MODEL TCR-110 Z2

ROAD TANKER AND ISO TANK CONTAINER REFRIGERATION UNIT

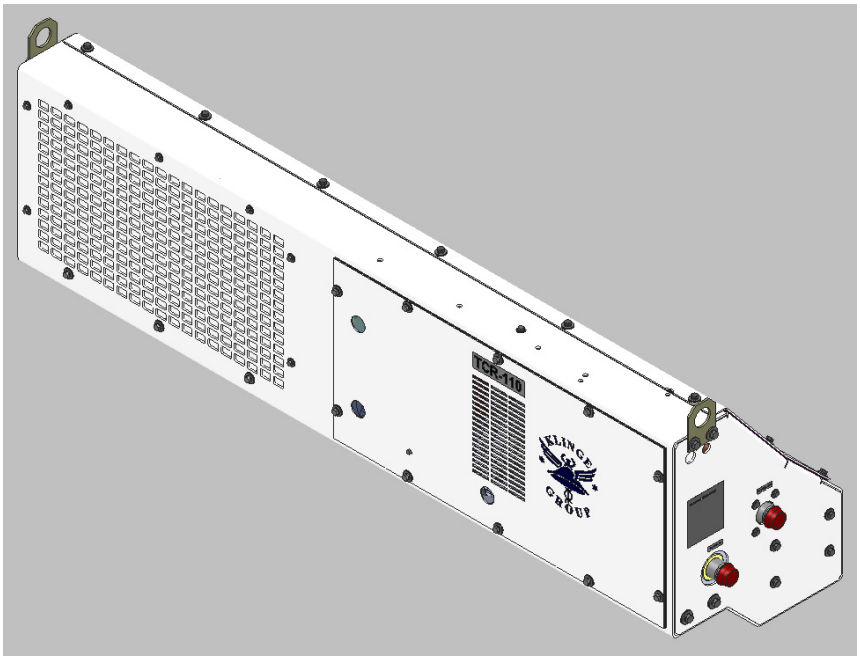
FOR

ZONE 2 HAZARDOUS LOCATIONS

CERTIFIED TO ATEX ZONE 2

II 3 G

Ex db eb h nA nC IIB T3 Gc



ATEX MANUAL

MANUFACTURED BY KLINGE CORPORATION

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REVISION RECORD

Rev	Description	Date	Approved
C	polyolester was polyol ether (pg 24)	2016/06/09	BES
D	Changed Glycol Temp Limit Switch illustration, pg 15; updated Limit Chart, pg 52	2016/07/12	BES
E	Pg 81 Item 6 was K31-00858-40, re-printed to show illustrations on pgs 74, 76, 78 & 80	2016/11/09	BES
F	Inserted "Main Power Connection" at 1.11.2, updated electrical schematic, added "UNCONTROLLED IF PRINTED" to footer	2016/11/30	BES
G	Updated Section 7.5 Piping Schematic (pgs 66 & 67)	2017/03/28	BES
H	Revised manual part number (was K35-05850-53), added Service and Spare Parts Request information (pg 4)	2018/02/14	BES
J	Added probe accuracy table (pg 19)	2018/04/30	BES
K	Added Dual System alarm codes A41 & A42 to Alarm Code table	2018/06/01	BES
L	Revised Section 3.1, Section 7.6B Item 6 was K31-00858-40	2018/08/08	BES
M	Removed standard operation, service and parts information, creating ATEX specific information document	2020/9/30	BES
N	Updated ATEX string	2021/08/09	BES
P	Updated per Intertek review	2023/06/20	BES
R	Added refrigerant R-513A	2025/02/11	BES

Use of this Manual

This manual must be used in conjunction with the current revision of Klinge Corporation manual TCR-110 Z2 Operation Manual.

The use of this manual is intended for the safe operation of the equipment described. It is therefore reasoned that persons who have the occasion to use this manual have a knowledge of mechanical and electrical systems and components addressed by its' contents. However, efforts have been made to enable persons less familiar with these systems to use this manual.

The equipment may be installed in a number of configurations. Each may have optional items and differing external details provided by third parties. The specific electrical circuit and pipe diagram are posted on the unit as decals.

Most external and internal pipework parts are standard commercially available pipe fittings and not covered here. For external pipe fitting, replace like for like, taking care to replace stainless steel with stainless steel.

Suggestions as to improvement in content and format are welcome and should be addressed to engineering@klingecorp.com. Corrections and improvements will be included on dated revisions – the latest of which will be available upon request.

Service Request

Requests for Service should be directed to the Klinge Service Team. The below link should be used to place all requests for service and will afford the quickest response time.

https://klingecorp.com/request-service/

This form will help us determine model and age of the equipment, location, basic details about the issue, who to contact and how to best handle the issues with the equipment. A service ticket number will be provided in a response email once the form is received and processed. If the equipment is out of warranty, charges may apply for extensive technical support.

Additionally, our Service Department can be reached via email at technical@klingecorp.com.

Spare Parts Request

Requests for Spare Parts should be directed to our Parts Department via email at spares@klingecorp.com. Please have available at the time of the request the Serial Number of the equipment to ensure that the proper part is provided.

Contents

1. Refrigeration Unit

The Klinge Model TCR-110-Z2 refrigeration unit is designed specifically for operating in Zone 2 Hazardous Locations.

The unit is charged with R-404A, R-452A, R-134a or R-513A refrigerant.

WARNING
The control box can only be opened in a hazardous location when the flow of power has been cut using the Main Power Disconnect Switch.

This unit is designed to maintain temperatures from -20ºC (-4ºF) to +29ºC (84ºF) automatically, utilizing cooling and optional heating cycles.

The unit is designed to operate on 400/480 volt AC +/-10%, 3 phase 50/60 Hz +/-2.5%.

Control System power is provided by a single-phase transformer which steps down the high voltage power source to 24 volt and 14 volt AC single phase.

A self-diagnostic function test checks the condition of the refrigeration unit automatically and is performed by the microprocessor thermostat. This saves labor costs and makes pre-trip inspections reliable.

A phase sequence sensing and control system is installed in the electrical control section; this system will automatically reverse two of the phases if required to correct component rotation, regardless of the incoming phase sequence of the power.

All motors, including the compressor, are equipped with automatic reset internal thermal overload protection.

The unit is delivered complete with a charge of refrigerant, compressor lubricating oil, mode-indicating LEDs, and microprocessor thermostat, factory tested and ready for operation upon installation.

2. ATEX Compliance

The Model TCR-110-Z2 Container Refrigeration Unit complies with the following:

EN 60079-0: 2018	**Explosive atmospheres - Part 0: Equipment - General requirements**
EN 60079-1: 2014	**Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"**
EN 60079-7: 2015/A1:2018	**Explosive atmospheres - Part 7: Equipment protection by increased safety "e"**
EN 60079-15: 2010	**60079-15:2019 Explosive atmospheres. Equipment protection by type of protection "n"**
EN 14986: 2017	**Design of fans working in potentially explosive atmospheres**
EN ISO 80079-36:2016	**Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements**
EN ISO 80079-37:2016	**Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - Non-electrical type of protection constructional safety 'c', control of ignition sources “b”, liquid immersion “k”**

3. ATEX Certification

The Klinge Model TCR-110-Z2 refrigeration unit has received ATEX Certification for use in Zone 2 Hazardous Locations.

Zone 2 is defined as an area in which ignitable concentrations of flammable gases or vapors:

- Are not likely to exist under normal operating conditions,
- May exist for short periods.

The TCR-110-Z2 system uses components that will not cause ignition of explosive gases or vapors.

Description of ATEX Certification

⟨Ex⟩ **II 3 G**

Ex db eb h nA nC IIB T3 Gc

Tamb -20°C to +45°C

⟨Ex⟩	Specific marking for Explosion Protection	
II	Equipment Group	
3	Equipment Category	
G	Environment	Gas
Ex	Explosion Protection	
db	Type of Protection	Flameproof Enclosure
eb	Type of Protection	Increased Safety
h	Type of Protection	Constructional Safety
nA	Type of Protection	Increased Safety
nC	Type of Protection	Increased Safety
IIB	Gas Group	Gases, Vapors and Mists - Ethylene
T3	Temperature Class	200°C (392°F)
Gc	Equipment Protection Level	Suitable for Zone 2

Tamb -20°C to +45°C Ambient temperature range of operation

4. Special Conditions For Safe Use

- An appropriate cable conforming to the standards shall be used when connecting to the Main Power Disconnect (Part Number K25-26760-01).
- The equipment should be installed in accordance with EN 60079-14 and EN 60079-17.
- Before energizing the system, ensure the electrical control box cover is secured, with all fastening bolts tightened to a torque of 88.1 N m (65 lb.-ft.) when dry. If bolts are lubricated (use only petroleum jelly), the torque value is 67.8 N m (50 lb.-ft.).
- Before energizing the system, ensure the cover of the auxiliary junction box (if so equipped) is secured, with all fastening bolts tightened to a torque of 47.5 N m (35 lb.-ft.) when dry. If bolts are lubricated (use only petroleum jelly), the torque value is 36.6 N m (27 lb.-ft.).

5. Conditions where the equipment shall not be used –

- IIC (Hydrogen, Acetylene, etc.)
- The system shall not be operated in an outdoor environment without all cover panels in place.
- The system shall not be operated in a hazardous environment if there are signs of worn or frayed cables.

6. Ignition Hazard Assessment

Potential Ignition Source

- Hot Surfaces – The system was designed and has proven through testing to maintain surface temperatures less than T3 maximum, while in an ambient temperature of 45°C.
- Mechanically Generated Sparks – Minimum clearance requirements between rotating and stationary parts are maintained per EN 14986 also meeting the material requirements of EN 60079-0.
- Electrical Arcing – Certified EX components or enclosures have been used in the design of the system.
- Static Electrical Discharge – When contacting the solenoid coil, compressor junction box, condenser fan or evaporator fans a clean moist cloth must be used.
- Stray Electric Currents – Metal to metal contact of electrical components protects the system from stray electric currents, maintaining equal electrical potential.