

Appendix B. P-TAQS Code

Note: The supported method for installing this system is imaging the SD card. An exact copy of a working SD image should be made and modified for the new system. While technically possible, and briefly discussed here, we do not intend to support adding this code to existing PI partitions.

Node-Red Flows for P-TAQS (Updated 2019-06-06)

These flows can be copied and pasted into the Node-Red IDE once the Raspberry Pi OS is operating. Various nodes were downloaded from the “Palette Manager” in Node-Red and will show up as an error upon initial paste until the library has been downloaded. This code is in JSON format. The Node Red version used for the P-TAQS build is 0.19.4. The Raspberry Pi OS version for this build is Raspbian Stretch V9.

Other changes to note are the Raspberry Pis are programmed to automatically restart daily, and the USB’s UUID must be programmed to be automatically identified so the program can log data. The version of the code described in this document performs these steps automatically as long as the user images this code.

To change the UUID for the USB, a system expert will need to be consulted. This change requires accessing and modifying a crucial part of the PI system. Mistakes can and will make the system unusable.

Start Code:

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```

```
\n\nflow.set(\`"pm1bAvg"\`,flow.get(\`"pm1bSum"\`)/SumCount);\nflow.set(\`"pm25bAvg"\`,flow.get(\`"pm25bSum"\`)/SumCount);\nflow.set(\`"pm10bAvg"\`,flow.get(\`"pm10bSum"\`)/SumCount);\nflow.set(\`"pm1cbAvg"\`,flow.get(\`"pm1cbSum"\`)/SumCount);\nflow.set(\`"pm25cbAvg"\`,flow.get(\`"pm25cbSum"\`)/SumCount);\nflow.set(\`"pm10cbAvg"\`,flow.get(\`"pm10cbSum"\`)/SumCount);\n\n\nflow.set(\`"p03Avg"\`,flow.get(\`"p03Sum"\`)/SumCount);\nflow.set(\`"p05Avg"\`,flow.get(\`"p05Sum"\`)/SumCount);\nflow.set(\`"p1Avg"\`,flow.get(\`"p1Sum"\`)/SumCount);\nflow.set(\`"p25Avg"\`,flow.get(\`"p25Sum"\`)/SumCount);\nflow.set(\`"p5Avg"\`,flow.get(\`"p5Sum"\`)/SumCount);\nflow.set(\`"p10Avg"\`,flow.get(\`"p10Sum"\`)/SumCount);\n\n\nflow.set(\`"p03bAvg"\`,flow.get(\`"p03bSum"\`)/SumCount);\nflow.set(\`"p05bAvg"\`,flow.get(\`"p05bSum"\`)/SumCount);\nflow.set(\`"p1bAvg"\`,flow.get(\`"p1bSum"\`)/SumCount);\nflow.set(\`"p25bAvg"\`,flow.get(\`"p25bSum"\`)/SumCount);\nflow.set(\`"p5bAvg"\`,flow.get(\`"p5bSum"\`)/SumCount);\nflow.set(\`"p10bAvg"\`,flow.get(\`"p10bSum"\`)/SumCount);\n\n\n msg.payload = \`"averaged "\`+ flow.get(\`"SumCount"\`) + \`" "\` + flow.get(\`"pm25Sum"\`) + \`" "\` + flow.get(\`"pm25Avg"\`);\n\n\n\nflow.set(\`"PAtempSum"\`,0);\nflow.set(\`"PARhSum"\`,0);\nflow.set(\`"PA dewpointSum"\`,0);\nflow.set(\`"PA pressureSum"\`,0);\nflow.set(\`"pm1Sum"\`,0);\nflow.set(\`"pm25Sum"\`,0);\nflow.set(\`"pm10Sum"\`,0);\nflow.set(\`"pm1cSum"\`,0);\nflow.set(\`"pm25cSum"\`,0);\nflow.set(\`"pm10cSum"\`,0);\nflow.set(\`"pm1bSum"\`,0);\nflow.set(\`"pm25bSum"\`,0);\nflow.set(\`"pm10bSum"\`,0);\nflow.set(\`"pm1cbSum"\`,0);\nflow.set(\`"pm25cbSum"\`,0);\nflow.set(\`"pm10cbSum"\`,0);\n\n\nflow.set(\`"p03Sum"\`,0);\nflow.set(\`"p05Sum"\`,0);\nflow.set(\`"p1Sum"\`,0);\nflow.set(\`"p25Sum"\`,0);\nflow.set(\`"p5Sum"\`,0);\nflow.set(\`"p10Sum"\`,0);\n\n\nflow.set(\`"p03bSum"\`,0);\nflow.set(\`"p05bSum"\`,0);\nflow.set(\`"p1bSum"\`,0);\nflow.set(\`"p25bSum"\`,0);\nflow.set(\`"p5bSum"\`,0);\nflow.set(\`"p10bSum"\`,0);\nflow.set(\`"PAindex"\`,SumCount);\n\n\nflow.set(\`"SumCount"\`,0);\n\nreturn msg;\n\n},"outputs":1,"noerr":0,"x":1032.5000114440918,"y":443.05554580688477,"wires":[["13319e8.0c24662"]],{"id":"56d775ca.b80f2c","type":"inject","z":"30619a3e.4c7806","name":"Average/send VIPER every minute","topic":"","payload":"","payloadType":"date","repeat":"60","crontab":"","once":false,"onceDelay":0.1,"x":295.8333282470703,"y":483.88888931274414,"wires":[["71725fbf.59239","125c2ed0.64a6d1","29534efa.0366f2"]],{"id":"71725fbf.59239","type":"function","z":"30619a3e.4c7806","name":"Average flag","func":"flow.set(\`"average"\`,1);\nflow.set(\`"averageWind"\`,1);\nflow.set(\`"BCaverage"\`,1);\n\n\nflow.set(\`"deploymentname"\`,`"PTAQS"`);\n\n\nflow.set(\`"GPS.lat"\`,35.994342);\n\n\nflow.set(\`"GPS.lon"\`,`-78.898453`);\n\n\n},"outputs":1,"noerr":0,"x":600.0000076293945,"y":534.7222328186035,"wires":[[]],{"id":"13319e8.0c24662","type":"debug","z":"30619a3e.4c7806","name":"Averaged","active":true,"tosidebar":true,"console":false,"tostatus":false,"complete":"payload","x":1202.4999542236328,"y":457.2222023010254,"wires":[[]],{"id":"61f5565a.99f858","type":"function","z":"30619a3e.4c7806","name":"Averaging Wind","func":"var c = flow.get(\`"SumCountWind"\`);\n\n\nflow.set(\`"windDirection["+c+"]"\`,flow.get(\`"windD"\`));\n\n\nflow.set(\`"windSpeed["+c+"]"\`,flow.get(\`"windS"\`));\n\n\nflow.set(\`"SumCountWind"\`,c+1);\n\n\nflow.set(\`"windPressureSum"\`,flow.get(\`"windPressureSum"\`) + flow.get(\`"windPressure"\`));\n\n\nflow.set(\`"windTempSum"\`,flow.get(\`"windTempSum"\`) + flow.get(\`"windTemp"\`));\n\n\nvar tempSum = flow.get(\`"windTempSum"\`);\n\n\n//flow.set(\`"windRHSum"\`,flow.get(\`"windRHSum"\`) + flow.get(\`"
```

```

windRH\");\nvar vx = new Array(60);\nvar vy = new Array(60);\n\nvar sumX=0;\nvar
sumY=0;\n\nvar avgX;\nvar avgY;\n\nif (flow.get("averageWind\")==1)\n{\n  SumCount =
flow.get("SumCountWind");\n  msg.payload = "\n";\n
flow.set("averageWind",0)\nflow.set("windPressureAvg",flow.get("windPressureSum")/Su
mCount);\nflow.set("windTempAvg",flow.get("windTempSum")/SumCount);\n//flow.set("w
indRHAvg",flow.get("windRHSum")/SumCount);\n  for (i=0 ; i<c ; ++i)\n  {\n    var
yFactor=1;\n    var xFactor=1;\n    var angle = flow.get("windDirection["+i+"]");\n    var
wSpeed = flow.get("windSpeed["+i+"]");\n    if (angle===0 || angle===90 || angle===180 ||
angle===270 || angle===360)\n    {\n      if (angle===0 || angle===360)\n      {\n        vy[i] =
wSpeed;\n        vx[i] = 0;\n      }\n      if (angle===90)\n      {\n        vy[i] = 0;\n        vx[i] = wSpeed;\n
      }\n      if (angle===180)\n      {\n        vy[i] = (wSpeed*(-1));\n        vx[i] = 0;\n      }\n      if
(angle===270)\n      {\n        vy[i] = 0;\n        vx[i] = (wSpeed*(-1));\n      }\n    }else\n    {\n      if (angle >
90 && angle < 180)\n      {\n        angle = angle - 90;\n        yFactor = -1;\n      }\n      if (angle > 180 &&
angle < 270)\n      {\n        angle = angle - 180;\n        yFactor = -1;\n        xFactor = -1;\n      }\n      if (angle >
270 && angle < 360)\n      {\n        angle = angle - 270;\n        xFactor = -1;\n      }\n\n      var rangle =
0.0174533 * angle;\n      vx[i] = (wSpeed * Math.cos(rangle))*xFactor;\n      vy[i] = (wSpeed *
Math.sin(rangle))*yFactor;\n      \n//var a = (wSpeed * Math.cos(rangle))*xFactor;\n//var b =
(wSpeed * Math.sin(rangle))*yFactor;\n    }\n    \n    msg.vectors = vx[i]+"," + vy[i];\n    \n
sumX = sumX + vx[i];\n    sumY = sumY + vy[i];\n\n    msg.sums = sumX + "," + sumY;\n    \n
\n    }\n    avgX = sumX/c;\n    avgY = sumY/c;\n    \n    var avgVspeed =
Math.sqrt((avgY*avgY) + (avgX*avgX));\n    var avgVangle =
Math.atan(Math.abs(avgY)/Math.abs(avgX)) * (1/0.0174533);\n    \n    var avgwDirection;\n    \n
avgwDirection = avgVangle;\n    \n    if(avgX<0 && avgY<0)\n    {\n      avgwDirection =
avgVangle + 180;\n    }else\n    {\n      if(avgX<0)\n      {\n        avgwDirection = avgVangle +
270;\n      }\n      if(avgY<0)\n      {\n        avgwDirection = avgVangle + 90;\n      }\n    }\n    \n
\n    flow.set("SumCountWind",0);\n    flow.set("windPressureSum",0);\n
flow.set("windTempSum",0);\n    // flow.set("windRHSum",0);\n
flow.set("windDirAvg",avgwDirection);\n    var tomps = avgVspeed/1.944; //convert knots to
mps\n    flow.set("windSpeedAvg", tomps);\n    msg.averagedResult = "avgX=" + avgX +
"avgY=" + avgY + "\n" + "tempSum=" + tempSum + " sumCount=" + c + "\n
avgwDirection=" + avgwDirection + ", avgwSpeed=" + avgVspeed ; \nreturn
msg;\n\n}else\n{\n  // return
msg;\n\n},"outputs":1,"noerr":0,"x":1648.166633605957,"y":1153.8887968063354,"wires":[["8
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elay":0.1,"x":213.3333282470703,"y":590.5555467605591,"wires":[["c54257e3.814ff8","e95ab

```



```
056.41af3", "dee53a54.fad328"]]}, {"id": "8acb8964.5b0938", "type": "function", "z": "30619a3e.4c7806", "name": "Write headers", "func": "flow.set(\\\"SumCount\\\",0);\\nflow.set(\\\"SumCountWind\\\",0);\\nflow.set(\\\"BCSumCount\\\",0);\\nflow.set(\\\"windDirection\\\",[]);\\nflow.set(\\\"windSpeed\\\",[]);\\nvar instrument = flow.get(\\\"configuration\\\");\\nmsg.payload = \\\"podID,utcTime,localTime(\\\"+flow.get(\\\"TZ\\\")+\\\"),\\\";\\nif (instrument == \\\"config1\\\")\\n{\\nmsg.payload = msg.payload + \\\"BCTime,\\\";\\n}\\nmsg.payload = msg.payload + \\\"PA-time,PA_avgIndex,PA-MacAddress,PA-FirmwareVersion,PA-HardwareVersion,\\\";\\nmsg.payload = msg.payload + \\\"PA-temp(degF),PA-RH(%),PA-dewPoint(degF),PA-Pressure(mbar),PA-adc (V),PA-freeMemory,PA-WifiSignalStrength(rssi),PA-FirmwareUptime(seconds),\\\";\\nmsg.payload = msg.payload + \\\"PA-PM1-a(ug/m3),PA-PM2.5-a(ug/m3),PA-PM10-a(ug/m3),PA-PM1correctionFactor-a(ug/m3),PA-PM2.5correctionFactor-a(ug/m3),PA-PM10correctionFactor-a(ug/m3),\\\";\\nmsg.payload = msg.payload + \\\"PA-#particles0.3u-a,PA-#particles0.5u-a,PA-#particles1.0u-a,PA-#particles2.5u-a,PA-#particles5.0u-a,PA-#particles10u-a,\\\";\\nmsg.payload = msg.payload + \\\"PA-PM1-b(ug/m3),PA-PM2.5-b(ug/m3),PA-PM10-b(ug/m3),PA-PM1correctionFactor-b(ug/m3),PA-PM2.5correctionFactor-b(ug/m3),PA-PM10correctionFactor-b(ug/m3),\\\";\\nmsg.payload = msg.payload + \\\"PA-#particles0.3u-b,PA-#particles0.5u-b,PA-#particles1.0u-b,PA-#particles2.5u-b,PA-#particles5.0u-b,PA-#particles10u-b\\\";\\nif (instrument == \\\"config1\\\")\\n{\\nmsg.payload = msg.payload + \\\",BCSerial,BCStatus,BCTimebase(seconds),BCBattery(%),BCTapePos,BCFlowSetpoint(mL/min),BCFlowTotal(mL/min),BCSampleTemp(degF),BCSampleRH(%),\\\";\\nmsg.payload = msg.payload + \\\"BCInternalTemp(degF),BCUVATN1,BCBlueATN1,BCGreenATN1,BCRedATN1,BCIRATN1,\\\";\\nmsg.payload = msg.payload + \\\"BCUVATN2,BCBlueATN2,BCGreenATN2,BCRedATN2,BCIRATN2,\\\";\\nmsg.payload = msg.payload + \\\"BCUVK,BCBlueK,BCGreenK,BCRedK,BCIRK,\\\";\\nmsg.payload = msg.payload + \\\"BCUVConcentration1(ng/m3),BCBlueConcentration1(ng/m3),BCGreenConcentration1(ng/m3),BCRedConcentration1(ng/m3),BCIRConcentration1(ng/m3),\\\";\\nmsg.payload = msg.payload + \\\"BCUVConcentration2(ng/m3),BCBlueConcentration2(ng/m3),BCGreenConcentration2(ng/m3),BCRedConcentration2(ng/m3),BCIRConcentration2(ng/m3),\\\";\\nmsg.payload = msg.payload + \\\"BCUVConcentrationc(ng/m3),BCBlueConcentrationc(ng/m3),BCGreenConcentrationc(ng/m3),BCRedConcentrationc(ng/m3),BCIRConcentrationc(ng/m3),\\\";\\nmsg.payload = msg.payload + \\\"AirMarPressure(mbar),AirMarTemp(degC),AirMarDirection(degrees),AirMarSpeed(m/s)\\\";\\n}\\nmsg.filename = \\\"/media/usb/\\\"+msg.filename+\\\".txt\\\";\\nreturn msg;\", \"outputs\": 1, \"noerr\": 0, \"x\": 2023, \"y\": 732.3888549804688, \"wires\": [[\"ce5e257.54519d8\", \"7b47c192.0d68\"]]}, {\"id\": \"ce5e257.54519d8\", \"type\": \"file\", \"z\": \"30619a3e.4c7806\", \"name\": \"\", \"filename\": \"\", \"appendNewline\": true, \"createDir\": false, \"overwriteFile\": \"false\", \"x\": 2253, \"y\": 751.2222290039062, \"wires\": [[]]}, {\"id\": \"a7ab53b0.38795\", \"type\": \"moment\", \"z\": \"30619a3e.4c7806\", \"name\": \"\", \"topic\": \"\", \"input\": \"\", \"inputType\": \"date\", \"inTz\": \"ETC/GMT\", \"adjAmount\": 0, \"adjType\": \"days\", \"adjDir\": \"add\", \"format\": \"MMDDYYYY\", \"locale\": \"en_US\", \"output\": \"filename\", \"outputType\": \"msg\", \"outTz\": \"America/Denver\", \"x\": 1788, \"y\": 732.2222290039062, \"wires\": [[\"8acb8964.5b0
```



```
BCSumCount = flow.get("BCSumCount");\n \n flow.set("BCCoverage",0);\n \n flow.set("BCFlowTotalAvg",flow.get("BCFlowTotalSum")/BCSumCount);\n flow.set("BCSampleTempAvg",flow.get("BCSampleTempSum")/BCSumCount);\n flow.set("BCSampleRHAvg",flow.get("BCSampleRHSum")/BCSumCount);\n flow.set("BCInternalTempAvg",flow.get("BCInternalTempSum")/BCSumCount);\n \n flow.set("BCUVATN2Avg",flow.get("BCUVATN2Sum")/BCSumCount);\n flow.set("BCBlueATN2Avg",flow.get("BCBlueATN2Sum")/BCSumCount);\n flow.set("BCGreenATN2Avg",flow.get("BCGreenATN2Sum")/BCSumCount);\n flow.set("BCRedATN2Avg",flow.get("BCRedATN2Sum")/BCSumCount);\n flow.set("BCIRATN2Avg",flow.get("BCIRATN2Sum")/BCSumCount);\n \n flow.set("BCUVKAvg",flow.get("BCUVKSum")/BCSumCount);\n flow.set("BCBlueKAvg",flow.get("BCBlueKSum")/BCSumCount);\n flow.set("BCGreenKAvg",flow.get("BCGreenKSum")/BCSumCount);\n flow.set("BCRedKAvg",flow.get("BCRedKSum")/BCSumCount);\n flow.set("BCIRKAvg",flow.get("BCIRKSum")/BCSumCount);\n \n \n flow.set("BCUVATN1Avg",flow.get("BCUVATN1Sum")/BCSumCount);\n flow.set("BCBlueATN1Avg",flow.get("BCBlueATN1Sum")/BCSumCount);\n flow.set("BCGreenATN1Avg",flow.get("BCGreenATN1Sum")/BCSumCount);\n flow.set("BCRedATN1Avg",flow.get("BCRedATN1Sum")/BCSumCount);\n flow.set("BCIRATN1Avg",flow.get("BCIRATN1Sum")/BCSumCount);\n \n flow.set("BCUVBC1Avg",flow.get("BCUVBC1Sum")/BCSumCount);\n flow.set("BCBlueBC1Avg",flow.get("BCBlueBC1Sum")/BCSumCount);\n flow.set("BCGreenBC1Avg",flow.get("BCGreenBC1Sum")/BCSumCount); \n flow.set("BCRedBC1Avg",flow.get("BCRedBC1Sum")/BCSumCount);\n flow.set("BCIRBC1Avg",flow.get("BCIRBC1Sum")/BCSumCount);\n \n flow.set("BCUVBC2Avg",flow.get("BCUVBC2Sum")/BCSumCount);\n flow.set("BCBlueBC2Avg",flow.get("BCBlueBC2Sum")/BCSumCount);\n flow.set("BCGreenBC2Avg",flow.get("BCGreenBC2Sum")/BCSumCount); \n flow.set("BCRedBC2Avg",flow.get("BCRedBC2Sum")/BCSumCount);\n flow.set("BCIRBC2Avg",flow.get("BCIRBC2Sum")/BCSumCount);\n \n flow.set("BCUVBCcAvg",flow.get("BCUVBCcSum")/BCSumCount);\n flow.set("BCBlueBCcAvg",flow.get("BCBlueBCcSum")/BCSumCount);\n flow.set("BCGreenBCcAvg",flow.get("BCGreenBCcSum")/BCSumCount); \n flow.set("BCRedBCcAvg",flow.get("BCRedBCcSum")/BCSumCount);\n flow.set("BCIRBCcAvg",flow.get("BCIRBCcSum")/BCSumCount);\n \n msg.payload =\n 'averaged '+ flow.get("BCSumCount") + '\n BCc IC Sum = '\n flow.get("BCIRBCcSum") ;\n \n \n flow.set("BCFlowTotalSum",0);\n flow.set("BCSampleTempSum",0);\n flow.set("BCSampleRHSum",0);\n flow.set("BCInternalTempSum",0);\n \n \n flow.set("BCUVATN1Sum",0);\n flow.set("BCBlueATN1Sum",0);\n flow.set("BCGreenATN1Sum",0);\n flow.set("BCRedATN1Sum",0);\n flow.set("BCIRATN1Sum",0);\n \n \n flow.set("BCUVATN2Sum",0);\n flow.set("BCBlueATN2Sum",0);\n flow.set("BCGreenATN2Sum",0);\n flow.set("BCRedATN2Sum",0);\n flow.set("BCIRATN2Sum",0);\n \n \n flow.set("BCUVKSum",0);\n flow.set("BCBlueKSum",0);\n flow.set("BCGreenKSum",0);\n flow.set("BCRedKSum",0);\n flow.set("BCIRKSum",0);
```



```
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```

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mp","active":false,"tosidebar":true,"console":false,"tostatus":false,"complete":"true","x":1483,"y":987.7222290039062,"wires":[]},{ "id":"7de94488.2f7e9c","type":"ui_text","z":"30619a3e.4c7806","group":"3ec662a9.8a280e","order":0,"width":0,"height":0,"name":"","label":"windPressure","format":"{msg.payload}"},"layout":"row-spread","x":1909.0000114440918,"y":1017.2222294807434,"wires":[]},{ "id":"af858f13.c23ea","type":"ui_text","z":"30619a3e.4c7806","group":"3ec662a9.8a280e","order":0,"width":0,"height":0,"name":"","label":"windTemp","format":"{msg.payload}"},"layout":"row-spread","x":1904.0000076293945,"y":1082.2222299575806,"wires":[]},{ "id":"543b84c0.91a94c","type":"function","z":"30619a3e.4c7806","name":"GetVariable","func":"msg.payload = flow.get(\"windPressureAvg\");\nreturn msg;","outputs":1,"noerr":0,"x":1719.0000076293945,"y":1042.2222299575806,"wires":[]},{ "id":"88710ab1.637108","type":"function","z":"30619a3e.4c7806","name":"GetVariable","func":"msg.payload = flow.get(\"windTempAvg\");\nreturn msg;","outputs":1,"noerr":0,"x":1724.0000076293945,"y":1084.7222299575806,"wires":[]},{ "id":"ca00dce8.2b17d","type":"function","z":"30619a3e.4c7806","name":"toFloat","func":"msg.payload = 1000*parseFloat(msg.payload);\nreturn msg;","outputs":1,"noerr":0,"x":1257,"y":1017.7222290039062,"wires":[["f46aa233.e0c57","8fbc702.44bb49"]]}, {"id":"3bade437.aeb01c","type":"function","z":"30619a3e.4c7806","name":"toFloat","func":"msg.payload = parseFloat(msg.payload);\nreturn msg;","outputs":1,"noerr":0,"x":1261,"y":1071.7222290039062,"wires":[["5b4d7546.97df2c","4847dfcb.292d5"]]}, {"id":"597fd557.5fc86c","type":"function","z":"30619a3e.4c7806","name":"toFloat","func":"if (msg.parts.index>5)\n{msg.payload = parseFloat(msg.payload);}\nreturn msg;","outputs":1,"noerr":0,"x":592,"y":1490.7222900390625,"wires":[["757a432d.78fe9c"]]}, {"id":"d9999b74.5ff9e8","type":"debug","z":"30619a3e.4c7806","name":"VIPER time","active":false,"tosidebar":true,"console":false,"tostatus":false,"complete":"true","x":1642.5000228881836,"y":414.72223138809204,"wires":[]},{ "id":"8488ea03.acbda8","type":"function","z":"30619a3e.4c7806","name":"VIPER setup","func":"var dateTimeVIPER = msg.Time;\n//VIPERs dateTime format\nvar unit = flow.get(\"podID\"); //get flow variable for unit number\n//var server = flow.get(\"server\");\n//var port = flow.get(\"port\");\n//var instrument = flow.get(\"configuration\");\n//var header = \"<?xml version='1.0' encoding='utf-16'><alert xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance' xmlns:xsd='http://www.w3.org/2001/XMLSchema' xmlns='urn:oasis:names:tc:emergency:cap:1.1'>\"; //exact header text\n//var ident = '<identifier>' + unit + '_' + msg.Time + '</identifier>'; //<ident> is a unique ID, in this case, a combination of unitnumber and the dateTime\n//var sent = '<sent>' + msg.Time + '</sent>'; //vipер dateTime\n//var deploymentName = flow.get(\"deploymentname\"); //get saved deployment name variable\n//var source = '<source>' + instrument + ',' + deploymentName + unit + ',0,0</source>'; //use deployment name and unitnumber to build source string\n//var GPSlat = flow.get(\"latitude\"); // get flow variables for GPS coordinates\n//var GPSlon = flow.get(\"longitude\"); // get flow variables for GPS coordinates\n//var GPS = '<info><area><circle>' + GPSlat + ',' + GPSlon + ' 0</circle></area>'; //build GPS portion of string\n//var footer = '</headline></info></alert>'; //build footer to close open tags\n//var pm1 = flow.get(\"pm1Avg\"); // get all measurement values saved as flow variables\n//var pm25 =
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flow.get(\"pm25Avg\");\nvar pm10 = flow.get(\"pm10Avg\");\nvar PAtemp =
flow.get(\"PAtempAvg\");\nvar PARh = flow.get(\"PARhAvg\");\n\nvar BC_Serial =
flow.get(\"BCSerial\");\nvar BC_Timebase =flow.get(\"BCTimebase\");\nvar
BC_Battery=flow.get(\"BCBattery\");\nvar BC_Tape_Pos = flow.get(\"BCTapePos\");\nvar
BC_Flow_Set = flow.get(\"BCFlowSetpoint\");\nvar BC_Flow_Total =
flow.get(\"BCFlowTotal\");\nvar BC_Air_Temp = flow.get(\"BCSampleTemp\");\nvar
BC_Int_Temp = flow.get(\"BCInternalTemp\");\n\nvar BCUV =
flow.get(\"BCUVBCcAvg\");\nvar BCIR = flow.get(\"BCIRBCcAvg\");\nvar BCStatus =
flow.get(\"BCStatus\");\nvar BCUVATN1 = flow.get(\"BCUVATN1Avg\");\nvar BCIRATN1 =
flow.get(\"BCIRATN1Avg\");\nvar BCUVATN2 = flow.get(\"BCUVATN2Avg\");\nvar
BCIRATN2 = flow.get(\"BCIRATN2Avg\");\nvar BCUVK = flow.get(\"BCUVKAvg\");\nvar
BCIRK = flow.get(\"BCIRKAvg\");\nvar windSpeed = flow.get(\"windSpeedAvg\");\nvar
windDirection = flow.get(\"windDirAvg\");\nvar windPressure =
flow.get(\"windPressureAvg\");\nvar PAmac = flow.get(\"PAmac\");\nvar PAfirmware =
flow.get(\"PAfirmware\");\nvar PAdewpoint = flow.get(\"PAdewpoint\");\nvar PApresure =
flow.get(\"PApresure\");\nvar PARssi = flow.get(\"PARssi\");\nvar PAuptime =
flow.get(\"PAuptime\");\nvar PAtime = flow.get(\"PA_time\");\nvar pm1 =
flow.get(\"pm1\");\nvar pm25 = flow.get(\"pm25\");\nvar pm10 = flow.get(\"pm10\");\nvar
pm1c = flow.get(\"pm1c\");\nvar pm25c = flow.get(\"pm25c\");\nvar pm10c =
flow.get(\"pm10c\");\nvar p03 = flow.get(\"p03\");\nvar p05 = flow.get(\"p05\");\nvar p1 =
flow.get(\"p1\");\nvar p25 = flow.get(\"p25\");\nvar p5 = flow.get(\"p5\");\nvar p10 =
flow.get(\"p10\");\n\nvar pm1b = flow.get(\"pm1b\");\nvar pm25b = flow.get(\"pm25b\");\nvar
pm10b = flow.get(\"pm10b\");\nvar pm1cb = flow.get(\"pm1cb\");\nvar pm25cb =
flow.get(\"pm25cb\");\nvar pm10cb = flow.get(\"pm10cb\");\nvar p03b =
flow.get(\"p03b\");\nvar p05b = flow.get(\"p05b\");\nvar p1b = flow.get(\"p1b\");\nvar p25b =
flow.get(\"p25b\");\nvar p5b = flow.get(\"p5b\");\nvar p10b = flow.get(\"p10b\");\nvar PA_index
= flow.get(\"PAindex\");\n\n\n\nvar data =
\"PA_Temperature;\"+two(PAtemp)+\";degF;Green;\"; //build data string\ndata = data +
\"PM1a;\"+two(pm1)+\";ug/m3;Green;\"; //each additional data point is appended to the existing
data\ndata = data + \"PM2.5a;\"+two(pm25)+\";ug/m3;Green;\";\ndata = data +
\"PM10a;\"+two(pm10)+\";ug/m3;Green;\";\ndata = data + \"PA_mac;\"+PAmac+\";;Green;\";
\ndata = data + \"PA_firmware;\"+PAfirmware+\";;Green;\";\ndata = data +
\"PA_rssi;\"+PARssi+\";;Green;\";\ndata = data + \"PA_index;\"+PA_index+\";;Green;\";\ndata =
data + \"PA_uptime;\"+PAuptime+\";;Green;\";\ndata = data + \"PA_Relative
Humidity;\"+two(PARh)+\";%;Green;\";\ndata = data + \"PA_time;\"+PAtime+\";;Green;\";\n\nif
(instrument == \"config1\")\n{\ndata = data + \"BCUV
Concentration;\"+two(BCUV)+\";ng/m3;Green;\";\ndata = data + \"BCIR
Concentration;\"+two(BCIR)+\";ng/m3;Green;\";\ndata = data + \"BCUV
Attenuation(1);\"+two(BCUVATN1)+\";;Green;\";\ndata = data + \"BCIR
Attenuation(1);\"+two(BCIRATN1)+\";;Green;\";\ndata = data + \"BCUV
Attenuation(2);\"+two(BCUVATN2)+\";;Green;\";\ndata = data + \"BCIR
Attenuation(2);\"+two(BCIRATN2)+\";;Green;\";\ndata = data + \"BCUV
K;\"+two(BCUVK)+\";;Green;\";\ndata = data + \"BCIR K;\"+two(BCIRK)+\";;Green;\";\ndata

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= data + \"BC Status;\"+BCStatus+\";;Green;\";\n
data = data + \"WindSpeed;\"+two(windSpeed)+\";m/s;Green;\";\n
data = data + \"WindDirection;\"+two(windDirection)+\";degrees;Green;\";\n
data = data + \"WindPressure;\"+two(windPressure)+\";mbar;Green;\";\n
data = data + \"BC_serial;\"+BC_Serial+\";;Green;\";\n
data = data + \"BC_timebase;\"+BC_Timebase+\";secs;Green;\";\n
data = data + \"BC_battery;\"+BC_Battery+\";%;Green;\";\n
data = data + \"BC_tape_pos;\"+BC_Tape_Pos+\";;Green;\";\n
data = data + \"BC_flow_set;\"+BC_Flow_Set+\";mL/min;Green;\";\n
data = data + \"BC_flow_total;\"+BC_Flow_Total+\";mL/min;Green;\";\n
data = data + \"BC_air_temp;\"+BC_Air_Temp+\";degC;Green;\";\n
data = data + \"BC_int_temp;\"+BC_Int_Temp+\";degC;Green;\";\n
data = data + \"PM1ca;\"+two(pm1c)+\";ug/m3;Green;\";\n
data = data + \"PM25ca;\"+two(pm25c)+\";ug/m3;Green;\";\n
data = data + \"PM10ca;\"+two(pm10c)+\";ug/m3;Green;\";\n
data = data + \"p03a;\"+two(p03)+\";;Green;\";\n
data = data + \"p05a;\"+two(p05)+\";;Green;\";\n
data = data + \"p1a;\"+two(p1)+\";;Green;\";\n
data = data + \"p25a;\"+two(p25)+\";;Green;\";\n
data = data + \"p5a;\"+two(p5)+\";;Green;\";\n
data = data + \"p10a;\"+two(p10)+\";;Green;\";\n
data = data + \"PM1b;\"+two(pm1b)+\";ug/m3;Green;\"; //each additional data point is appended to the
existing data\n
data = data + \"PM2.5b;\"+two(pm25b)+\";ug/m3;Green;\";\n
data = data + \"PM10b;\"+two(pm10b)+\";ug/m3;Green;\";\n
data = data + \"PM1cb;\"+two(pm1cb)+\";ug/m3;Green;\";\n
data = data + \"PM25cb;\"+two(pm25cb)+\";ug/m3;Green;\";\n
data = data + \"PM10cb;\"+two(pm10cb)+\";ug/m3;Green;\";\n
data = data + \"p03b;\"+two(p03b)+\";;Green;\";\n
data = data + \"p05b;\"+two(p05b)+\";;Green;\";\n
data = data + \"p1b;\"+two(p1b)+\";;Green;\";\n
data = data + \"p25b;\"+two(p25b)+\";;Green;\";\n
data = data + \"p5b;\"+two(p5b)+\";;Green;\";\n
data = data + \"p10b;\"+two(p10b)+\";;Green;\";\n
\n\n//data = data + \"Dew
Point;\"+dp+\";degC;Green;\";\n
msg.payload = header + ident + sent + source + GPS +
\"<headline>\" + data + footer; //build entire string using the substrings we've built\n
return msg;
//send the message on to the TCP connection\n
function two(x) {\n
return
Number.parseFloat(x).toFixed(2);\n
}
,\"outputs\":1,\"noerr\":0,\"x\":1792.5000228881836,\"y\":482.2
222318649292,\"wires\":[[\"9bcf1dd4.abde3\",\"c5649815.e564f8\"]],{\"id\":\"318030f8.6d2cd\",\"type
\":\"change\",\"z\":\"30619a3e.4c7806\",\"name\":\"\",\"rules\":[\"t\":\"set\",\"p\":\"Time\",\"pt\":\"msg\",\"to\":\"pa
yload\",\"tot\":\"msg\"],[\"t\":\"set\",\"p\":\"time\",\"pt\":\"flow\",\"to\":\"payload\",\"tot\":\"msg\"],\"action\":\"\",\"p
roperty\":\"\",\"from\":\"\",\"to\":\"\",\"reg\":false,\"x\":1615.0000228881836,\"y\":507.2222309112549,\"wir
es\":[[\"8488ea03.acbda8\"]],{\"id\":\"c5649815.e564f8\",\"type\":\"tcp
out\",\"z\":\"30619a3e.4c7806\",\"host\":\"remote.ertviper.org\",\"port\":\"8001\",\"beserver\":\"client\",\"base
64\":false,\"end\":true,\"name\":\"\",\"x\":1932.5000305175781,\"y\":354.7222328186036,\"wires\":[]},{\"
id\":\"9bcf1dd4.abde3\",\"type\":\"debug\",\"z\":\"30619a3e.4c7806\",\"name\":\"VIPER
string\",\"active\":true,\"tosidebar\":true,\"console\":false,\"tostatus\":false,\"complete\":\"payload\",\"x\":19
60,\"y\":487.222225189209,\"wires\":[]},{\"id\":\"bb6427b6.b194b8\",\"type\":\"inject\",\"z\":\"30619a3e.4
c7806\",\"name\":\"Do after

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flow.get("BCGreenATN1Avg") + "\",\" + flow.get("BCRedATN1Avg") + "\",\" +
flow.get("BCIRATN1Avg") + "\",\";\nmsg.payload = msg.payload +
flow.get("BCUVATN2Avg") + "\",\" + flow.get("BCBlueATN2Avg") + "\",\" +
flow.get("BCGreenATN2Avg") + "\",\" + flow.get("BCRedATN2Avg") + "\",\" +
flow.get("BCIRATN2Avg") + "\",\";\nmsg.payload = msg.payload + flow.get("BCUVKAvg")
+ "\",\" + flow.get("BCBlueKAvg") + "\",\" + flow.get("BCGreenKAvg") + "\",\" +
flow.get("BCRedKAvg") + "\",\" + flow.get("BCIRKAvg") + "\",\";\nmsg.payload =
msg.payload + flow.get("BCUVBC1Avg") + "\",\" + flow.get("BCBlueBC1Avg") + "\",\" +
flow.get("BCGreenBC1Avg") + "\",\" + flow.get("BCRedBC1Avg") + "\",\" +
flow.get("BCIRBC1Avg") + "\",\";\nmsg.payload = msg.payload + flow.get("BCUVBC2Avg")
+ "\",\" + flow.get("BCBlueBC2Avg") + "\",\" + flow.get("BCGreenBC2Avg") + "\",\" +
flow.get("BCRedBC2Avg") + "\",\" + flow.get("BCIRBC2Avg") + "\",\";\nmsg.payload =
msg.payload + flow.get("BCUVBCcAvg") + "\",\" + flow.get("BCBlueBCcAvg") + "\",\" +
flow.get("BCGreenBCcAvg") + "\",\" + flow.get("BCRedBCcAvg") + "\",\" +
flow.get("BCIRBCcAvg") + "\",\";\nmsg.payload = msg.payload +
flow.get("windPressureAvg") + "\",\" + flow.get("windTempAvg") + "\",\" +
flow.get("windDirAvg") + "\",\" + flow.get("windSpeedAvg");\n}\nmsg.filename =
\"/media/usb/\"+msg.filename+\".txt\";\nreturn
msg;,"outputs":1,"noerr":0,"x":1667.5000267028809,"y":553.2222330570221,"wires":[["44604
e0d.dd6e2","67a17a84.f19714"]],{"id":"e0d8d451.4552c8","type":"moment","z":"30619a3e.4c
7806","name":"","topic":"","input":"","inputType":"date","inTz":"ETC/GMT","adjAmount":"20
","adjType":"seconds","adjDir":"add","format":"MMDDYYYY","locale":"en_US","output":"fil
ename","outputType":"msg","outTz":"America/Denver","x":1421.0000305175781,"y":550.2222
328186035,"wires":[["3a027a6d.5243c6"]],{"id":"67a17a84.f19714","type":"debug","z":"3061
9a3e.4c7806","name":"","active":true,"tosidebar":true,"console":false,"tostatus":false,"complete
":"payload","x":1956.5000305175781,"y":536.2222318649292,"wires":[]},{"id":"125c2ed0.64a6
d1","type":"delay","z":"30619a3e.4c7806","name":"","pauseType":"delay","timeout":"20","time
outUnits":"seconds","rate":"1","nbRateUnits":"1","rateUnits":"second","randomFirst":"1","rand
omLast":"5","randomUnits":"seconds","drop":false,"x":822.5,"y":484.722225189209,"wires":[["
528ad60d.5d5ba8"]],{"id":"29534efa.0366f2","type":"delay","z":"30619a3e.4c7806","name":"","
","pauseType":"delay","timeout":"20","timeoutUnits":"seconds","rate":"1","nbRateUnits":"1","rat
eUnits":"second","randomFirst":"1","randomLast":"5","randomUnits":"seconds","drop":false,"x
":825,"y":529.722225189209,"wires":[["e0d8d451.4552c8"]],{"id":"245d3a1e.653386","type":
"debug","z":"30619a3e.4c7806","name":"raw
BC","active":false,"tosidebar":true,"console":false,"tostatus":false,"complete":"true","x":425.5,"
y":1551,"wires":[]},{"id":"c4d3668e.c0ead8","type":"debug","z":"30619a3e.4c7806","name":"ra
w
wind","active":false,"tosidebar":true,"console":false,"tostatus":false,"complete":"true","x":277.5,
"y":1267.5,"wires":[]},{"id":"757a432d.78fe9c","type":"function","z":"30619a3e.4c7806","nam
e":"Set up BC Variables","func":`\nif (msg.parts.index===0)\n{\n
flow.set("BCSerial",msg.payload);\n}\nif (msg.parts.index===5)\n{\n
flow.set("BCTime",msg.payload);\n //msg.payload = "BC Time Set, Index 4";\n return
msg;\n}\nif (msg.parts.index===10)\n{\n flow.set("BCTimebase",msg.payload);\n
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msg.payload = "timebase" + msg.payload;\n  return msg;\n}\n\nif (msg.parts.index===11)\n{\n  flow.set("BCStatus",msg.payload);\n}\n\nif (msg.parts.index===12)\n{\n  flow.set("BCBattery",msg.payload);\n}\n\nif (msg.parts.index===16)\n{\n  flow.set("BCTapePos",msg.payload);\n}\n\nif (msg.parts.index===17)\n{\n  flow.set("BCFlowSetpoint",msg.payload);\n}\n\nif (msg.parts.index===18)\n{\n  flow.set("BCFlowTotal",msg.payload);\n  //msg.payload = "BC FT Set, Index 18";\n  return msg;\n}\n\nif (msg.parts.index===21)\n{\n  flow.set("BCSampleTemp",msg.payload);\n  //msg.payload = "BC ST Set, Index 19";\n  return msg;\n}\n\nif (msg.parts.index===22)\n{\n  flow.set("BCSampleRH",msg.payload);\n  //msg.payload = "BC SRH Set, Index 20";\n  return msg;\n}\n\nif (msg.parts.index===25)\n{\n  flow.set("BCInternalTemp",msg.payload);\n  // msg.payload = "BC IT Set, Index 23";\n  return msg;\n}\n\nif (msg.parts.index===30)\n{\n  flow.set("BCUVATN1",msg.payload);\n}\n\nif (msg.parts.index===31)\n{\n  flow.set("BCUVATN2",msg.payload);\n}\n\nif (msg.parts.index===32)\n{\n  flow.set("BCUVK",msg.payload);\n}\n\nif (msg.parts.index===36)\n{\n  flow.set("BCBlueATN1",msg.payload);\n}\n\nif (msg.parts.index===37)\n{\n  flow.set("BCBlueATN2",msg.payload);\n}\n\nif (msg.parts.index===38)\n{\n  flow.set("BCBlueK",msg.payload);\n}\n\nif (msg.parts.index===42)\n{\n  flow.set("BCGreenATN1",msg.payload);\n}\n\nif (msg.parts.index===43)\n{\n  flow.set("BCGreenATN2",msg.payload);\n}\n\nif (msg.parts.index===44)\n{\n  flow.set("BCGreenK",msg.payload);\n}\n\nif (msg.parts.index===48)\n{\n  flow.set("BCRedATN1",msg.payload);\n}\n\nif (msg.parts.index===49)\n{\n  flow.set("BCRedATN2",msg.payload);\n}\n\nif (msg.parts.index===50)\n{\n  flow.set("BCRedK",msg.payload);\n}\n\nif (msg.parts.index===54)\n{\n  flow.set("BCIRATN1",msg.payload);\n}\n\nif (msg.parts.index===55)\n{\n  flow.set("BCIRATN2",msg.payload);\n}\n\nif (msg.parts.index===56)\n{\n  flow.set("BCIRK",msg.payload);\n}\n\nif (msg.parts.index===57)\n{\n  flow.set("BCUVBC1",msg.payload);\n}\n\nif (msg.parts.index===58)\n{\n  flow.set("BCUVBC2",msg.payload);\n}\n\nif (msg.parts.index===59)\n{\n  flow.set("BCUVBCc",msg.payload);\n}\n\nif (msg.parts.index===60)\n{\n  flow.set("BCBlueBC1",msg.payload);\n}\n\nif (msg.parts.index===61)\n{\n  flow.set("BCBlueBC2",msg.payload);\n}\n\nif (msg.parts.index===62)\n{\n  flow.set("BCBlueBCc",msg.payload);\n}\n\nif (msg.parts.index===63)\n{\n  flow.set("BCGreenBC1",msg.payload);\n}\n\nif (msg.parts.index===64)\n{\n  flow.set("BCGreenBC2",msg.payload);\n}\n\nif (msg.parts.index===65)\n{\n  flow.set("BCGreenBCc",msg.payload);\n}\n\nif (msg.parts.index===66)\n{\n  flow.set("BCRedBC1",msg.payload);\n}\n\nif (msg.parts.index===67)\n{\n  flow.set("BCRedBC2",msg.payload);\n}\n\nif (msg.parts.index===68)\n{\n  flow.set("BCRedBCc",msg.payload);\n  \n}\n\nif (msg.parts.index===69)\n{\n  flow.set("BCIRBC1",msg.payload);\n}\n\nif (msg.parts.index===70)\n{\n  flow.set("BCIRBC2",msg.payload);\n}\n\nif (msg.parts.index===71)\n{\n  flow.set("BCIRBCc",msg.payload);\n  msg.payload = "IR BCc = " + msg.payload ;\n  return msg;\n}\n\n","outputs":1,"noerr":0,"x":804,"y":1491.2222900390625,"wires":[["e4223966.56d378
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End Code: