

# inception

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## 3rd Party Automation Interface

### Overview

This technical note covers the basics of how to configure the Inner Range Inception controller to interface with 3rd party systems.

### Prerequisites

- Inception Firmware version 1.4.3 or higher
- For serial communication, a USB to Serial adaptor is required
- A 3rd Party System that is capable of sending or receiving fixed HEX or ASCII messages via TCP or Serial, or controllable via HTTP get requests.

### Introduction

The Inception system has been previously only capable of low-level interfacing to 3rd party systems, which required the inputs and outputs on the Inception system to be connected directly to the 3rd party system.

Now, a new 3rd Party Automation Interface has been added to Inception. This feature allows Inception to send and receive messages to and from a 3rd party system via Serial or TCP, or allows 3rd party systems to be controlled by HTTP requests. Connections can be established to multiple 3rd party systems simultaneously.

The 3rd Party Automation Interface supports two-way communication, enabling Inception to control other systems, inform them of state changes and allows other systems to control Inception.

The messages used by the Automation Interface are fixed plain text commands using HEX or ASCII characters. You can also use framing characters to ensure the full messages are received and sent.

The 3rd Party Automation Interface is split into two parts:

- **Connections**
- **Automated Actions**

# 3rd Party Automation Interface

## Introduction (cont.)

### Connections

A new Connections structure is now available in the Inception controller. Connections are generic text-based communication handlers that interface with other systems by sending and receiving short text messages over a TCP or Serial connection.

As a part of Inception's 3rd Party Automation Interface, connections are responsible for establishing and maintaining the link between the Inception controller and the 3rd party system. Connections are also responsible for framing the messages that are sent and received.

It is automated actions that are responsible for the processing of incoming messages and the generation of outgoing messages.

Connections can be either TCP (Client), TCP (Server) or Serial. Serial connections require a USB to Serial converter, and if multiple connections are needed a USB Hub can be used.

In addition, HTTP connections are also available which can execute HTTP get requests to control another system.

### Automated Actions

The pre-existing Automated Actions feature is the second part of 3rd Party Automation Interface configuration.

Automated actions are responsible for handling all of the custom functionality required by a client, beyond traditional access control and intruder detection functionality. Often this would be simple automation scenarios such as turning on lighting when an area is disarmed but has the flexibility to handle very complicated scenarios.

Automated actions are configured in two parts; the trigger condition and the action responses. The trigger condition determines when actions should occur, while the action responses determine which actions to perform when the trigger condition becomes valid, and which actions to perform when it becomes invalid. These action responses can control basic items in the system like outputs, areas and doors, but can also control many other things, like the feedback tones on individual SIFER readers or siren devices.

Automated actions have been updated with the addition of the 3rd Party Automation Interface. To respond to messages received from 3rd party systems, triggers can be configured to activate when a specific message is received from a particular connection. This activation can then be used to trigger any action within the Inception system, which allows a 3rd party system to act directly upon entities in Inception.

To send messages to a 3rd party system, an action can be configured to send custom text to a connection. This custom text could then trigger the 3rd party system to hold the state change or perform some automation. These actions can be triggered in response to almost anything, allowing Inception to tell other systems about state changes as they occur.

## 3rd Party Automation Interface

### Configuration of a 3rd Party Interface: Establishing Connection

#### Configuring a Connection

Before configuring the 3rd Party Automation Interface, it is vital that you understand the capabilities of the external system and have access to the manufacturer's documentation.

Connections are created and edited on the [Configuration > General > Connections] page. You can create as many connections as needed to allow communication both to and from multiple devices.

Connections require a number of communication settings to establish and maintain a connection with a 3rd party system, along with any data framing information to indicate when messages start and end.

The screenshot shows the 'Connection Details' configuration page. It includes the following fields and settings:

- Enable:** A checked checkbox.
- Connection Type:** A dropdown menu set to 'TCP (Client)'.
- Port:** A text input field containing '8081'.
- IP Address:** A text input field containing '192.168.0.10'.
- Enable Message Send Retry:** A checked checkbox.
- Message Send Retry Timeout:** A dropdown menu set to '1 minute'.

Each field has an information icon (i) to its right.

#### Connection Types

The Inception controller supports the following connection types:

- **Serial**

This Connection sends and receives data over a specific serial port. Serial ports can be used with USB to Serial converters, and multiple connections can be used with a USB Hub. This connection type is best suited when two-way communication between Inception and an external system is required.

When configuring a serial connection, you will need to specify the serial port, baud rate, data bits, stop bits and parity. These settings will vary based on your 3rd party system.

## 3rd Party Automation Interface

### Configuration of a 3rd Party Interface: Establishing Connection (cont.)

#### • HTTP

This Connection makes HTTP requests to a specific URL. However, unlike the other connection types, a HTTP connection can only send messages and not receive them. This connection type can be used with systems that expose a HTTP based control interface.

HTTP requests expect a response code in the 200 range (2XX) to indicate a successful request. If authentication is required, a HTTP Connection can optionally use Basic or Digest authentication for devices/APIs that require valid user credentials.

When configuring a HTTP connection type you will need to specify the base URL for the requests (e.g. `http://192.168.10.100/` ). The automated action responses are then configured with the remainder of the URL (e.g. an action sending text “control/action.cgi?action=5” would result in a HTTP request being made to `http://192.168.10.100/control/action.cgi?action=5` )

#### • TCP Client

This Connection acts as a TCP client and attempts to open a connection to a specified IP address and port. This connection type is best suited when the Inception Controller is responsible for initiating the connection and sending messages to an external system.

When configuring a TCP (Client) connection, you will need to specify an IP address and port of the 3rd party system for Inception to connect to.

#### • TCP (Server)

This Connection acts as a TCP server and listens for incoming connections on the specified port. This connection type is best suited when the external system is the one responsible for initiating the connection and sending messages to the Inception Controller. If Inception tries to send messages via this Connection, it will be sent to all clients who have connected to it.

When configuring a TCP (Server) connection, you will need to specify the port the Inception Controller will listen on.

Both of the TCP options are bi-directional, allowing messages to be sent and received by the connections. However, it may be preferable to create a separate TCP Client connection for messages sent from Inception and a TCP Server connection to receive messages into Inception.

## 3rd Party Automation Interface

### Configuration of a 3rd Party Interface: Establishing Connection (cont.)

#### Data Framing

The second part of the configuration of a connection is Data Framing. The “data framing” of the information that is sent and received determines what characters represent the start and the end of messages. Data framing can be configured individually for both incoming and outgoing messages.

For outgoing messages, these characters are automatically added to the start and end of each message. With incoming messages, data framing characters are used to filter out the unnecessary characters and identify the proper start and end of messages.

| Field                        | Value |
|------------------------------|-------|
| Prefix for Sent Messages     |       |
| Suffix for Sent Messages     | \r\n  |
| Prefix for Received Messages |       |
| Suffix for Received Messages | \r\n  |

For receiving messages, especially via serial, it is recommended to at least use suffix characters to identify when messages end. If the information being sent is not a coded protocol and is sentence based, a prefix and suffix can be used to extract a specific section out from a text stream to use for automation.

With incorrect data framing, messages from a 3rd party system may not be matched correctly and will not be able to trigger actions reliably.

Framing characters are standard ASCII text, with the addition of some escaped control characters, like `\r` for carriage return, `\n` for line feed, `\t` for tab, `\0` for null, `\\` for an actual backslash and `\x[00-FF]` for a hex character (`\xa2`, `\x9b` etc.).

To determine if you need data framing for your 3rd party system, refer to the manufacturer's documentation or view the messages Inception receives by enabling Detailed Events on the Inception controller (see the Troubleshooting section later in this document for more information).

## 3rd Party Automation Interface

### Configuration of a 3rd Party Interface: Sending and Receiving

#### Configuring an Automated Action

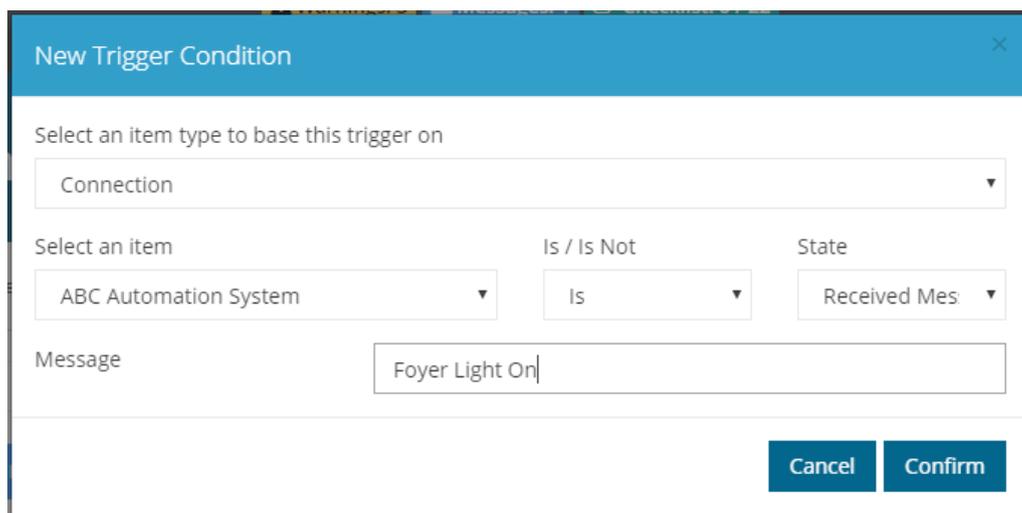
Once you have configured the connections, the next step is to configure the automated actions. Automated actions are responsible for triggering actions based on received messages or sending messages out via a connection.

Automated actions are created and edited on the [**Configuration > Automated Actions**] page.

#### Automated action to respond to received messages

To respond to messages that have been received and framed by a connection, a new trigger condition called Connection was added to automated actions.

This allows a connection to be selected and the trigger condition can be configured to activate based on the connection state (Connected or Disconnected), or when a particular message is received.



You can create multiple triggers, looking for different messages from either the same or different connections. When the exact message is received the trigger condition will be valid and the actions when true will be triggered.

Since the trigger condition is waiting for a particular message to be received, the state of the automated action will usually be false. For this reason, the Actions When False section is not commonly used.

There is no limit to the number of automated actions you can create. One automated action can be created to control something in Inception like turning on an output, and then another automated action can be created to trigger on a different message to turn off that output.

## 3rd Party Automation Interface

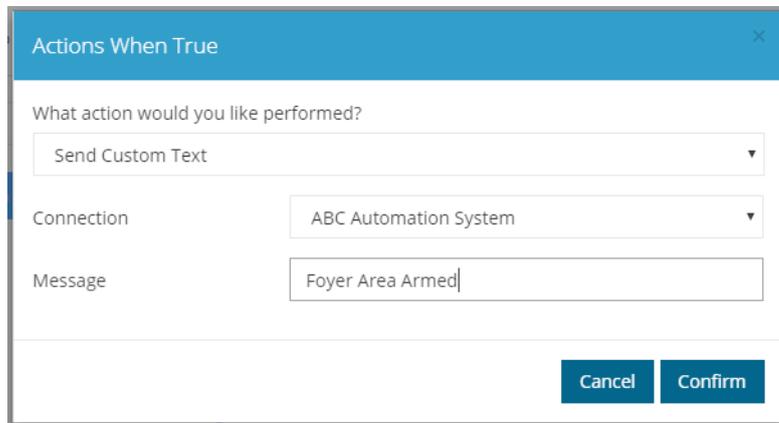
### Configuration of a 3rd Party Interface: Sending and Receiving (cont.)

#### Automated action to send events

To handle the sending of messages to a connection, a new action type called Send Custom Text has been added. This action can be used with any trigger, such as an area arming or a door unlocking, allowing state changes of items in Inception to trigger actions and tell other systems about the state change.

Both the Action When True and the Action When False options can be used to send different messages to a 3rd party system within the same automated action. This allows a single automated action to send different messages when an area is armed or disarmed, or when an output is on or off.

When configuring the action, the Send Custom Text action is chosen. There, the connection to send the message to can be selected, and the message you would like to send is entered. These messages can accept the same characters as a connection's data framing. This allows standard ASCII text, with the addition of some escaped control characters, like `\r` for carriage return, `\n` for line feed, `\t` for tab, `\0` for null, `\\` for an actual backslash and `\x[00-FF]` for a hex character (`\xa2`, `\x9b` etc.).



These messages can then be used by the 3rd party system to perform automation, such as turning on lights or air-conditioning in response to an area disarming, or increasing CCTV recording rates in response to an alarm event.

Actions can also be sent in response to button presses on Inovonics or Paradox remotes via Remote Fob Templates. In the templates, the same action can be configured in response to specific button presses which lets both the Inception system and 3rd party systems be controlled from the same remote.

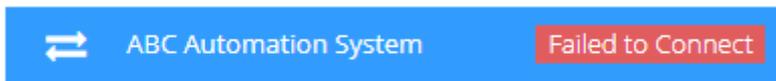
## 3rd Party Automation Interface

### Troubleshooting Connections

Configuring Inception's 3rd party Automation Interface can sometimes be complicated, as any issues require the investigation of two or more systems to find where the fault lies. Below are some troubleshooting options to help diagnose issues and simplify the configuration of Inception's Automation Interface:

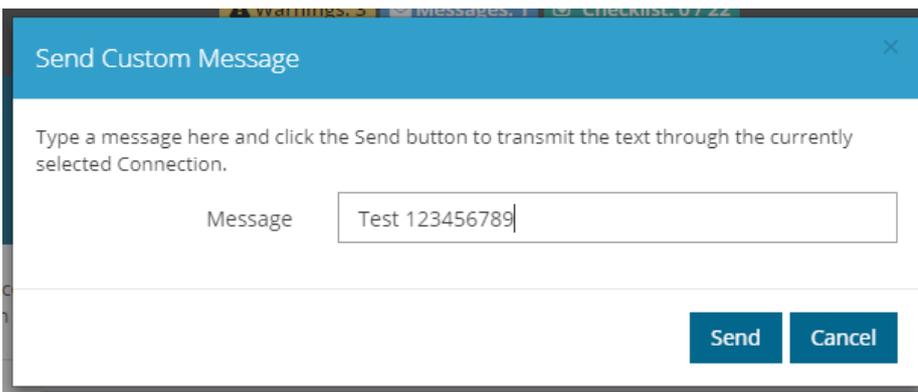
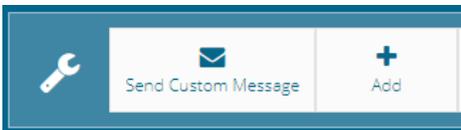
#### Connection State

On the [**Configuration > General > Connections**] page, each Connection displays its current state to help quickly identify if there are any connection issues.



#### Sending Test Messages

Also on the [**Configuration > General > Connections**] page is the Send Test Message button in the toolbox. If selected, a dialogue window will open where a message can be entered and sent to the currently selected connection. This feature can be useful in testing the framing of outgoing messages and ensuring the correct text is received by the other system.

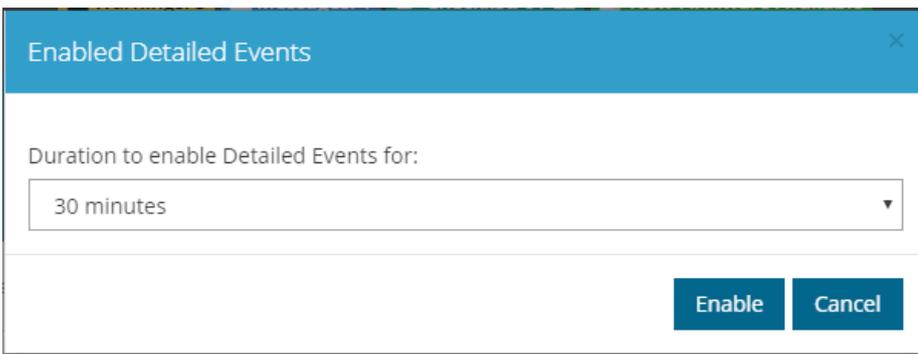


## 3rd Party Automation Interface

### Troubleshooting Connections (cont.)

#### Detailed Events

By default, the Inception controller does not log connection messages as there is the potential for them to be very verbose and for more important information to be lost. For debugging and diagnosis purposes, Detailed Events mode (available from the **[System > Service]** page) can be enabled to temporarily see all received connection messages.



Detailed Events mode will cause extra review events to be logged. In particular, each message that is sent or received by a connection is logged, and any text that is discarded due to incorrect framing can also be seen. This will allow you to identify if any data framing characters such as ASCII text or any escaped control characters are within the received messages.

Below is an example of messages being received without any data framing settings. Each message is split over multiple events since the start and end of the message has not been defined.

| When                   | Message                     | Who           | What               | Where |
|------------------------|-----------------------------|---------------|--------------------|-------|
| 08/09/2017<br>10:09:51 | Connection Received Message | CBUS Lighting | 0040000002\r\n     |       |
| 08/09/2017<br>10:09:51 | Connection Received Message | CBUS Lighting | 0000000000000000   |       |
| 08/09/2017<br>10:09:51 | Connection Received Message | CBUS Lighting | 0000000000000000   |       |
| 08/09/2017<br>10:09:51 | Connection Received Message | CBUS Lighting | 0000098\r\nD638B00 |       |



## 3rd Party Automation Interface

### Tips and Tricks

#### Custom Outputs

When using an automated action to trigger and control an entity in Inception from a 3rd party system, you may not want to trigger a physical item such as a door, area or output. In some cases, you may want to trigger an entity to only reflect the state of something in a 3rd party system, in this case, a custom output can be used.

A custom output is an output that has no physical location or mechanism and exists only within the Inception controller's logic. The custom output and the state that it represents can then be used to trigger automated actions.

Since the 3rd party system may send thousands of state change messages to Inception, it is not recommended to use a physical output as it may activate thousands of times a day.

Custom outputs are ideal for use as automated action triggers that when controlled can send custom text to a 3rd party system to trigger automation.

Custom outputs are configured on the [**Configuration > Outputs > Custom Outputs**] page.

Custom outputs can also be configured to be end-user controllable. This provides a simple way for the user to control a 3rd party system from Inception.

#### Custom Inputs

Most 3rd party systems do not have the alarm reporting capabilities of Inception. It is possible to use Inception to report events from 3rd party systems using custom inputs. Custom inputs are configured on the [**Configuration > Inputs > Custom Inputs**] page.

A custom input is an input that has no physical location or mechanism and exists only within the Inception controller's logic. Custom inputs have two states, active and inactive, which can be triggered by automated actions. These logical inputs can be used in the same way as physical inputs.

- **Area Responses**

Assigning a custom input to an area with an input type will generate area responses, such as sounding sirens, activating strobes and generating area alarm events.

- **Alarm reporting**

If Inception is configured for reporting, alarm events generated from a custom input can be reported to a central monitoring station.

- **Input Activity**

The state of a custom input can be used as a trigger in an automated action.

Note: While the 3rd Party Automation Interface allows Inception to report alarms for a 3rd party system, it should not be used as the method for reporting critical alarms such as fire alarms. It is recommended to use a low-level connection between systems via physical inputs, outputs and end of line resistors for reporting critical alarms.

## 3rd Party Automation Interface

### Tips and Tricks (cont.)

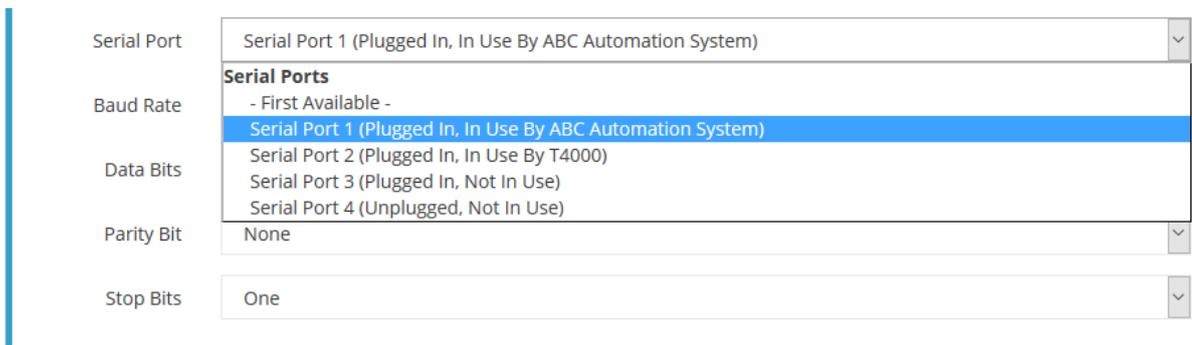
#### Serial Connection Configuration

With a USB hub, Inception supports the option of multiple simultaneous serial ports.

Inception detects all of the connected serial ports and keeps track of them, including if a connection or alarm reporting system has been assigned that port or if the port is unplugged or plugged in.

All of this information is displayed when selecting the serial port during configuration, allowing a clear view of what ports are already in use. If you are not sure which USB connection is which, the USB to serial cables can be unplugged and, after reloading the web interface, the remaining plugged in connections can be easily seen.

By default, connections and the T4000 are assigned the First Available port. This attempts to use the first detected connection that is not in use by something else in the system. However if multiple serial connections are used in a system, it is recommended that each connection is assigned the correct serial port.



The screenshot shows a configuration form with the following fields:

- Serial Port:** A dropdown menu currently showing "Serial Port 1 (Plugged In, In Use By ABC Automation System)".
- Baud Rate:** A dropdown menu showing "Serial Ports" with a sub-menu open. The sub-menu options are: "- First Available -", "Serial Port 1 (Plugged In, In Use By ABC Automation System)", "Serial Port 2 (Plugged In, In Use By T4000)", "Serial Port 3 (Plugged In, Not In Use)", and "Serial Port 4 (Unplugged, Not In Use)".
- Data Bits:** A dropdown menu.
- Parity Bit:** A dropdown menu currently showing "None".
- Stop Bits:** A dropdown menu currently showing "One".

#### Configuring a Heartbeat

Some 3rd party systems will send Inception a heartbeat message that needs a reply to confirm the connection between the systems is still working. While an explicit heartbeat option isn't available in Inception, an automated action can be configured for sending a heartbeat response each time a heartbeat message is received.

1. Configure the trigger condition to look for the heartbeat message.
2. Add an action to the Action When True section to send the heartbeat response via the connection.

Each time a heartbeat is received a response will be sent.

#### Sending Messages from Remote Fob Button Presses

Actions can also be sent due to button presses on Inovonics or Paradox remotes via the Remote Fob Templates. In these templates, the Send Custom Text action can be configured in response to specific button presses. This allows both the Inception system and 3rd party systems be controlled from the same remote.

## 3rd Party Automation Interface

### Tips and Tricks (cont.).

#### Bi Directional Control

In some automation scenarios you may want to control an item, such as lighting, from both the Inception controller and the 3rd party system. This requires that the light state is synchronised across both systems. If not synchronised, turning on a light from Inception may have no result or even turn the off the light.

A combination of the automated actions above can be used to allow for bi-directional control of an automation point from Inception and a 3rd party system.

Two automated actions can be used to turn an Inception output on and off based on messages received from the 3rd party system. An additional automated action is needed to send on and off commands to the 3rd party system when the state of the output is controlled from Inception.

This configuration results in the Inception Controller and the 3rd party system both being able to control lighting and more importantly reflect the state correctly.



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