Inclusion of common Node.js functions, for which there is no specific Node-RED node available, inside the Node-RED environment or external repositories, is a very powerful feature, given the vast availability of these functions. Node-RED nodes have some differences in packaging and implementation with relation to their node.js equivalents, thus direct porting is not feasible. Due to the fact that Node-RED is executed in a sandboxed environment, it does not have access to the overall features and libraries of the normal Node.js installation in the same server. Thus references to these libraries (mainly through the 'include' keyword) need to be enriched with the following process (we use as an example the amqplib of Node.js).

1. Install globally (for all Node-RED accounts) the required library through the relevant instruction:

sudo npm install –g amqplib

2. Follow the instructions in http://Node-RED.org/docs/writing-functions.html#global-context and change the settings.js file global context tag to include the needed libraries (Figure 1), restarting afterwards the Node-RED daemon:

sudo nano /usr/lib/node_modules/node-red/settings.js

```
functionGlobalContext: {
    os:require('os'),
    amqp:require('amqplib'),
    amqpcreds:require('amqplib/lib/credentials'),
    amqpconnect:require('amqplib/lib/connect'),
    assert:require('assert'),
//    amqputil:require('amqplib/test/util'),
    net:require('net'),
    url:require('url'),
    amqpcreds:require('amqplib/lib/credentials'),
    amqpCall:require('amqplib/callback_api')
//  bonescript:require('bonescript'),
//  arduino:require('duino')
```

Figure 1: Configuration of settings.js file in Node-RED for external Node.js libraries

3. Create a typical 'function' node in Node-RED and enter the client code exploiting the library (as indicated in the common examples of these libraries), by referencing the function using the global.context keyword followed by the designated name in the settings.js file (Figure 2). This definition needs to replace any typical 'include' instance of the external library.
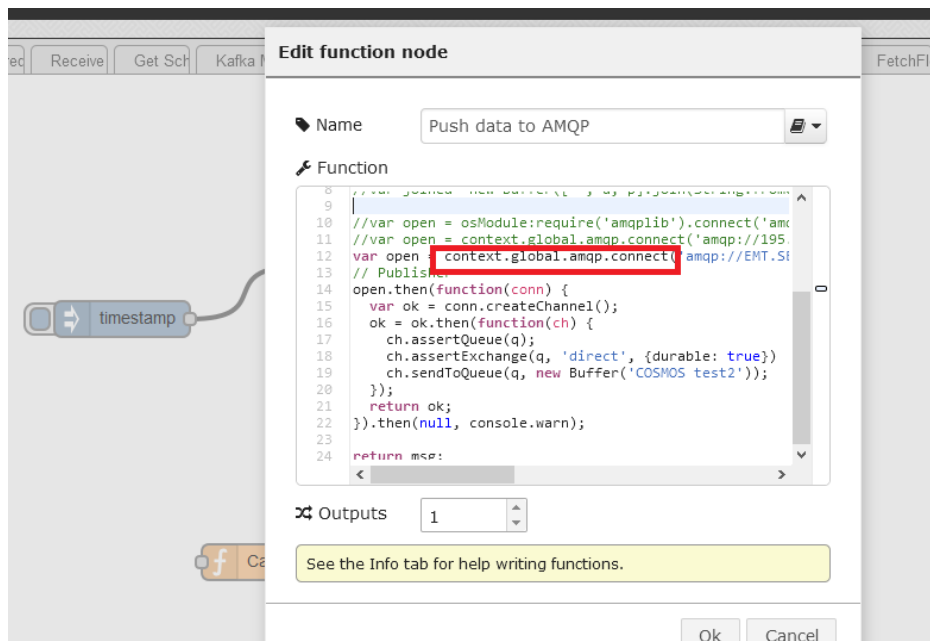
Figure 2: Node-RED function node code for inclusion of external libraries