Specification Sheet



TCH-112

MANUFACTURED BY

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UNIT INFORMATION

General	TCH-112 is an electrical heating unit designed for standard ISO tank containers to provide high reliability in extreme ambient temperature. The unit is designed in the standard format to heat cargoes up to 60°C. A higher temperature may be obtained as an option up to 103°C plus. The system consists of an electric pump, heater electric control panel, and expansion tank. The electrical control panel and expansion tank are mounted separately. There are numerous options to accommodate tank types, food and hazardous cargoes, extreme conditions etc. The various options and customized features are listed at the end of this document. The machine is designed to work by pumping a heat transfer fluid around existing steam and glycol coils or wrap around plates provided by the tank builder. Generally, the heating medium is glycol, but synthetic oil may be used for higher temperature applications. Klinge will give advice on routing and venting pipes and heat calculations. The front and side covers are removable for ease of maintenance. The pump and heater are replaceable from the right side of the unit without removal of unit from tank.
Construction	The frame is constructed of aluminum alloy 5052-H32, treated to resist corrosion induced by salt spray atmosphere. All fasteners; bolts, screws, nuts, washers, hinges are stainless steel.
Equipment design	The TCH-112 is designed to withstand and operate satisfactorily under sea-going and environmental conditions including: Environment: Salt-laden air, sea spray, high humidity and severe atmospheric conditions. Rolling: Amplitude of 30 degrees on each side, period of 13 seconds. Pitching: Amplitude of 6 degrees, period of 8 seconds. Permanent List: 20 degrees on each side. Shock: Acceleration of 2 G in all directions Vibration: Of the type encountered on ships or land vehicles and rail systems.

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Unit Dimensions	Length: 1100 mm Height: 390 mm Depth: 480 mm
Weight	55 Kg Unit 26 Kg Electrical Box (Including Cables) 5 Kg Installation Kit 9 Kg Expansion Tank (Std - Plastic) 12 Kg Expansion Tank (Optional – Aluminum)
Power supply Main power Control power	 50 Hz; 360VAC min. - 460VAC max. 60 Hz; 400VAC min. - 500VAC max. AC, 12 and 24 Volts (Transformed from 3 Phase Power)
Method of Heating	Electrical Immersion Resistance Heater 12 kW
Paint	Powder Coated
Power Plug	4 Pole, 380/460V, 50/60 Hz Ground at 3 o'clock, 32A As per IEC 60947-1 and ISO 1492-2
Power Cable	Length: 64' (19.5m) Temperature Range: -40°C to 90°C Cable: SO 10/4 Black
Heat Transfer Fluid	Heat Transfer Fluid is not supplied with the equipment. The quantity required will depend on the tank construction.

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UNIT CAPACITY

Unit Capacity: **480 Volts @ 60 Hz**	The gross heating capacity of the unit based on the defined criteria is 12 kW. The net heating capacity will depend on the tank details and interconnecting pipe details and their insulation.

STANDARD INFORMATION

Machinery is designed for and suitable for transportation over long voyages of heated cargoes.
Thermostat Set Point Range: Standard: -29°C to +60°C (-20°F to +140°F) High Heat: -29°C to +103°C (-20°F to +217°F) Requires Config Menu change and Higher Setting
Machinery will be in full functional operation and work satisfactorily in ambient temperatures from -20°C to +50°C (-4°F to +122°F). If the equipment is already in operation the system will be able to operate in ambient temperatures down to -30°C (-22°F). Components are made to withstand temperatures up to + 70°C (158°F). Components exposed to transfer fluid are made to withstand temperatures up to + 120°C (248°F), if higher temperatures are required special seals will need to be utilized.
The unit is built to comply with relevant ISO Recommendations.

UNIT INFORMATION, HEATING SYSTEM

Pump/Motor	**Type**	Centrifugal
	Power	0.38 kW (0.5 HP)
Heater	**Type**	Immersion
	Heating Capacity	12 kW
Heating Safety Controls	**Standard High Temperature Switch**	Cut-out 98 °C
	Glycol Level Switch	Float Switch

UNIT INFORMATION, ELECTRICAL SYSTEM

Electrical Safety Controls	**Control Circuit Breaker**	4 Amp

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	Main Power Circuit Breaker	19-25 Amp (Adjustable) Set at 20 Amps
Internal Electric Panel Components	**Contactors**	Pump, Heater and Phase Changers
	Temperature Control	Microprocessor Controller
	Circuit Breakers	Main Power CB
	Transformer	Primary 480 VAC Secondary 12 and 24 VAC
	Switch	Power On-Off Function Test
External Electric Panels Components	**Circuit breaker**	Control Circuit CB's
	Temperature Control	Display Panel

CONTROL SYSTEM

General Information

The control system is an electronic solid-state device consisting of three parts:

1. Microprocessor Controller (Thermostat)
2. Display Panel (Temperature Selector)
3. Temperature Sensing Probes

The above components are contained as part of the electrical control box with the exception of the cargo and glycol temperature probes, which are mounted in thermal wells in the tank container and glycol piping. If there is no probe well in the tank to receive the thermostat probe it may be attached under the insulation to the shell of the tank.

Indicator LEDs are provided to determine correct functions and as an aid for servicing the unit. The indicator LEDs mounted on the thermostat are visible from the front of the electric control panel when the door is closed.

When the unit **ON/OFF** switch is in the **ON** position, the display will show the Cargo Probe Temperature. With the Test Switch depressed the temperature that is shown will be the Glycol Temperature.

The set point is entered using the membrane switches on the display panel. It is stored in nonvolatile memory and will always be intact - even in case of power failure. In order to prevent false entry or changes of values, both selector buttons have to be depressed simultaneously for a new set point to be entered into the memory.

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Display Panel

General Description

The display panel consists of three membrane switches and a three digit alpha-numeric LED display**.** The display indicates the temperatures as derived from the temperature probes.

Temperature Selection

Once a set point is entered, the thermostat controls the actions of the TCH-112 system so that it will achieve and maintain the requested setting.

Entering a temperature set point:

1. Pressing the UP (^) or DOWN (^{V}) key causes the display to show the current set point.
2. After the current set point is displayed, the pressing of one of these keys will increase or decrease the display by one whole degree.
3. Holding a key pressed will cause the display to change one degree each half second.
4. Once the desired Set Point is achieved both the UP (^) and DOWN (V) key are pressed simultaneously for the new set point to be saved.
5. The display automatically returns to normal mode approximately 5 seconds after the last key pressed.

Changing Temperature Unit of Measure:

1. The thermostat can operate in either degrees Centigrade (C) or degrees Fahrenheit (F).
2. Pressing the C/F key causes the display to indicate the current mode. This is indicated by a C or F in the right character of the display. The right most decimal point in the display is also illuminated when in Fahrenheit (F) mode.
3. Each pressing of the C/F key causes the mode to change.
4. After selecting degrees C or degrees F, pressing either the up or down key will cause the currently selected mode to be saved and the display will immediately return to normal mode.
5. The display automatically returns to normal mode approximately 5 seconds after the last key pressed.

Temperature Sensing Probes:

Proper functionality of the unit depends on proper probe location and mounting.

The system is adaptable to customer requirements. The location of the thermo-well is determined by the customer, but in general, for tanks designed to carry full loads, is a1/3rd of the way up the height of the liquid and some distance from any heating or cooling coils.

The thermostat allows for two control probes, one in the cargo and one in the heating medium to heat the cargo. The heat transfer medium, by definition, must be higher in temperature than the cargo. The temperature of the cargo may be varied by raising or lowering the temperature of the glycol. Locally overheating the cargo at the point at which the glycol first comes in contact with the tank may be a problem with some cargoes. The glycol limit setting prevents this local over heating of sensitive cargo.

Setting the Glycol Limit:

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The setting is an "off-set" limit on either side of the entered set point. In a case when it is not required or when the cargo will not be affected by local sub-cooling or overheating, set the bandwidth limit high. It is suggested, in this case, to have the "off-set" limit at 15 degrees or more. The minimum setting is 2°C (4°F).

To enter Glycol Limit:

Hold the Glycol Temp / Set Limit toggle switch while adjusting the touch pad as described above for entering a temperature set point.

Microprocessor Thermostat Controller:
The Microprocessor Controller (MPC) is equipped with various Inputs and Outputs. The MPC serves as the brains of the Heating System.

Input signals to the Thermostat consist of the following:

1. Cargo temperature probe.
2. Glycol temperature probe
3. Set point as entered from display panel.
4. Glycol Limit as entered from display panel.
5. Glycol Safety Switches
6. Signal to initiate function test.

Output signals from the Thermostat are by means of eight relays. Four relays are single pole single throw normally open and four are single pole double throw. The outputs from the Thermostat consist of the following:

1. Heater On (Heating)
2. Glycol Pump On
3. Alarm Light
4. Alarm Horn

Each output relay has a red LED mounted on the circuit board adjacent to the relay to indicate if that relay is energized.

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OPTIONS

Data logger	A self-contained 6 channel electronic data logger with printer housed either in its own enclosure or mounted in the control box with or without the temperature limits integrated into the alarm system that can be printed out or downloaded.
Horn	A horn can be mounted on the electrical box to allow for audible notification when an alarm condition is noted.
Frame or Beam Tank Mounting	The machine is designed to mount on ether the bottom rail of the tank or to be suspended from the stiffening rings of a beam tank.
GSM or Satellite Communication	Retrofitted or fitted as original equipment the machine can be fitted with a GSM or Satellite transponder and transmit both location and a combination of signals.
Log Show (Remote Monitoring)	This option gives you the ability to remotely monitor the operating condition of the unit.
Additional Heater Elements	Additional heating elements can be added to provide additional heating capacity.

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REVISION RECORD

Rev	Description	Date	Approved
B	Changed Glycol pump to 0.38 kW (0.5 HP), page 4, added "UNCONTROLLED IF PRINTED" to footer	2016/12/01	BES
C	Changed degree symbols two places, changes to electrical system table for Amps.	2019/04/08	JCF
D	Updated system component weights, added Thermostat set point ranges	2024/01/16	BES

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