Remote monitoring of Crouzet Millenium 3
Using Netbiter EasyConnect EC220 & Netbiter Argos
History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Description</th>
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<tr>
<td>1.11</td>
<td>2012-09-26</td>
<td>Typos</td>
<td>SDA</td>
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<tr>
<td>1.10</td>
<td>2013-05-13</td>
<td>Updated with new template</td>
<td>SDA</td>
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<tr>
<td>1.02</td>
<td>2011-10-04</td>
<td>Minor updates, terminology</td>
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<tr>
<td>1.01</td>
<td>2011-09-22</td>
<td>Added Millenium Config</td>
<td>ANST</td>
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<tr>
<td>1.00</td>
<td>2011-09-13</td>
<td>First release</td>
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1 Requirements

The following items are required to perform the steps in this application note.

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<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netbiter EasyConnect EC220</td>
<td>Part number: NB1000</td>
</tr>
<tr>
<td>Netbiter Argos subscription</td>
<td>Free or Standard</td>
</tr>
<tr>
<td>Mobile SIM Card (GPRS enabled)</td>
<td></td>
</tr>
<tr>
<td>Crouzet Millenium 3</td>
<td>Supplied by your local Crouzet dealer</td>
</tr>
<tr>
<td>Netbiter – Millenium connection cable</td>
<td>Part number: 50010830</td>
</tr>
<tr>
<td>Web browser and Internet access</td>
<td></td>
</tr>
</tbody>
</table>

2 Terminology

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netbiter Argos Data Center</td>
<td>The <em>Netbiter Argos data center</em> is a solution that collects and stores data from connected field systems. Netbiter Argos includes features such as alarm management, reporting capabilities and much more.</td>
</tr>
<tr>
<td>Netbiter Argos Account</td>
<td>A <em>Netbiter Argos Account</em> is a user account from which connected field systems are managed.</td>
</tr>
<tr>
<td>Netbiter Argos Project</td>
<td>Connected field systems can be grouped in <em>Netbiter Argos Projects</em>, for a better management overview. A project can be used to group e.g. field systems belonging to a specific address, customer or similar.</td>
</tr>
<tr>
<td>Field System</td>
<td>A <em>field system</em> is one Netbiter Gateway and the devices connected to it, taken together as a unit. A field system can contain multiple devices, but only one gateway.</td>
</tr>
<tr>
<td>Gateway</td>
<td>A <em>gateway</em> can be an EasyConnect, a webSCADA unit, or a third-party product compatible with Netbiter Argos.</td>
</tr>
<tr>
<td>Device</td>
<td>A <em>device</em> is a piece of equipment to be monitored, and which is connected to a gateway. Examples of devices; diesel generator controllers, UPS’s, energy meters and PLC’s.</td>
</tr>
</tbody>
</table>
3 Solution Overview
This application note describes how to remotely access parameter values from the internal function blocks (SL-IN/SL-OUT) in the Crouzet Millenium 3 Micro PLC, using the Netbiter® EC220 remote gateway and the Netbiter® Argos data center.

In addition to the SL-IN/SL-OUT function, the following input/outputs of the EC220 are available for remote management:

- 2 Digital inputs (isolated, 24VDC)
- 2 Analog inputs (0-10V, 0-20mA, Pt100)
- 1 Analog output (0-10V)
- 1 Relay output (max 1A@24VDC)
- Millenium serial communication protocol (SL-IN/SL-OUT) through the Netbiter RS-232 serial interface (to which the Crouzet Millenium 3 is connected).

The Netbiter EasyConnect EC220 has a built in GPRS modem for communication with the Netbiter Argos service. The illustration below provides an overview of the system as described in this document.
4 Getting Started

4.1 Insert SIM card

Insert the SIM card into the EasyConnect EC220, as shown in this illustration.
Press the small button to the side of the SIM card holder to open.

Important!
Make sure that PIN code security is disabled.

4.2 Wiring and Power

4.2.1 EC220
The EC220 requires 9-24VDC, 1.5W, which is connected to the screw terminal block. Note that the GND terminal (ground -) is internally connected to the analog input/output common (AO:COM, AI:COM).
For I/O wiring diagrams of the EC220, see page 35. For further information, see the installation guide included with the EC220.

4.2.2 Crouzet Millenium 3
The Crouzet Millenium 3 requires 24VDC, 1.4W which is connected to the screw terminal block.
The Millenium unit is connected to the RS-232 port of the EC220 using the supplied cable with a 9-pin D-sub male connector.
4.3 Create a Netbiter Argos Account

1. Power up the EC220 and the Millenium 3.
2. Open a web browser and navigate to https://www.netbiter.net
3. Under the login window, click the link for Create an account, which opens the page shown below.

4. Fill in the required fields (as indicated by *). The System ID and the Activation Code are provided on a printed document supplied with the Netbiter EasyConnect EC220. The Activation Code is used to pair the remote device with an account on Netbiter Argos. The Activation Code is unique for each product and Device ID.

5. To read the terms and conditions for using Netbiter Argos click the link Accept the terms and conditions. To complete the registration, check the box and click Register.
4.4 Activate the Account

After clicking Register, an e-mail containing an activation link will be sent to the supplied e-mail address.

Open the e-mail and click on the activation link. After the account is activated it will be possible to log on to Netbiter Argos.

To use an existing account, enter the username and password in the login window. A lost password for an existing account can be reset by clicking Lost your password? A new password will then be sent to the email address registered for that account.
4.5 Activating the System

1. After logging in, there will be a default project called MyFirstProject under the Administration tab. Click on MyFirstProject and then click There are 1 pending system(s).

2. In the row for MyFirstSystem, click Activate.

3. If using an optional extra subscription, enter a subscription key. Alternatively, select the standard subscription from the dropdown list.

4. Select either Netbiter SIM card or custom/standard SIM card.

5. Enter the phone number for the SIM card.
6. For a custom/standard SIM card, enter the access point name (APN), as well as the username and password, if required by the operator. This information should be supplied with the SIM card. If not please contact your mobile operator. For a Netbiter SIM card, the APN is already configured.

7. Set the product type to **EC220-M3**. This will configure the EC220 for use with the Crouzet device.

8. Click the **Activate** button. This will send a configuration SMS/text message to the EC220, which will receive and process the configuration. The unit will then reboot and automatically reconnect to Netbiter Argos, a process that takes a few minutes to complete.

---

**5 Synchronize Configuration and Change Firmware**

The final steps in the setup process are to synchronize the configuration and change the firmware in the EasyConnect EC220.

1. Select the system from the **Management → All Systems** tab.
2. Click the **Configuration** tab.
3. Click the **Synchronize Configuration** button.
4. The update process will now detect that the EC220 is configured as an EC220-M3, which means that the firmware must be updated. Click the **Change Firmware** button to continue.
5. Select the firmware file *Netbiter EC220 Millenium firmware* and click **Update Firmware**.

To reinstall an existing firmware to the same version, check the box for **overwrite**.

After the new firmware is installed, the unit will reboot and reconnect to Netbiter Argos, which may take a few minutes.

**Note!** This only updates the firmware. The monitoring configuration has not yet been set up.
6 Programming the Crouzet Millenium 3

6.1 Setting up Serial Communication

For serial communication with the Millenium 3, the following is required:

- The program *M3 Crouzet Logic Software* installed on a computer.
- A serial port on the computer, or alternatively, some sort of adapter to emulate one.
- Function blocks must be set up.

1. Start the program, click **File**, and then **New**.

2. Under **Controller choice**, select the correct controller. Check the model number in the **Reference** column.

3. Click **Next** twice and then select the programming type **FBD** (Function Block Diagram).
4. Click **Next** to open the workspace in which the controller can be programmed.

To the left are the 4 digital inputs I1 - I4, as well as the 4 analog inputs IB, IC, ID, IE, (which can also be used as digital inputs). To the right are the 4 relay outputs O1 - O4.

5. In the **Display** menu, ensure that **Function bar** is selected.

6. By clicking the button **IN/OUT**, you can now select the appropriate function blocks.

### 6.2 Selecting Function Blocks

1. For the digital input I1, use the mouse to drag DI to the block I1, as indicated by the arrow in the illustration to the right.

2. In the same way, drag-and-drop the digital output DO to the block O1.

3. Drag the analog input AI to the block IB.
4. Click the HMI/COM button.

5. Add components for the SL-IN and SL-OUT blocks. By double-clicking on these, the address range can be selected. For SL-IN this should be 1-8, and for SL-OUT it should be 25-32.

These function blocks provide the serial communication link between the Crouzet Millenium 3 and the Netbiter EasyConnect EC220.

However, as there is only a single entry point in the building blocks for a 16-bit word, converter blocks for the individual signal bits are required. These are found under the CALC button as DE/BC and BC/DE.
Wiring connections are inserted by clicking and dragging from one arrow point to another.

The workspace should now something like the image below.

The BIN/DEC module summarizes 16 individual bits into a 16-bit word and places it on the output.

The DEC/BIN module accepts a 16-bit word input, which is then divided into 16 individual bits.

The SL-IN and SL-OUT devices only operate with a 16-bit word length. As the analog input IB has a 16-bit word available, this can be connected directly to the second input of the SL-IN function module (address 26).
6.3 Writing the Configuration to the Millenium Controller

1. Using the Crouzet serial cable, connect the Millenium 3 to the computer’s serial port.

2. From the menu bar in Crouzet Logic Software M3, select **Controller → Connection → Configure**.

3. Select the serial connection (Com Port).
The configuration can now be transferred to the controller by clicking **Write to the controller**.

As the Crouzet Millenium 3 is connected via a serial cable to the Netbiter EasyConnect EC220, the data transfer takes place only on the SL-IN/SL-OUT function blocks (via the serial link).

Signals that are present at the input terminals of the Millenium 3 over the SL-OUT function blocks are transmitted to and visualized on Netbiter Argos, over the Internet via the EC220’s built-in GPRS modem.

For the inputs and outputs of the Millenium 3 to be manageable in Netbiter Argos, the EC220 must be configured accordingly. This is described on the following pages.
7 Configure Crouzet Monitoring parameters

To start the configuration in Netbiter Argos, go to the tab at:
Management → [System Name] → Configuration.

At the bottom of the page, offline alarms can be enabled. This will trigger an alarm from Netbiter Argos if the EC220 is detected as offline. Depending on the reason the unit goes offline; detection may take up to 30 minutes.

![Server side alarm configuration](image)

7.1 Add Log Parameter

To add a log parameter, click the Logging tab and then the button Add log parameter. Select from which device and group the parameter should be defined. For the Millenium device, parameters can be defined as a word or an individual bit. For more information about this, see chapter Programming the Crouzet Millenium.

A number of settings and conditions can be set for the log parameter. The log interval defines the time that will elapse between two readings.

The log type can be set as Value or Delta. Value shows the actual parameter value at the sample time. Delta shows the difference between the last sample and the one before. Delta is typically used for energy meters.

![Add log parameter](image)

When finished, click the Save button.
7.2 Add Visualization Parameter

Visualization parameters are used to represent registers on the overview page of a field system, or on a custom dashboard.

To add a visualization parameter click Visualization and the button Add visualization parameter. Select from which device and group the parameter should be defined. For the Millenium device, a parameter can be defined as a word or as an individual bit.

The parameter name in the template will be automatically copied to the description field. To edit the parameter name without changing the template, check the box to the right of the field. It will then be possible to change the description as visualized on the overview page.

If the change should be applied to every device that uses this template, edit the parameter name in the template instead.

When finished, click the Save button.
7.3 Add Alarm Parameter

The field system can be configured to generate alarms when certain conditions are met. To add an alarm parameter, click the Alarms tab and then the button Add alarm parameter.

- The trigger defines what value will trigger the alarm.
- Alarm class can be used to group alarms.
- Alarm severity can be used to define the alarm as critical, major, minor or warning.

When finished, click the Save button.

7.4 Units, Scaling and Offsets

Defining units, scaling and offsets can be useful when representing values in a graphical view, as in the case for dashboards. This is applicable to log, visualization and alarm parameters.

The unit will be displayed in the legend of the graph, and will be set automatically, according to the remote device template. To change the default unit, check the box to the right and enter the required unit.

A scaling value is a divider that scales the value as read from the register.

Example:

Parameter value: 6
Scaling = 2 will give 3 as logged value.
Scaling = 0.5 will give 12 as logged value.

An offset adds a number to the read and scaled parameter value.

Example:

Parameter value = 2
Offset = 1 will give 3 as logged value
Offset = -1 will give 1 as logged value
7.5 Downloading the Configuration

When the configuration of the remote system is complete, the final step is to download the configuration to the field system. Press the button synchronize configuration. The unit will reboot and reconnect to Netbiter Argos online. This may take a few minutes.

7.6 Positioning the Field system

Using Google Maps, the field system can be pinpointed at its exact location anywhere on the globe. In a project with many systems scattered over a large geographic area, this feature makes it easy to get an overview of the different systems and their status. Click Map to position the system. Zoom in and scroll to set the position.

Note! If connected to a GPS unit, the field system can automatically position itself on the map. GPS tracking on the map can be enabled to monitor movements. An alarm can be triggered if the device is moved outside a defined radius, which is also known as Geo-fencing.
7.7 Dashboards

A dashboard is a graphical representation of parameters configured for a remote system.

It is good practice to use profile dashboards wherever possible, as a profile dashboard can be shared by multiple field systems. A system dashboard will only be applied to a specific field system. The profile dashboard will automatically add the dashboard to every field system that uses the device profile.

Netbiter Argos provides a number of dashboard widgets.

- Live values in a list.
- Live values in a graphical drawing of the monitored system.
- Latest logged values.
- Logged value in a graph.
- Alarms in a list.

7.7.1 Drawing Widget

The drawing widget is a graphical web application that can be used to create dynamic, customized and interactive visualizations of a field system. Images, objects, parameters and alarms can be added and visualized on the dashboard.

If a parameter such as a relay output is made writable, it can then be used for remote management, simply by clicking on it in the dashboard. The images related to the parameter can also be altered to represent the value.
8 Views in Netbiter Argos

8.1 Presentation

From the Presentation menu, status can be viewed per project or system. There is also an alarm overview.

Under each system there are a number of tabs available:

- **Dashboard** - for graphical representations of parameters configured in the field system.
- **Overview** - can show a picture of the system, a description and list of active alarms.
- **Alarm** - contains an alarm list and alarm history.
- **Historical data** - contains data collected from the device over time, which can be viewed on site or downloaded as a csv- or xls-file.
- **Map** - shows positioning information for the system.
- **Notes** - can be used for annotations.
- **Information** - describes the remote system.

8.2 Reports

Under Reports, it is possible to create various reports, as well as schedule when reports should be generated. Reports can be Accounts, Online status, Export data, Energy, Tank volume, Temperature, Consumption, Trends and Comparison reports. A notification mail will be sent to the Argos account administrator whenever a report is generated.
8.3 Management

The Management tab is used to manage existing projects and systems. New projects or field systems may also be added.

There are three tabs available for a project.

- **Systems** - displays all the gateways (field systems) connected to the project and their current status.
- **Properties** - shows details of the project, including its name.
- **File Area** - allows files connected to the project to be uploaded and stored (disk space is limited to 10MB, except for the free subscription in which the limit is 1MB).

For each (field) system, the following tabs are available:

- **Status** - displays online, synchronization and traffic information.
- **Configuration** - used for device configuration and synchronization.
- **Dashboards** - provide graphical representations of configured parameters and alarms.
- **Map** - positions the system on Google maps for reference, travel directions and tracking.
- **Backup/Firmware** - provides configuration backup, restore and firmware update.
- **Mobile network** - configures mobile phone number and APN information.
- **Properties** - handles system specific information, location and time zone settings.

8.4 Account

There are four tabs under Account.

- **Information** - contains information about the current account. There is also subscription information and a logging calculation tool that can be used when selecting the subscription level.
- **Licensing** - is used for managing subscription keys and SMS license keys.
- **Users** - manages user information, user rights and alarm schedules.
- **External data access** - provides information regarding web services, API and RSS feeds. The web services API makes it possible to read out application-specific data and have it represented on the customer’s system or on an external website.
9 Millenium Remote Monitoring Example

This example describes the remote monitoring of three parameters from a connected Millenium controller:

1. Representation of a switch connected between +24V and the digital input I1.

![Switch Diagram]

2. Reading of an analog value at the analog input IB, in this example generated by a potentiometer.

![Analog Input Diagram]

3. Control of a 24V light bulb through the switch at the digital input I1.

![Control Diagram]

9.1 Visualization

On the Management tab in Netbiter Argos, go to Visualization and click the button Add visualization parameters.

![Visualization Interface]
1. For the switch on digital input I1 select Device, Group and Parameter as shown below. The description can be edited by checking the box and entering any text.

![Add visualization parameter]

2. For the potentiometer on analog input IB, scaling and offset can be configured. This can be used for converting an input to another scale, for example degrees Celsius to degrees Fahrenheit.

![Add visualization parameter]

3. Relay output O1.

![Add visualization parameter]
9.2 Logging

The logging function in Netbiter Argos show selected values collected over time. This can be used for creating trend graphs, or it be downloaded for further processing in a spreadsheet program.

To define log parameters go to the Logging tab and click the button Add log parameter.

In the example below, we will log the analog value on IB.

For log point settings, see chapter 7.1, Add Log Parameter.

Logged data can be displayed on the dashboard as a live value and/or a drawing widget.
9.3 Alarms

Netbiter Argos can send alarms triggered by a threshold value (below, over or equal to). The alarm can be sent via SMS, e-mail or RSS to pre-defined recipients. For more information about alarm settings see 7.3, Add Alarm Parameter.

To add alarms, go to Alarms and click the button Add alarm parameter.

In the example below, set the threshold value to 500, which means the alarm will be triggered if the value drops below this.
9.3.1 Adding Alarm Recipients

Go to Account → Users. Select an existing user or add a new user. Click on Edit user. Enter an e-mail address and/or mobile phone number, depending on how the alarm should be sent.

Click on User rights to configure the type of alarms to send.

Click on Alarm schedule to set when alarms should be sent. Alarms of a particular severity can be configured to override alarm scheduling.

9.4 Using the Example Setup

The entry Light bulb on Relay Output O1 allows the relay to open and close and the light bulb to be lit or unlit. Clicking the ON button will close the relay of the Millenium 3. Clicking the OFF button will open the relay again. Relay clicking in the Millenium 3 is always audible.

The entry Potentiometer on analog input IB indicates the current value read from the potentiometer connected to the Millenium 3. The value 1023 represents the maximum value, and the value 0 represents the minimum of the 10-bit A/D converter. If the potentiometer changes, the value in the representation also changes. The web page may need a refresh (F5) to show the latest value.

The entry Switch on Digital Input I1 indicates that the switch to digital input I1 is closed. If the switch is opened again, the value OFF is displayed.
### 9.4.1 Add a Dashboard

A dashboard provides a graphical presentation of a remote system. Various visualization components (widgets) are available for presenting data in various ways, such as; display trend curves of log values, and the display of the latest logged values and alarms.

Under **Management → Dashboards**, click the **Add** button to add a new dashboard. Then click on **Add Drawing**.

A new system picture drawing will open. Click the **Edit** button to open the drawing widget tool.
This will open a blank work area in which components can be selected and inserted from the menu on the right. To do this, click first on the component and then on the desired location in the work area.

For this example installation the following components are to be added to the dashboard:

- A gauge visualizing the analog value from the potentiometer connected to the input block IB.
- ON/OFF buttons to manipulate and display the value of the writable parameters of the relay output.
- A light bulb visualizing the relay output from the output block O1.
9.4.2 Add Gauge

This example uses a gauge to display the analog value from the potentiometer. Select the desired image, e.g. a white gauge, from the public library.

Double-click on the icon that now appears in the work area, and select the parameter to be associated with the gauge. In this example, select parameter **Potentiometer on analog input IB**. For the Max value, enter 1023, as this is the maximum value used in this example.
9.4.3 Add Switch Buttons

Go to the image library as shown in chapter 8.4.2 and select the desired image. Position it on the drawing and then double-click on it.

Select the parameter to associate this with, in this case the relay output. Check the box to make it writable and makes it possible to manipulate the position of the relay, by clicking on the image. Enter the values to be represented by the appropriate image, and then select images from the library. In this case we select the images offbutton_desel.png and offbutton_sel.png.

Repeat this procedure for the ON button. For this button we select the images onbutton_desel.png and onbutton_sel.png.

9.4.4 Add Light Bulb

Select the desired image from the image library. Position it on the drawing and then double-click on it. For this example, we select the images lightbulb.png and lightbulb_on.png to represent the relay output. When the relay output is closed (1) the light bulb will be lit, and when the relay output is open it will be unlit.
9.5 Visualization Components

It is also possible to add further visualization fields to a dashboard. In the menu Widgets, select from the available list of visualization components. The available widgets are:

- **Live values** – as a list or a drawing
- **Logged value** – latest values or a log graph
- **Alarms** – as a list.

Click **Edit** to configure the settings for the information field, in this example a log graph.
10 Reference

10.1 Wiring diagrams for external connectors

Output wiring diagrams

Analog output

Analog load 0-10V
Max load resistance 2kΩ

- AO: OUT
- AO: COM

Relay output

24Vdc / 24VAC
○ Relay: NO
0Vdc / 0VAC
○ Relay: COM

Input wiring diagrams

Analog input for temperature readings

PT100
- AI: AI 1 or AI 2
- AI: COM

Analog input for voltage readings

0-10V
- AI: AI 1 or AI 2
- AI: COM

Analog input for current readings

- AI: AI 1 or AI 2
- AI: COM

Digital input

9-24Vdc
- DI: DI 1 or DI 2
0Vdc
- DI: COM
10.2 LED Indicators

There are four LED’s on the front of the EC220.

Power LED

When the Power LED is green, power is applied to the EC220.

Status LED

Indicates the status of the EC220. The red LED flashes in 4-second repeated cycle to report errors.

- Off: Normal operation
- 1 flash: Not registered on home network (GSM/GPRS)
- 2 flashes: No APN configured. (This configuration is done from Netbiter Argos)
- 3 flashes: No connection to Netbiter Argos.

Running LED

Flashes to indicate that the device is in normal run mode.

GSM signal LED

Indicates the signal quality of the mobile network.

1 flash: Poor signal.
2 flashes: Low to medium signal.
3 flashes: Good signal.
10.3 Further Information

Netbiter Product information
http://www.netbiter.com

Technical support for the Netbiter products
http://support.netbiter.com/

Information about the Crouzet Millenium 3
http://www.crouzet.com