

CLAIMS:

1. A system for measuring the amount of bunker fuel, such as for example heavy fuel oil, transferred during a bunkering activity, said system comprises:

a pipe extending from an inlet to an outlet, said pipe being configured to transport bunker fuel from said inlet to said outlet,

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an air and/or gas separator connected to said pipe at a first position, said air and/or gas separator having a gas and/or air outlet for discharging air and/or gas removed from said pipe,

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a Coriolis flow meter including a sensor assembly in said pipe and meter electronics, said Coriolis flow meter being configured to measure a flowrate of the bunker fuel as it flows through said Coriolis flow meter,

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said pipe comprising a downwardly extending portion arranged downstream of said first position and upstream of said Coriolis flow meter,

25 an electronically controlled backpressure valve in said pipe at a position downstream of said Coriolis flow meter, said backpressure valve having an adjustable restriction effect on any fluid flowing through said backpressure valve,

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a pressure sensor configured for sensing the pressure in said pipe at a second position

downstream of said first position and of upstream of said backpressure valve, and

an electronic control unit in electrical communication
5 with said Coriolis flow meter, with said pressure sensor
and with said electronically controlled backpressure
valve,

said electronic control unit being configured to adjust
10 the restriction effect of said backpressure valve using
the signal from said pressure sensor in order to maintain
the pressure sensed by said pressure sensor close to a
predetermined pressure value.

15 2. A system according to claim 1, wherein said
predetermined pressure value substantially corresponds to
the static pressure created by a column of bunker fuel
with a height that substantially corresponds to the
height (h) covered by said downwardly extending portion
20 of said pipe or corresponds to the height difference
between said first position and said second position.

3. A system according to claim 1 or 2, wherein said
electronic control unit is configured:

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to adjust the position and thereby increase the
restriction effect of said backpressure valve when
the pressure detected by said pressure sensor is
below a first threshold, and

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to adjust the position and thereby decrease the
restriction effect of said backpressure valve when
the pressure detected by said pressure sensor

is above a second threshold that is higher than said first threshold.

4. A system according to claim 1 or 2, wherein:

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said first threshold is slightly below the static pressure created by a column of bunker fuel with a height that substantially corresponds to the height (h) covered by said downwardly extending portion of said pipe, and

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said second threshold is slightly above the static pressure created by a column of bunker fuel with a height that substantially corresponds to the height (h) covered by said downwardly extending portion of said pipe.

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5. A system according to any one of claims 1 to 4, wherein said gas and/or air outlet of said air separator is connected to the atmosphere via conduit to an overflow tank, said conduit including detection means such as a sight glass for verifying that no bunker fuel is flowing to said overflow tank .

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25 6. A system according to any one of claims 1 to 5, wherein said inlet comprises an bunkering manifold, preferably said inlet comprising two bunkering manifolds, one bunkering manifold being suitable to form a port bunkering manifold of a ship and the other bunkering manifold being suitable for forming the starboard

30 bunkering manifold of a ship.

7. A system according to any one of claims 1 to 6, wherein said outlet is connected to a bunker fuel tank.

5 8. A system according to any one of claims 1 to 7, wherein said downwardly extending portion includes a substantially vertically extending droppipe section.

9. A system according to claim 8, wherein said first
10 position where said air separator connects to said pipe is close to or at the upper end of said droppipe section.

10. A system according to claim 8 or 9, wherein said
15 second position where said pressure sensor connects to said pipe is close to or at the lower end of said droppipe section.

11. A system according to any one of claims 1 to 7,
further comprising a first fluid switch located just
20 upstream of said Coriolis sensor to determine if the pipe just upstream of said Coriolis sensor is filled with bunker fuel and a second fluid switch located just downstream of said Coriolis sensor to determine if the pipe just downstream of said Coriolis sensor is filled
25 with bunker fuel, said electronic control unit being in electrical communication with said first fluid switch and with second fluid switch, and said electronic control unit being configured to start measuring the a flowrate of the bunker fuel only when both the first fluid switch
30 and the second fluid switch indicate the presence of bunker fuel in the pipe.

12. A system according to according to claim 11 wherein
said electronic control unit being configured to stop
measuring the flowrate of the bunker fuel when both of
5 said fluid switches indicates that the pipe at the
position of the fluid switch concerned is not filled with
bunker fuel.

13. A large ocean going ship with a system according to
10 claim any one of claims 1 to 11, wherein the inlet of
said pipe is connected to a port bunker manifold of said
ship and to a starboard bunker manifold of said ship and
the outlet of said pipe is connected to a bunker oil fuel
tank of said ship.

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14. A method for transferring bunker fuel from a barge or
other container to a bunker fuel tank in a ship, using a
pipe, said pipe including a Coriolis flow meter
configured for measuring a flow of bunker fuel through
20 said pipe and a restriction or throttling valve
downstream of said Coriolis flow meter, an air or gas
vent being connected to said pipe at a first position
where said pipe is higher than- and upstream of said
Coriolis flow meter, said method comprising:

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measuring a pressure in said pipe at a second position
between said air or gas vent and said Coriolis flow
meter, said second position being lower than said first
position,

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increasing a pumping rate of bunker fuel into said pipe
to a nominal pumping rate, and

applying a high restriction or throttling effect with said restriction or throttling valve until said measure pressure exceeds a first threshold.

5 15. A method according to claim 14, further including after said measured pressure has exceeded said first threshold: adjusting said restriction or throttling effect of said restriction or throttling valve with the aim to keep said measured pressure above said first
10 threshold by increasing said restriction or throttling effect and below a second threshold that is slightly higher than said first threshold by reducing said restriction or throttling effect.

15 16. A method according to claim 14 or 15, wherein said first threshold substantially corresponds to the static pressure created by a column of bunker fuel with a height that substantially corresponds to the height difference (h) between said first position and said second position.

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17. A method according to any one of claims 14 to 16, wherein a vent line is connected to said venting position, said method further comprising periodically checking for bunker fuel in said vent line.

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