

Interfacing Campbell Scientific Dataloggers to the ZephIR 300

Programming and Configuration

QUICK DEPLOY GUIDE



ZephIR 300 Connector Panel



CR1000 With NL115

Caution!

The Campbell Scientific Datalogger is a rugged instrument and will give years of reliable service if a few precautions are observed:

- Protect from over-voltage
- Protect from water
- Protect from ESD
- Disuse accelerates depletion of the internal battery, which backs up several functions. The internal battery will be depleted in three years or less if the datalogger is left on the shelf. When the datalogger is continuously used, the internal battery may last up to 10 years or more.
- Maintain a level of calibration appropriate to the application.

The ZephIR 300 is a Class 1 Laser Product.

Class 1 Laser Product

Laser Wavelength: 1560 to 1565 nm Peak Power: <1 W (70 mm aperture)



Introduction

Campbell Scientific CR6, CR800, CR850, CR1000, CR1000X, and CR3000 dataloggers can be used to obtain data from the ZephIR 300. The dataloggers use the Modbus protocol to poll the ZephIR 300 for 10-minute averaged data.

Some of the benefits of using a Campbell Scientific datalogger with a ZephIR 300 Lidar are:

- Lidar data in standard Campbell Scientific format
- Flexible data transfer options through Campbell Scientific equipment
- Lidar data compatible with existing systems that use Campbell Scientific LoggerNet software
- Data configurability with programmable Campbell Scientific dataloggers
- Lidar-to-meteorological tower communications and data concentration
- Single-point data gateway for Lidar data and data from other devices
- Customizable DNP3 or Modbus maps to meet the requirements of SCADA systems

ZephIR 300 Compatibility

The datalogger must be programmed to enable communications with the ZephIR 300. This guide describes the steps for setting up a CR1000 datalogger to communicate and collect data from a ZephIR 300 Lidar.

The ZephIR 300 must be running firmware version 1.3 or later to be compatible with the Modbus protocol and to be able to send data to Campbell Scientific dataloggers. Earlier versions of ZephIR firmware may be compatible but will require different datalogger programs than the programs described in this manual.



LoggerNet Device Configuration Utility (DevConFig)



Datalogger Programs

Template programs are available to facilitate datalogger programming for datalogger-to-ZephIR 300 communications.

The template programs contain code specific for ZephIR 300 communications. Code can be added to the existing template programs to measure met tower instruments, set up Modbus or DNP3 maps to make data available to SCADA systems, send emails, FTP data, etc. To obtain copies of the template programs, please contact Campbell Scientific.

Throughout the remainder of this guide, program and configuration examples will be shown for the CR1000 datalogger. Equivalent programming templates are available for the CR6, CR800, CR850, CR1000X, and CR3000 dataloggers.

There are three files that are loaded onto the datalogger to set up ZephIR 300 to datalogger communications:

Interface Template

This program is used to poll the ZephIR 300 for 10-minute averaged data. Code can be added to this template program to measure and store mast instrumentation data.

• Flag Convert File

The interface template program calls on this file to run a subroutine that converts ZephIR 300 information and status flag data to readable text for storage with the 10-minute averaged data.

• Discovery Template

This program is run on the datalogger to establish initial communications with the ZephIR 300 and to learn the ZephIR 300 configuration (heights being measured). This file is optional and is used to automate the process of setting up the datalogger to poll the ZephIR 300 for the heights that the ZephIR 300 is configured to measure.

Software Configuration and Programming

A. Create a USR drive on the CR1000 Datalogger

1. Connect to the CR1000 datalogger using Device Configuration Utility



2. Select the Settings Editor tab

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CR 10X		
CR 10X-PB		Serial Number
CR 10X-TD		
CR200 Series		Station Name
CR23X		
CR23X-PB	=	PakBus Address
CR23X-TD		
CR3000		Security Level 1
CR 5000		
CR510		Security Level 2
CR 510-PB		
CR510-TD		Security Level 3
CR310 TD		
CR000 Selles		UTC Offset
		-1
Datalogging Sensor		Is Router
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NL200		
NL240	+	
Communication Port		
COM1		
·	-	
Use IP Connection		
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115200 🔻		I

3. Scroll down until you find the USR: Drive Size setting. Enter **30000** in the data entry field and then click the **Apply** button at the bottom of the window. After the settings are applied *Device Configuration Utility* can be closed. *NOTE:* A larger USR drive size may be needed for larger programs.

Ele Language Options Help Device Type Deployment Settings Editor Camera Current Settings Editor Datalogger Current Settings Editor CR10X Routes CR10X+PB Routes CR20X Series Routes CR23X+PB Rate CR23X+PB Rate CR3000 Files Manager CR3000 Routes CR510 Include File Name CR500 RS222 Always On Name RS222 Always On Name RS222 Hardware Handshaking Buffer Size 0 RS222 Hardware Handshaking Timeout 0 RS222 Hardware Handshaking Timeout 0 Image: State Communication Port Communication Port <th>Device Configuration Utility 2.0</th> <th>3 Off-line Mode</th>	Device Configuration Utility 2.0	3 Off-line Mode
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B. Establishing Communications with ZephIR_Discovery_Template.cr1

 Connect to the CR1000 using the *Connect* screen in *LoggerNet* and click the **File Control** button at the top of the Connect screen. The *File Control* window will open as shown below. For more information on setting up a connection to the CR1000 using *LoggerNet*, see the CR1000 Manual.

File Control: De	esk_IP				Classes	
5 <u>S</u> end	🥌 <u>F</u> ormat	R <u>e</u> fr	esh <u>R</u> etriev	re R <u>u</u> n Options	<u>D</u> elete	S <u>t</u> op
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Z Set Run Option	ns on Send					
files						

- With the *File Control* window now open, select the USR Drive and click the **Send** button. Browse to where the **Template Program** file (See Section 3) is located, select the file, and then click the **Open** button.
- Clear the Run Now box and check the Run On Power-up box. Click the OK button.

Select Run Options
ZephIR_Interface_Template_10min.cr1
Run Now
Preserve data if no table changed
Delete associated data tables created by: ZephIR_Discovery_Template_Rev1.cr1
📝 Run On Power-up
OK Cancel <u>H</u> elp

- 4. With the *File Control* window still open, select the USR Drive and click the **Send** button. Browse to where the *Flag Convert* file is located, select the file, and then click the **Open** button.
- 5. Clear the **Run Now** box. Click the **OK** button.
- 6.After the *Interface* and *Flag Convert* files have been sent, close the *File Control* window.
- 7. Open the **Discovery Template** file in the *CRBasic Editor*. In the *ZephIR_Discovery_Template.cr1* file, there is an *IP_Address* constant defined near the beginning of the program. Enter the **IP address** of the ZephIR 300 between the quotation marks.

CRBasic Editor - [ZephIR_Discovery_Template.cr1 for the CR1000]						
🔶 <u>F</u> ile <u>E</u> dit <u>V</u> iew <u>S</u> ea	arch Com <u>p</u> ile <u>T</u> emplate <u>I</u> nstruction <u>G</u> oto <u>W</u> indow T <u>o</u>					
🖹 🚖 🗟 🖬 🗟	🗳 🖓 📓 🛐 😭 🏷 🎾 🎘 🖓 🖉 📽 💷 📉					
'CR1000 Series Datal	ogger					
'Program written by Paul Smart						
'Program polls ZephIR 300 for configuration data						
Dublic Press bath	-14					
Public Flemp, Datt volt						
Public Num Heights						
Public ZenbIR ID As Boolean						
Public Handle As Long						
Public ZephIR String1 As String *1000						
Public ZephIR String2 As String *1000						
Public ZephIR String3 As String *1000						
Public Socket, Result						
Const IP_Address = "10.10.5.22"						
'Main Program						
BeginProg						
Scan (1, Sec, 5, 0)						
'Attempt to open socket for communication with ZephIR						
Socket = TCPOpen(IP_Address, 502, 1)						
'Modbusmaster instruction to get data from ZephIR						
modbusmaster(Result, Socket, 115200, 1, 3, Heights(1), 8201, 12, 1, 50, 0)						
<						
Line: 15 Col: 21	C:\Users\paul.smart.CAMPBELLSCI\Documents\Projects\ZephIF					

8. Save and compile the *ZephIR_Discovery_Template.cr1* file.

9. On the *Connect* screen, click the **Send** button.

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us File Control Num Display Graphs Ports & Flags	Clocks
Value	Adjusted Server Date/Time 10/26/2012 2:32:47 PM Station Date/Time 10/26/2012 8:32:19 PM Check Set Pause Clock Update Program ZephIR_Discovery_Template_Rev1 Send Betrieve Notes

- 10. Browse to where the *ZephIR_Discovery_Template.cr1* file is located, select the file, and then click **Open**.
- 11. After the CR1000 has compiled the Discovery Program, it will attempt to open a TCP socket with the ZephIR 300 and communicate with it via the Modbus over TCP protocol.

Upon successful communication with the ZephIR 300, the CR1000 will automatically create a configuration file on the USR drive called *ZephIR_Config.cr1*. This file is created based on the settings read from the ZephIR 300. The file documents the heights, aw well as the number of heights, that the ZephIR 300 is configured to measure.

Important Note: If the configuration of the ZephIR 300 is changed, the Discovery Program should be run again after all data is collected from the datalogger.

The CR1000 automatically compiles and runs the *Interface Template* file that was previously loaded on the USR drive of the CR1000 datalogger. The *Interface template* file then polls the ZephIR 300 on a regular interval to obtain the 10-minute averaged data.

Note: The ZephIR 300 can be configured to measure a maximum of 10 heights. However, a reference height of 38 m is always measured. The wind speed data at this height will be reported back to the datalogger and recorded in the final storage table.

C. Customizing the Template Files

Code can be added to the *Interface Template* program using the *CRBasic Editor*. Common functionality that is added is reading and storing data from cup anemometers, wind vanes, temperature and relative humidity probes, barometric pressure sensors, etc.

For assistance in customizing the programs running on Campbell Scientific dataloggers, please contact Campbell Scientific.