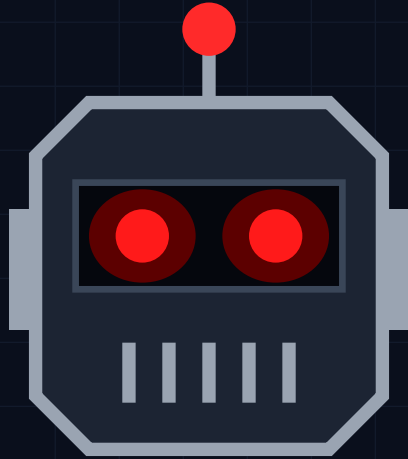




THE STRINGINATOR

User Manual

Serial and UDP data formatting, viewing and logging

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1 Introduction

The Stringinator is a Windows program for working with the lines of text that instruments send over RS232 serial ports or over a network using UDP. It can pick a value out of every line an instrument sends and show it in large text, reformat the line and pass it on to another serial port or network address, watch many instruments at once, and log their readings to a file. As well as text, it can read Kongsberg EM3000 binary attitude data and turn it into text.

Everything is done in tabs. There are four kinds:

Tab	What it is for
Output Formatter	Takes the lines from one input, picks out a value and displays it, reformats the line with your own prefix, separator and suffix, and sends the result to a serial port and/or a UDP address. Each output line can also be logged to a file. You can have as many Output Formatter tabs as you need.
Viewer	Watches up to 16 inputs at once and shows the selected data from each one in large text. All the inputs can be logged together to one file at a fixed interval (for example once a second), with one column per input. An input can also be an NMEA ZDA time source, which can supply the time column in the log.
Input Display	A display-only dashboard showing what every input is receiving (each Output Formatter's input and every Viewer input), with a clear live / no-data status for each one. There is always exactly one of these.
Output Display	A display-only dashboard showing what every Output Formatter tab is sending, with a clear live / no-data status for each one. There is always exactly one of these.

The way all your tabs are set up (ports, baud rates, parsing, formatting, Viewer inputs and logging options) can be saved as a **project** and loaded again later, so you only have to set things up once. See section 8.

2 Getting started

2.1 What you need

- A Windows PC.
- The program file, **Stringinator.exe**. Nothing else needs to be installed.
- Drivers for any USB-to-serial adapters you use, so that they appear as COM ports in Windows Device Manager.

2.2 Installing

Copy **Stringinator.exe** into a folder of your choice, for example a folder in Documents or on the desktop. There is no installer.

Tip

For quick access, right-click **Stringinator.exe** and choose **Send to > Desktop (create shortcut)**, or pin it to the Start menu or taskbar.

2.3 Starting the program

Double-click **Stringinator.exe** (or its shortcut). The program opens with one Output Formatter tab, one Viewer tab, and the Input Display and Output Display tabs.

Note

The first time you start the program, Windows may show a **Windows protected your PC** message. Click **More info**, then **Run anyway**. If Windows Firewall asks whether to allow the program on networks, allow it if you will use UDP.

Tip

The title uses the free **Orbitron** or **Audiowide** fonts if one of them is installed on the PC. They are optional; without them a standard font is used.

3 The main window

3.1 Layout

- **Title banner** across the top. The name of the open project is shown in its top-right corner ("Untitled" until the project has been saved).
- **File menu** for saving and opening projects (section 8).
- **Tabs**: your Output Formatter and Viewer tabs, then Input Display and Output Display, then **+ Add tab**.

3.2 Working with tabs

To...	Do this
Add a tab	Click + Add tab and choose Add Output Formatter or Add Viewer . The new tab appears just before Input Display.
Rename a tab	Right-click the tab and choose Rename tab... . The new name is also used on the Input Display and Output Display. Long names are shortened on the tab itself (shown with ...) but kept in full everywhere else.
Close a tab	Right-click the tab and choose Close tab . If the tab is still connected or logging you will be asked to confirm, and it is disconnected first. At least one Output Formatter or Viewer tab must stay open.

The Input Display and Output Display tabs cannot be renamed or closed.

3.3 Live / no-data colours

Wherever a value is shown in large text, its colour tells you whether data is still arriving:

Colour	Meaning
Normal text colour	Nothing has been received yet.
Green	Data has arrived within the last 5 seconds.
Red	No data for 5 seconds or more. The last value stays on screen so you can still read it.

3.4 COM ports

- Ports are listed with their Windows description, for example **COM3 - USB Serial Port**.
- Any **Refresh** button re-scans the PC's ports and updates the lists in every tab. Use it after plugging in a USB adapter.
- Several inputs can use the same COM port at the same time: any number of Output Formatter tabs and Viewer inputs. The port is opened once and every line received goes to each of them. This is how you pick different strings from one instrument (section 3.5).
- Inputs sharing a COM port must all use the same baud rate, data bits, parity, stop bits, flow control and input **Format** (text or binary). If they don't, a message tells you the settings the port is already open with.
- A port that is open as an Output Formatter *output* can't also be used as an input or as another output; you will get a **Port in use** message.
- A port that is being used by a different program cannot be opened either; Windows reports this as a connection error.

3.5 Several strings on one input

Many instruments send several different strings on the same port, one after another, for example a GNSS receiver sending GGA, HDT and VTG lines:

```
$GPGGA,031823.60,5708.700310,N,00204.153522,W,1,14,0.8,25.67,M,50.00,M,,*46
$HEHDT,45.01,T*2F
$GPVTG,45.00,T,46.50,M,3.97,N,7.36,K,A*2A
```

Every input (on the Output Formatter and in the Viewer) has a filter: **Only lines starting with** on the Output Formatter, and **Starts with** on each Viewer input. Type the start of the string you want and that input uses only those lines and ignores all the others. Because several inputs can share one port (section 3.4), you can pick each string with its own input. For example, with four Viewer inputs on the same port and the Separator set to , :

Input name	Starts with	Field #	Shows
Position	\$GPGGA	3-6	5708.700310 N 00204.153522 W
Fix quality	\$GPGGA	7	1
Heading	\$HEHDT	2	45.01
Speed	\$GPVTG	6	3.97

- Leave the filter blank to use every line.
- The filter must match the start of the line exactly, including capital letters and the talker ID: **\$GPGGA** will not pick up **\$GNGGA**.
- The input monitor still shows every line that arrives, so you can see what is available to pick from. Everything else (the big value, the last line shown, the live / no-data status, logging and the Input Display) uses only the lines that match.

3.6 Binary input (EM3000)

Some motion sensors, such as a Seapath or an MRU, can send attitude as Kongsberg **EM3000** binary data instead of text. Every input (on the Output Formatter and in the Viewer) has a **Format** setting next to its Source: leave it on **Text lines** for normal text data, or choose **EM3000 binary** to read this data.

Each EM3000 packet is 10 bytes, with values sent low byte first and no line ending:

Bytes	Content
1	Status (0 = normal)
2	Sync byte, 90 hex
3 – 4	Roll, in 0.01° units
5 – 6	Pitch, in 0.01° units
7 – 8	Heave, in cm
9 – 10	Heading, in 0.01° units (0 to 359.99°)

The Stringinator turns every packet into a line of text, which is then used exactly like a line from a text instrument: field picking, the line filter, the big display, logging, the Input Display and the Output Formatter all work as normal. The input monitor shows each packet in hex, with the line it becomes:

```
05:40:12.345 00 90 E5 FE 76 FF FB FF 96 11 -> EM3000,0,-2.83,-1.38,-0.05,45.02
```

With the separator set to , the fields are:

Field #	1	2	3	4	5	6
Value	EM3000	Status	Roll (°)	Pitch (°)	Heave (m)	Heading (°)

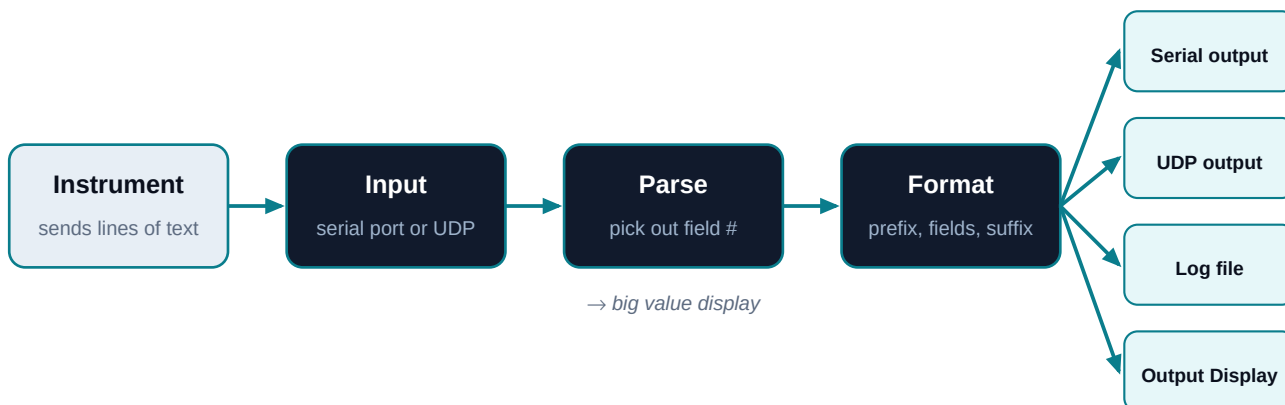
- For example, a Viewer input on field 6 shows the heading, and 3-5 shows roll, pitch and heave together.
- To pass the data on as text, use an Output Formatter with the Format set to EM3000 binary and build the output line with the prefix, separator and Fields to output. The Stringinator then works as a binary-to-text converter.
- A packet is only accepted when its sync byte is followed by sensible values (heading 0 to 360°, sensible roll, pitch and heave). Stray or damaged bytes are skipped and reading carries on from the next good packet.
- EM3000 data is usually sent 50 to 100 times a second, so the input's baud rate must match the sensor's, typically 19200 or faster.

Note

Text and binary can't be read from the same port at the same time. All inputs sharing a port must use the same Format.

4 Output Formatter

An Output Formatter takes lines from one instrument, picks out one value, shows it in large text, rebuilds the line in the format you choose and sends it on.



How a line travels through an Output Formatter tab.

4.1 Input (from instrument)

Choose where the data comes from with **Source**: **Serial** or **UDP**. Only the settings for the chosen source are shown.

Setting	Description
Format	Text lines for normal text data, or EM3000 binary for Kongsberg EM3000 attitude data (section 3.6).
COM port	The serial port the instrument is connected to.
Baud	Speed of the serial line. Pick from the list or type any other rate.
Data bits, Parity, Stop bits	Must match the instrument. Most instruments use 8 data bits, no parity, 1 stop bit (often written 8-N-1).
Flow	Flow control: None, RTS/CTS (hardware) or XON/XOFF (software). Usually None.
Listen on IP	(UDP) Which network adapter to listen on. 0.0.0.0 means all adapters, which is normally what you want.
Port	(UDP) The UDP port number the instrument sends to.
Connect	Opens the input and starts receiving. The button becomes Disconnect . The Source and Format cannot be changed while connected.

Serial data is read a line at a time; lines ending in LF or CR LF work best. Over UDP, each network packet may contain one or several lines. Lines ending in CR, LF or CR LF are all split correctly, and blank lines are ignored.

4.2 Output (to destination)

The formatted line can be sent to a serial port, to a UDP address, or to both at once.

Setting	Description
Serial port, Baud, Data bits, Parity, Stop bits, Flow	The serial port to send to and its line settings. Press Connect next to it to open the port.
Send via UDP	Tick to also send each line as a UDP packet.
To IP, Port	Where UDP packets are sent. <code>127.0.0.1</code> is this same PC. A broadcast address such as <code>192.168.1.255</code> sends to every device on that network.
Line ending sent	Added to the end of every line sent: CR LF, CR, LF or None.
Sending enabled	Untick to stop sending (both serial and UDP) without disconnecting. Lines are still shown on screen and logged.

Note

Only plain ASCII characters can be sent. Any other character (for example the degree sign °) is sent as a question mark, so use plain text such as **degC** in units, prefixes and suffixes.

4.3 Input parsing

Setting	Description
Input separator	What separates the fields in each incoming line. (whitespace) means any spaces or tabs, with several in a row counting as one. Pick a comma, semicolon, colon, tab (<code>\t</code>) or equals sign from the list, or type your own.
Value is field #	Which field is the value, counting from 1 for the first field.
Only lines starting with	Use only lines that start with this text, for example <code>\$GPGGA</code> . Leave blank to use every line. See section 3.5.
Decimal places	Round the value to this many decimal places. Leave blank to keep the value exactly as received. Values that aren't plain numbers are left unchanged.

4.4 Display

- **Units:** text shown after the value, for example **m** or **degC**.
- **Last input:** the last line used (the last matching line if a filter is set), with any CR and LF characters shown as `\r` and `\n` so you can see exactly what the instrument sends.
- **Big value:** the selected value with its units. It shows **field?** if a line has fewer fields than the field number you chose; nothing is sent for that line.

4.5 Output formatting

Setting	Description
Prefix	Text put at the start of every output line.
Output separator	Text put between the fields in the output line.
Suffix	Text put at the end of every output line (before the line ending).
Fields to output	<code>all</code> to send every field, or a list of field numbers such as <code>1, 2</code> . Fields are sent in the order you list them, so <code>3, 1</code> sends field 3 then field 1. Numbers that don't exist in a line are skipped.
Add units to value	Tick to put the units after the value in the output line too.

In the prefix, separator and suffix boxes you can type `\t` for a tab, `\r` for CR and `\n` for LF. The line ending is added automatically, so you don't need to type it.

4.6 Worked example

An instrument sends lines like `T1 23.456 18.2` followed by CR LF, and you want to send `DEPTH, T1, 23.5 m` to a data logger.

Setting	Value
Input separator	(whitespace)
Value is field #	2
Decimal places	1
Units	m
Prefix	DEPTH,
Output separator	,
Suffix	(blank)
Fields to output	1,2
Add units to value	Ticked

The line splits into three fields: `T1`, `23.456` and `18.2`. Field 2 is rounded to `23.5`, the units are added, fields 1 and 2 are joined with commas and the prefix goes in front. The big display shows **23.5 m** and the program sends `DEPTH, T1, 23.5 m` followed by the chosen line ending.

4.7 Input monitor and formatted output

The bottom of the tab has two panes side by side.

- **Input monitor** (left) shows every line received, with the PC time to the millisecond. For UDP the sender's address is shown in square brackets, for example `[192.168.1.20:5000]`. The last 1000 lines are kept. Tick **Pause display** to freeze it while you read it (data is still processed), and **Clear** to empty it.
- **Formatted output** (right) shows every line produced, exactly as it is sent. **Copy last** copies the most recent line to the clipboard; **Clear** empties the pane.
- **Log to file**: tick it and choose a file to record every output line. If the file already exists, new lines are added to the end of it. Untick to stop logging.
- **Add PC time**: puts the PC date and time (`2026-10-15 14:32:01.123`) and a tab in front of each logged line.

4.8 If something goes wrong

- If the input port fails (for example a USB adapter is unplugged), the input is disconnected and a message explains why.
- If the serial output fails, the output port is disconnected and a message is shown.
- If a UDP packet can't be sent (for example an invalid address), **Send via UDP** is unticked and a message is shown.
- If the log file can't be written, **Log to file** is unticked and a message is shown.

5 Viewer

The Viewer watches several instruments at once. Each input has its own connection settings and its own large display, and all of them can be logged together to one file.

5.1 Layout

- **Top bar**: **+ Add input** adds another input (up to 16). **Columns** sets how many inputs are shown side by side (1 to 3). The number of inputs is shown on the right.
- **Input panels**: one per input, arranged in a grid. If they don't all fit, scroll with the mouse wheel or the scroll bar.
- **Input monitor**: raw data from all inputs, each line labelled with the input's name.
- **Logging**: settings for logging all inputs to one file.

5.2 Input panels

Setting	Description
Name	Your name for the input. It is used in the monitor and as the column heading in the log file.
Remove	Disconnects the input and removes its panel.
Source	Serial or UDP, as in the Output Formatter.
Connect	Opens the input. The button becomes Disconnect .
Type	Data for ordinary instrument data, or ZDA time (NMEA) for a time source (section 5.4).
Log	Tick to include this input as a column in the log file.
Format	Text lines or EM3000 binary, as in the Output Formatter (section 3.6).
COM port, Baud, Refresh, Data bits, Parity, Stop bits, Flow	Serial settings, as in the Output Formatter.
Listen on IP, Port	UDP settings, as in the Output Formatter.
Field #	Which field to display and log, counting from 1. 0 (or blank) means the whole line. For several fields, list them (3, 5) or give a range (3-6); they are shown and logged together, separated by spaces.
Units	Text shown after the value.
Separator	What separates the fields, as in the Output Formatter.
Starts with	Use only lines that start with this text, for example \$HEHDT . Leave blank to use every line. See section 3.5.

5.3 The live data screen

The lower part of each input panel is a boxed screen showing the data as it arrives:

- A status light in the top-right corner: **WAITING** until the first data arrives, **LIVE** while data keeps arriving, and **NO DATA** after 5 seconds without any. The screen's border changes colour to match.
- The selected value with its units in large text (green or red as described in section 3.3). It shows **field?** if the line has fewer fields than the field number.
- The last raw line received, in small text underneath.

5.4 ZDA time inputs

Set **Type** to **ZDA time (NMEA)** for an input connected to a GPS or other device that sends NMEA 0183 ZDA time sentences, such as:

```
$GPZDA,143201.00,15,10,2026,00,00*6A
```

- Any talker ID is accepted (**\$GPZDA**, **\$GNZDA**, **\$IIZDA** and so on). Other sentences arriving on the same input are ignored.

- If the sentence has a checksum it is checked; sentences with a wrong checksum are rejected and the display shows **ZDA?**.
- The screen shows the UTC time to hundredths of a second, with the date underneath.
- Field #, Units and Separator are not used for ZDA inputs and are greyed out.
- NMEA devices commonly use 4800 baud; check your device's settings.

A ZDA input can supply the time column in the log (section 5.5).

5.5 Logging

Logging writes one row to a text file at a fixed interval, with a column for each input.

1. Tick **Log** on every input you want in the file, and give the inputs sensible names.
2. Set the logging options (table below).
3. Tick **Log inputs to file** and choose a file name. Logging starts straight away and the file name is shown next to the tick box.
4. Untick **Log inputs to file** to stop.

Option	Description
Log every ... seconds	How often a row is written: from 0.1 to 3600 seconds. The default is 1 second.
Add time column from	Tick to add a time column at the start of each row. PC time uses the PC clock. ZDA time uses the time from a ZDA input (in UTC).
Add units	Tick to write each value with its units.
Separator	What goes between columns: Tab, Comma, Semicolon, Space or Pipe (). You can also type your own; <code>\t</code> means tab. Use Comma for a .csv file.

A heading row with the input names is written first, then one row per interval. For example, with a tab separator:

```
PC time          Depth  Heading
2026-10-15 14:32:01.123 23.5   181.2
2026-10-15 14:32:02.123 23.6   181.4
```

- Each row holds the latest value from each input at that moment. If an instrument is slower than the log interval, its last value is repeated until a new one arrives.
- A cell is left empty if its input is disconnected, has received nothing yet, or its latest line didn't contain the chosen field.
- The ZDA time is carried forward from the last sentence using the PC's clock, so it stays accurate between sentences. If no valid ZDA sentence has arrived for 10 seconds, the time column is left empty.
- Which inputs are logged, and the heading row, are fixed when logging starts. Set the options before you start; to change them, stop logging and start it again.
- If you choose a file that already exists, the new rows are added to the end of it.

5.6 Default UDP port numbers

New tabs and inputs are given different default UDP port numbers so that they don't clash. You can change any of them.

Where	Default UDP ports
First Output Formatter	Listens on 5000, sends to 5001
Further Output Formatters	Listen on 6000, 6002, 6004... and send to 6001, 6003, 6005...
First Viewer	Input 1 listens on 5000, input 2 on 5001, and so on
Further Viewers	Second Viewer starts at 7000, third at 7020, and so on

Note

Inputs listening on the same UDP port share it, just like a shared COM port: they all receive the same data, so they must also use the same **Listen on IP**. The first Output Formatter and input 1 of the first Viewer both default to port 5000, so they share whatever arrives there; change one of them if that isn't what you want.

6 Input Display

The Input Display tab is a dashboard showing what every input is receiving. There is nothing to set up: it shows one card for each Output Formatter tab's input and one for every Viewer input, and cards appear and disappear automatically as tabs and inputs are added or removed.

Each card shows:

- The input's name: the Output Formatter tab's name, or the Viewer tab and input name, for example **Viewer · Heading**.
- A status: **NOT CONNECTED**, **WAITING** until the first data arrives, **LIVE** while data is arriving, or **NO DATA** with the number of seconds since the last data. A coloured bar down the left edge and a status light match it; the light flashes each time new data arrives.
- Where the data comes from, for example **COM3 @ 9600 · \$GPGGA** or **UDP 0.0.0.0:5000**, including the input's filter if it has one.
- The time the last data arrived and the number of lines received.
- The value the input is picking out in large text (the same value shown on its own tab), with the three previous values underneath.

Each Viewer starts with four inputs, so inputs you aren't using show as NOT CONNECTED. Tick **Connected inputs only** at the top of the tab to hide them. Along the top are also the current PC time and a summary of how many inputs are live and how many have no data.

7 Output Display

The Output Display tab is a dashboard for keeping an eye on everything being sent. There is nothing to set up: it shows one card for every Output Formatter tab, and cards appear and disappear automatically as Output Formatter tabs are added or closed.

Each card shows:

- The Output Formatter tab's name (renaming the tab renames the card).
- A status: **WAITING** until the first line is sent, **LIVE** while lines are being sent, or **NO DATA** with the number of seconds since the last line. A coloured bar down the left edge and a status light match it; the light flashes each time a new line goes out.
- The time the last line was sent and the total number of lines sent.
- The latest line in large text, with the three previous lines underneath. Tabs and line endings are shown as spaces so each line fits on one row.

Along the top are the current PC time and a summary of how many formatters are live and how many have no data.

8 Projects

A project stores the set-up of all your tabs so you can close the program and pick up exactly where you left off, or keep different set-ups for different jobs.

8.1 The File menu

Command	Shortcut	What it does
New project	Ctrl+N	Starts afresh with one Output Formatter and one Viewer.
Open project...	Ctrl+O	Opens a saved project, replacing the current tabs.
Open recent		Lists the last 8 projects you saved or opened.
Save project	Ctrl+S	Saves to the current project file. The first time, it asks for a file name.
Save project as...	Ctrl+Shift+S	Saves to a new file name.
Exit		Closes the program.

Project files have the extension **.stringinator**. They are plain text, so they can be copied to another PC or e-mailed like any other file.

8.2 What is saved

- Every Output Formatter and Viewer tab, in order, with its name.
- All input and output settings: source, input format, COM ports, baud rates, data bits, parity, stop bits, flow control, UDP addresses and ports.
- All parsing, display and formatting settings: line filters, separators, field numbers, decimal places, units, prefix, suffix, fields to output, line ending, and the tick boxes.
- For each Viewer: every input and its settings, the number of columns and all the logging options.
- The window size and position, and which tab was showing.

Not saved: whether ports were connected, log files that were being written, and the contents of the monitors. After opening a project, press **Connect** on the inputs and outputs you need, and start any logging.

8.3 Good to know

- If a saved COM port isn't plugged in when you open the project, its name is kept. Plug in the adapter (check it has the same COM number), press **Refresh** if needed, then **Connect**.
- If you have unsaved changes when you start a new project, open another one or close the program, you are asked whether to save them first.
- If any tabs are still connected or logging when you open or start a project, you are asked to confirm; they are disconnected before the new project is loaded.

9 Troubleshooting

Problem	What to check
"Port in use" message	The port is open as an Output Formatter output. A port used as an output can't also be an input or another output. Disconnect it there first.
Message that a port is already open with different settings	Another input is already using that COM port with a different baud rate, data bits, parity, stop bits, flow control or Format. Make the settings match to share the port.
Connection error when opening a COM port	The port is being used by another program, the adapter has been unplugged, or the COM number has changed. Press Refresh and check Windows Device Manager.
Garbled characters in the monitor	The baud rate, data bits, parity or stop bits don't match the instrument. If the instrument sends EM3000 binary, set the input's Format to EM3000 binary .
Format is EM3000 binary but nothing is decoded	Check the baud rate and line settings match the sensor, and that the sensor really is set to EM3000 output. The monitor shows nothing until a complete, sensible packet arrives.
Nothing at all in the monitor (serial)	Check the cable and the COM port. Some instruments need RTS/CTS flow control, or need a null-modem cable.
Nothing arrives over UDP	Check the port number matches what the sender uses, and that Listen on IP is 0.0.0.0. Make sure Windows Firewall allows Stringinator.exe. Make sure no other program is listening on the same port.
UDP error when connecting	Another program is already listening on that port, or another input in this program uses the same port with a different Listen on IP. Choose a different port or use the same Listen on IP.

Problem	What to check
Monitor shows data but the input shows nothing	The Starts with filter doesn't match. It must match the start of the line exactly, including capital letters and the talker ID (\$GP ~~GG~~ A is not \$GNGGA).
Display shows field?	The line has fewer fields than the field number. Check the separator and the field number against the raw data in the monitor.
Value is not rounded	Decimal places only work on plain numbers. If the field contains letters (such as units stuck to the number) it is left as received.
Receiving device gets nothing	Check the output port is connected, Sending enabled is ticked, the output baud rate and settings match the device, and the line ending is what the device expects.
Display shows ZDA?	The ZDA sentence couldn't be read or its checksum is wrong. Check the baud rate (often 4800 for NMEA) and look at the raw data in the monitor.
Empty cells in the Viewer log	The input was disconnected, hadn't received anything yet, or its latest line didn't contain the chosen field. For the time column, the ZDA input may have been quiet for more than 10 seconds.
Display has turned red	No data has arrived for 5 seconds. Check the instrument and the connection.

Appendix: quick reference

Codes you can type

Type	Means	Where
\t	Tab	Separators, prefix, suffix, log separator
\r	Carriage return (CR)	Separators, prefix, suffix, log separator
\n	Line feed (LF)	Separators, prefix, suffix, log separator

Field numbering

With the separator set to , the line \$XDR,C,21.4,C,AIRTEMP has these fields:

Field #	1	2	3	4	5
Value	\$XDR	C	21.4	C	AIRTEMP

In the Viewer, field 0 means the whole line, and you can list several fields (3,5) or give a range (3-6).

Status at a glance

Shown as	Meaning
WAITING	Nothing received (or sent) yet.
LIVE / green	Data within the last 5 seconds.
NO DATA / red	Nothing for 5 seconds or more.
field?	The line has fewer fields than the chosen field number.
ZDA?	A ZDA sentence couldn't be read.