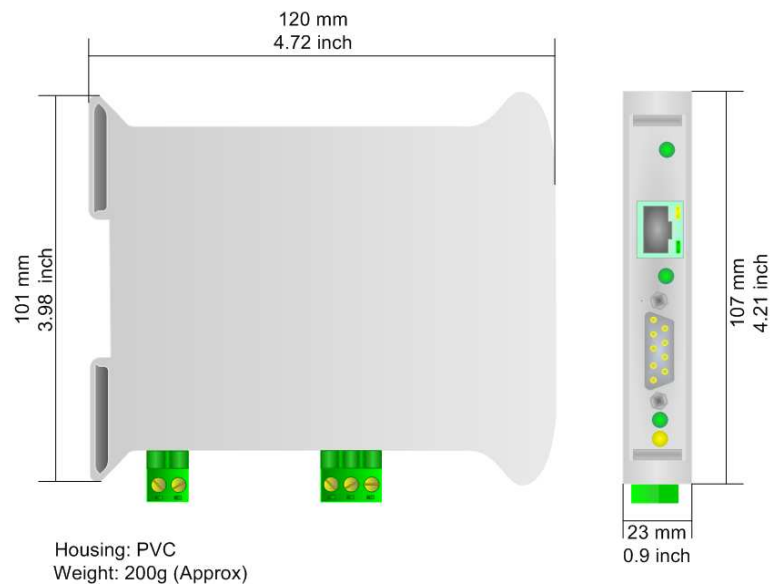*Industrial Electronic Devices*

MECHANICAL DIMENSIONS:

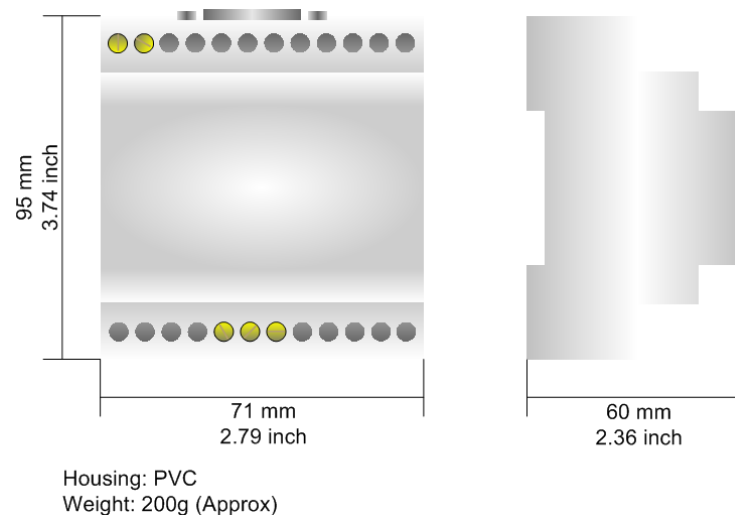*Figure 7: Mechanical dimensions scheme for HD67506*

Figure 8: Mechanical dimensions scheme for HD67506M

ORDER CODE:

Order Code: **HD67506**   -   Modbus Master / Ethernet – Converter

Order Code: **HD67506M**   -   Modbus Master / Ethernet – Converter (different enclosure)

ACCESSORIES:

Order Code: **AC34001**   -   Rail DIN - Power Supply 220/240V AC 50/60Hz – 12 V AC

Order Code: **AC34002**   -   Rail DIN - Power Supply 110V AC 50/60Hz – 12 V AC

Order Code: **AC34104**   -   European Input - Power Supply 230V AC 50Hz – 12 V DC

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Disposal of old electrical and electronic equipment (as in the European Union and other European countries with separate collection systems).

This symbol on the product or on its packaging indicates that this product may not be treated as household rubbish. Instead, it should be taken to an applicable collection point for the recycling of electrical and electronic equipment. If the product is disposed correctly, you will help prevent potential negative environmental factors and impact of human health, which could otherwise be caused by inappropriate disposal. The recycling of materials will help to conserve natural resources. For more information about recycling this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

RESTRICTION OF HAZARDOUS SUBSTANCES DIRECTIVE

The device respects the 2002/95/EC Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (commonly referred to as Restriction of Hazardous Substances Directive or RoHS).

CE MARKING

The product conforms with the essential requirements of the applicable EC directives.

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Otherwise contact us at the address support@adfweb.com

RETURN POLICY:

If while using your product you have any problem and you wish to exchange or repair it, please do the following:

- Obtain a Product Return Number (PRN) from our internet support at www.adfweb.com. Together with the request, you need to provide detailed information about the problem.
- Send the product to the address provided with the PRN, having prepaid the shipping costs (shipment costs billed to us will not be accepted).

If the product is within the warranty of twelve months, it will be repaired or exchanged and returned within three weeks. If the product is no longer under warranty, you will receive a repair estimate.