Log & Guard™ B:safe

Monitoring trolley for cryostorage

User manual

Log & Guard B:safe

User manual, first issue 2021.03.01/International/English

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1 Introduction

This user manual provides information on how to use the Log & Guard B:safe monitoring trolley for cryostorage.

Log & Guard is an automated 24/7 monitoring system that was created and developed specifically for IVF. The Log & Guard B:safe monitoring trolley enables the monitoring of the storage of cryopreserved oocytes, sperm and embryos.

The Log & Guard B:safe monitoring trolley is to be combined with a Log & Guard controller supporting wireless data transmission to collect and display the data, save them permanently and send out text message alerts in case a cryostorage tank is malfunctioning. The Log & Guard B:safe monitoring trolley can be added to any existing Log & Guard monitoring network with a controller supporting wireless data transmission.

The product fulfils the requirements of EN 61326-1:2013: Electrical equipment for measurement, control and laboratory use.

1.1 Limitation of liability

It is the sole responsibility of the clinic to ensure that cryopreserved material is kept safe at all times, e.g. by having more than one safety system in place. Vitrolife assumes no liability for any loss of or damage to cryopreserved material contained in storage tanks monitored by the Log & Guard B:safe monitoring trolley.

2 Overview of the Log & Guard B:safe monitoring trolley

Figure 1: Log & Guard B:safe monitoring trolley with storage tank.

2.1 Specifications of the Log & Guard B:safe monitoring trolley

Figure 2: Log & Guard B:safe monitoring trolley: Plate with surface temperature sensor, holding rods, bearing parts, skirt with access to alarm socket and battery case, and wheels.

Table 1: Specifications of the Log & Guard B:safe monitoring trolley

Reference number	14840/0213		
Monitoring trolley	Ø 70 cm, H: 16 cm, weight: 20 kg Holding rods: Ø 2 cm, H: 8 cm, for storage tanks with an outer diameter of 451 to 508 mm (most tanks with a volume between 25 and 60 litres) Five wheels		
Batteries	2 x LR20 (alkaline, high capacity)		
Battery lifetime	Approximately 3 years for recommended sampling intervals		
Sensor type	Weight	Surface temperature	Calculated relative evaporation
Measuring range	0-100 kg	-199 °C to +50 °C	N/A
Accuracy	+/- 20 g	+/- 0.5 °C	N/A
Resolution	10 g	0.1 °C	N/A
Recommended measurement interval	15-30 minutes	15-30 minutes	6-12 hours (selectable range)
Calibration	By single-point calibration to externally measured value		N/A
Interface	Combined 4-pin socket for storage tank alarm relay and for optional low temperature sensor (for measuring the temperature inside the storage tank)		
Working temperature	20-50 °C; stable temperature required		
Relative humidity range	0-99 %		
Features	Wireless transmitter		
Requirements for operation	The Log & Guard B:safe monitoring trolley must be placed in the same room as the Log & Guard controller or an Ethernet gateway connected to the controller.		

WARNING	Do not step on the monitoring trolley.
	Do not lean on the monitoring trolley or tank.
	The monitoring trolley must only be used with all five holding rods installed correctly.
	Two persons must handle the storage tank when positioning it on or removing it from the monitoring trolley.
	Relocation should be avoided. If relocation is necessary: be careful, move slowly, relocate on an even floor, watch your feet and wear protective shoes.

CAUTION	Observe the RF limitation and measurement intervals.
	Avoid contact between the monitoring trolley and other items to ensure correct measurement.
	Ensure that the ambient temperature is stable.

2.2 Unpacking and installation of the Log & Guard B:safe monitoring trolley

The Log & Guard B:safe monitoring trolley can be connected to any Log & Guard controller that has a serial number starting with AOLG. To ensure optimum signal strength, the Log & Guard B:safe monitoring trolley should be installed in the same room as the Log & Guard controller or an Ethernet gateway connected to the controller.

2.2.1 Unpacking the Log & Guard B:safe monitoring trolley

Take all parts out of the box. The loose holder with the surface temperature sensor is attached to the underside of the monitoring trolley (Figure 3). A small box containing holding rods, screws, Allen keys and batteries is included with the monitoring trolley (Figure 4).

List of items included in the box:

- Log & Guard B:safe monitoring trolley with surface temperature sensor attached
- 5 holding rods (5 screws, 5 studs and 5 guides)
- Allen keys (2 mm, 3 mm and 6 mm)
- 2 x LR20 alkaline high-capacity batteries.

Figure 3: Loose holder with the surface temperature sensor attached to the underside of the monitoring trolley.

Figure 4: Small box containing holding rods, screws, Allen keys and batteries.

2.2.2 Integration into the Log & Guard software

For sensor channel integration into the Log & Guard software, please provide the MAC address printed on the label on the skirt of the Log & Guard B:safe monitoring trolley to Vitrolife support.

2.2.3 Assembly of Log & Guard B:safe components

Installing the surface temperature sensor

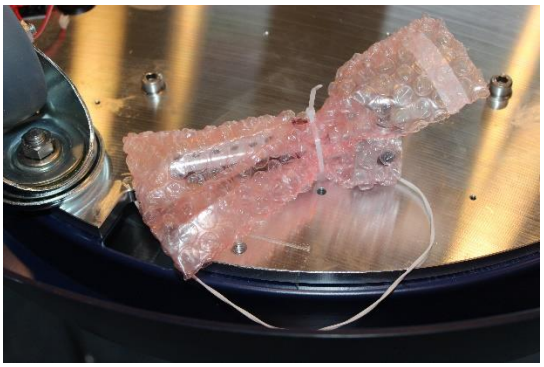


Figure 5: Surface temperature sensor mounted on the underside of the trolley during shipment.

1. Remove the surface temperature sensor from the underside of the trolley.
2. Flip the trolley onto its back and place it upside down on the edge of a table (Figure 6).

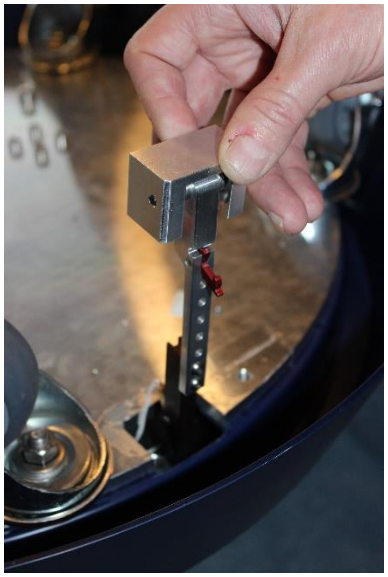


Figure 6: Surface temperature sensor being mounted from the underside of the trolley.

Alternatively, the trolley may be flipped onto its side if no table is available (Figure 7).

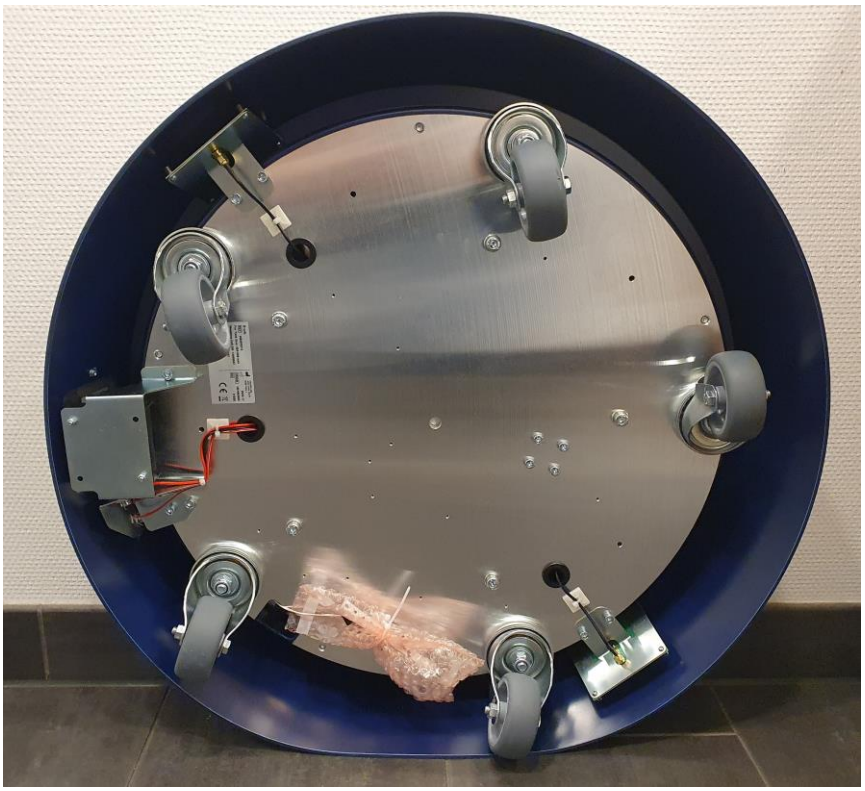


Figure 7: Log & Guard B:safe monitoring trolley on its side for removal and mounting of the surface temperature sensor.

3. Mount the surface temperature sensor from the underside of the trolley as shown (Figure 8).

Figure 8: Surface temperature sensor being fixed to the trolley from below.

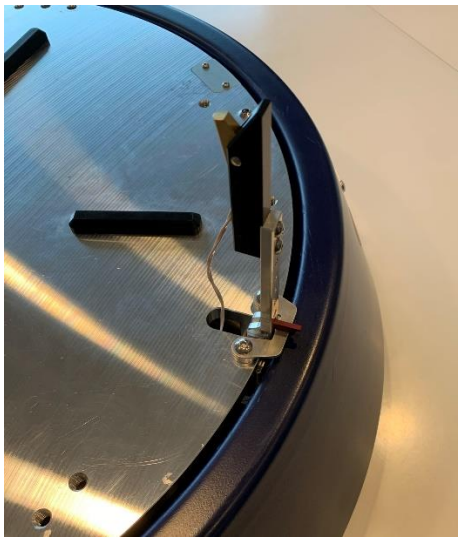


Figure 9: Surface temperature sensor and parts assembled.

4. Move the holder of the surface temperature sensor in non-contact position towards the edge of the monitoring trolley and lock it there using the red hook (Figure 10A).
5. To place the surface temperature sensor in measuring position, lift the red hook to release the holder and check that the sensor tip is in contact with the tank surface (Figure 10B).

A **B**

Figure 10: Surface temperature sensor: A. Locked position (red hook) for removal or installation of the storage tank. B. Measuring position in contact with the storage tank surface.

Installing the holding rods

The Log & Guard B:safe monitoring trolley has five holding rods for securing the storage tank placed on top of it. The holding rods can be adjusted to fit tanks with a diameter from 451 to 508 mm.

⚠ WARNING	**Danger of accident and injury.**
	Two persons must handle the storage tank when positioning it on or removing it from the monitoring trolley.
	Do not step on the monitoring trolley.
	Do not lean on the monitoring trolley or tank.
	Watch your feet and wear protective shoes.

See Figure 11 for tank diameters and suitable hole positions.

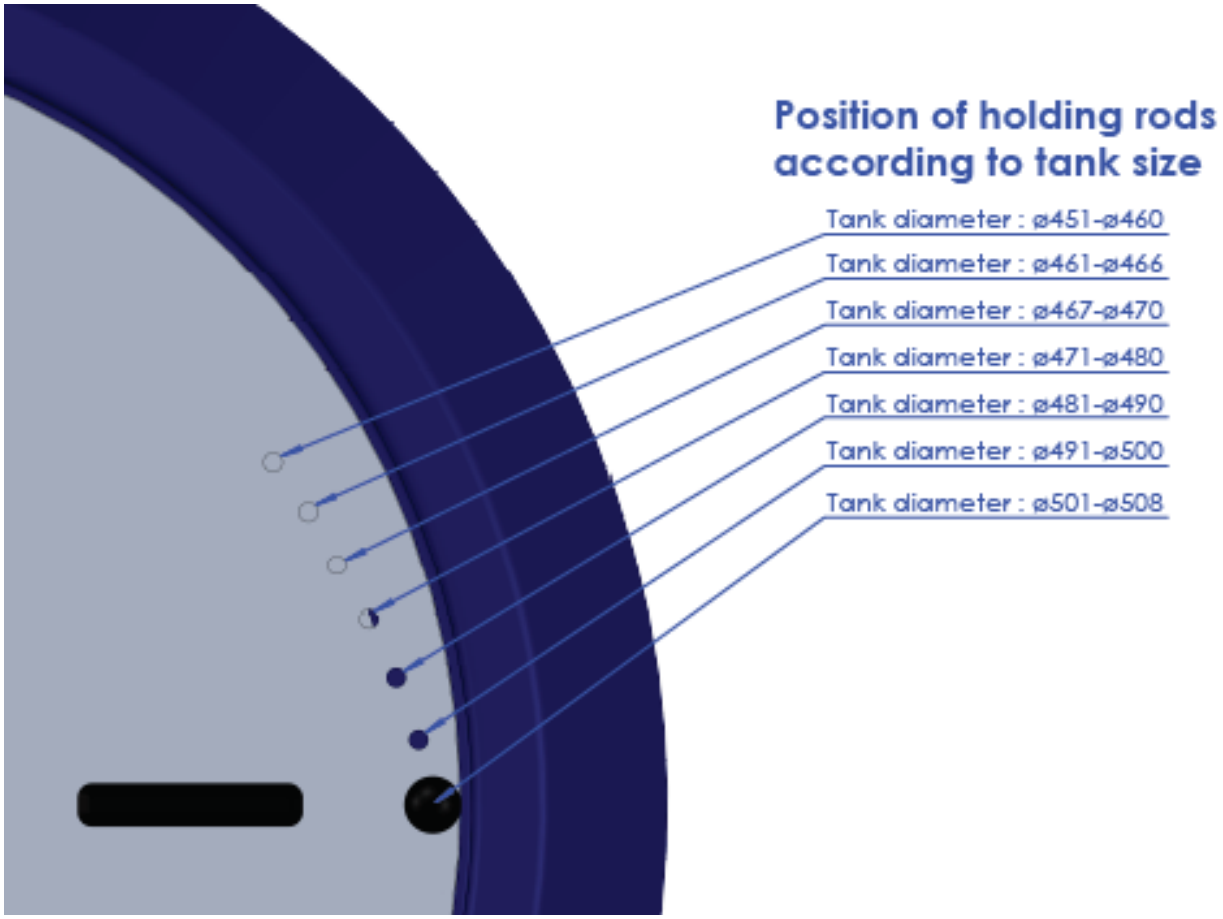


Figure 11: Holding rod positions and suitable tank diameters.

Alternatively, check for the most suitable hole position directly by carefully placing the storage tank in the centre of the monitoring trolley (remove it again to fix the holding rods).

A **B**

Figure 12: A. Log & Guard B:safe monitoring trolley with holding rods and covers before installation. B. Holes for installation of the holding rods for storage tanks with a diameter of 451 to 508 mm.

Figure 13: Screw with stud.

1. All holding rods must be installed in the same hole position (counted from the outermost to the innermost hole in each set of holes in the surface plate of the monitoring trolley).
2. Fix all screws with studs for securing the holding rods in the correct hole positions (Figure 13).
3. Cover the screws with the holding rods.

Inserting or changing the batteries

The battery case is behind the cover plate bearing the Vitrolife logo (Figure 14).

1. Unscrew the two screws of the cover plate completely to remove the plate (keep the screws and the plate).
2. Insert two batteries, type LR20. Observe correct polarity as indicated inside the battery case. The minus pole, which is the flat part of a battery, must touch the spring inside the battery case.
3. Attach the cover plate and fix it using the two screws. Stop when fixed, do not overtighten!

Figure 14: Battery case of the Log & Guard B:safe monitoring trolley. Remove the cover plate after unscrewing the two screws.

2.2.4 Installation of the optional low temperature sensor and alarm contact

1. Use a 2 mm Allen key to loosen the screws holding the small cover plate, and remove the cover plate to uncover the socket.
2. Plug the low temperature sensor into the socket in the correct orientation.

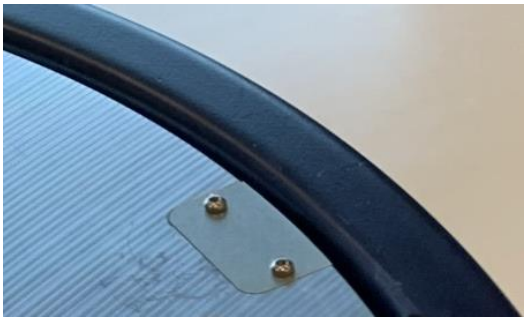


Figure 15: Access to the alarm socket on the top of the Log & Guard B:safe monitoring trolley.

A special coupling is required to connect both the cables of the low temperature sensor and the cables of the alarm contact to fit the socket inside the Log & Guard B:safe monitoring trolley. Contact Vitrolife support if needed.

3 Getting started – operation of the Log & Guard B:safe monitoring trolley

The monitoring of a storage tank using the Log & Guard B:safe monitoring trolley can be started at any time. Read this section carefully before starting the operation of a newly installed Log & Guard B:safe monitoring trolley.

⚠ CAUTION	Let the Log & Guard B:safe monitoring trolley equilibrate to ambient temperature before start of operation. Increases in temperature will affect the weight sensor and lead to an incorrect weight measurement with an artificial increase in weight.

⚠ CAUTION	Check that the surface temperature sensor is in measuring position, touching the tank surface.

Adjustment of values and intervals

1. Set the thresholds and measurement intervals according to the recommendations for channel configuration while the remote alerting function of the Log & Guard system is deactivated.
2. The installing technician must observe for five days whether the thresholds meet the average performance of the devices monitored by the Log & Guard system. Adjust the thresholds of individual Log & Guard sensors as necessary (alternatively, set alarm delay times or optimise the performance of your equipment, e.g. by adjusting set points).
3. After performing the necessary adjustments, activate the remote alerting function of all relevant Log & Guard channels.

Weight monitoring

1. Start the first full weight measuring cycle by pressing the tare button after refilling the storage tank **to the full level** of liquid nitrogen. If the tare reset is successful, the LED above the battery case will light once and an audible signal will be released (Figure 16).

⚠ CAUTION	Never press the tare button if the storage tank is not refilled to the full level of liquid nitrogen! Weight monitoring must always start from a defined point (full = zero) to enable reliable alerting in subsequent filling cycles.

Figure 16: Tare button and LED.

The subsequent weight loss caused by the evaporation of liquid nitrogen over time will be displayed and recorded as a negative weight measured from the zero starting point.

2. Refill the storage tank at regular intervals according to the internal operating procedures as done before you started using the Log & Guard B:safe monitoring trolley. Do not wait until you receive a notification about low tank weight!
3. There is no need to press the tare button after subsequent tank refilling. Instead, after routine refilling to full level, validate in the Log & Guard B:safe weight sensor channel that the initial zero point was reached again. Deviations of about +/- 100 g from zero correspond to a filling level of about 3 mm in a typical 30-35 litre storage tank and are considered acceptable (100 g correspond to 81 ml of liquid nitrogen).
4. Set a reasonable warning level to trigger an alert if the liquid nitrogen level in the storage tank falls too low. One option is to calculate the weight loss that corresponds to half of the filling volume of the storage tank measured in litres of liquid nitrogen: total volume of the storage tank (litres) multiplied by 0.807 kg/l divided by 2. The specific weight of liquid nitrogen is 0.807 kg/l.

4 Display of sensor data and sensor channels

4.1 Display of sensor data of the Log & Guard B:safe monitoring trolley: overview page

On the overview page of the Log & Guard web interface, connected sensors are displayed (and grouped) according to the measured subject, e.g. temperature or weight. Consequently, values measured by the different sensor types integrated in the Log & Guard B:safe monitoring trolley plus the data from the calculated relative evaporation channel will be displayed in rows in the Log & Guard software (Figure 17).

IMPORTANT	Name all sensor channels of one Log & Guard B:safe monitoring trolley in a way that enables you to identify the corresponding channels.

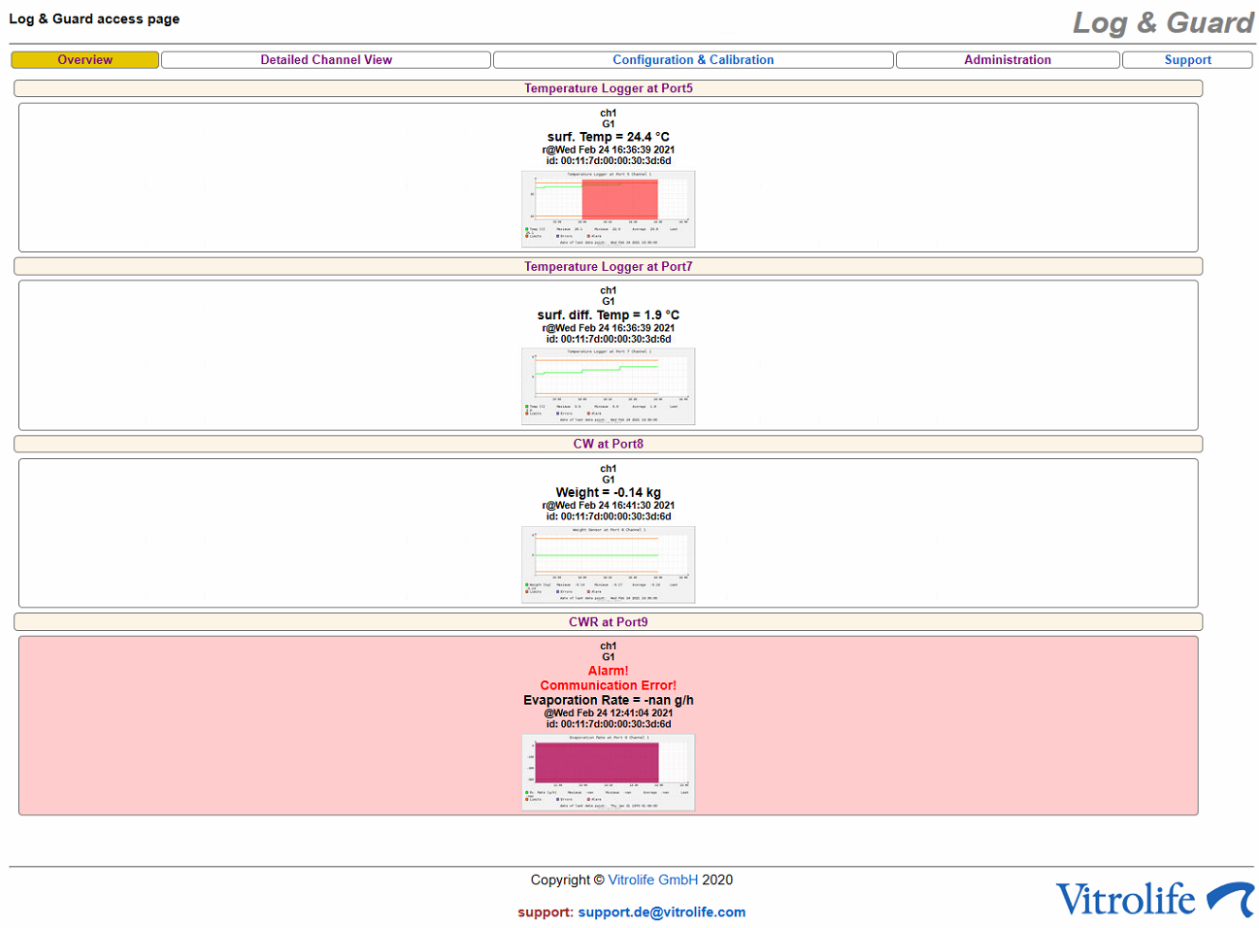


Figure 17: Display of the two sensor channels and the calculated relative evaporation channel of the Log & Guard B:safe monitoring trolley on the Log & Guard overview page (example).

4.2 Display of sensor channels of the Log & Guard B:safe monitoring trolley: detailed channel view pages

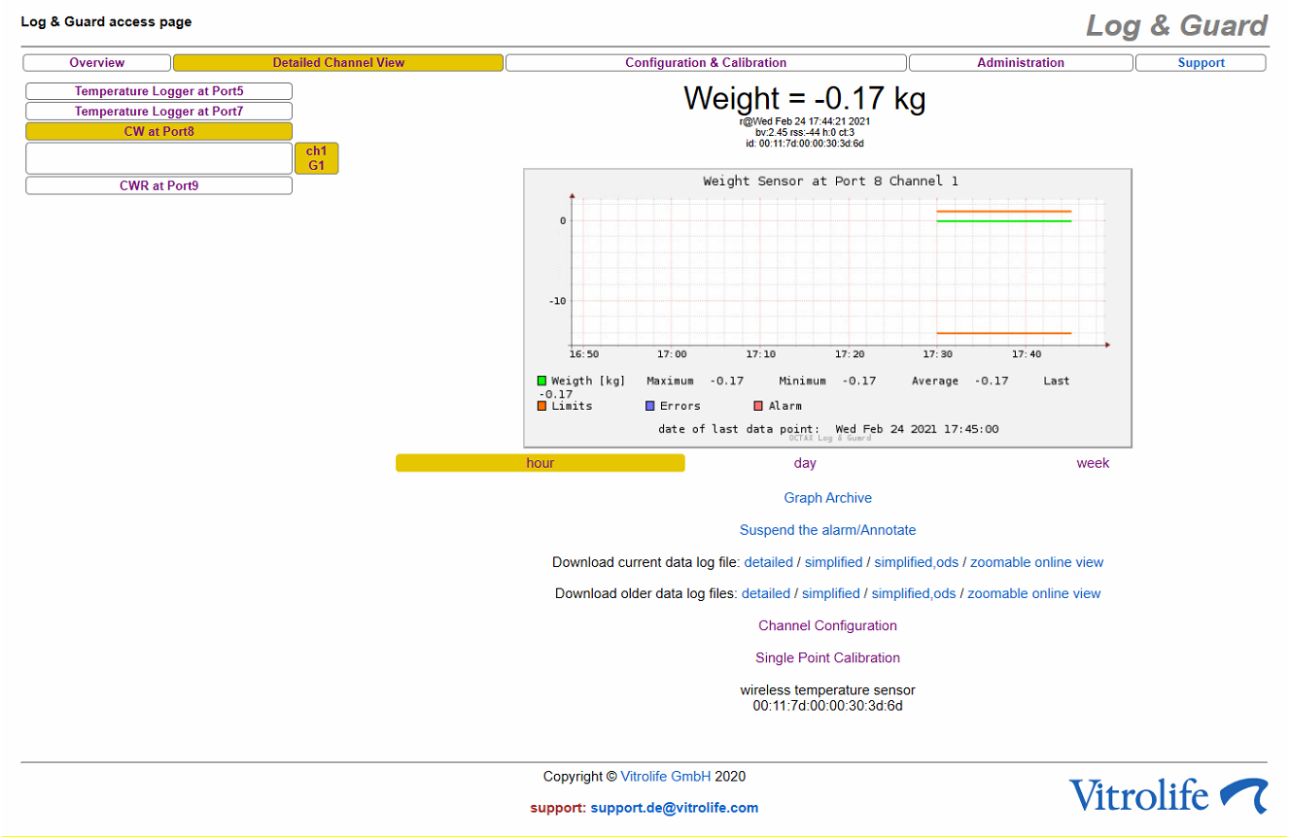


Figure 18: Detailed channel view of the weight sensor channel (CW) of the Log & Guard B:safe monitoring trolley.

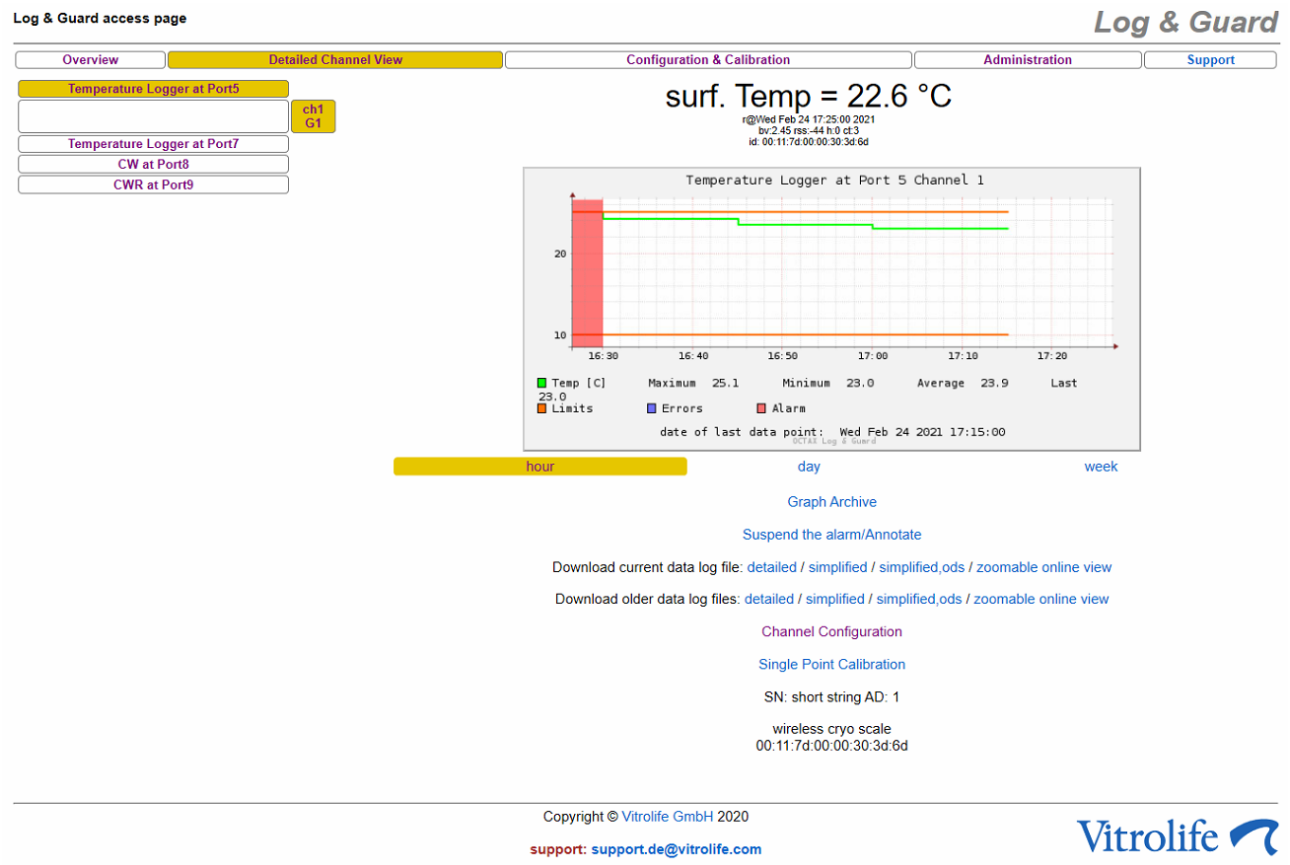


Figure 19: Detailed channel view of the surface temperature sensor channel of the Log & Guard B:safe monitoring trolley.

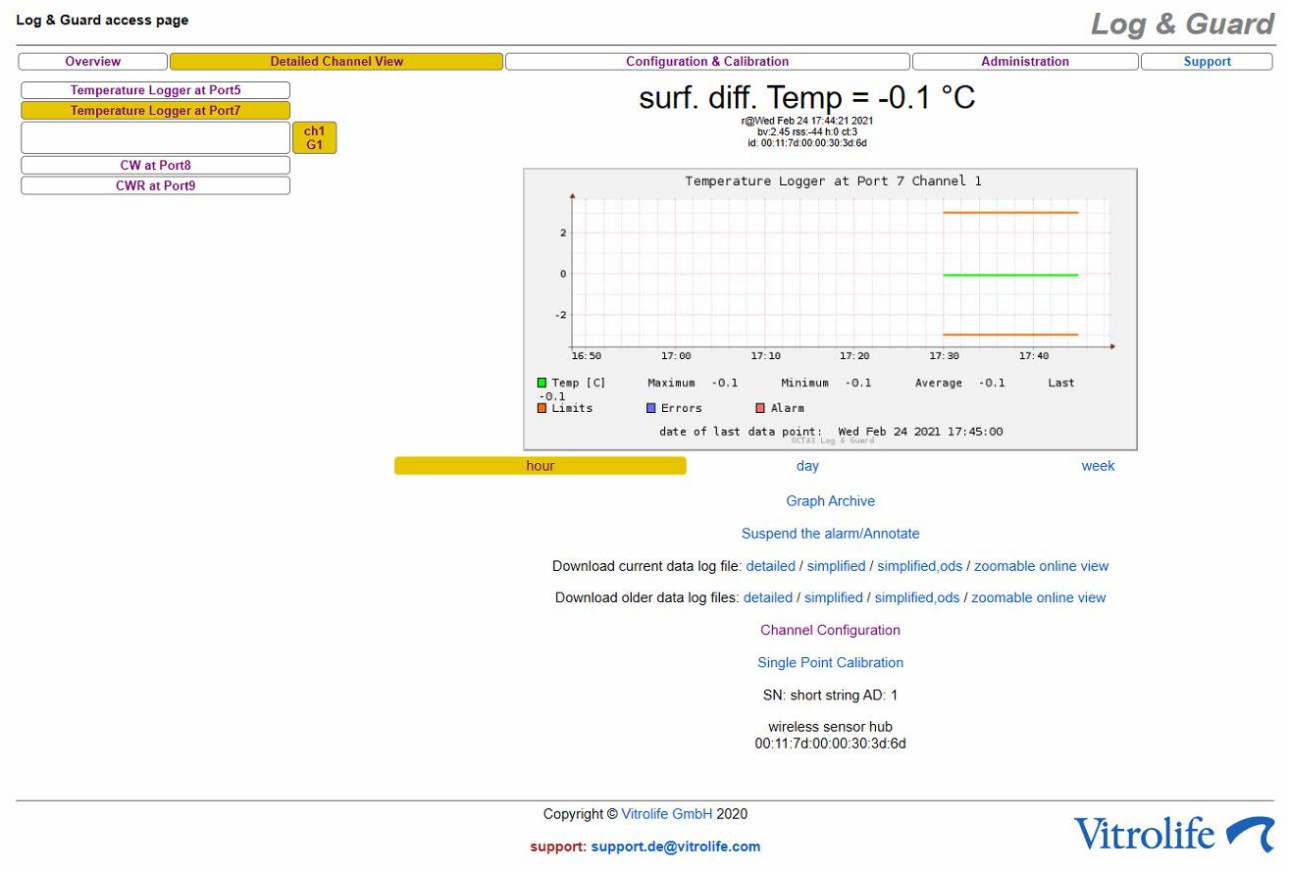


Figure 20: Detailed channel view of the surface temperature difference channel of the Log & Guard B:safe monitoring trolley.

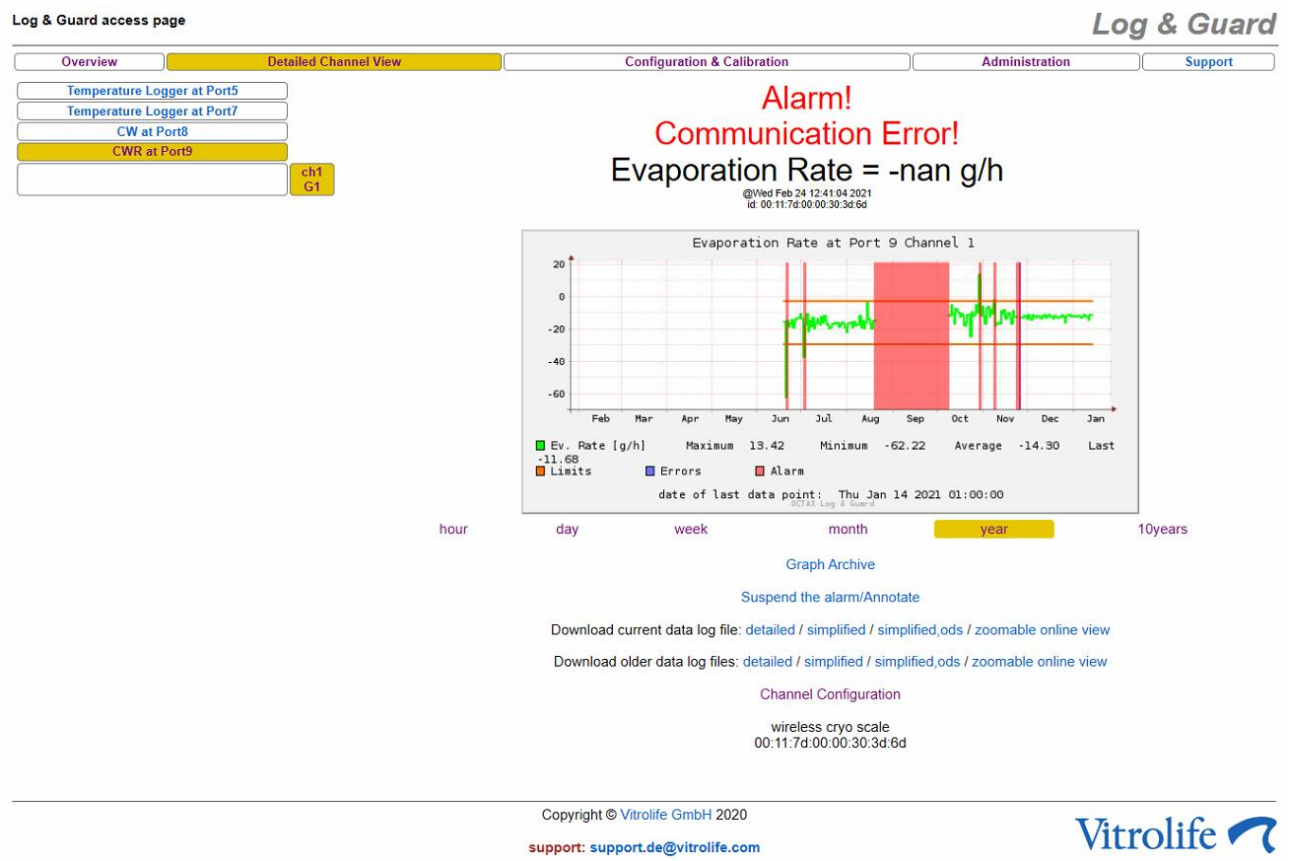


Figure 21: Detailed channel view of the calculated relative evaporation channel (CWR) of the Log & Guard B:safe monitoring trolley.

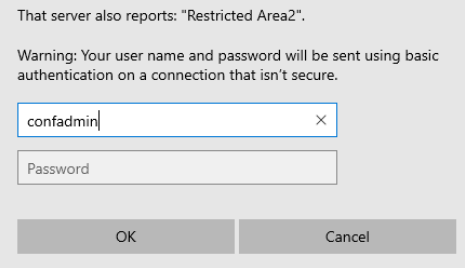
5 Configuration and calibration of sensor channels

5.1 Configuration of the sensor channels of the Log & Guard B:safe monitoring trolley

Channel configuration and calibration of all Log & Guard sensors are password-protected actions within the configuration area.

5.1.1 Access to the configuration area

1. Log in to the configuration area in one of the following ways:
   - Click the **Configuration & Calibration** menu button at the top of the page and select a channel from the menu on the left side.
   - Click the **Channel Configuration** link below the graph on the detailed channel page.
2. Enter the default user name and password.



   - Default user name: confadmin
   - Default password: octax
3. Click **OK** to log in.

IMPORTANT	The configuration area (for all channels) stays accessible for the current browser session. To reactivate area protection, close the browser window.

4. The window structure of the configuration area for the selected sensor channel opens (the window header of the active window is displayed with yellow background). Select a window according to the task to be performed:
   - Single-point calibration: calibration of the selected sensor channel to an externally measured value (optional).
   - Channel configuration: enter specific channel settings for the selected channel (see the following sections).

5.2 Configuration of the weight sensor channel of the Log & Guard B:safe monitoring trolley

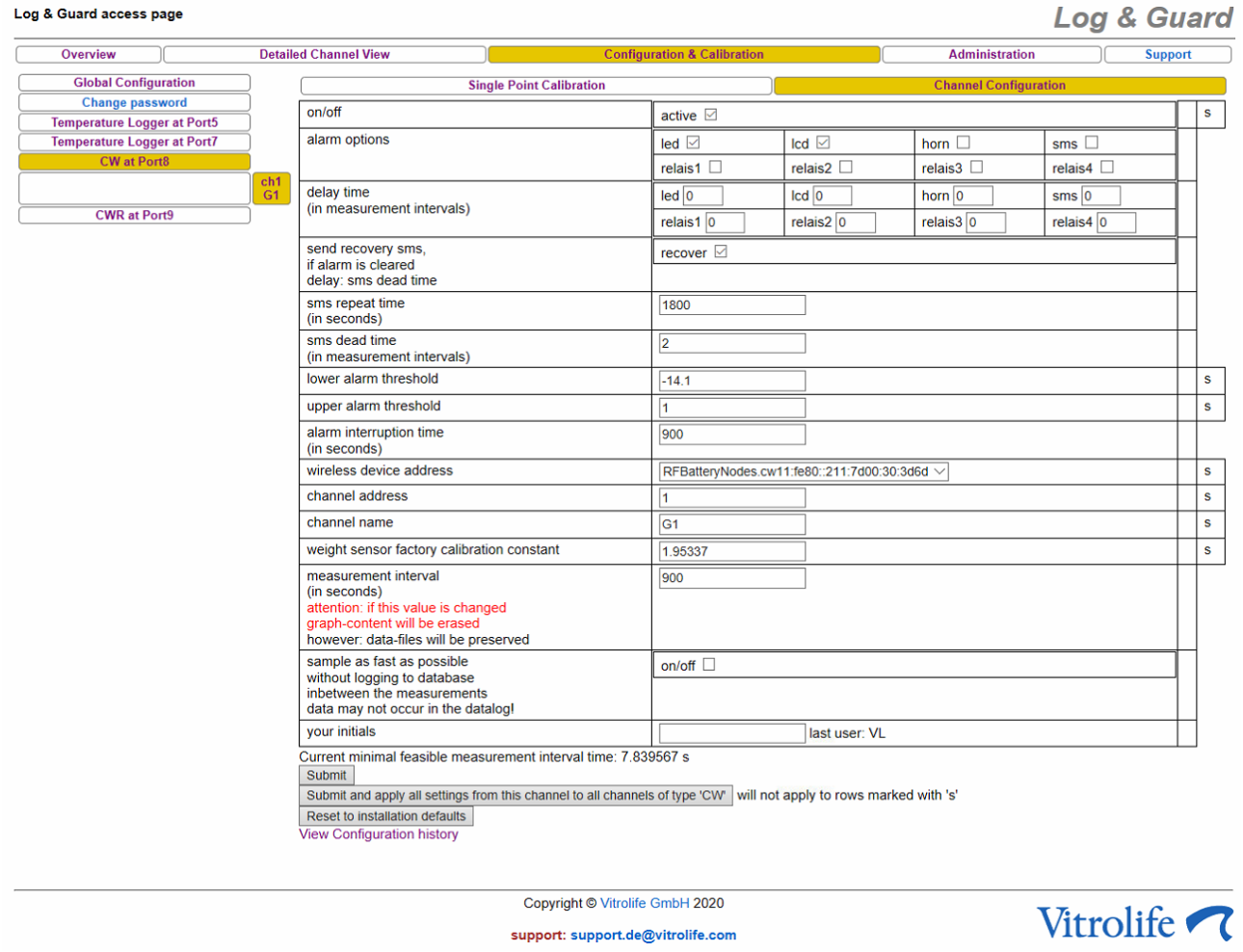


Figure 22: Configuration page for the weight sensor channel of the Log & Guard B:safe monitoring trolley.

Table 2: Options on the configuration page for the weight sensor channel of the Log & Guard B:safe monitoring trolley

	Significance	**Default/recommended value**	**Important information**
active	Select the check box to activate all functions of the sensor channel.	on	If the check box is not selected, the following message is displayed on the overview and detailed channel pages: “Channel is not active. Data may be outdated.”

	Significance	**Default/recommended value**	**Important information**
alarm options	Select the check boxes to activate alerting via the selected devices (**led**, **lcd**, **horn**, **sms** and/or **relais1-4**).		
delay time	Specify the delay time in seconds. The time starts to count down when the Log & Guard system detects an alert situation. An alert will be triggered after the delay time if the alert situation is still detected.		Measured in multiples of the measurement interval.
send recovery sms	Select the check box to activate the sending of a text message about clearance of an alert.		**sms** must be activated under **alarm options**. The sending of the text message will be delayed by the **sms dead time**.
sms repeat time	The time starts to count down after the first alert text message is sent. After the **sms repeat time** has elapsed, a reminder text message will be sent only if the alert situation is still detected by the Log & Guard system.	1,800 seconds = 30 minutes	**sms** must be activated under **alarm options**.
sms dead time	The time starts to count down after the **sms repeat time** has elapsed. The **sms dead time** overrides any new alert situation (no text message alert during countdown). This effect may be intended if the measured values are fluctuating around a threshold value, causing repeated recovery and alerting.		Measured in multiples of the measurement interval. **sms** must be activated under **alarm options**.

	Significance	**Default/recommended value**	**Important information**
lower alarm threshold	Lower weight limit. Values below the threshold will trigger an alert (if activated, see above).	Total volume [litres] of the storage tank * 0.807 kg / 2	Negative value! The weight will decrease by 0.807 kg per litre of liquid nitrogen. The warning level should be set to half of the total volume of the storage tank.
upper alarm threshold	Upper weight limit. Values above the threshold will trigger an alert (if activated, see above).	1 kg	The starting weight after refilling is zero after the tare button is pressed on the Log & Guard B:safe monitoring trolley. The weight will decrease as the liquid nitrogen evaporates.
alarm interruption time	The time starts to count down after an alert is suspended. The horn will be paused until the interruption time has elapsed. If the alert situation is still detected, the horn will be restarted.	900 seconds = 15 minutes	
wireless device address	Set upon installation.		Do not change!
channel address	Set upon installation.		Do not change!
channel name	Enter an individual name.		The channel name will be displayed on the overview and detailed channel pages. Choose a name that will identify the specific equipment that the Log & Guard B:safe monitoring trolley is monitoring.
weight sensor factory calibration constant	Enter the factory calibration constant from the label on the Log & Guard B:safe monitoring trolley.		The calibration constant must be equivalent to the constant of the specific internal weight cell of the Log & Guard B:safe monitoring trolley.

	Significance	**Default/recommended value**	**Important information**
measurement interval	Time interval in seconds between two data points. When the measurement interval is changed, the graphical display of logged data will be restarted in an empty diagram. All data are logged continuously.	900 seconds = 15 minutes	Shorter intervals will reduce the battery life and may have a negative impact on wireless communication. Bear in mind that some of the above variables are set as multiples of the measurement interval.
sample as fast as possible	A measurement is performed every 1-3 seconds (or longer), depending on the load of the Log & Guard system. Information about the currently feasible minimal measurement interval time is provided below the configuration table.		Remember to deselect the check box to return to the regular measurement interval.
your initials	Enter your initials. The last user will be identified in the next session.		The initials will be logged in the configuration history.
Submit	Click this button to apply and save all changes.		Changes on the configuration page are saved in the configuration history.
Submit and apply all settings from this channel to all channels of type ‘CW’	Click this button to automatically copy the alerting options and measurement interval to all other connected weight sensor channels.		Verify before clicking this button that you want to override the settings of all other connected weight sensor channels.
Reset to installation defaults	Click this button to reset all values to the default values.		
View Configuration history	Click this link to open the configuration history.		

CAUTION	Enter the weight sensor factory calibration constant delivered with the Log & Guard B:safe monitoring trolley for correct calculation of the weight and relative evaporation rate. The same factory calibration constant must be entered on the configuration page for the weight sensor channel and on the configuration page for the calculated relative evaporation channel. Never change the factory calibration constant after correct installation. During single-point calibration, a different internal calibration constant will be set.

IMPORTANT	To start operation of the Log & Guard B:safe weight sensor channel, follow the steps in section 3.

5.3 Single-point calibration of the weight sensor channel of the Log & Guard B:safe monitoring trolley

During single-point calibration, the Log & Guard system compares the value measured by the Log & Guard B:safe weight sensor to the nominal value entered by the user. A calibration weight of at least 10 kg is needed to perform the calibration. The tank can stay in place with the calibration weight placed on top of it. Make sure that the combined weight of the tank and the calibration weight does not exceed 100 kg. The standard tare operation may need to be reperformed after this calibration. In normal circumstances, the factory calibration is sufficient, and this calibration is only recommended in special circumstances. Contact Vitrolife support if you have any questions.

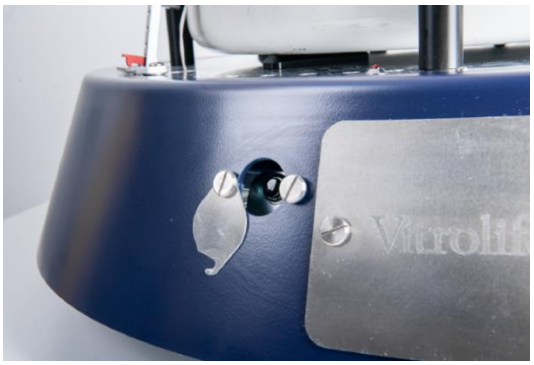


Figure 23: Access to the tare button of the Log & Guard B:safe monitoring trolley. To open, loosen the right screw and swing away the cover plate.

Performing single-point calibration

1. Place the storage tank on the Log & Guard B:safe monitoring trolley without the calibration weight.
2. Swing away the cover plate as shown above (Figure 23).
3. Press the tare button of the Log & Guard B:safe monitoring trolley without otherwise touching the trolley or the storage tank.
4. Open the detailed channel page of the weight sensor channel to be calibrated.

5. Click the **Single Point Calibration** link below the graph.
6. Enter the user name and password.
    - Default user name: confadmin
    - Default password: octax
7. Wait for several measurement intervals to verify that the measured weight value is stable and close to zero (Figure 24).
8. Place a calibration weight of at least 10 kg on top of the tank.
9. Wait for several measurement intervals to verify that the measured weight is stable and close to the nominal weight of the calibration weight, e.g. 10 kg.
10. Enter the weight of the calibration weight in the **nominal weight** line (if this is not displayed).
11. Enter your initials.
12. Click **Calibrate** to perform single-point calibration of this channel.
13. When the single-point calibration is complete, the calculated offset is displayed on the next page as the calibration constant. It is also displayed in the graph on the detailed channel page.
14. Refit the cover plate as shown above (Figure 23).

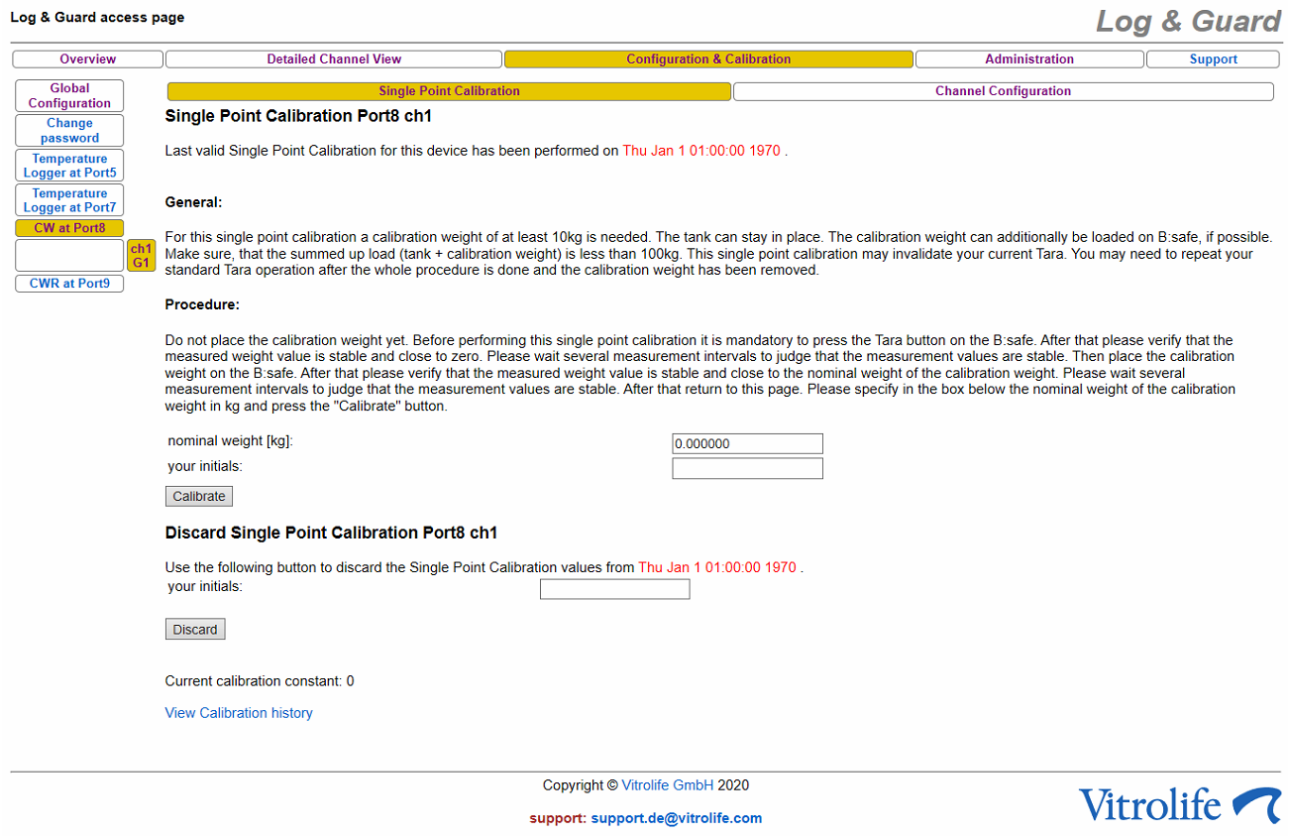


Figure 24: Single-point calibration page for the weight sensor channel of the Log & Guard B:safe monitoring trolley.

IMPORTANT	The offset will be displayed immediately after single-point calibration, and the measurement value will not be updated. The offset will not be active until after the next measurement. Depending on the measurement interval of the Log & Guard channel, this may take some minutes.

Discarding the offset

1. Perform steps 1-5 above.
2. Enter your initials below the **Discard Single Point Calibration** line.
3. Click **Discard**.
4. The next page informs you that the calibration constant was reset to zero.

5.4 Configuration of the surface temperature sensor channel of the Log & Guard B:safe monitoring trolley

The surface temperature of the storage tank is measured directly by the surface temperature sensor in measuring position (the red hook is loose). The surface temperature sensor is used to monitor sudden drops in the surface temperature of the storage tank placed on the Log & Guard B:safe monitoring trolley.

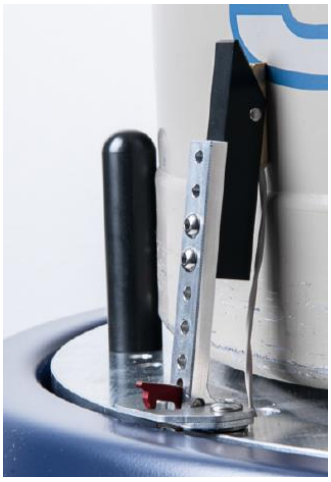


Figure 25: Surface temperature sensor of the Log & Guard B:safe monitoring trolley in measuring position.

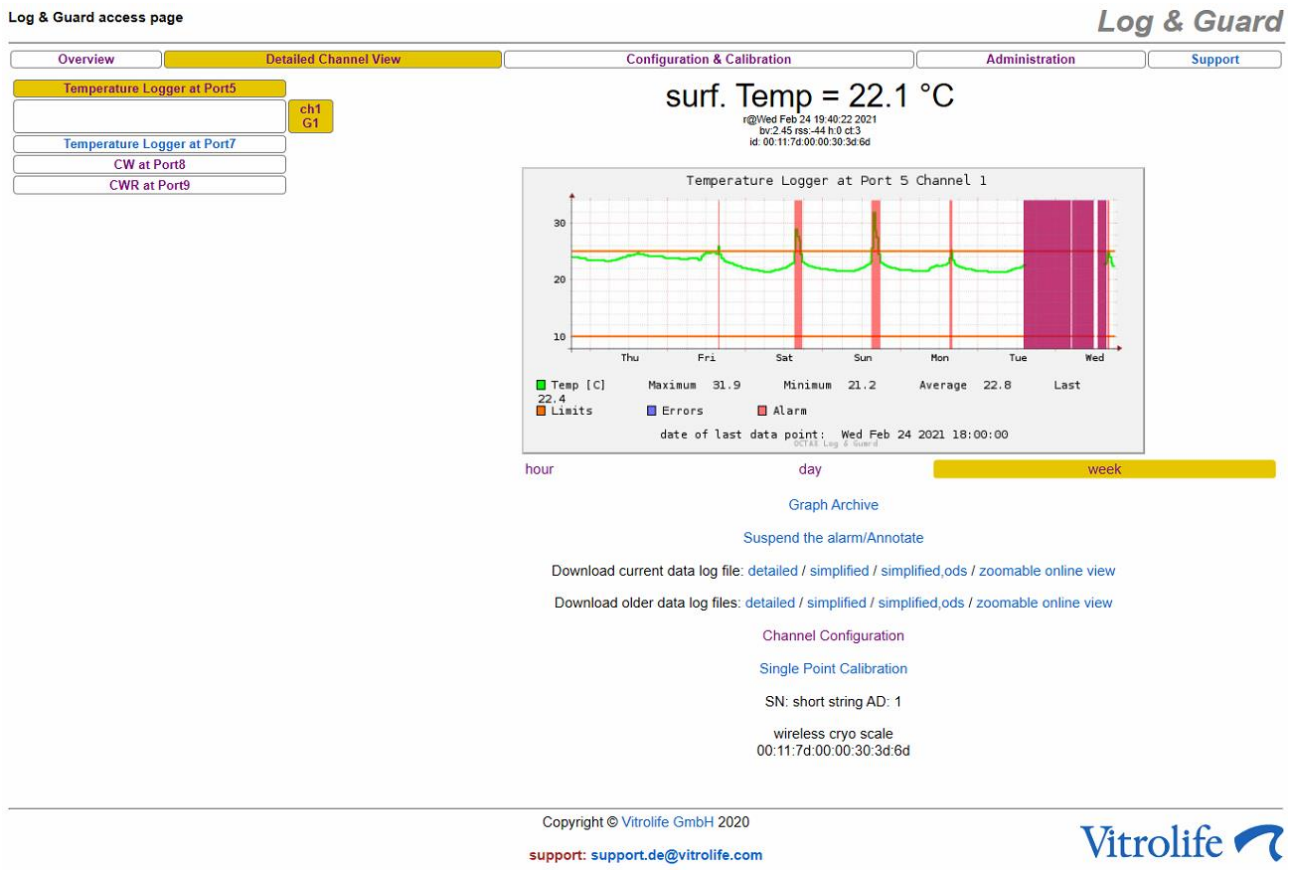


Figure 26: Detailed channel view of the surface temperature sensor channel of the Log & Guard B:safe monitoring trolley over the course of a week.

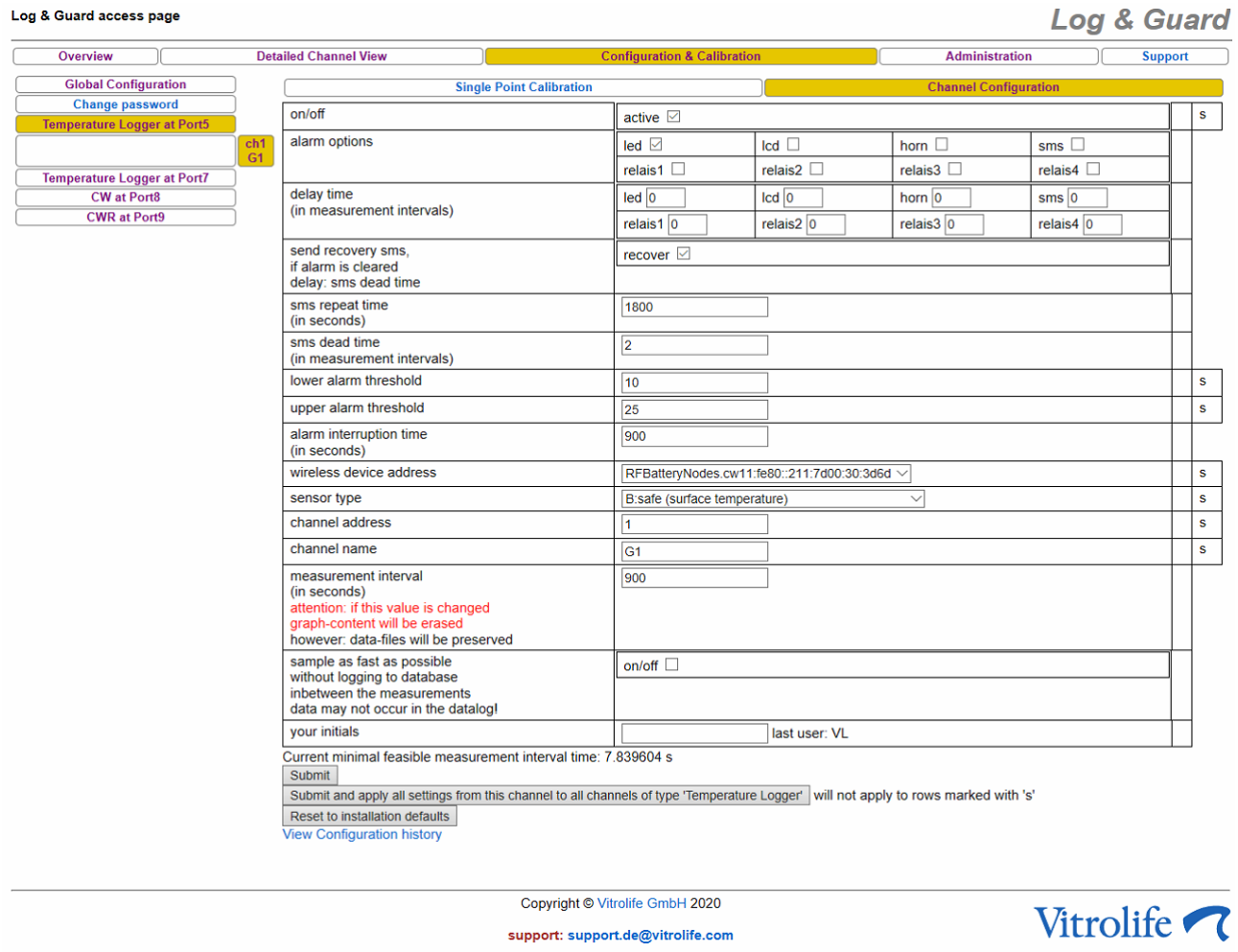


Figure 27: Configuration page for the surface temperature sensor channel of the Log & Guard B:safe monitoring trolley.

Table 3: Options on the configuration page for the surface temperature sensor channel of the Log & Guard B:safe monitoring trolley

	Significance	**Default/recommended value**	**Important information**
active	Select the check box to activate all functions of the sensor channel.	on	If the check box is not selected, the following message is displayed on the overview and detailed channel pages: “Channel is not active. Data may be outdated.”
alarm options	Select the check boxes to activate alerting via the selected devices (**led**, **lcd**, **horn**, **sms** and/or **relais1-4**).		

	Significance	**Default/recommended value**	**Important information**
delay time	Specify the delay time in seconds. The time starts to count down when the Log & Guard system detects an alert situation. An alert will be triggered after the delay time if the alert situation is still detected.		Measured in multiples of the measurement interval.
send recovery sms	Select the check box to activate the sending of a text message about clearance of an alert.		**sms** must be activated under **alarm options**. The sending of the text message will be delayed by the **sms dead time**.
sms repeat time	The time starts to count down after the first alert text message is sent. After the **sms repeat time** has elapsed, a reminder text message will be sent only if the alert situation is still detected by the Log & Guard system.	1,800 seconds = 30 minutes	**sms** must be activated under **alarm options**.
sms dead time	The time starts to count down after the **sms repeat time** has elapsed. The **sms dead time** overrides any new alert situation (no text message alert during countdown). This effect may be intended if the measured values are fluctuating around a threshold value, causing repeated recovery and alerting.		Measured in multiples of the measurement interval. **sms** must be activated under **alarm options**.
lower alarm threshold	Lower surface temperature limit. Values below the threshold will trigger an alert (if activated, see above).		

	Significance	**Default/recommended value**	**Important information**
upper alarm threshold	Upper surface temperature limit. Values above the threshold will trigger an alert (if activated, see above).		
alarm interruption time	The time starts to count down after an alert is suspended. The horn will be paused until the interruption time has elapsed. If the alert situation is still detected, the horn will be restarted.	900 seconds = 15 minutes	
wireless device address	Set upon installation.		Do not change!
sensor type	Set upon installation.		Do not change!
channel address	Set upon installation.		Do not change!
channel name	Enter an individual name.		The channel name will be displayed on the overview and detailed channel pages. Choose a name that will identify the specific equipment that the Log & Guard B:safe monitoring trolley is monitoring.
measurement interval	Time interval in seconds between two data points. When the measurement interval is changed, the graphical display of logged data will be restarted in an empty diagram. All data are logged continuously.	900 seconds = 15 minutes	Shorter intervals will reduce the battery life and may have a negative impact on wireless communication. Bear in mind that some of the above variables are set as multiples of the measurement interval.

	Significance	**Default/recommended value**	**Important information**
sample as fast as possible	A measurement is performed every 1-3 seconds (or longer), depending on the load of the Log & Guard system. Information about the currently feasible minimal measurement interval time is provided below the configuration table.		Remember to deselect the check box to return to the regular measurement interval.
your initials	Enter your initials. The last user will be identified in the next session.		The initials will be logged in the configuration history.
Submit	Click this button to apply and save all changes.		Changes on the configuration page are saved in the configuration history.
Submit and apply all settings from this channel to all channels of type 'Temperature Logger'	Click this button to automatically copy the alerting options and measurement interval to all other connected temperature sensor channels.		Verify before clicking this button that you want to override the settings of all other connected temperature sensor channels.
Reset to installation defaults	Click this button to reset all values to the default values.		
View Configuration history	Click this link to open the configuration history.		

5.5 Single-point calibration of the surface temperature sensor channel of the Log & Guard B:safe monitoring trolley

During single-point calibration, the Log & Guard system compares the actual value measured by the Log & Guard B:safe monitoring trolley's surface temperature sensor to an externally measured nominal value.

A calibration constant is calculated to adjust the actual value to the nominal value. All future measurements by the surface temperature sensor will be adjusted by the current calibration constant until the constant is discarded or a new single-point calibration is performed. An additional line in the detailed channel view of the surface temperature sensor displays the current calibration constant (if applicable).

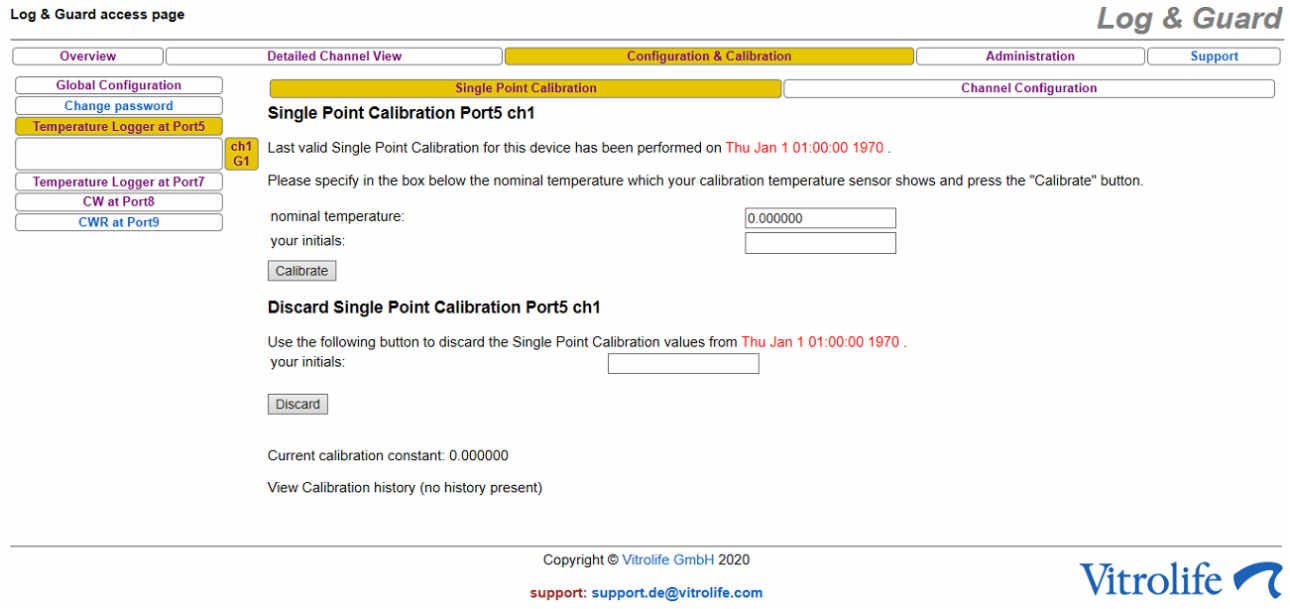


Figure 28: Single-point calibration page for the surface temperature sensor channel of the Log & Guard B:safe monitoring trolley.

⚠ CAUTION	Risk of incorrect temperature settings. To avoid inaccurate temperature measurement, use a calibrated thermometer when calibrating temperature sensors.

Performing single-point calibration

1. Use a calibrated thermometer to measure the surface temperature of the storage tank where the surface temperature sensor is located.
2. Allow the calibration thermometer to equilibrate to the surface temperature.

3. Open the detailed channel page of the surface temperature sensor channel to be calibrated.
4. Click the **Single Point Calibration** link below the graph.
5. Enter the user name and password.

    - Default user name: confadmin
    - Default password: octax

6. Enter the externally measured temperature value of the calibrated thermometer in the **nominal temperature** line (Figure 28).
7. Enter your initials.
8. Click **Calibrate** to perform single-point calibration of this channel.
9. When the single-point calibration is complete, the calibration constant is displayed on the next page. It is also displayed in the graph on the detailed channel page.

IMPORTANT	The offset will be displayed immediately after single-point calibration, and the measurement value will not be updated. The offset will not be active until after the next measurement. Depending on the measurement interval of the Log & Guard channel, this may take some minutes.

Discarding the offset

1. Perform steps 1-5 above.
2. Enter your initials below the **Discard Single Point Calibration** line.
3. Click **Discard**.
4. The next page informs you that the calibration constant was reset to zero.

5.6 Configuration of the surface temperature difference channel of the Log & Guard B:safe monitoring trolley

The surface temperature difference is calculated based on the measurement value of the storage tank surface temperature sensor and the internal temperature sensor of the scales inside the monitoring trolley. For a fully functional storage tank, the difference will be approximately 0-1° C during normal operation because the storage tank surface is always slightly colder than the ambient air as the internal tank vacuum is less than 100%. In case of a vacuum defect of the storage tank, the surface temperature sensor will detect a lower temperature than the ambient temperature, and the temperature difference will increase.

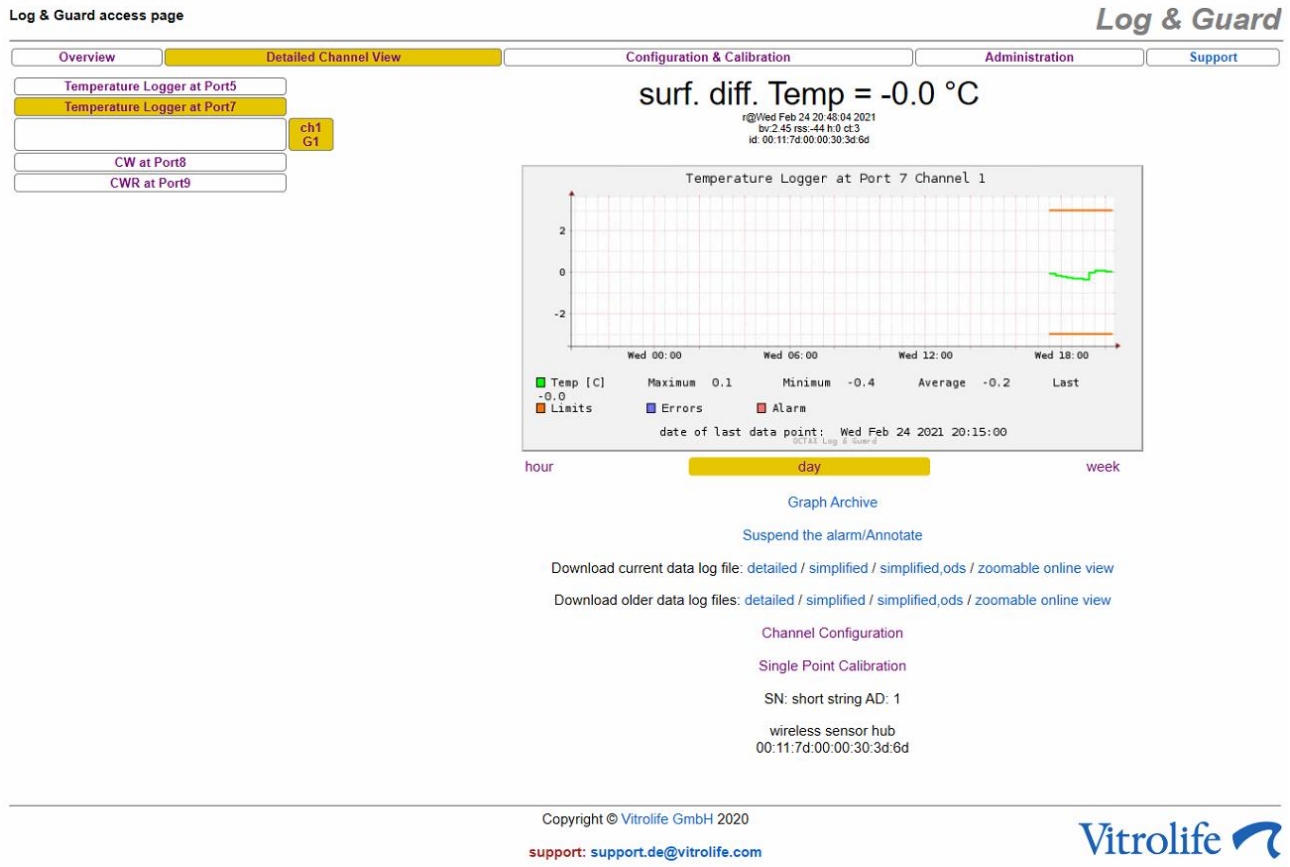


Figure 29: Detailed channel view of the surface temperature difference channel of the Log & Guard B:safe monitoring trolley over the course of a day.

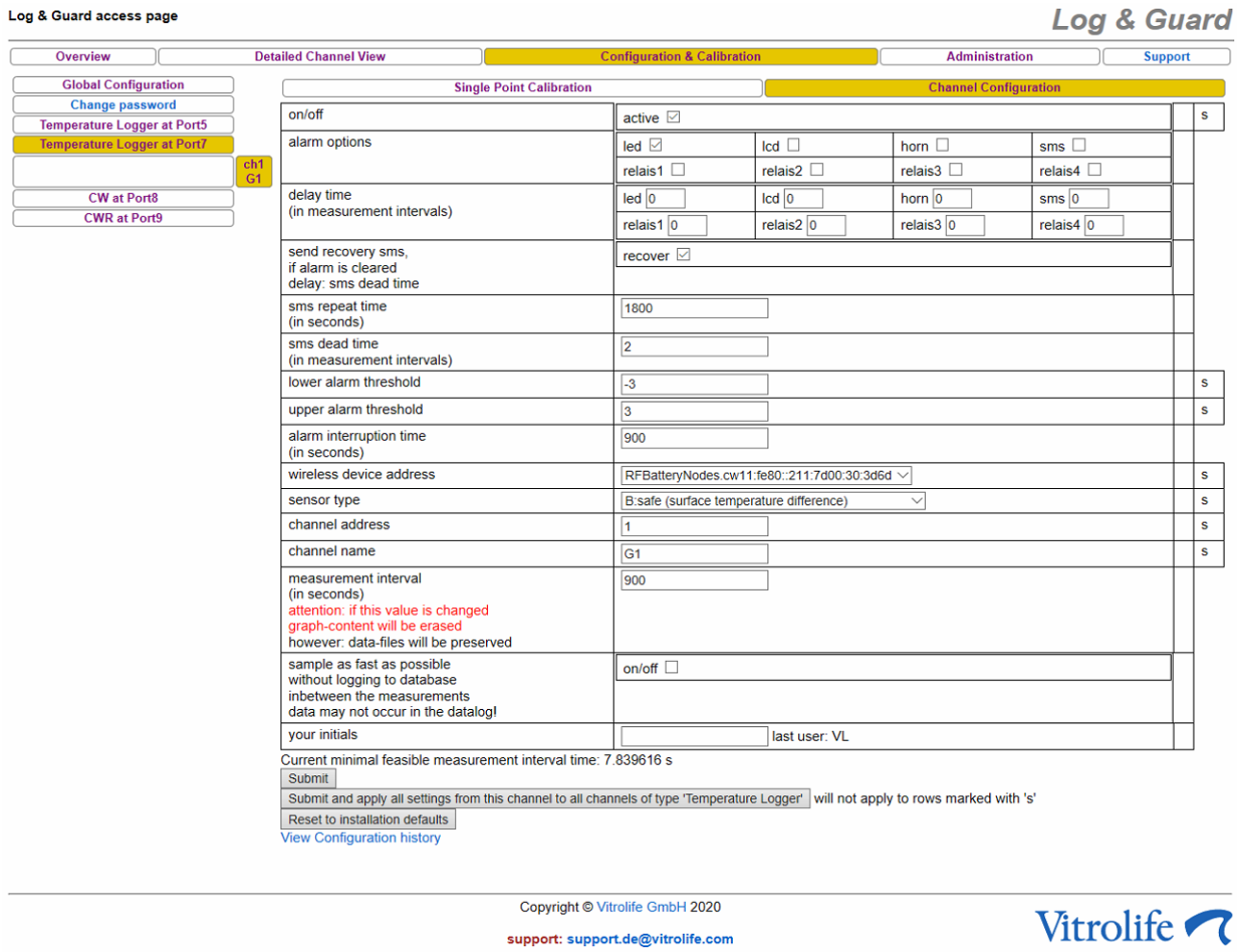


Figure 30: Configuration page for the surface temperature difference channel of the Log & Guard B:safe monitoring trolley.

Table 4: Options on the configuration page for the surface temperature difference channel of the Log & Guard B:safe monitoring trolley

	Significance	**Default/recommended value**	**Important information**
active	Select the check box to activate all functions of the sensor channel.	on	If the check box is not selected, the following message is displayed on the overview and detailed channel pages: “Channel is not active. Data may be outdated.”
alarm options	Select the check boxes to activate alerting via the selected devices (**led**, **lcd**, **horn**, **sms** and/or **relais1-4**).		

	Significance	**Default/recommended value**	**Important information**
delay time	Specify the delay time in seconds. The time starts to count down when the Log & Guard system detects an alert situation. An alert will be triggered after the delay time if the alert situation is still detected.		Measured in multiples of the measurement interval.
send recovery sms	Select the check box to activate the sending of a text message about clearance of an alert.		**sms** must be activated under **alarm options**. The sending of the text message will be delayed by the **sms dead time**.
sms repeat time	The time starts to count down after the first alert text message is sent. After the **sms repeat time** has elapsed, a reminder text message will be sent only if the alert situation is still detected by the Log & Guard system.	1,800 seconds = 30 minutes	**sms** must be activated under **alarm options**.
sms dead time	The time starts to count down after the **sms repeat time** has elapsed. The **sms dead time** overrides any new alert situation (no text message alert during countdown). This effect may be intended if the measured values are fluctuating around a threshold value, causing repeated recovery and alerting.		Measured in multiples of the measurement interval. **sms** must be activated under **alarm options**.
lower alarm threshold	Lower temperature difference limit. Values below the threshold will trigger an alert (if activated, see above).	-3 °C	

	Significance	**Default/recommended value**	**Important information**
upper alarm threshold	Upper temperature difference limit. Values above the threshold will trigger an alert (if activated, see above).	+3 °C	
alarm interruption time	The time starts to count down after an alert is suspended. The horn will be paused until the interruption time has elapsed. If the alert situation is still detected, the horn will be restarted.	900 seconds = 15 minutes	
wireless device address	Set upon installation.		Do not change!
sensor type	Set upon installation.		Do not change!
channel address	Set upon installation.		Do not change!
channel name	Enter an individual name.		The channel name will be displayed on the overview and detailed channel pages. Choose a name that will identify the specific equipment that the Log & Guard B:safe monitoring trolley is monitoring.
measurement interval	Time interval in seconds between two data points. When the measurement interval is changed, the graphical display of logged data will be restarted in an empty diagram. All data are logged continuously.	900 seconds = 15 minutes	Shorter intervals will reduce the battery life and may have a negative impact on wireless communication. Bear in mind that some of the above variables are set as multiples of the measurement interval.

	Significance	**Default/recommended value**	**Important information**
sample as fast as possible	A measurement is performed every 1-3 seconds (or longer), depending on the load of the Log & Guard system. Information about the currently feasible minimal measurement interval time is provided below the configuration table.		Remember to deselect the check box to return to the regular measurement interval.
your initials	Enter your initials. The last user will be identified in the next session.		The initials will be logged in the configuration history.
Submit	Click this button to apply and save all changes.		Changes made on the configuration page are saved in the configuration history.
Submit and apply all settings from this channel to all channels of type 'Temperature Logger'	Click this button to automatically copy the alerting options and measurement interval to all other connected temperature sensor channels.		Verify before clicking this button that you want to override the settings of all other connected temperature sensor channels.
Reset to installation defaults	Click this button to reset all values to the default values.		
View Configuration history	Click this link to open the configuration history.		

5.7 Single-point calibration of the surface temperature difference channel of the Log & Guard B:safe monitoring trolley

If the surface temperature difference is not approximately 0-1° C (almost the same temperature measured by the surface temperature sensor and the internal temperature sensor of the scales inside the monitoring trolley), the initial temperature difference can be adjusted by single-point calibration to the value measured by the surface temperature sensor (as the nominal value). For a fully functional storage tank, the difference will be approximately 0-1° C during normal operation because the storage tank surface is always slightly colder than the ambient air as the internal tank vacuum is less than 100%.

⚠ CAUTION	The surface temperature difference is an additional safety feature for detecting storage tank defects at an early stage. The Vitrolife technician should check other storage tank performance values before performing single-point calibration of the surface temperature difference channel. Contact Vitrolife support if you have any questions.

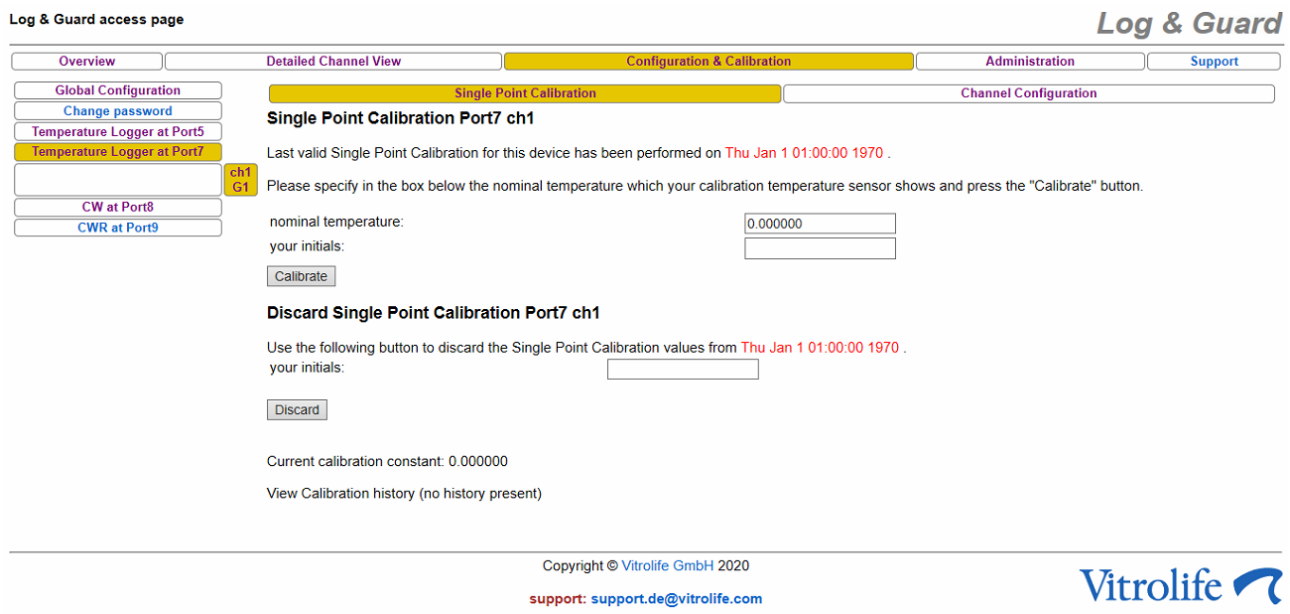


Figure 31: Single-point calibration page for the surface temperature difference channel of the Log & Guard B:safe monitoring trolley.

5.8 Configuration of the calculated relative evaporation channel of the Log & Guard B:safe monitoring trolley

The Log & Guard B:safe monitoring trolley offers the option to calculate and track the relative evaporation rate of a storage tank as an additional safety feature in storage tank monitoring. In periods without disturbance of the storage tank related to cryosample handling or refilling of the tank, weight changes will only occur as a result of regular evaporation of liquid nitrogen from the tank. If the undisturbed period is long enough to establish a stable evaporation rate, the relative evaporation rate measured in grams of liquid nitrogen per hour can be calculated. The relative evaporation rate is influenced mostly by the specifications of the storage tank and will be within a range that is typical for this storage tank. The expected normal evaporation rate will be defined in the user manual for the storage tank. Distinct changes in the relative evaporation rate may hint at the tank insulation becoming defective or at improper handling (e.g. that the plug is not inserted). To calculate the relative evaporation rate, weight measurements are sampled over a period of 6 to 12 hours while the storage tank is not disturbed. The start time and length of the sampling interval can be adjusted by the user within the limits specified on the configuration page for the calculated relative evaporation channel. See below for detailed information.

5.8.1 Setting the start time and interval duration for the evaluation of the relative evaporation rate

Start time: Define a time point after closure of the IVF laboratory or after completion of all work related to cryostorage. The storage tank should already have been undisturbed for a short period before the start time and must not be touched after the start time to ensure reliable evaluation of the evaporation rate. As usual working hours end in the evening, optional start times can be selected from 18.00 to 23.00 (6 p.m. to 11 p.m.) (Figure 32).

Interval duration: Select a duration that will result in an end time before work related to cryostorage is resumed. Storage tank handling before the end time of the evaluation interval will affect the rate calculation. The end time is indicated automatically after submission of the changes to the configuration page as the start time plus the interval duration (in 24-hour format).

Notification time: Define a number of hours after the end time when the rate is to be calculated. This should match the time when the user wants to have available the latest calculated relative evaporation rate in connection with a routine quality check, e.g. at the beginning of the work day. The evaporation rate will be calculated based on the data from the last evaluation interval and refreshed in the Log & Guard web interface once a day. If the value is outside the thresholds, an alert will be triggered at the notification time only.

Start time	Interval duration	Notification time
18.00	6 hours	1 hour
19.00	7 hours	2 hours
20.00	8 hours	3 hours
21.00	9 hours	4 hours
22.00	10 hours	5 hours
23.00	11 hours	6 hours
	12 hours	7 hours
		8 hours
		9 hours
		10 hours
		11 hours
		12 hours

Figure 32: Schematic view of the times and time periods related to the evaluation of the relative evaporation rate.

Example of evaluation of the relative evaporation rate:

1. The clinic closes at 17.00 (5 p.m.), and the start time is set to 18.00 (6 p.m.).
2. The storage tank can remain undisturbed until 7.00 (7 a.m.) the next morning. Thus, the interval duration is set to 12 hours for maximum rate resolution, and the evaluation will end at 6.00 (6 a.m.) the next morning.
3. The notification time is set to 1 hour as the clinic would like access to the measurements at 7.00 (7 a.m.).

5.8.2 Determining the threshold levels for the relative evaporation rate

1. Observe the relative evaporation rate for one or more days to establish a rate that is specific for this storage tank (“normal evaporation rate”).
2. Make sure that the tank is filled to at least 75% of its capacity before performing this step:

   Open the plug of the storage tank in the evening and leave it open on purpose for one (overnight) sampling interval (“worst-case evaporation rate”).
3. Divide the value of the normal evaporation rate by 2 and set this as the upper limit.
4. Add the worst-case evaporation rate (2) to the normal relative evaporation rate (1) and divide the resulting value by 2. Set this as the lower limit.

Example:

(1) Observation resulted in an average relative evaporation rate of -7.5 g/h.

(2) When the plug was left open overnight, the evaporation rate rose to -16 g/h.

(3) The upper threshold (rounded) is: -7.5 g/h / 2 = -3.8 g/h.

(4) The lower threshold (rounded) is: -7.5 g/h + (-16 g/h) = -23.5 g/h / 2 = -12 g/h.

The range is expected to be 3 to 4 g/h above and below the normal evaporation rate. With these settings, a plug left open unintentionally will be detected at the end of the (overnight) sampling interval (the evaporation rate will be higher than normal). If the evaporation rate is lower than normal, the resulting alert may indicate that the upper plate of the weight sensor is stuck or influenced in such a way that a reduction in weight could not be detected.

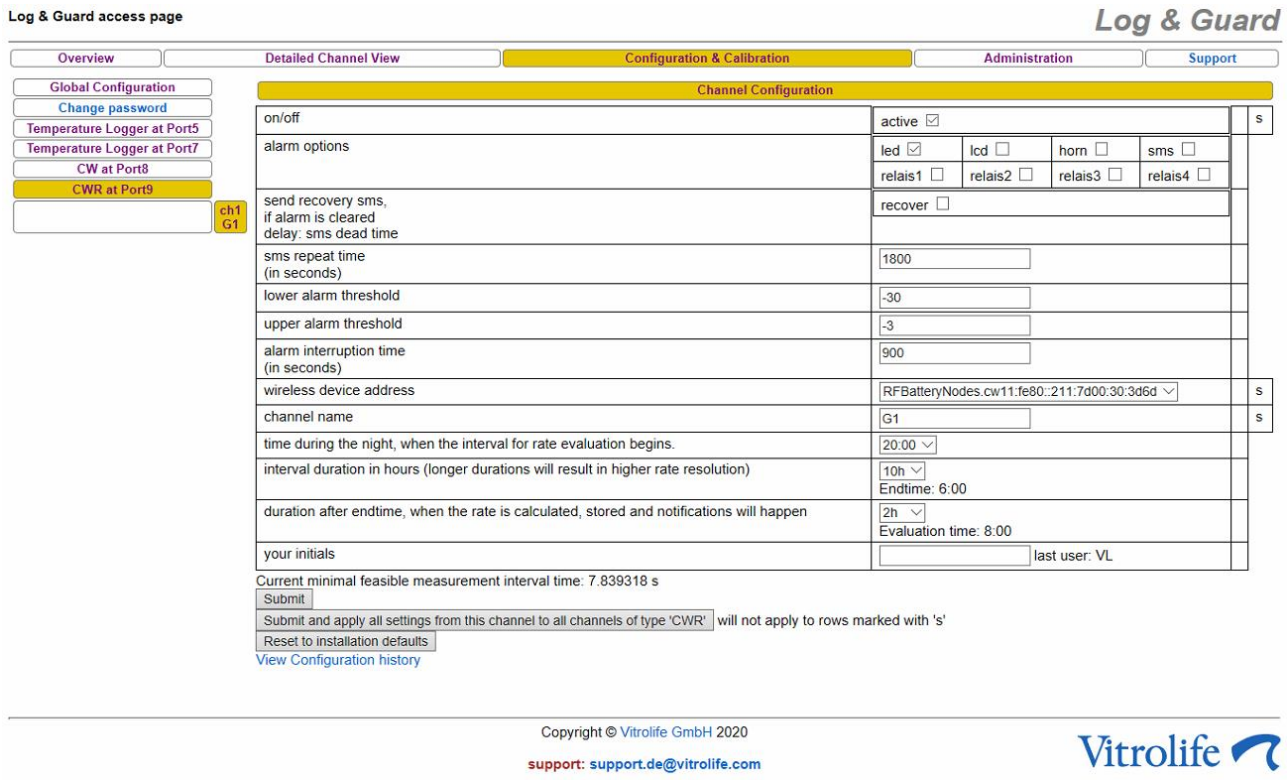


Figure 33: Configuration page for the calculated relative evaporation channel of the Log & Guard B:safe monitoring trolley.

Table 5: Options on the configuration page for the calculated relative evaporation channel of the Log & Guard B:safe monitoring trolley

	Significance	**Default/recommended value**	**Important information**
active	Select the check box to activate all functions of the sensor channel.	on	If the check box is not selected, the following message is displayed on the overview and detailed channel pages: “Channel is not active. Data may be outdated.”
alarm options	Select the check boxes to activate alerting via the selected devices (**led**, **lcd**, **horn**, **sms** and/or **relais1-4**).		
send recovery sms	Select the check box to activate the sending of a text message about clearance of an alert.		**sms** must be activated under **alarm options**.
sms repeat time	The time starts to count down after the first alert text message is sent. After the **sms repeat time** has elapsed, a reminder text message will be sent only if the alert situation is still detected by the Log & Guard system.	1,800 seconds = 30 minutes	**sms** must be activated under **alarm options**.
lower alarm threshold	Lower temperature difference limit. Values below the threshold will trigger an alert (if activated, see above).	Storage tank-specific	See section 5.8.2.
upper alarm threshold	Upper temperature difference limit. Values above the threshold will trigger an alert (if activated, see above).	Storage tank-specific	

	Significance	**Default/recommended value**	**Important information**
alarm interruption time	The time starts to count down after an alert is suspended. The horn will be paused until the interruption time has elapsed. If the alert situation is still detected, the horn will be restarted.	900 seconds = 15 minutes	
wireless device address	Set upon installation.		Do not change!
channel name	Enter an individual name.		The channel name will be displayed on the overview and detailed channel pages. Choose a name that will identify the specific equipment that the Log & Guard B:safe monitoring trolley is monitoring.
time during the night when the interval for rate evaluation begins (start time)	Select from the drop-down menu in 24-hour format: 18.00 to 23.00, corresponding to 6 p.m. to 11 p.m.		Start time for evaluation of the evaporation rate. The storage tank should have settled and no operations must take place after the start time to ensure reliable rate calculation.
interval duration in hours (longer durations will result in a higher rate resolution) (interval duration)	Select from the drop-down menu. Minimum interval: 6 hours. Maximum interval: 12 hours.		The interval duration for the evaluation of the evaporation rate determines the end time. The storage tank must not be touched after the start time and until the end time of the evaluation interval to ensure reliable rate calculation. A longer interval improves the resolution of the rate calculation.
end time	Automatic calculation of the end time of the evaluation interval: according to the selected time parameters (in 24-hour format).	Start time + interval duration	

	Significance	**Default/recommended value**	**Important information**
duration after the end time when the rate is calculated, stored and notifications will happen (notification time)	Select from the drop-down menu. Minimum interval: 1 hour. Maximum interval: 12 hours.		Define a number of hours after the end time when the rate is to be calculated. Refreshed only once a day.
evaluation time	Automatic calculation of the evaluation time: according to the selected time parameters (in 24-hour format).	Start time + interval duration + notification time	
your initials	Enter your initials. The last user will be identified in the next session.		The initials will be logged in the configuration history.
Submit	Click this button to apply and save all changes.		Changes on the configuration page are saved in the configuration history.
Submit and apply all settings of this channel to all channels of type “CWR”	Click this button to automatically copy the alerting options and measurement interval to all other connected weight sensor channels.		Verify before clicking this button that you want to override the settings of all other connected weight sensor channels.
Reset to installation defaults	Click this button to reset all values to the default values.		
View configuration history	Click this link to open the configuration history.		

5.9 Configuration of the optional low temperature sensor channel of the Log & Guard B:safe monitoring trolley

The Log & Guard B:safe monitoring trolley offers the option of installing a low temperature sensor inside the storage tank. The connection of a low temperature sensor is described in section 2.2.4.

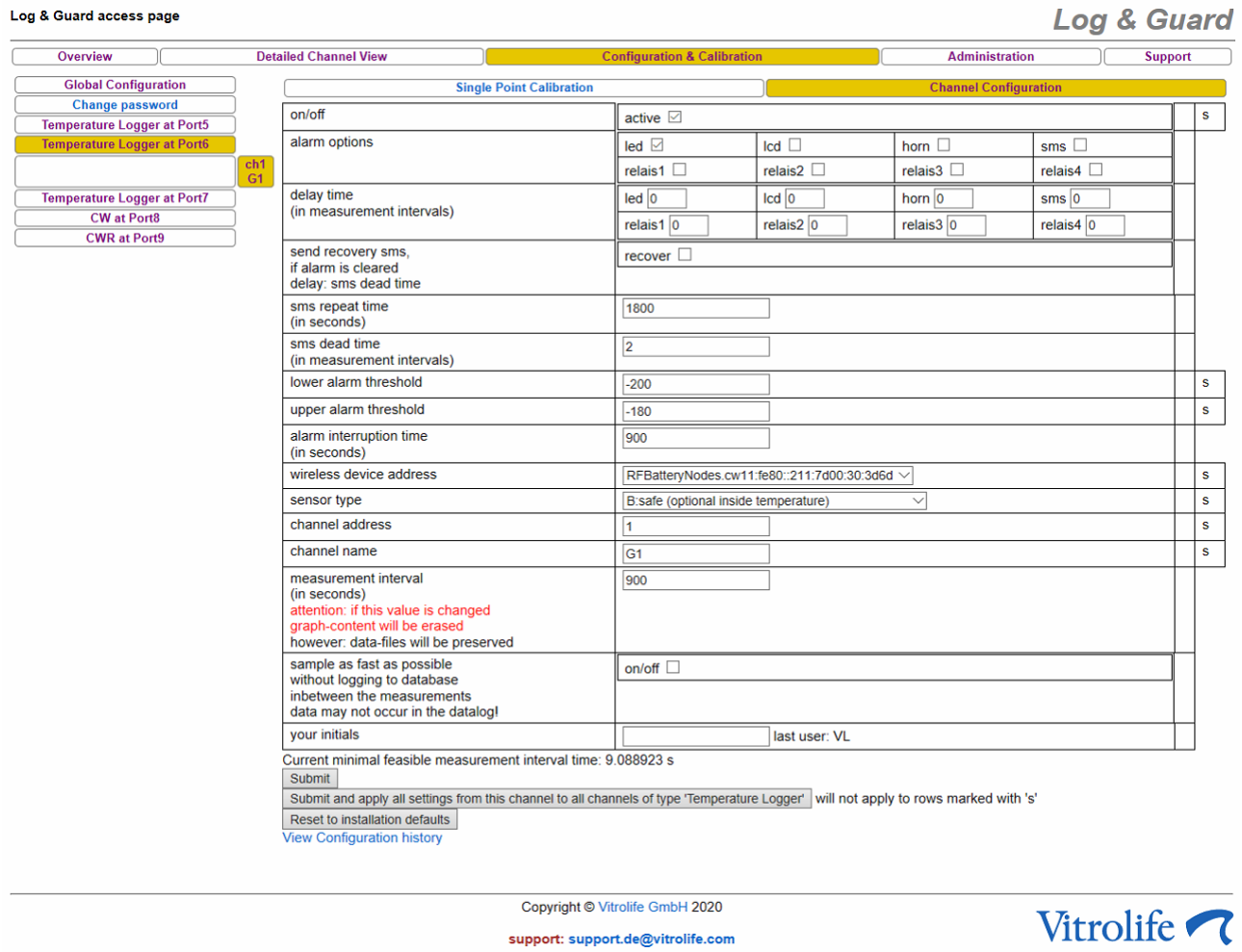


Figure 34: Configuration page for the optional low temperature sensor of the Log & Guard B:safe monitoring trolley.

Table 6: Options on the configuration page for the optional low temperature sensor of the Log & Guard B:safe monitoring trolley

	Significance	**Default/recommended value**	**Important information**
active	Select the check box to activate all functions of the sensor channel.	on	If the check box is not selected, the following message is displayed on the overview and detailed channel pages: “Channel is not active. Data may be outdated.”
alarm options	Select the check boxes to activate alerting via the selected devices (**led**, **lcd**, **horn**, **sms** and/or **relais1-4**).		
delay time	Specify the delay time in seconds. The time starts to count down when the Log & Guard system detects an alert situation. An alert will be triggered after the delay time if the alert situation is still detected.		Measured in multiples of the measurement interval.
send recovery sms	Select the check box to activate the sending of a text message about clearance of an alert.		**sms** must be activated under **alarm options**. The sending of the text message will be delayed by the **sms dead time**.
sms repeat time	The time starts to count down after the first alert text message is sent. After the **sms repeat time** has elapsed, a reminder text message will be sent only if the alert situation is still detected by the Log & Guard system.	1,800 seconds = 30 minutes	**sms** must be activated under **alarm options**.

	Significance	**Default/recommended value**	**Important information**
sms dead time	The time starts to count down after the **sms repeat time** has elapsed. The **sms dead time** overrides any new alert situation (no text message alert during countdown). This effect may be intended if the measured values are fluctuating around a threshold value, causing repeated recovery and alerting.		Measured in multiples of the measurement interval. **sms** must be activated under **alarm options**.
lower alarm threshold	Lower inside temperature limit. Values below the threshold will trigger an alert (if activated, see above).	-200 °C	
upper alarm threshold	Upper inside temperature limit. Values above the threshold will trigger an alert (if activated, see above).	-180 °C	
alarm interruption time	The time starts to count down after an alert is suspended. The horn will be paused until the interruption time has elapsed. If the alert situation is still detected, the horn will be restarted.	900 seconds = 15 minutes	
wireless device address	Set upon installation.		Do not change!
sensor type	Set upon installation.		Do not change!
channel address	Set upon installation.		Do not change!

	Significance	**Default/recommended value**	**Important information**
channel name	Enter an individual name.		The channel name will be displayed on the overview and detailed channel pages. Choose a name that will identify the specific equipment that the Log & Guard B:safe monitoring trolley is monitoring.
measurement interval	Time interval in seconds between two data points. When the measurement interval is changed, the graphical display of logged data will be restarted in an empty diagram. All data are logged continuously.	900 seconds = 15 minutes	Shorter intervals will reduce the battery life and may have a negative impact on wireless communication. Bear in mind that some of the above variables are set as multiples of the measurement interval.
sample as fast as possible	A measurement is performed every 1-3 seconds (or longer), depending on the load of the Log & Guard system. Information about the currently feasible minimal measurement interval time is provided below the configuration table.		Remember to deselect the check box to return to the regular measurement interval.
your initials	Enter your initials. The last user will be identified in the next session.		The initials will be logged in the configuration history.
Submit	Click this button to apply and save all changes.		Changes on the configuration page are saved in the configuration history.
Submit and apply all settings from this channel to all channels of type ‘Temperature Logger’	Click this button to automatically copy the alerting options and measurement interval to all other connected temperature sensor channels.		Verify before clicking this button that you want to override the settings of all other connected temperature sensor channels.

	Significance	Default/recommended value	Important information
Reset to installation defaults	Click this button to reset all values to the default values.		
View Configuration history	Click this link to open the configuration history.		

6 Symbols and labels

Label	Description	Note
	Manufacturer name and address	See section 8.

7 Disposal of waste

In order to minimise the waste of electrical and electronic equipment, waste must be disposed in accordance with the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE) as amended by Directive (EU) 2018/849. This includes: PCBs (lead-free HASL), switches, PC batteries, printed circuit boards and external electrical cables. All components are in accordance with the RoHS 2 Directive 2011/65/EU, which states that new electrical and electronic components do not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers.

8 Contact information

Urgently need help? Call our service hotline for support:

+45 7023 0500

(available 24 hours a day, 7 days a week)

E-mail support: support.de@vitrolife.com

(response within 2 working days)

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