



VALIDATION SUMMARY REPORT

Walk-in Refrigeration Storage / Cold Room

Title: Validation Summary Report for Walk-in Refrigeration / Cold Room Model DT820P

Manufacturer:	Polar King International, Inc.
Model Number:	DT820P
Equipment ID / Serial No:	A20049561

Revision Number: 1
Issue Date: 08/01/2020



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1.0 INTRODUCTION

The Validation Summary Report summarizes the qualification activities measured on the Walk-In Cold Room, Polar King Unit A20049561. The unit is manufactured by Polar King International, Inc. and has a model number of DT820P. It is controlled by an A421 thermostat manufactured by Johnson Controls . This summary also covers any discrepancies encountered throughout the validation study.

2.0 REFERENCES

Temperature mapping of storage area, technical supplement to WHO Technical Report Series, No. 961, 2011.

3.0 SUMMARY

3.1 INSTALLATION & QULAIFICATION

The validation study for A20049561 was completed on July 17th, 2020. Verifications for the study were documented and saved using Vaisala Veriteq vLog.

3.1.1 System Components Identification

Identification information for the Cold Room was verified. This included model and serial numbers for the condensing unit, compressor, and structure. Refrigerant type and expansion valve were confirmed, as was insulation thickness.

3.1.2 Documentation Verification

Documentation for installation and maintenance of A20049561 was obtained. These documents were reviewed, and include manuals, quality control reports and production worksheets.

3.1.3 Refrigeration System Components Visual Inspection

A visual inspection of refrigeration system components was conducted to verify the equipment was installed in accordance with the manufacturer’s recommendation. Critical components were confirmed to be in new working order. No damage was noted.

3.1.4 Electrical Supply Verification

A Fluke Multimeter was used to confirm the provided voltage supply was in accordance with requirements specified on the serial plate of the Cold Room.



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3.1.5 Thermostatic Controller Identification

The installation location of the thermostatic control was noted and documented as required. Vaisala temperature data logger #15 was used to mirror the thermocouple location. All set points used for testing were documented as necessary.

3.1.6 Refrigeration System Spare Parts

No spare parts are required for the Validation Summary.

3.2 OPERATION QUALIFICATIONS

3.2.1 Vaisala Validation Equipment Calibration Verification

Calibration documentation for (16) Vaisala DL1000-1400 was reviewed and all temperature data loggers were found to be in calibration.

3.2.2 Temperature Data Logger Placement

The set-up of all temperature monitoring loggers was done in accordance with acceptable usage practices, obtaining measurements at multiple low, medium and high points within the Cold Room. 14 data points were logged in each study, as shown in figure 1. Logger #15 was used exclusively to mirror the t-stat, while #16 was used to collect ambient temperature data.

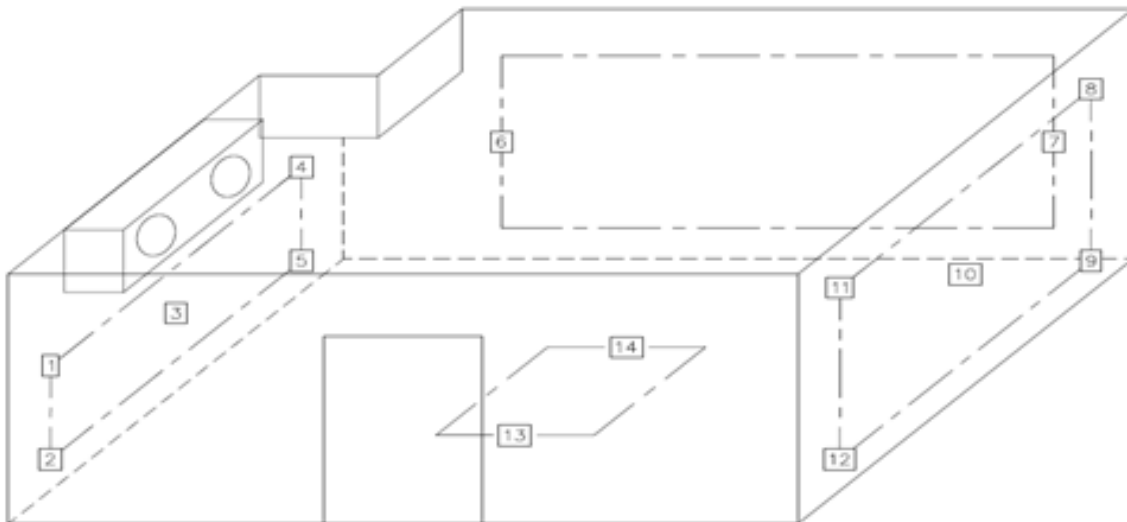


Figure 1



Manufacturer:	Polar King International, Inc.
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Table 1: Temperature Data Logger Locations and Labels

Data Logger Location	Data Logger Label	Alternate Data Logger Label
1	VA Logger #1	17341014
2	VA Logger #2	17341013
3	VA Logger #3	17381125
4	VA Logger #4	17381127
5	VA Logger #5	17381085
6	VA Logger #6	17381124
7	VA Logger #7	17381128
8	VA Logger #8	17381126
9	VA Logger #9	17381086
10	VA Logger #10	17371120
11	VA Logger #11	17381121
12	VA Logger #12	17381122
13	VA Logger #13	16451060
14	VA Logger #14	17381123
15	VA Logger #15	17371094

3.2.3 24-HR Empty Unit Thermal Mapping (5°C Set Point)

At a set point of 5°C the Cold Room was tested empty, with the door closed. The average ambient temperature during the test period was 26.67°C, (80.00°F). Temperature data loggers were positioned as shown in figure 1. Temperature data was recorded for a 24 hr period, from 02:00pm EDT on 07/08/20 to 02:00pm EDT on 07/09/20. The data was logged at 30 second intervals. The summarized data for all 15 temperature data loggers can be found in Table 2. No deviations were noted.

Graphical reports are available upon request.



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Table 2: Temperature Data Logger Locations and Labels

Data Logger Location	Data Logger Label	Data Logger Label (Alternate)	Max Temp (°C)	Avg. Temp (°C)	Min Temp (°C)
1	VA Logger #1	17341014	5.68	4.78	2.19
2	VA Logger #2	17341013	5.63	4.70	2.06
3	VA Logger #3	17381125	5.68	4.66	2.54
4	VA Logger #4	17381127	5.42	4.76	3.53
5	VA Logger #5	17381085	5.32	4.65	3.25
6	VA Logger #6	17381124	5.80	4.70	3.53
7	VA Logger #7	17381128	5.36	4.65	3.20
8	VA Logger #8	17381126	5.74	4.59	3.28
9	VA Logger #9	17381086	5.43	4.76	3.37
10	VA Logger #10	17371120	5.39	4.42	2.29
11	VA Logger #11	17381121	6.01	4.80	2.34
12	VA Logger #12	17381122	5.58	4.83	3.04
13	VA Logger #13	16451060	5.37	4.80	4.01
14	VA Logger #14	17381123	5.23	4.62	3.36
15	VA Logger #15	17371094	6.94	5.14	4.82

3.2.4 Empty Unit Open Door Temperature Recovery (5°C Set Point)

At an average ambient temperature of 31.51°C (88.72°F) testing was conducted between 3:51pm EDT and 04:16pm EDT on 07/09/20. After 25 minutes, only 3 data loggers had recorded temperatures outside of the acceptable zone (8°C), so the test was terminated, as such usage is well outside the normal scope of use. Stable recovery was rapid.

Graphical reports are available upon request.



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3.2.5 Empty Unit Power Failure Test (5°C Set Point)

The test was conducted between 09:38am EDT and 01:00pm EDT on 07/10/20. Temperature was logged at 30 second intervals. The logged data showed the empty Cold Room, with the power supply disconnected; held temperature within (+/- 3°C) for 1 hour and 24 minutes; when exposed to an average ambient temperature of 25.38°C (77.7°F). With restored power, the unit stabilized within the acceptable range rapidly. The graphical report is available by request.

3.2.6 24-HR Empty Unit Thermal Mapping (-20°C Set Point)

At a set point of -20°C the Cold Room was tested empty, with the door closed. Temperature data loggers were positioned as shown in figure 1. Temperature data was recorded for a 24 hr period, from 06:00pm EDT on 07/20/20 to 06:00pm EDT on 07/21/20. The data was logged at 30 second intervals. Graphical reports are available upon request.

Data Logger Location	Data Logger Label	Alternate Data Logger Label	Max Temp (°C)	Avg. Temp (°C)	Min Temp (°C)
1	VA Logger #1	17341014	-14.44	-20.00	-21.29
2	VA Logger #2	17341013	-14.92	-20.12	-21.39
3	VA Logger #3	17381125	-15.69	-20.06	-21.07
4	VA Logger #4	17381127	-17.05	-19.92	-20.53
5	VA Logger #5	17381085	-17.11	-20.08	-20.84
6	VA Logger #6	17381124	-16.22	-19.91	-20.51
7	VA Logger #7	17381128	-16.98	-20.13	-20.89
8	VA Logger #8	17381126	-16.03	-20.10	-20.96
9	VA Logger #9	17381086	-17.02	-19.95	-20.72
10	VA Logger #10	17371120	-16.50	-20.41	-21.76
11	VA Logger #11	17381121	-13.97	-20.06	-21.29
12	VA Logger #12	17381122	-15.92	-19.92	-20.76
13	VA Logger #13	16451060	-17.51	-20.04	-20.43
14	VA Logger #14	17381123	-17.76	-20.13	-20.50
15	VA Logger #15	17371094	-15.32	-19.42	-19.80



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3.2.7 Empty Unit Open Door Temperature Recovery (-20°C Set Point)

At an average ambient temperature of 30.09°C (86.16°F) testing was conducted between 03:54pm EDT and 05:30pm EDT on 07/14/20. Temperature was logged at 30 second intervals. After 24 minutes, approximately 50% of the data loggers had recorded temperatures outside of the acceptable zone (+/-10°C), prompting the door to be closed. Full consistent recovery at -20°C was achieved in approximately 1 hour 10 minutes.

Graphical reports are available upon request.

3.2.8 Empty Unit Power Failure Test (-20°C Set Point)

The test was conducted between 11:54am EDT and 04:00pm EDT on 07/15/20. Temperature was logged at 30 second intervals. The logged data showed the empty Cold Room, with the power supply disconnected; the unit held temperature within the acceptable range for 2 hours and 21 minutes when exposed to an average ambient temperature of 29.37°C (84.86°F). With restored power, the unit stabilized within the acceptable range in 1 hour 15 minutes. The graphical report is available by request.

3.3 Qualification Deviations

No deviations were found during testing.

4.0 CONCLUSION

Temperature validation of A20049561 was deemed a success without any deviations to report.



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5.0 Approvals

In review of the collected data for this Validation Summary Report, this study has been deemed successfully completed with satisfactory results. All deviations are listed within the Validation Summary report and are available by request as appendices. The Polar Leasing unit A20049561 has been successfully validated.

Name: Todd Ellinger

Title: VP Business Admin

Signature: [Handwritten Signature]

Date: 8-1-20

Name: David C. Schenk

Title: President

Signature: [Handwritten Signature]

Date: 8/1/20

Polar Leasing Company Approvals:

The signatures below indicate a full review and understanding of the validation data, thus fully completing the requirements of the report.

Name: Bart Tippmann

Title: President

Signature: [Handwritten Signature]

Date: 8/1/20

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Vaisala DL1000-1400 Temperature Data Logger



The 1000/1400 temperature data loggers include the VL-series for regulated environments and the SP-series for non FDA/GxP regulated industries. The VL-series of data loggers, together with vLog VL software, provide a superior, high accuracy solution for use in FDA/GxP regulated environments by ensuring tamperproof files and electronic records that meet 21 CFR Part 11 requirements. The SP-series provides a compact, easily deployable, highly

accurate measurement and recording device. Coupled with vLog SP software for downloading, displaying, analyzing and reporting of recorded environmental data, the SP-series was designed for use in non FDA/GxP regulated environments. Optional browser-based viewLinc software provides 24/7 multi-stage alarm notification and remote monitoring for both the VL and SP series of data loggers.

Features/Benefits

- Industry-leading precision and accuracy
- Printed reports for any time period
- 10-year battery
- Validation and continuous monitoring with the same model
- Two year limited warranty
- Superior alternative to chart recorders and hard-wired systems
- Traceable to SI units through national metrology institutes.*
- Timebase calibrated over the operating temperature range
- Adjustable time based recording
- Snap-in logger cradle for easy network connectivity
- Two probe options give high accuracy – from -90 °C to +70 °C

* Measurement results are traceable to the international system of units (SI) through national metrology institutes (NIST USA, MIKES Finland, or equivalent) or ISO/IEC 17025 accredited calibration laboratories.

Applications

- Ideal for Monitoring & Validation of:
- Refrigerators & Freezers (to -90 °C)
 - Incubators
 - Stability Chambers
 - Warehouses
 - Ambient conditions



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Technical Data

General

Size	85 x 59 x 26 mm (3.4 x 2.3 x 1") 76 g (2.7oz)
Interfaces	RS-232 serial, USB, Ethernet, WiFi, PoE network interface available
Mounting	3M Dual Lock™ Fasteners Snap-in connector locks provide secure probe connections
PC Software	Graphing & Reporting Software vLog SP for SP-series vLog VL for VL-series viewLinc for continuous monitoring & alarming OPC Server to add on to existing OPC compatible monitoring systems
Internal Clock	Accuracy ±1 min. /month -25 °C to +70 °C (-13 °F to +158 °F)
Electromagnetic Compatibility	FCC Part 15 and CE
Power Source	Internal 10-year lithium battery (Battery life specified with sample interval of 1 min. or longer)
Logger Operating/Storage Range	-40 °C to +85 °C (-40 °F to +185 °F) 0 %RH to 100 %RH non-condensing

Internal Temperature Sensor

Series	Sensor Type
1000-21x	Precision-tolerance epoxy-encapsulated NTC thermistor

Memory

Data Sample Capacity	
1000-2XX	48,100 12-bit samples
1400-44X	85,300 12-bit samples
Memory Type	Non-volatile EEPROM
Memory Modes	User selectable: wrap (FIFO) or stop when memory is full. User selectable start time. User selectable stop time (VL series only).
Sampling Rates	User-selectable (in 10 second intervals) from once every 10 seconds to once a day.

Recording Span: 1000-2xx

SAMPLE INTERVAL	NUMBER OF CHANNELS ENABLED	
	1	2
10 Seconds	5.5 Days	2.7 Days
1 Minute	1.1 Months	16.7 Days
5 Minutes	5.5 Months	2.7 Months
15 Minutes	1.3 Years	8.3 Months
1 Hour	5.4 Years	2.7 Years



VL-1000-21x



VL-1000-22x

Recording Span: 1400-44x

SAMPLE INTERVAL	NUMBER OF CHANNELS ENABLED			
	1	2	3	4
10 Seconds	9.8 Days	4.9 Days	3.2 Days	2.4 Days
1 Minute	1.9 Months	29.6 Days	19.7 Days	14.8 Days
5 Minutes	9.8 Months	4.9 Months	3.2 Months	2.4 Months
15 Minutes	2.4 Years	1.2 Years	9.8 Months	7.4 Months
1 Hour	9.7 Years	4.8 Years	3.2 Years	2.4 Years



VL-1400-44x



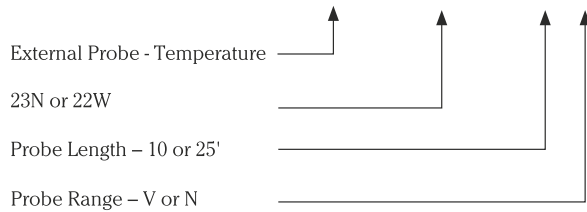
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EPT Series Temperature Probes

Sensor Models

"N" Range External Probes	EPT-23N-XXN and EPT-22W-XXN
Operating/Storage Range	-40 °C to +95 °C (-40 °F to +203 °F)
Connector Color Code	Black
"V" Range External Probes	EPT-23N-XXV and EPT-22W-XXV
Operating/Storage Range	-95 °C to +95 °C (-139 °F to +203 °F)
Connector Color Code	Blue

EPT - XXX - XXX



Sensor Tips

EPT-23N-XXX	Stainless Steel Diameter 3.2 mm (1/8") °F Length 38 mm (1.5")
EPT-22W-XXX (liquid submersible)	Sealed Teflon Tip Diameter 3 mm (0.12") Length 28 mm (1.1")
Probe Lengths	3 m (10') and 7.6 m (25')
Cable Construction	2mm (0.07") Diameter Teflon coated cable

Temperature Probe Accessories

Thermal Dampening Block, for use in refrigerators and freezers, simulates a glycol bottle to reduce viewLinc alarms generated by opening and closing a door.

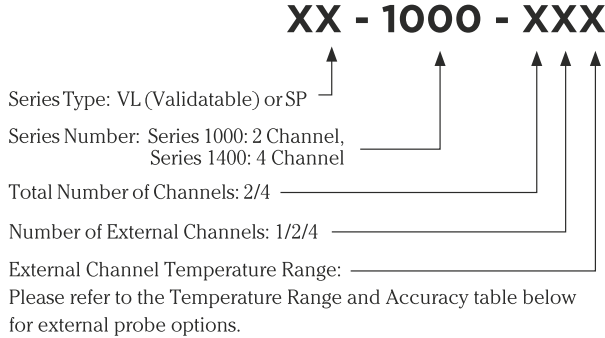




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Product Part Number Legend: Guide for reading the product tables and selecting the most appropriate model for your application.



Temperature Range and Accuracy

Internal Sensor

Calibrated	
Measurement Range	-25 °C to +70 °C (-13 °F to +158 °F)
Operating/Storage Range	-40 °C to +85 °C (-40 °F to +185 °F)
0 %RH to 100 %RH non-condensing	
Initial Accuracy	+/-0.10 °C over +20 °C to +30 °C (+/-0.18 °F over +68 °F to +86 °F) +/- 0.2 °C over -25 °C to +70 °C (+/- 0.36 °F over -13 °F to +158 °F)
One Year Accuracy	+/-0.15 °C over +20 °C to +30 °C (+/-0.27 °F over +68 °F to +86 °F) +/-0.25 °C over -25 °C to +70 °C (+/-0.45 °F over -13 °F to +158 °F)
Resolution	0.02 °C at +25 °C (0.04 °F at +77 °F)

External Probes - All Models

"N" RANGE EXTERNAL PROBE	
Calibrated	
Measurement Range	-25 °C to +70 °C (-13 °F to +158 °F)
Operating/Storage Range	-40 °C to +95 °C (-40 °F to +203 °F)
Initial Accuracy*	+/-0.10 °C over +20 °C to +30 °C (+/-0.18 °F over +68 °F to +86 °F) +/-0.15 °C over -25 °C to +70 °C (+/-0.27 °F over -13 °F to +158 °F)
One Year Accuracy*	+/-0.2 °C over +20 °C to +30 °C (+/-0.36 °F over +68 °F to +86 °F) +/-0.25 °C over -25 °C to +70 °C (+/-0.45 °F over -13 °F to +158 °F)
Resolution	0.02 °C at +25 °C (0.04 °F at +77 °F)
"V" RANGE EXTERNAL PROBE	
Calibrated	
Measurement Range	-90 °C to -40 °C (-130 °F to -40 °F)
Operating/Storage Range	-95 °C to +95 °C (-139 °F to +203 °F)
Initial Accuracy*	+/- 0.2 °C over -90 °C to -40 °C (+/- 0.36 °F over -130 °F to -40 °F)
One Year Accuracy*	+/-0.25 °C over -90 °C to -40 °C (+/-0.45 °F over -130 °F to -40 °F)
Resolution	0.02 °C at -80 °C (0.04 °F at -112 °F)

*Specification for external channels is for a probe calibrated to the specific channel of the data logger and with the data logger at -25 °C to +70 °C (-13 °F to +158 °F)



www.vaisala.com

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www.vaisala.com/requestinfo



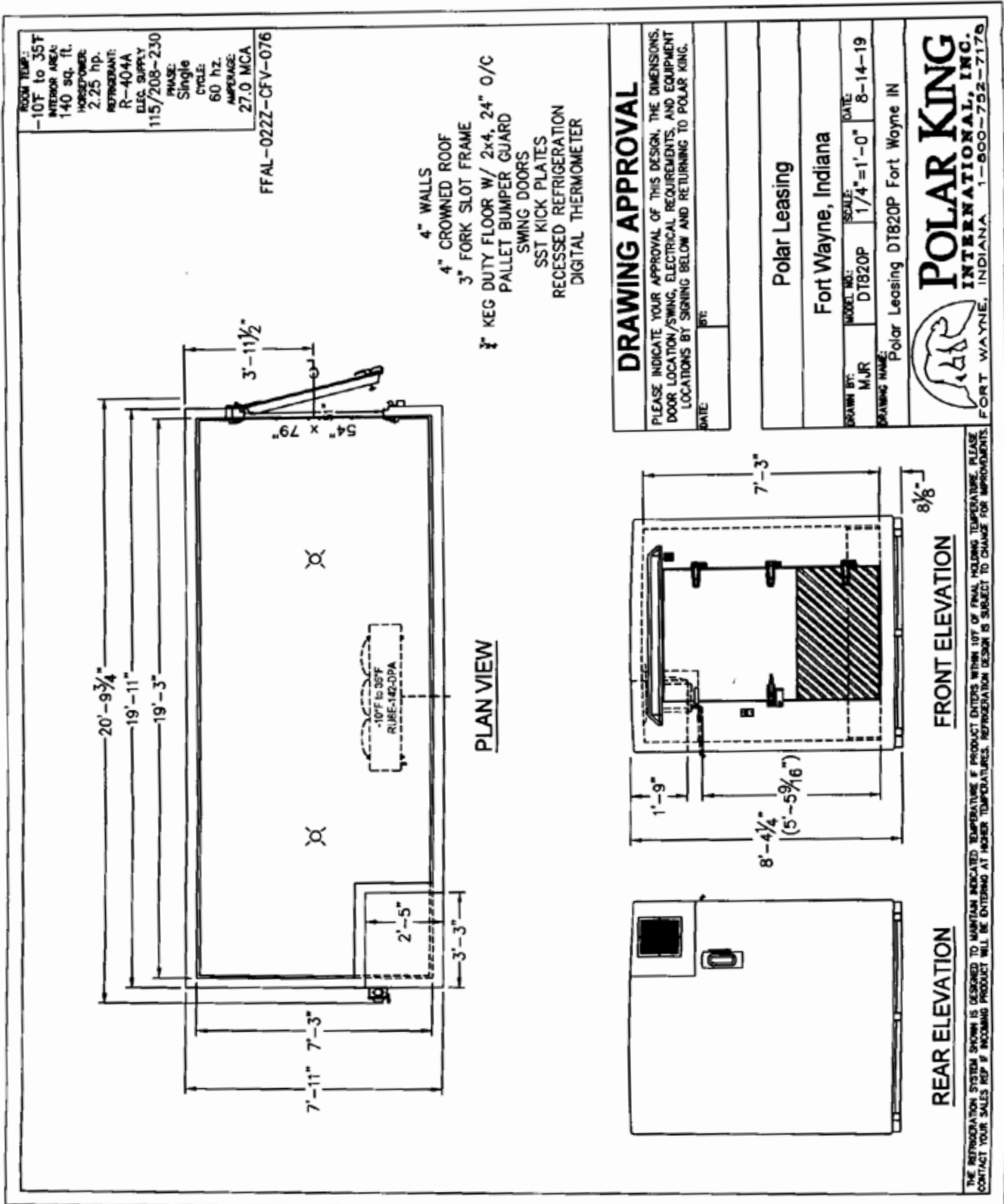
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DRAWING APPROVAL

PLEASE INDICATE YOUR APPROVAL OF THIS DESIGN, THE DIMENSIONS, DOOR LOCATION/SWING, ELECTRICAL REQUIREMENTS, AND EQUIPMENT LOCATIONS BY SIGNING BELOW AND RETURNING TO POLAR KING.

DATE: _____ BY: _____

Polar Leasing
Fort Wayne, Indiana

MODEL NO.: DT820P SCALE: 1/4" = 1'-0" DATE: 8-14-19

DRAWN BY: M.J.R. SEAL: _____

DRAWING NAME: Polar Leasing DT820P Fort Wayne IN

POLAR KING INTERNATIONAL, INC.
FORT WAYNE, INDIANA 1-800-752-7178

THE REFRIGERATION SYSTEM SHOWN IS DESIGNED TO MAINTAIN INDICATED TEMPERATURE IF PRODUCT ENTERS WITHIN 10° OF FINAL HOLDING TEMPERATURE. PLEASE CONTACT YOUR SALES REP IF INCOMING PRODUCT WILL BE ENTERING AT HIGHER TEMPERATURES. REFRIGERATION DESIGN IS SUBJECT TO CHANGE FOR IMPROVEMENTS.