

User's & Set Up Manual

Controller RFS6000
RF-DC communication station

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The general use and functioning of the controller will be described in this manual.

The exact behavior of the controller depends on the user application that is running. For instructions about applications please consult the documentation of that software.

Please read this manual carefully before using the controller, to maximise the efficiency of this controller.

CONTENTS

| | page |
|--|------|
| INTRODUCTION | 3 |
| 1. THE CONTROLLER RFS6000 | 4 |
| 1.1 Unpacking | 4 |
| 1.2 Antenna assembly | 4 |
| 1.3 Position | 4 |
| 1.4 Detailed view | 4 |
| 1.5 Handling precautions | 5 |
| 2. INSTALLATION AND STARTUP | 6 |
| 2.1 Power supply | 6 |
| 2.2 Connect to computer | 6 |
| 3. OPERATION OF THE CONTROLLER | 7 |
| 4. INSTALL SOFTWARE | 8 |
| 5. TECHNICAL SPECIFICATIONS | 10 |
| 5.1 Electrical specifications | 10 |
| 5.2 Transceiver specifications | 10 |
| 5.3 Functionality | 10 |
| 5.4 Environmental specifications | 10 |
| 5.5 Physical specifications | 10 |
| 6. TROUBLESHOOTING | 11 |
| 7. PRODUCT ORDERING INFORMATION | 11 |
| APPENDIX | 12 |
| A. PINOUT DESCRIPTION | 12 |
| B. DESCRIPTION FIRMWARE | 13 |

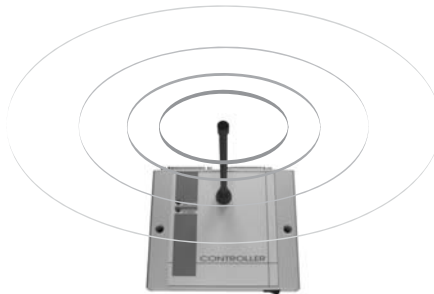
INTRODUCTION

The RFS6000 is a RF network controller for radio frequency communication with data collectors of Opticon (hereafter called RF device).

The controller is equipped with a built in radio transceiver for short range communication. It communicates with compatible portable Opticon devices.

The controller normally is provided with firmware. To allow updates of the firmware the controller is equipped with flash-ROM, where data can be erased and data of new installed software can be stored.

Data transmission to a host system can be achieved by the RS232 interface. The controller is prepared for use in a RS485 network structure.



1

THE CONTROLLER RFS6000

1.1 UNPACKING

Before you begin your installation, be certain that you have all the items listed below:

Remove the packaging and check for any physical damage. We recommend you to save all packaging: it should be used whenever you need to transport your terminal for service. Damage caused by improper repackaging is not covered by the warranty.

RFS6000

package contents:

The RFS 6000 controller



Antenna



ADDITIONALS FOR RFS6000:

Serial cable RS232



Power supply



1.2 ANTENNA ASSEMBLY

Before operation first screw the antenna into the applicable hole of the controller by hand.

! Use only the antenna as supplied by Opticon. Antenna's with other specifications are not allowed.

! Fix the antenna handtight. Screwing the antenna too tight may cause serious damage to the antenna.

1.3 POSITION

The controller operates with the maximum result if it can operate in free space. Place the controller under the following conditions:

- Check if the antenna is properly fixed.
- Place the controller at a central point, preferably as high as possible.
- Avoid objects (for example metal objects) in the near area that may reflect or obstruct the radiation of the electromagnetic field.

1.4 DETAILED VIEW

- 1. Antenna**
short range antenna for radio frequency communication
- 2. Power switch**
- 3. Power LED (red)**
ON: Power is ON
blinking at start: ready for download
continous blinking: no software detected
OFF: Power is OFF
- 4. Decode LED (green)**
blinking: data received from Opticon device
OFF: no data

1.5 HANDLING PRECAUTIONS

To avoid malfunctioning and to ensure years of trouble free operation, pay attention to the following:

General use



Do not use or leave the product in extremely hot areas - like direct sunlight, near a heater, or in a car - or in areas that are very cold, humid, moistured or dusty.



Do not expose the product to rain or water splash



Do not leave the terminal in an area where static charge is accumulated, or near devices where electromagnetic emission is generated.

General cleaning instructions

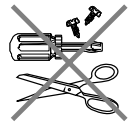


Clean the exterior by wiping it with a soft, dry cloth. Do not use much water.



Do not use thinner, white spirit or other solvents.

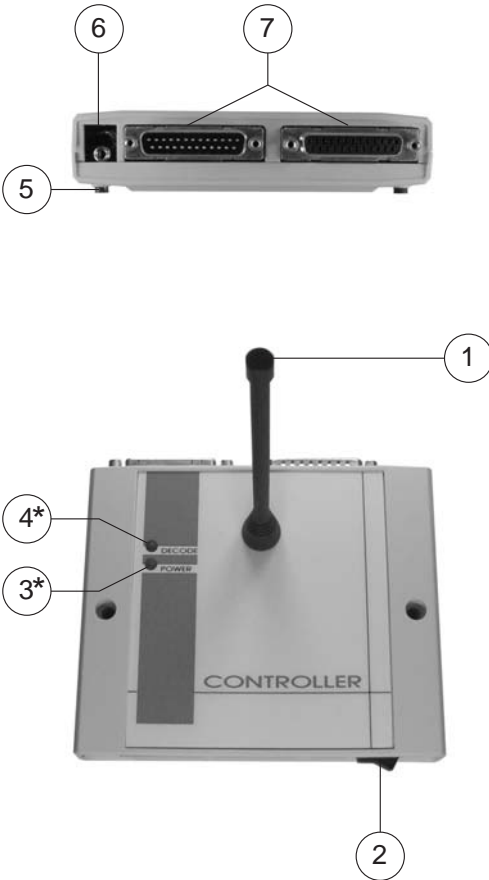
Maintenance



There are no user-serviceable parts inside the controller. So do not try to take it apart.

The manufacturer will not be liable for any damage caused by the customer.

In case of malfunction that can not be solved by the trouble-shooting instructions in this manual, please consult your supplier or our service department.



5. Cushion pads

4 pads for placement on a counter

6. DC input socket

input for 5V adaptor of Opticon

7. RS 232 / RS485 socket

one DB 25 male socket and one DB 25 female socket is provided for connection to PC or to other RFS6000 controller

2

INSTALLATION AND STARTUP

This chapter will provide instructions on how to install the controller.

After the installation the terminal is ready for receiving your application program. Please refer to the documentation of the used software.

! Exercise caution at all times when working with AC powered equipment. Turn off your host computer before installation.

! Do not operate these devices before reading this chapter. Consult Appendix B for troubleshooting information if you experience difficulties after the installation.

! Because of the special pin-out of the connectors, use the cables supplied by the manufacturer. When you need another cable for a certain device, that is not supplied, contact your supplier to purchase the right cable. In case another cable is used, take notice of the pin-out specifications further in this manual.

2.1 POWER SUPPLY

The controller is powered directly from a DC voltage. Herefor, use the 5V adapter as supplied.

1. Plug the rounded end of the power cord on the back side of the controller.
2. Plug the adapter into an 220V AC outlet.

2.2 CONNECT TO COMPUTER

Installing controller in serial mode:
(see figure below)

1. Check if the power supply is connected.
2. Plug the DB25 connector of the RS232 interface cable on the back side of the controller.
3. Plug the DB9 connector of the RS232 interface cable into the serial port of the host computer.

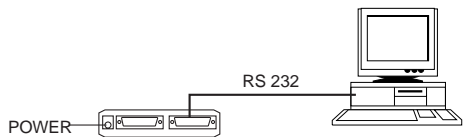


Figure 2.2.1 Serial mode

3

OPERATION OF THE CONTROLLER

The RF network between the RFS6000 and the RF devices of Opticon is specially designed for data collection. In such applications the data is transmitted in small chunks and gathered at the host. The communication between the RF device and the host is achieved by short messages sent through the RFS6000 controller. Examples of short messages are scanned data from one RF device (e.g. barcode) sent to the host computer, and responses related to the data (e.g. name, price) sent from the host computer to the portable RF device.

Reliable communication between the RF devices and the controller is assured by the protocol that is implemented in the controller.

For the communication between controller and host firmware is available. The firmware supports 2 protocols.

Free running protocol:

This protocol is designed for using the controller without the need of software amendments on the PC. It supports one-way communication only, meaning that a return message is sent by the controller to the host only, the host can not send messages to the RF devices.

Two-way protocol:

This protocol is based on the ANSI X3.28 standard. Using this protocol the host can also send return messages to the RF devices. Opticon has a DLL available that allows easy development with tools like delphi and C++ Builder (Borland products).

Description of the protocol and communication settings are stated in Appendix B.

For installation and setup of the firmware, see chapter 4.

4 INSTALL SOFTWARE

To allow easy updates of firmware, the controller is equipped with a flash-ROM. This ROM can be erased, and then the user can install new firmware.

Install needs

To install Opticon firmware successfully on the controller you need:

- PC with windows95/98/2000 environment
- Opticon installation software 'apload' version EAGV0106 or higher.
- Opticon software for RFS6000 version IBBV0102 or higher.

The program 'apload' can be obtained from the Opticon internet site or your local dealer.

Install notes

Firmware loading settings:

Only the COM port and software needs to be set in 'apload'. Other details like baudrate, number of databits, etc. are irrelevant for loading firmware to RFS6000.

Installation failure:

The firmware installation will not affect the boot loader program in the RFS6000. When the installation fails, simply switch the RFS6000 off and back on, and repeat the procedure.

Downloading and installing sequence:

- Connect the RFS6000 to a PC that runs windows95/98/2000.
- Make sure the RFS6000 is switched off.
- Start the program 'apload' on the PC. Check the version. This should be EAGV0106 or higher.
- Make sure that the right COM port is selected in 'apload'. To do this, select menu item 'Settings' - 'Port' and select the port whereto the controller is connected.
- Select the menu item 'File' - 'Download'. A dialog box will pop-up where you can select the software for the RFS6000. Wait for pressing the open button. Switch the RFS6000 on. The unit will start blinking the red LED. While the red LED is still blinking return to the dialog box on the PC and select the 'Open' button. The software will start the downloading automatically.
Note!
When the red LED already lights continuously, downloading is not possible anymore. To return to download mode simply switch off the controller and then switch back on.
- Check the progress bar of 'apload' to reach 100%. At that moment the software is installed. The unit will restart automatically, and starts running the newly installed firmware.

Setup notes:

For the setup of the controller the user need the program 'SetupRFS'. This can be obtained from the Opticon internet site or your local dealer. The program is also available in Opticon's C-development kit for handheld terminals.

Use this program to setup the RFS6000, selecting free-running or X3.28 protocol, and setting communication parameters.

You can also use SetupRFS to set the base station address. For each RFS6000 in a group of RF networks that are within receiving range of one another, different base station addresses should be set, to prevent undefined behaviour caused by mutual interference. The RF device must be setup using the corresponding base station address of the applicable station, so that it will communicate only with the required RFS6000. To setup the RF device, consult the manual of the software as supplied with your RF device.

Setup sequence using 'SetupRFS':

- Make sure no programs are running (such as appload) that are using the COM port to which the RFS 6000 is connected.
- Start the SetupRFS program
- In the "settings" menu, select the COM port to which the RFS 6000 is connected.
- Select the desired configuration.
- Switch on the RFS6000, and while its power LED is still flashing, press the "store settings" button in the SetupRFS window.
- If an error message is shown, switch the RFS6000 off and repeat the previous step.

5 TECHNICAL SPECIFICATIONS

5.1 Electrical specifications

- Voltage requirement 5V \pm 5 %
- Current consumption Typical use 100 mA
 Max. 180 mA

5.2 Transceiver specifications

- Frequency 433.92 MHz license free band
- Transceiving system RF-DC
aerial antenna system
- Operation range up to 50 meters distance from
antenna, depending on
environment characteristics
- ERP max. 10 mW
(effective radiated power)
- Transmission speed up to 38400 bits/s
(practical transmission speed
depends on application)

5.3 Functionality

- Memory 32 KByte ROM
 128 KByte FlashROM
for program storage
 32 KByte RAM
- Microprocessor 16-bit
- Firmware updates may be downloaded
via RS232 cable
- Interfaces supported RS232
 RS485

5.4 Environmental specifications

- Temperature 0 - +55 °C in operation
 -40 - +70 °C in storage
- Emission According to EN50081, part 1
- Immunity According to EN50082, part 1
- R&TTE conform I-ETS 300-220

5.5 Physical specifications

- Dimensions 125 x 140 x 180 mm
(l x w x h) (incl. antenna)
- Weight 260 g
- Standard cable DB25 male / DB9 female

6 TROUBLE SHOOTING

This chapter contains information to solve problems you may encounter when using the controller.

It is possible that you may not solve the problems, despite our descriptions. In this case, please contact your supplier or the technical support department of Opticon.

The controller does not respond to PC.

 *The red power LED is off.*

- Check if the power supply is properly connected. If necessary reconnect.

 *The red power LED is on.*

- Check if the cables are properly connected. If necessary reconnect.
- Check if the baudrate in the application corresponds with the baudrate of the PC.

 *The red power LED blinks continuously.*

- The controller does not detect software. Software might not be downloaded or wrong software might be downloaded. Download the right application from the PC to the controller.

Data from the communicating device is not received.

 *The green decode LED is off.*

- Move the communicating device closer to the antenna until you entered the field of the antenna.

7 PRODUCT ORDERING INFORMATION

Controller

- RFS 6000 RF controller A6020000010

Powersupply

- 5V power supply A50500N0010

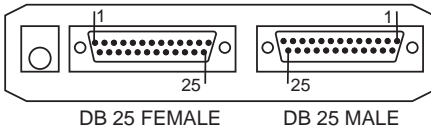
Connection cables

- RS 232 cable C40120N0170
DB25 male / DB 9 female

A

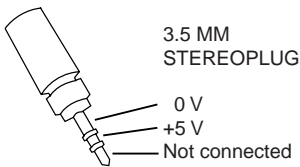
APPENDIX PINOUT

Pinout description of connectors of the controller which can be used for connection:



| PIN | IN/OUT | FUNCTION |
|---------|----------|---------------|
| 1 | - | FRAME GROUND |
| 2 | OUT | RS232 TxD |
| 3 | IN | RS232 RxD |
| 4 | OUT | RS232 RTS |
| 5 | IN | RS232 CTS |
| 7 | - | SIGNAL GROUND |
| 9 / 11 | IN / OUT | RS485 Tx/Rx + |
| 10 / 12 | IN / OUT | RS485 Tx/Rx - |

Pinout description of the 5 V power plug:



B**APPENDIX
DESCRIPTION
FIRMWARE****Firmware Version IBBxxxx.S2**

(xxxxx denotes version, e.g. V0102 = version 1.02 or higher)

| | |
|----------------------------------|---|
| Communication parameters: | Baudrate 115200 8 databits, 1 stopbit, no parity bit |
| Protocol: | Language: ANSI X3.28 standard Type: select type using SetupRFS program |
| Return messages: | host can send return messages to RF devices |

Description:

With this protocol, the host must always send a response to the RFS6000 when it receives a message from the RF device. The response may contain useful data relating to the received message. The host is only allowed to send a message in response to a message from the RF device.*

To be able to address a specific RF device in the network, a 3-byte header precedes the message. The length of a message (including the header) is variable, but never exceeds 256 bytes. A message looks like this:

<RF device address><Message type><Sequence number>data

For transmission and response the same protocol is used, however the roles of sender and receiver are reversed. The 3 byte header of the response message must be identical to that of the corresponding received message.

* Note: If the application requires special messages to be sent to the RF device that are not initiated by an action of the user, the RF device could be programmed to regularly send empty messages to ask for these messages.

Transmit a message from RF-device to host:

Sender = RFS6000

Receiver = Host

Transmit a message Host to RF-device:

Sender = Host

Receiver = RFS6000

| | |
|-------------------------------------|---|
| -> <ENQ> | Sender first sends an enquiry character to indicate that it wants to send a message |
| <ACK> <- | Receiver responds that it is ready to receive the message |
| -> <DLE><STX> | Sender sends a 'start of transmission' sequence. |
| -> ...message... | Sender sends the message, with the format as described above. When a byte in the message is equal to DLE, an extra DLE is sent, to indicate that this DLE byte is part of the data. |
| -> <DLE><ETX> | Sender sends a 'end of transmission' sequence. |
| -> <BCC> | Sender sends a 'block check character'. This byte is the logical X-OR over all the bytes, starting with the <DLE><STX> sequence. |
| <- <ACK> | Receiver has to respond with ACK, if the message was received. (the BCC is found to be correct) |
| <- <NAK> | Receiver has to respond with NAK, if the message was not received correctly. (the BCC is found to be incorrect) |

| | |
|-------------------------|--|
| Protocol: | Type: free running (select type using SetupRFS program) |
| Return messages: | The string sent by the portable RF device is simply forwarded to the host. Any data sent by the host to the RFS6000 is discarded. |
| Description: | not applicable |

OPTICON

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