ENGINEERING TOMORROW

Installation and Commisioning Manual - Revision B

TurbocorCloud® Installation and Commissioning Manual

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List of Changes

Revision	Date	Page	Description of Change
A	12-19-2024		New Manual
B	5-7-2025		Update to Registration section

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Chapter 1.0 Introduction

TurboCloud is a system comprised of a central Gateway device that connects Turbocor compressors to the servers that power the TurbocorCloud dashboard.

The functionality of the TurbocorCloud Gateway provides a means to include product features like:

- **Remote Monitoring**: TurbocorCloud enables users to monitor compressor health, access logs, and analyze trend data from anywhere
- **Site Navigation**: The Dashboard allows users to quickly identify and navigate to sites requiring attention
- **Data Access**: TurbocorCloud provides automatic access of up to 150 datapoints from its database, enabling users to diagnose issues from any time period, past or present
- **Fault and Event Logs**: Downloadable fault and event logs simplify diagnosis, making it clear, accurate, and efficient
- **Health Reporting**: A 30-day health report provides consistent updates on compressor health and energy consumption trends
- **Collaboration**: Easily share information with other technicians to facilitate advanced troubleshooting assistance

If problems are experienced with any monitored compressor, a download of customized, date-specific operating data can be immediately available for analysis, eliminating the need to send a technician to the field to connect the Service Monitoring Tool (SMT) and wait to capture a live recording during the event.

1.1 Organization

This manual is organized in the following manner:

- **Section 1: Introduction** – this section describes the purpose of the manual, its organization, conventions used in the manual, and a safety summary which describes the use of Caution and Notes symbols
- **Section 2: Gateway Installation and Configuration** – this section provides the installation steps for the Gateway
- **Section 3: Connection to the Turbocor Compressor** – this section describes cable connection between the Gateway and the Turbocor Compressors
- **Section 4: Registration** – This section describes the steps required for registering the Gateway
- **Section 5: Connection to TurbocorCloud** – this section explains what each of the Light-Emitting Diode (LED) indicators on the front panel represent during operation of the Gateway
- **Section 6: SMT Connection for TT/TG Series Compressors** – this section explains how to connect the SMT
- **Appendix A: Troubleshooting** – this section provides additional help in the event a user experiences problems with the Gateway
- **Appendix B: Frequently Asked Questions** – this section contains frequently asked questions and answers that will assist with the setup and operation of the Gateway

  Appendix C: Acronyms/Terms – this section provides definitions of terms and acronyms used in this manual

The following conventions are used in this manual:

- Procedures – all user procedures are listed in numerical steps, unless it is a one-step procedure. A one-step procedure is shown as a bullet.
- External References – references to items not within this manual are underlined. Example: Refer to the TT/TG Series Service Manual for installation procedures.

1.2 Safety Summary

Safety precautions must be observed during installation, start-up, and service of the compressor due to the presence of pressure and voltage hazards. Only qualified and trained personnel should install, start up, and service Danfoss Turbocor® compressors. Safety information is located throughout the manual to alert service personnel of potential hazards and is identified by the headings **DANGER** and **CAUTION**.

1.3 Precautions

Consideration for personal safety and equipment safety is very important. The following sections cover safety precautions and methods that must be followed when servicing the compressor.

1.3.1 Danger Notification

A **DANGER** notification signifies an essential operation or maintenance procedure, practice, or condition which, if not strictly observed, could result in injury to or death of personnel or long-term health hazards. A Danger notification is displayed in the format shown in Figure 1-1 Danger Notification Example.

Figure 1-1 Danger Notification Example

• • • DANGER! • • •

1.3.2 Caution Notification

A **CAUTION** notification signifies an essential operation or maintenance procedure, practice, or condition which, if not strictly observed, could result in damage to or destruction of equipment or potential problems in the outcome of the procedure being performed. A Caution notification is displayed in the format shown in Figure 1-2 Caution Notification Example.

Figure 1-2 Caution Notification Example

• • • CAUTION • • •

1.3.3 Note

A **NOTE** provides additional information such as a tip, comment, or other useful, but not imperative information. A Note is displayed in the format shown in Figure 1-3 Note Example.

Figure 1-3 Note Example

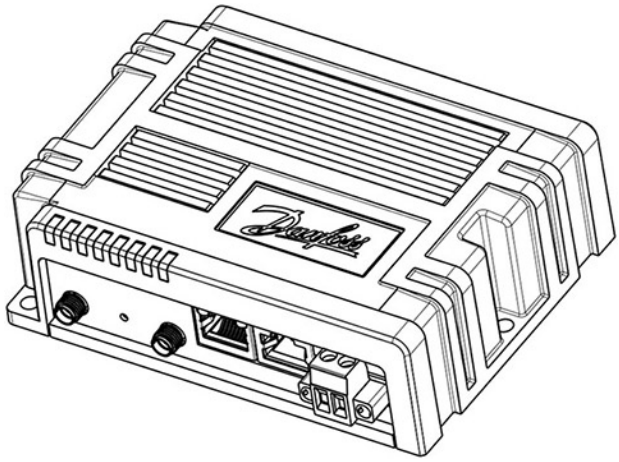
NOTE

1.4 Gateway Equipment

This section identifies the components that are required for the proper operation of TurbocorCloud Gateway. Refer to Figure 1-4 Gateway for an illustration of the Gateway.

1.4.1 Gateway

Figure 1-4 Gateway

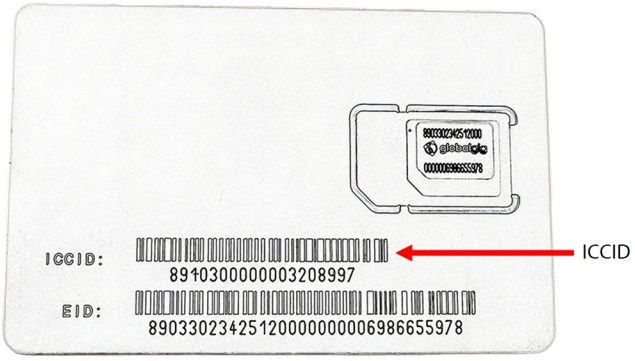


A SIM Card and two Direct-Connect Antennas are required for operation of the Gateway. If cellular service is poor then the “Dual-Cellular Antenna” is recommended (refer to Figure 1-7 Dual-Cellular Antenna on page 12). The antenna(s) and SIM Card must be purchased from Danfoss LLC.

NOTE
SIM Cards must be purchased from Danfoss LLC.

1.4.2 SIM Card

Figure 1-5 SIM Card



1.4.3 Antenna

The Gateway requires a single antenna at a minimum. An additional antenna can help to ensure continuous streaming and improve overall cellular communication with the cloud databases. Danfoss LLC offers two different styles of antennas for the Gateway. One style is direct connect, and the other is a Dual-Cellular Antenna that is to be mounted outside of the controls cabinet.

Figure 1-6 Direct-Connect Antenna

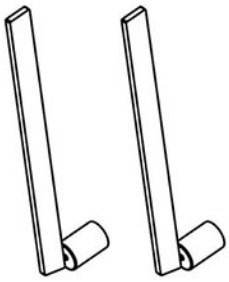
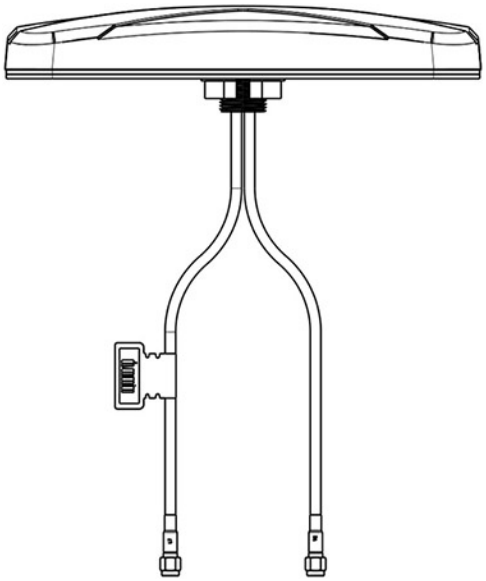


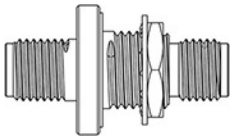
Figure 1-7 Dual-Cellular Antenna



The coax cable is used inside the controls cabinet when mounting the Dual-Cellular Antenna outside the cabinet or onto the chiller frame. The SMA Jack Bulkhead Fitting is then used to join the antenna coax to the Gateway.

Figure 1-8 Coax Cable

Figure 1-9 SMA Jack Bulkhead Fitting



1.5 Gateway Requirements

Power Requirement

In order to properly protect the Gateway circuits, an appropriately rated power supply must be used. The input voltage must be rated between 9-30 VDC for proper operation. The Gateway voltage tolerance supports +/- 10% (9 - 30 VDC) at 9 Watts minimum. The wire required to power is not supplied and must be sourced by the customer.

Antenna

Either the Direct-Connect Antenna or the Dual-Cellular Antenna is required.

SIM Card

The SIM Card form factor is Mini (2FF) and must be sourced from Danfoss.

Signal Cables

A shielded ethernet cable provides the communication between the Gateway and the Compressor I/O Board or CIM (not provided).

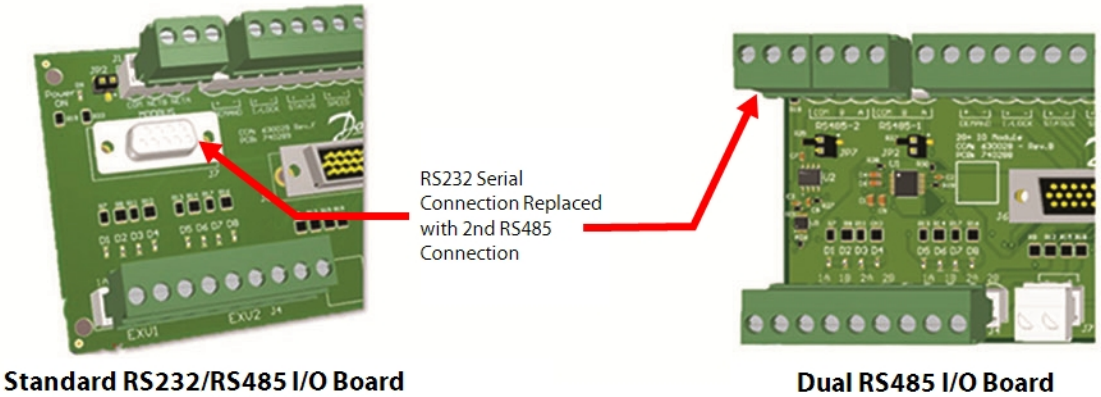
I/O Board (TT/TG Series Compressors)

A new dual RS485 I/O Board is required for operation of the Gateway when connected to more than one compressor at a time. The I/O Boards can be daisy-chained to the second RS-485 port and allow the Gateway to communicate to multiple compressors at a time. Refer to Figure 1-10 I/O Board Comparisons to determine if the installed I/O Board needs to be updated to the new style.

If the gateway will only be connected to one compressor, then the standard I/O Board with a RS232 port and a single RS-485 port will allow direct communication. In this configuration, a specialized serial cable with RJ-45 (Ethernet-style) connection and a male DB9 RS232 connection will be required. Refer to bulletin B-CN-349 for further details on the new I/O Board (https://www.turbocoroem.com/media/sypl0wy3/b-cn-349-en-rev-b-tt-series-comp-io-board-option-1.pdf).

NOTE
If the Gateway will only be connected to one compressor, then the standard I/O Board with a RS232 port and a single RS-485 port will allow direct communication. In this configuration, a specialized serial cable with RJ-45 (Ethernet-style) connection and a male DB9 RS232 connection will be required.

Figure 1-10 I/O Board Comparisons



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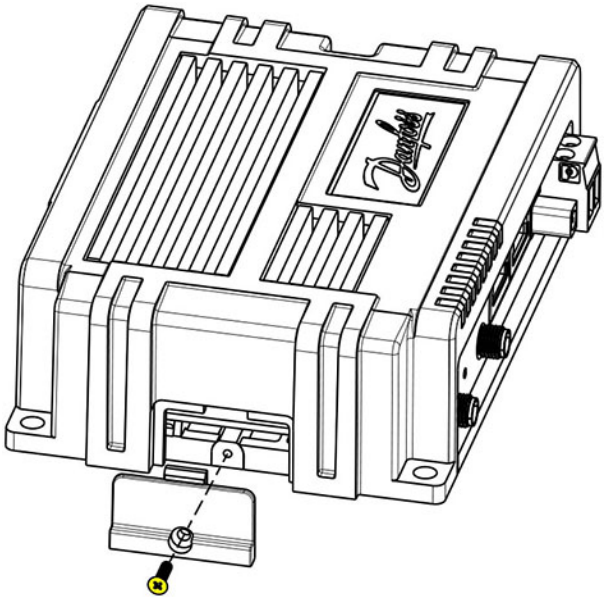
Chapter 2.0 Gateway Installation and Configuration

This section will walk through the installation steps for the Gateway. This begins with the installation of the SIM Card, but this can be performed after the physical mounting, provided that access to the SIM Cover is possible.

2.1 SIM Card Installation

1. Use a Philips screwdriver to remove the SIM Cover.

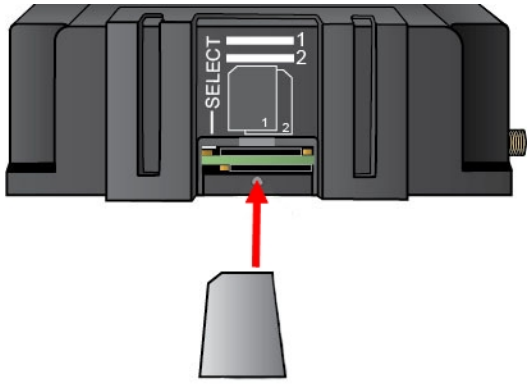
Figure 2-1 SIM Cover Removal



2. Insert the SIM Card into Slot 1 socket with the chamfered corner as shown in Figure 2-2 SIM Card Insertion.

NOTE
It is recommended to apply a small amount of dielectric grease to the SIM contacts if the Gateway will be subject to high vibration in the enclosure where it is installed.

Figure 2-2 SIM Card Insertion



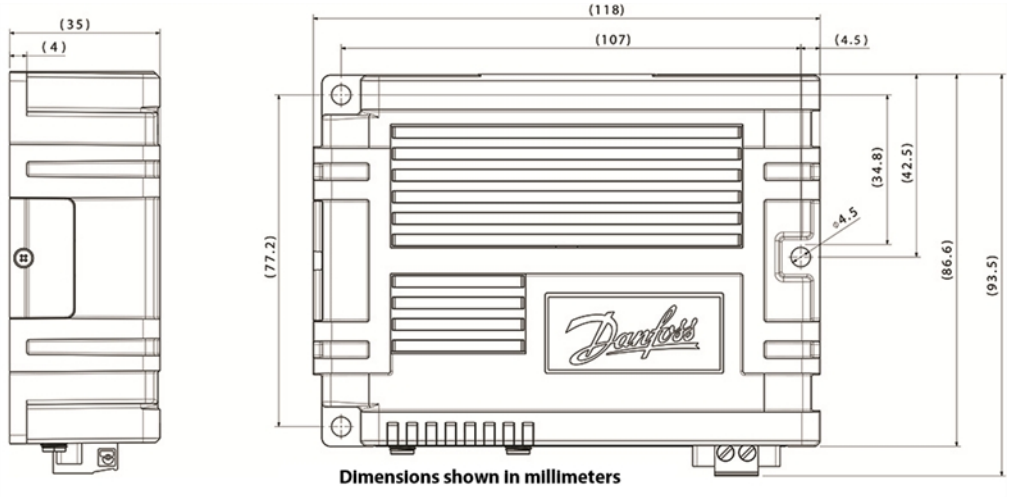
3. Reinstall the SIM Cover. Torque the fastener to no more than 225 mN m (2 in.lb.).

2.2 Gateway Mounting

There are two different mounting options for the Gateway. The Gateway kit includes the DIN Rail Clip which allows the device to be mounted to the DIN Rail. The Gateway can also be mounted directly to a surface without the DIN rail. This section illustrates the mounting options.

The Gateway must be mounted in an enclosure that prevents moisture and dust from reaching the device. Refer to Figure 2-3 Gateway Dimensions for the dimensions of the Gateway and the locations of the mounting holes.

Figure 2-3 Gateway Dimensions



2.2.1 DIN Rail Mounting

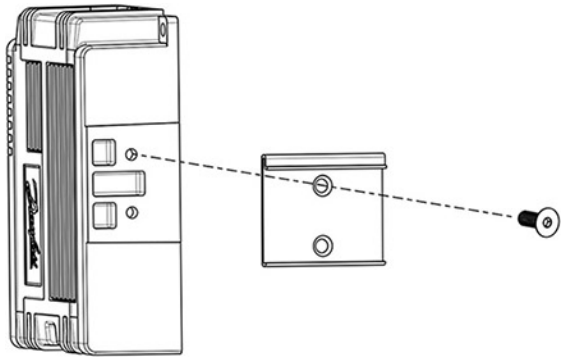
The Gateway has provisions to allow for two different DIN Rail mounting positions.

• • • CAUTION • • •
Do not use fasteners longer than 5 mm when mounting the DIN Rail to the Gateway as damage to the internal circuits will occur.

2.2.1.1 DIN Rail Configuration 1

This position allows the Gateway to be mounted in a vertical position by attaching the DIN Rail Clip to the back of the device. Refer to Figure 2-4 DIN Rail Mounting Configuration 1 for an illustration on the orientation.

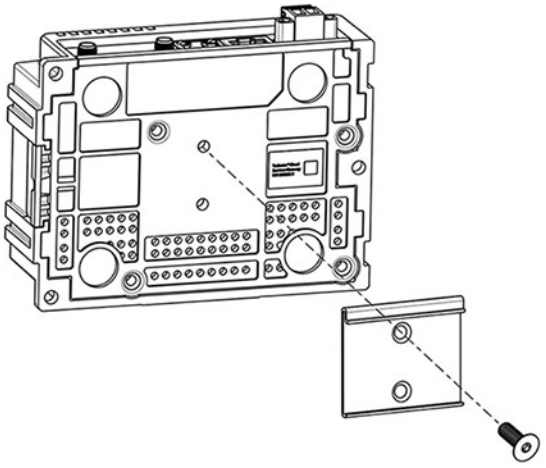
Figure 2-4 DIN Rail Mounting Configuration 1



2.2.1.2 DIN Rail Configuration 2

This position allows the Gateway to be mounted face up by securing the DIN Rail Clip to the bottom of the device. Refer to Figure 2-5 DIN Rail Mounting Configuration 2 for an illustration on the orientation.

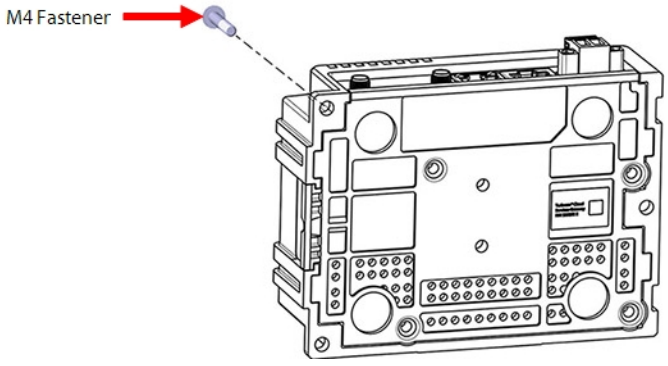
Figure 2-5 DIN Rail Mounting Configuration 2



2.2.2 Surface Mounting

The Gateway can be mounted directly to a flat surface using M4 fasteners. The length of the fasteners will depend on the thickness of the mounting surface.

Figure 2-6 Surface Mounting Configuration



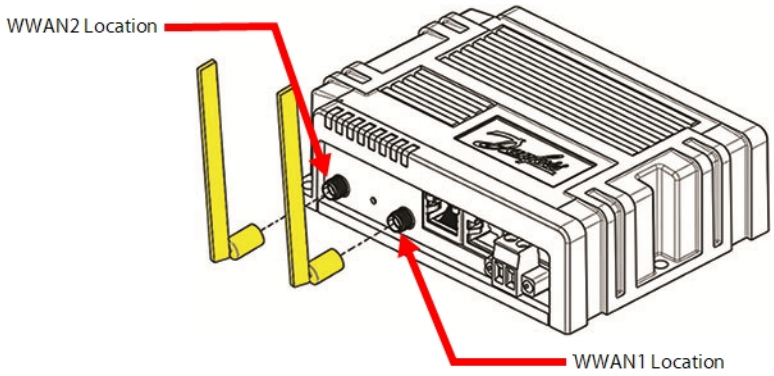
2.3 Antenna Installation

The Gateway has two antenna locations. If cellular service is limited, then using antennas in both ports or an external antenna will help to ensure improved service.

2.3.1 Direct-Connect Antenna

1. Insert the antennas and tighten the barrel connectors to secure it to the Gateway.

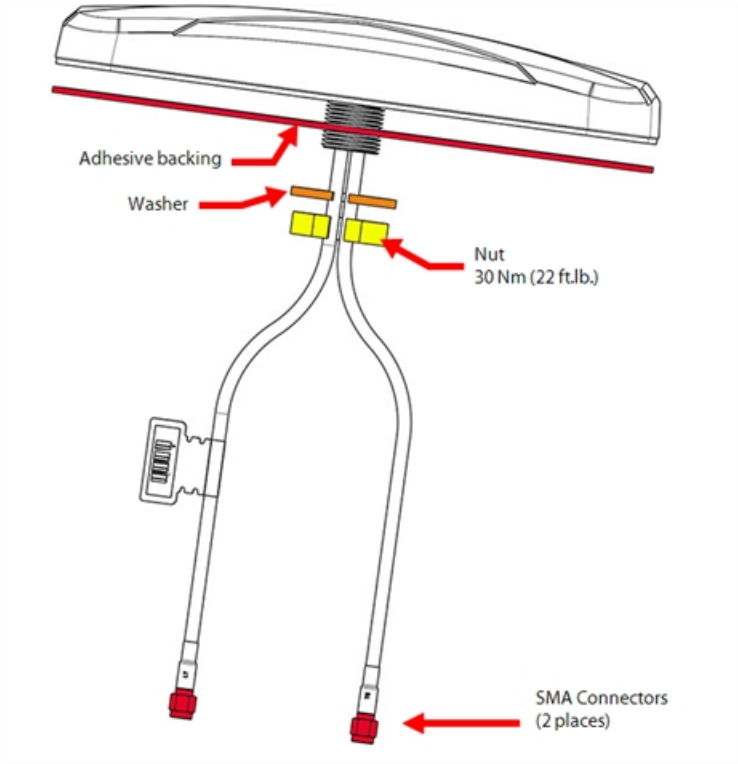
Figure 2-7 Gateway Antenna Installation



2.3.2 Dual-Cellular Antenna

The Dual-Cellular Antenna can be mounted directly to the exterior of the controls cabinet, or it can be mounted somewhere on the chiller frame (limited to cable length).

Figure 2-8 Dual-Cellular Antenna



2.3.2.1 Controls Cabinet Mounting

1. Identify the desired location for the antenna.
2. Mark and drill a 22 mm (0.9 in) diameter hole.
3. Clean the mounting surface to remove any residue.
4. Remove the nut and washer from the antenna assembly.
5. Test fit the antenna assembly.
6. Remove the adhesive backing from the antenna.
7. Place the antenna assembly onto the controls cabinet.
8. Install the antenna, nut, and washer.
9. Torque the nut to 30 Nm (22 ft.lb.).

• • • CAUTION • • •

Make sure to not tighten the mounting nut beyond 39 Nm (28 ft.lb.).

10. Connect the antenna cables to the Gateway.

2.3.2.2 Chiller Frame Mounting

1. Locate and make two holes for the SMA Jack Bulkhead Connectors. A standard hole (8mm) can be made for each connector.

NOTE

The maximum panel thickness for the SMA Jack Bulkhead Connector is 4.3 mm (0.169").

2. Install the Jack Bulkhead Connectors. They should be tight enough to compress the gasket slightly, but do not overtighten.

3. Identify the desired location for the antenna. Make sure the coax cables from the antenna can reach to the connectors mounted on the controls cabinet.
4. Mark and drill a 22 mm (0.9 in) diameter hole.
5. Clean the mounting surface to remove any residue.
6. Remove the nut and washer from the antenna assembly.
7. Test fit the antenna assembly.
8. Remove the adhesive backing from the antenna.
9. Place the antenna assembly into the desired location.
10. Install the antenna, nut, and washer and torque the nut to 30 Nm (22 ft.lb.).
11. Install the external coax cables to the antenna to the SMA connectors.
12. Install the two internal antenna coax cables to the SMA connectors and the Gateway.

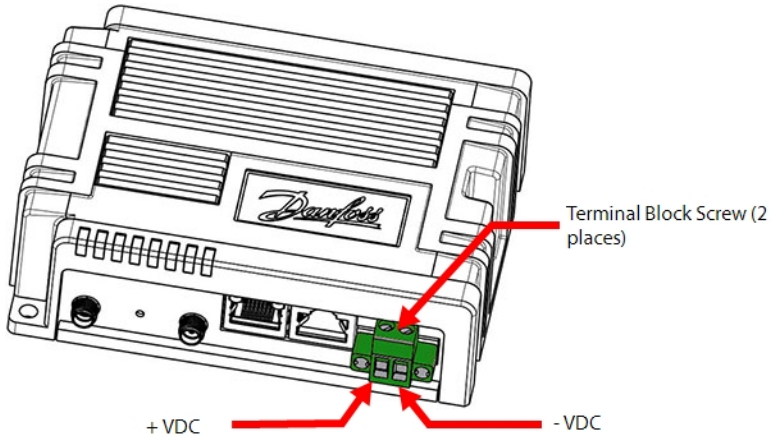
• • • CAUTION • • •
Do not tighten the mounting nut beyond 39 Nm (28 ft.lb.).

2.4 Power

The Gateway contains voltage-sensitive circuits and it is essential for the power source to supply power within designated specifications in order for it to function properly. The input voltage must be rated between 9 to 30 VDC for proper operation. The Gateway voltage tolerance supports +/- 10% (9 to 30 VDC) at 9 Watts minimum.

1. Strip 7-8 mm (9/32" – 9/16") of insulation off the wire ends and install the wires into the terminal block noting the polarity.
2. Tighten each connection with a flat-blade screwdriver.
3. Ensure the terminal block is fully inserted into the connector.

Figure 2-9 Terminal Block Connector



Chapter 3.0 Connection to the Turbocor Compressor

Proper communication between the Gateway and the compressor is critical to proper operation and data collection. These connections can be completed at any time prior to commissioning (i.e., at factory).

3.1 TT/TG Series Connections

An Ethernet-style cable will need to be installed between the Gateway and the I/O Board (Refer to Figure 3-1 Gateway to I/O Board Connection Overview). This cable should not be run near power cables or other control interface wires as they could inhibit the signal.

1. On the terminated cable end, strip 7-8 mm (9/32" – 9/16") of insulation off the wire ends and install the wires into the terminal block. Refer to Figure 3-2 Gateway to I/O Board Connection Pinout Reference (TT/TG Series Compressors) and Table 3-1 RS485 Data Cable Pinout for I/O Board for details on the configuration.
2. Tighten each connection with a flat-blade screwdriver.
3. Ensure the terminal block is fully inserted into the connector on the I/O Board.
4. Connect the RJ45 connector to the Serial Port on the Gateway.

Figure 3-1 Gateway to I/O Board Connection Overview

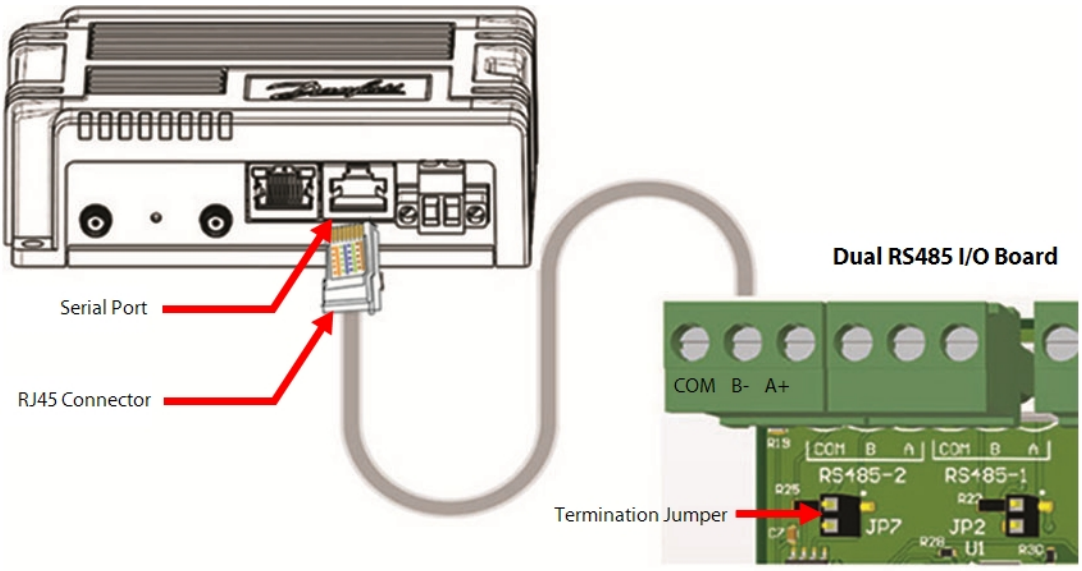
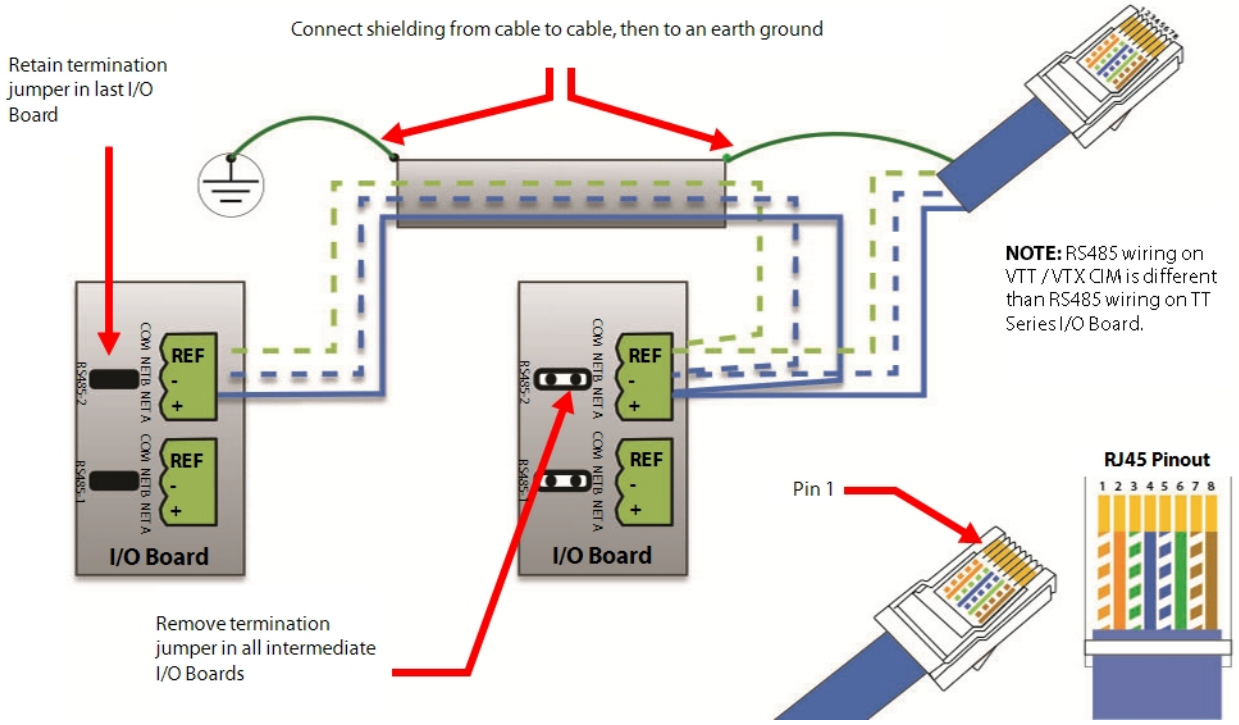


Figure 3-2 Gateway to I/O Board Connection Pinout Reference (TT/TG Series Compressors)



NOTE

The wiring scheme shown is T568B. You may also use the T568A wiring scheme but be sure to ensure both ends are wired the same.

Table 3-1 RS485 Data Cable Pinout for I/O Board

Pin#	Included Cable	RS485	I/O Board
1	White/Orange Stripe (could be solid white)	Not Used	N/A
2	Orange	Not Used	N/A
3	White/Green Stripe (could be solid white)	COM	COM
4	Blue	TxD/RxD+	A+
5	White/Blue Stripe (could be solid white)	TxD/RxD-	B-
6	Green	Shield/Earth Gnd	Tied to cable shielding and earth ground
7	White/Brown Stripe (could be solid white)	Not Used	N/A
8	Brown	Not Used	N/A

3.2 VT Series Connections

Install the RS485 cable between the Gateway and the CIM. This cable should not be run near power cables or other control interface wires as they could inhibit the signal.

1. On the terminated cable end, strip 7-8 mm (9/32" – 9/16") of insulation off the wire ends and install the wires into the terminal block. Refer to Figure 3-3 Gateway to CIM Connection Pinout Reference (VT Series Compressors) and Table 3-1 RS485 Data Cable Pinout for I/O Board for details on the configuration.
2. Tighten each connection with a flat-blade screwdriver.

3. Ensure the terminal block is fully inserted into the connector on the CIM.
4. On the other cable end, connect the RJ45 connector to the Gateway serial port.

Figure 3-3 Gateway to CIM Connection Pinout Reference (VT Series Compressors)

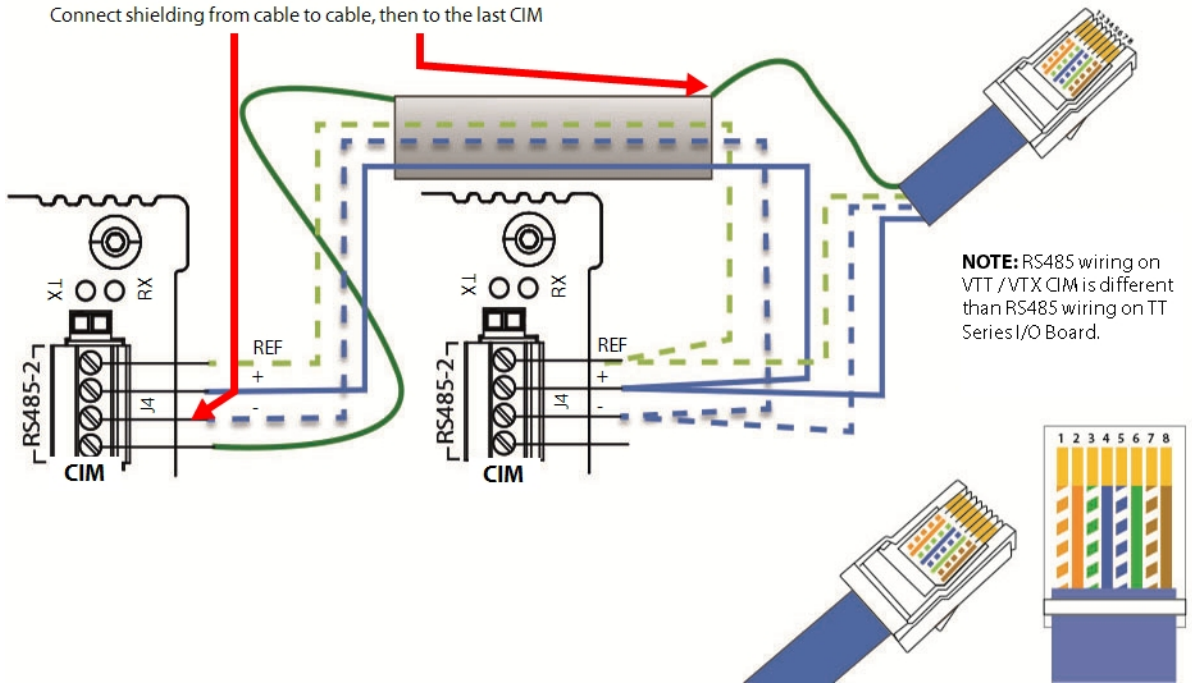


Table 3-2 RS485 Data Cable Pinout for CIM

Pin#	Included Cable	RS485	CIM
1	White/Orange Stripe	Not Used	N/A
2	Orange	Not Used	N/A
3	White/Green Stripe	COM	COM
4	Blue	TxD/RxD+	A+
5	White/Blue Stripe	TxD/RxD-	B-
6	Green	Shield/Earth Gnd	Tied to cable shielding and earth ground
7	White/Brown Stripe	Not Used	N/A
8	Brown	Not Used	N/A

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Chapter 4.0 Registration

A mobile device will be required to complete the Digital Services registration.

This chapter covers the installation, setup, and activation process required to register compressor(s) with a Digital Services subscription.

4.1 Required Items

You will need the following to complete the registration process:

- A SIM card
- A gateway (small Phillips head screwdriver to open door to access SIM card slots)
- Antenna(s)
- A power cord for the Gateway
- A cord to connect the compressor to the Gateway
- A way to connect the compressor via the SMT
- Access to the compressor itself
- The TurbocorConnect app on a device with the capability to access the internet and scan QR codes and barcodes

Refer to Section 1.3 Gateway Equipment on page 1 for illustrations of the hardware items mentioned above.

4.2 Mobile App

The TurbocorConnect App is available to download on the Google Play store for Android devices and the App Store for Apple devices. Find the official apps to see OS and device-specific requirements.

Figure 4-1 TurbocorConnect App

You can download the TurbocorConnect App by using your mobile device to scan the QR Codes below. You can also go to your desired app store and search for TurbocorConnect.

Google Play

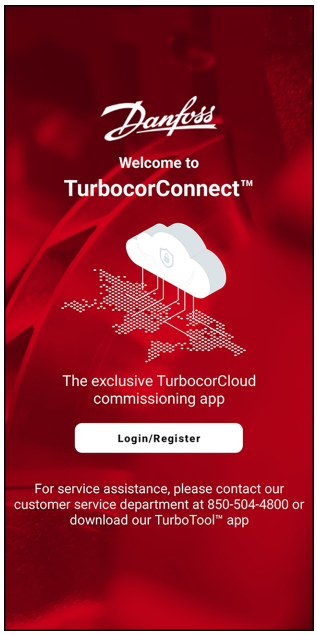
App Store

4.3 Registration Steps

This section covers the installation, setup, and activation process required to register compressor(s) with a TurbocorCloud subscription.

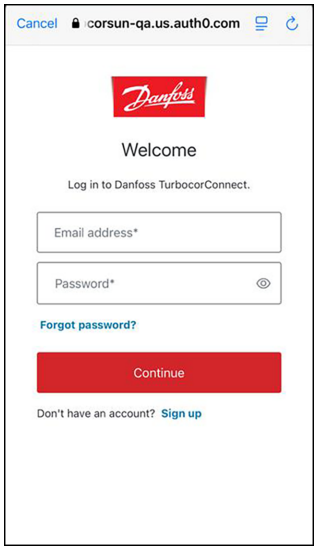
1. Download and install the TurbocorConnect App.
2. Open the TurbocorConnect App on your mobile device, then click **Login/Register**.

Figure 4-2 Login



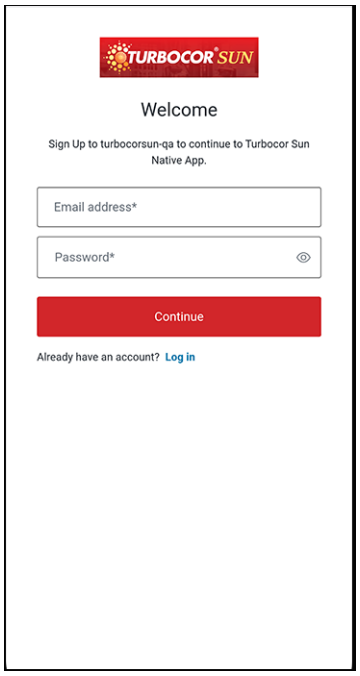
3. On the Welcome screen, log in to the application and click **Continue**. Refer to Figure 4-3 Welcome Screen, and skip to Step 5. If you do not already have an account, click **Sign up**. Refer to Figure 4-4 Sign Up Page.

Figure 4-3 Welcome Screen



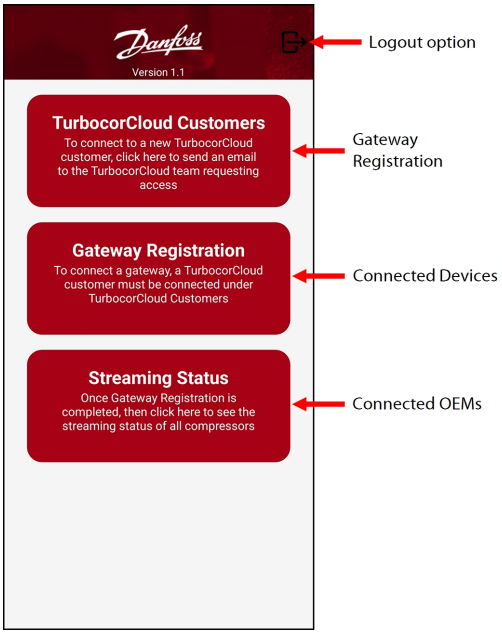
4. Once on the Sign up page, complete the information and click **Continue**. You will then be taken to the Main Menu.

Figure 4-4 Sign Up Page



5. From the Main Menu, select **TurbocorCloud Customers**.

Figure 4-5 Main Menu

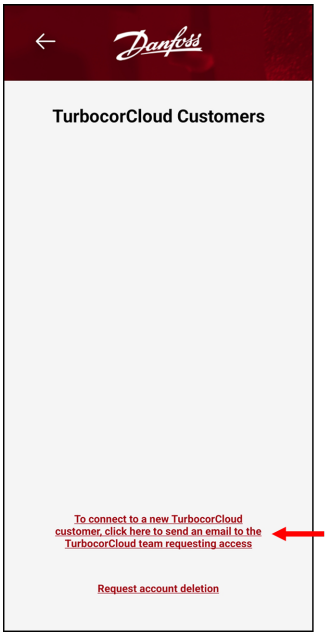


6. On the TurbocorCloud Customers page, click the link **To connect to a new TurbocorCloud customer, click here to send an email to the TurbocorCloud team requesting accessRequest access with new OEM**. Refer to Figure 4-6 Request Access on page 28.

   This should open a new email message to the DTC Cloud Services Team. Include the OEM's name in the body of the email so the account can be created.

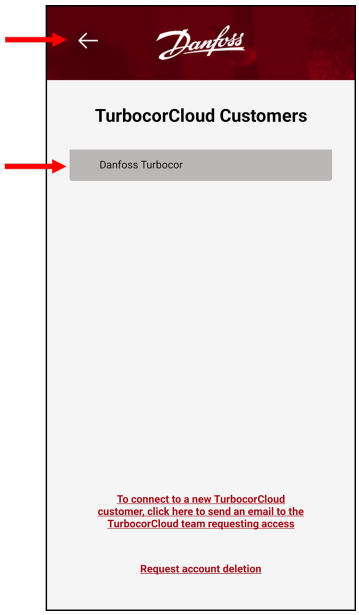
NOTE:
If no new email message appears, please send an email directly to dtccloudservices@danfoss.com.

Figure 4-6 Request Access



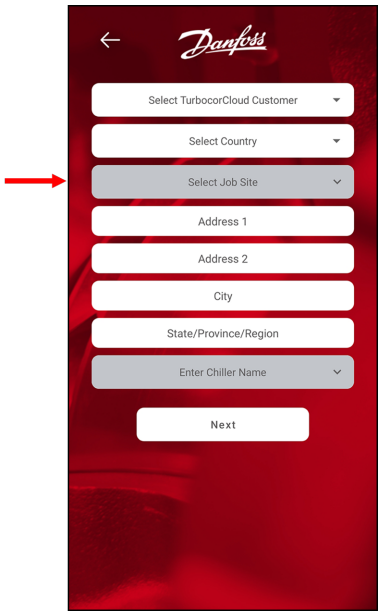
7. Once the DTC Cloud Services Member accepts the OEM request, the added OEM will appear as shown in Figure 4-7 Added OEM.
8. Click the left arrow to navigate back to the Main Menu.

Figure 4-7 Added OEM



9. From the Main Menu, click **Gateway Registration** to open the Gateway Registration Form.
10. Select the appropriate **TurbocorCloud Customer** and complete all relevent fields. All fields are required to be filled in except Address 2. After selecting the Country field, the Job Site field will become enabled. Ensure all information on the Gateway Registration page is accurate before proceeding. Refer to Figure 4-8 Gateway Registration Page
11. Click **Select Job Site** to open the Job Site page.

Figure 4-8 Gateway Registration Page



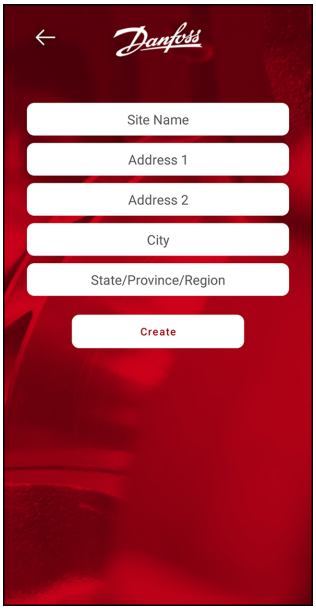
12. The Job Site Page will display any available job sites. If no job sites are displayed, you will need to create a new one. Refer to Figure 4-9 New Job Site on page 30.

13. To add a new job site, click **Add Job Site**. A form will now appear, allowing you to enter the details for the new job site.

Figure 4-9 New Job Site

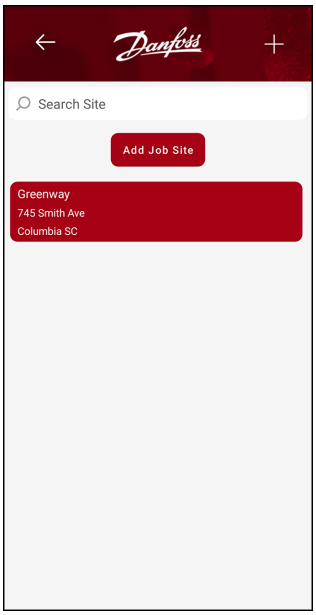
14. Once the information is entered, click **Create.** Refer to Figure 4-10 Add New Job Site.

Figure 4-10 Add New Job Site



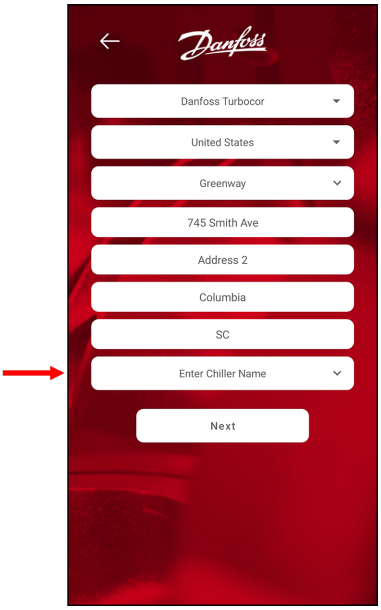
15. The screen displaying the added job site will appear. Click on the entered job site. Refer to Figure 4-11 Entered Job site on page 31.

Figure 4-11 Entered Job site



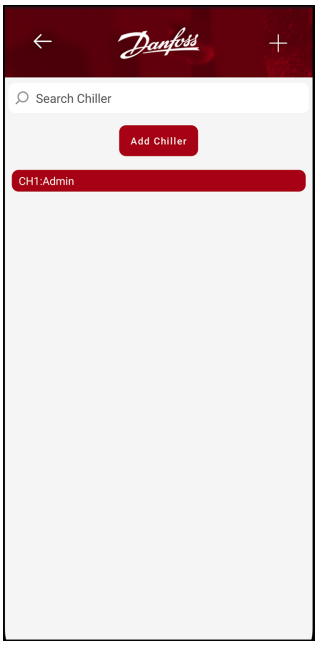
16. Click on **Enter Chiller Name**. Refer to Figure 4-12 Enter Chiller Name.

Figure 4-12 Enter Chiller Name



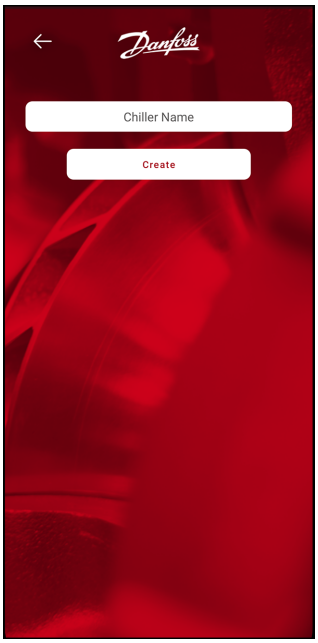
17. The Chiller Page will display all available chillers. Click the desired chiller, or if none are displayed, you can add a new chiller by clicking **Add Chiller**. Refer to Figure 4-13 Chiller List on page 32.

Figure 4-13 Chiller List



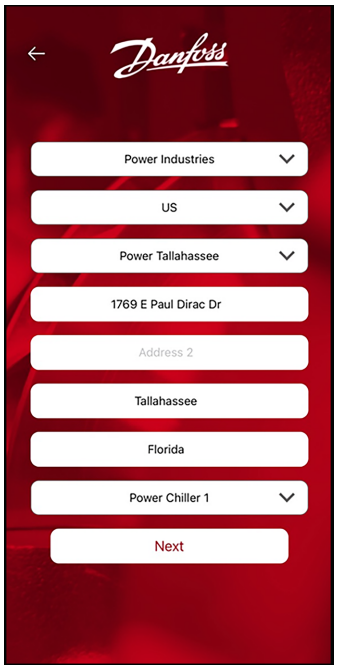
18. A screen will now appear allowing you to enter the chiller details. Once the chiller name is entered, click **Create** again to save. Refer to Figure 4-14 Add New Chiller.

Figure 4-14 Add New Chiller



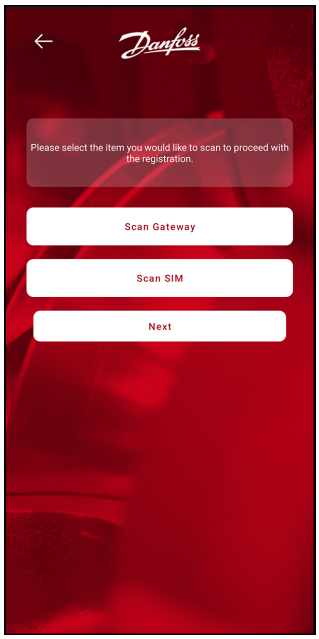
19. Once all of the required information is entered, click **Next.** The Gateway Registration Page will appear, with all fields populated. Refer to Figure 4-15 Gateway Registration Page on page 33.

Figure 4-15 Gateway Registration Page



20. Click on **Scan Gateway** to proceed. Refer to Figure 4-16 Scan Gateway.

Figure 4-16 Scan Gateway



21. If this is your first time using TurbocorConnect, you will need to grant the application access to your camera. Navigate to your mobile device's app permissions and enable camera access.

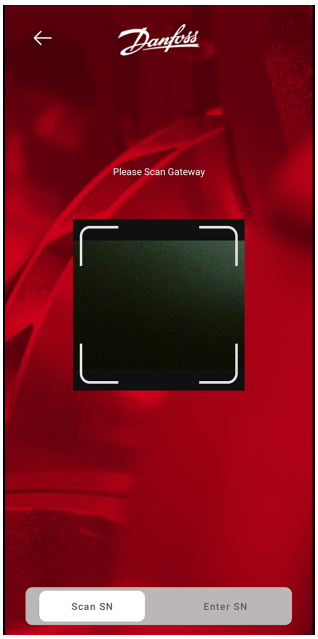
    There are two options to enter the Gateway Serial Number:

    - You can use your device's camera to scan the QR code on the bottom of the gateway device here
    - You can manually enter the Gateway's serial number from this location

22. To scan the Gateway, position your mobile device over the QR Code located on the bottom of the Gateway until it is visible within the scan window. Refer to Figure 4-17 Gateway QR Code Scan. For the location of the Gateway QR Code, refer to Figure 4-19 Gateway QR Code and Serial Number Location on page 35

23. Once the QR Code is captured, click **Submit**.

Figure 4-17 Gateway QR Code Scan



24. Click **Enter SN** to manually enter the Serial Number. Refer to Figure 4-19 Gateway QR Code and Serial Number Location on page 35 for the location of the Serial Number.

25. Enter the Serial Number in the Gateway field and click **Submit**. Refer to Figure 4-18 Manual Gateway Entry on page 35.

Figure 4-18 Manual Gateway Entry

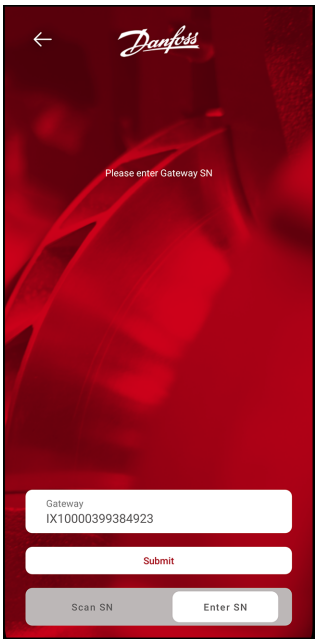
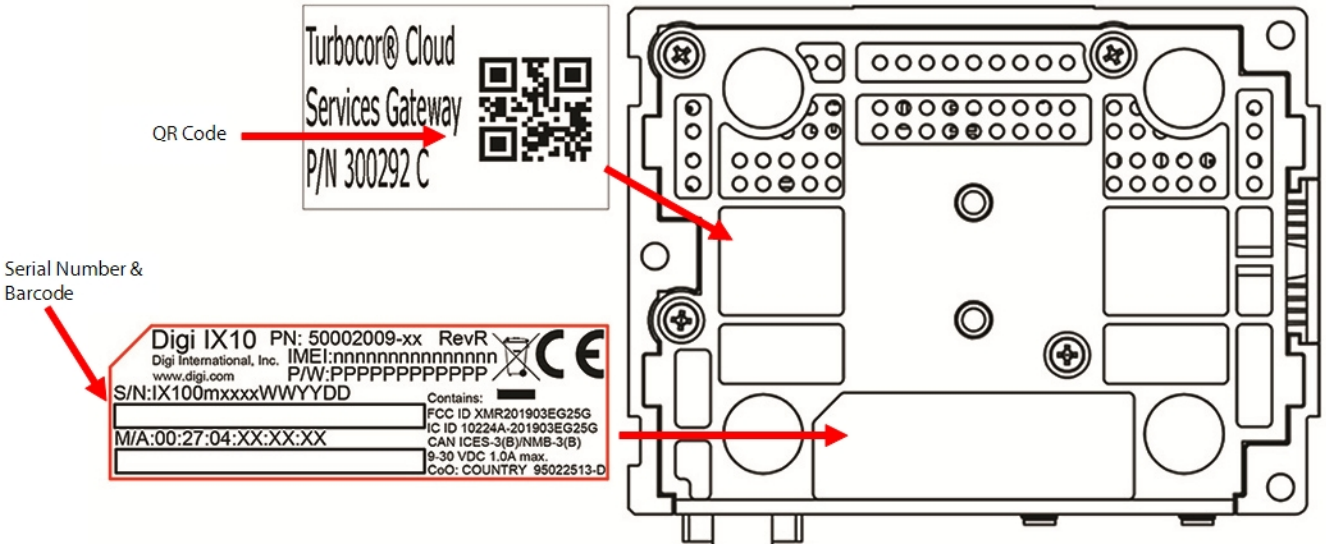
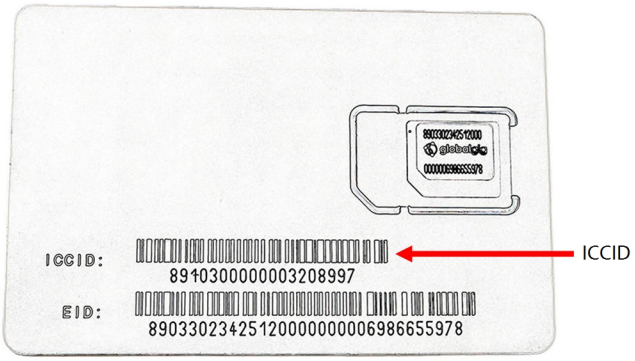


Figure 4-19 Gateway QR Code and Serial Number Location



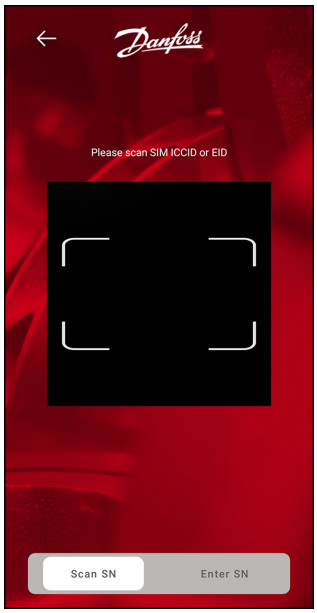
26. Once the Serial Number has been captured, the app will ask for the SIM card information. Refer to Figure 4-23 SIM Card Example on page 37 for the location of the ICCID bar code.

Figure 4-20 SIM Card Example



27. There are two options for entering the Integrated Circuit Card Identifier (ICCID) number for the SIM card:
    - You can use your device's camera to scan the ICCID located on the SIM Card
    - You can manually enter the ICCID numbers
28. To scan the SIM card, position your mobile device over the ICCID bar code until it is visible within the scan window. Refer to Figure 4-21 SIM Bar Code Scan.

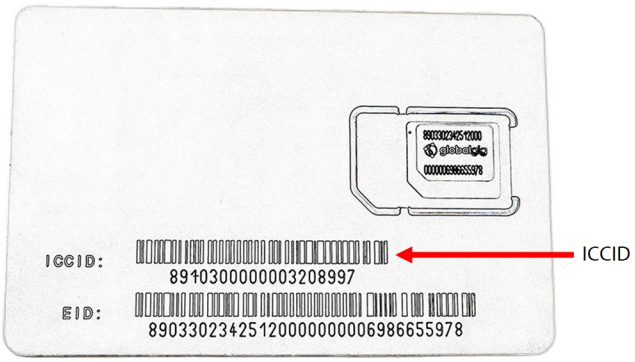
Figure 4-21 SIM Bar Code Scan



29. Click **Enter SN** to manually enter the ICCID from the SIM card. The app will display a sample SIM card with the ICCID. Refer to Figure 4-22 ICCID Manual Entry on page 37

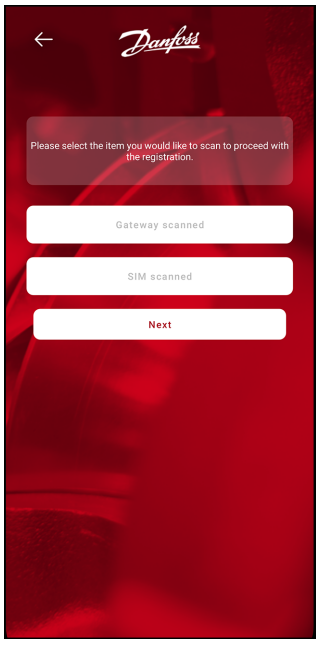
Figure 4-22 ICCID Manual Entry

Figure 4-23 SIM Card Example



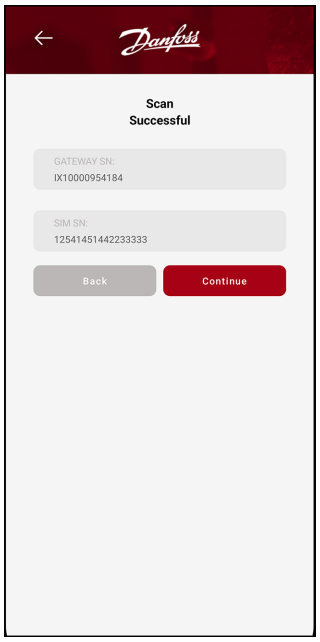
30. After entering the SIM ICCD, click **Submit**.
31. The next page will acknowledge that the entered Gateway Serial Number and SIM ICCID have been entered. Click **Next** to continue. Refer to Figure 4-24 Gateway and SIM Detail Entered on page 38.

Figure 4-24 Gateway and SIM Detail Entered



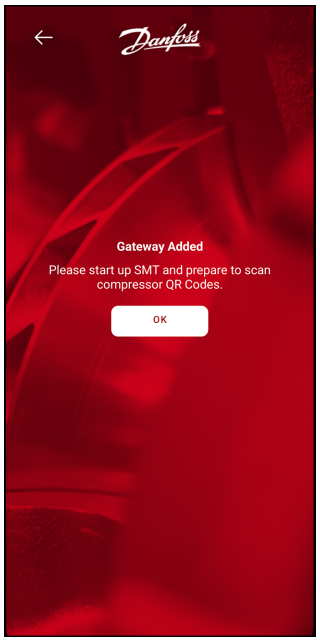
32. The Scan Successful page will display the information entered for the Gateway and SIM. Click **Continue** to proceed. Refer to Figure 4-25 Scan Successful Page.

Figure 4-25 Scan Successful Page



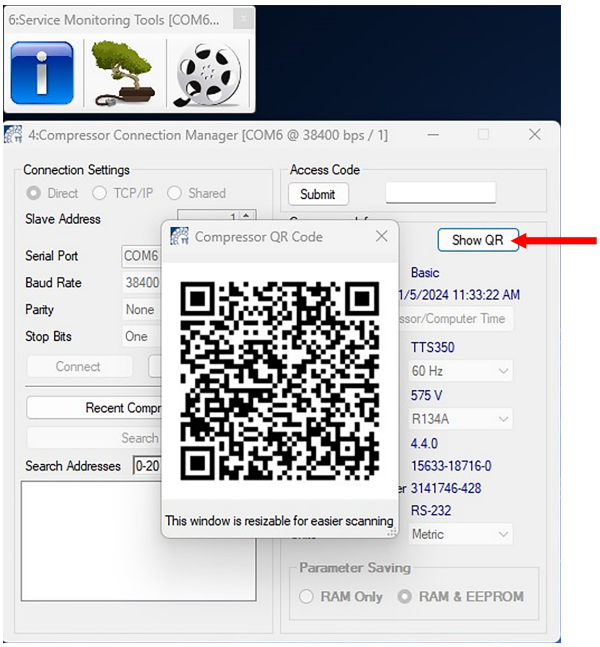
33. The next page will prompt you to start up the SMT. Refer to Figure 4-26 Start Up SMT. Start up the SMT and click **OK**. Refer to Chapter 6.0 SMT Connection for TTS/TGS Series Compressors on page 51.

Figure 4-26 Start Up SMT



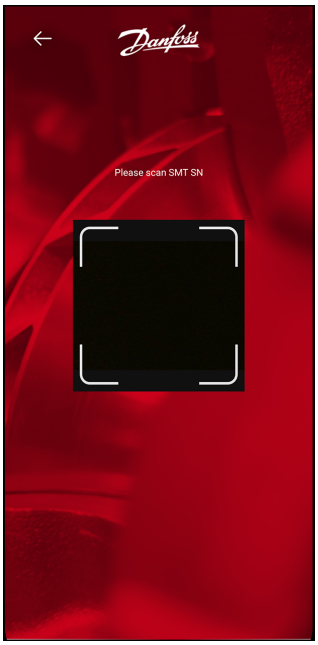
34. Now you can scan the SMT Serial Number. Click the **Show QR** button in the SMT Connection Manager page. Refer to Figure 4-27 SMT Connection Manager for the location of the QR Code.

Figure 4-27 SMT Connection Manager



35. Position your mobile device over the QR Code located in the SMT until it appears in the scan window. Refer to Figure 4-28 Scan SMT Serial Number.

Figure 4-28 Scan SMT Serial Number

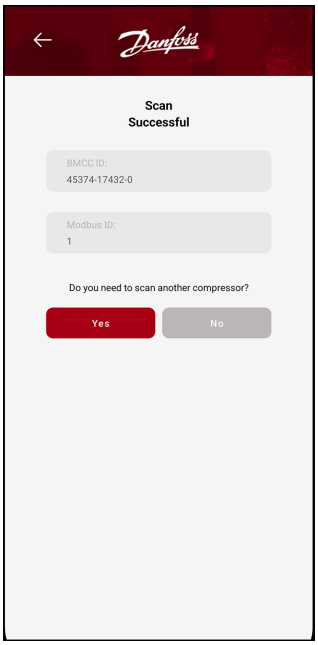


36. Once the QR Code is scanned, click **Submit**.

    Once scanned, you will be asked if you would like to scan another compressor. Click**Yes** if there are multiple compressors. If you select Yes, the process to scan the QR Code in the SMT will be repeated. If there are no other compressors to scan, click **No** to continue. Refer to Figure 4-29 SMT Scan Successful on page 41.

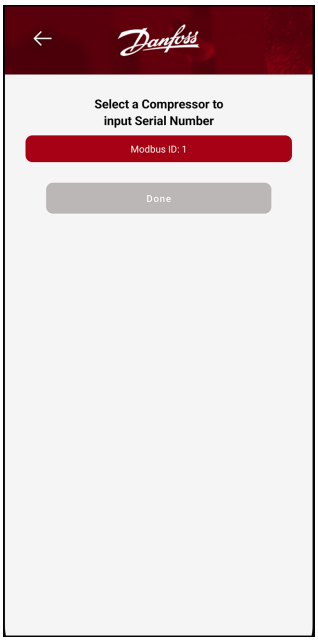
NOTE
it is recommended to scan each one at this time to ensure the Gateway device can connect to all of the compressors.

Figure 4-29 SMT Scan Successful



37. The Select a Compressor to Input Serial Number page will display all of the Modbus IDs that were previously entered. Refer to Figure 4-30 Select a Compressor to Input Serial Number. You will need to scan each compressor for every entered Modbus ID. Click on the first **Modbus ID**.

Figure 4-30 Select a Compressor to Input Serial Number

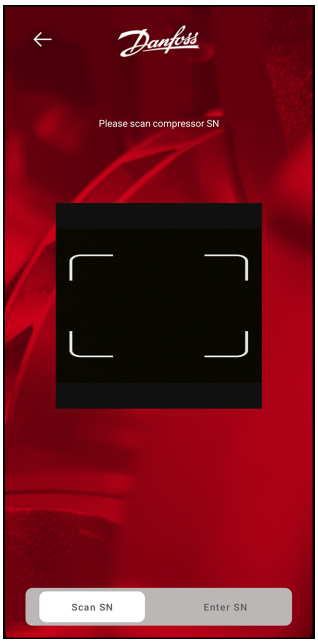


38. There are two options for entering the Compressor Serial Number:
    - You can use your device's camera to scan the serial number on the compressor
    - You can manually enter the compressor serial number

39. To scan the compressor serial number, place your mobile device over the Data Matrix code until it is visible in the scan window, then click **Submit**. Refer to Figure 4-31 Scan Compressor Serial Number for this and the following step.

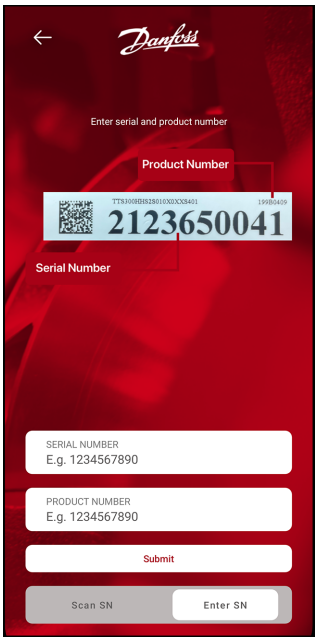
40. To manually enter the Serial Number, click **Enter SN**.

Figure 4-31 Scan Compressor Serial Number



41. Enter the Serial Number in the Serial Number field and click **Submit**. Refer to Figure 4-32 Manual Compressor Serial Number Entry.

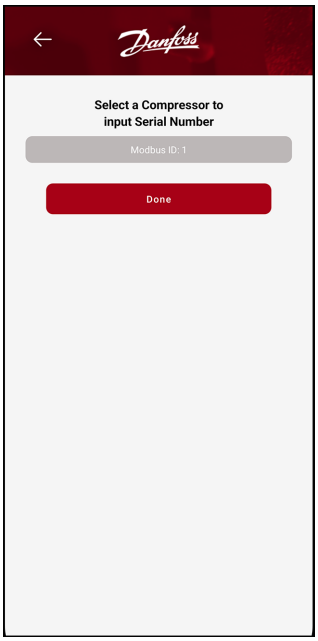
Figure 4-32 Manual Compressor Serial Number Entry



42. Repeat the above steps if there are multiple compressors.

43. Once all serial numbers have been scanned/entered, click **Done** to complete the registration process. Refer to Figure 4-33 Compressor Scan Complete

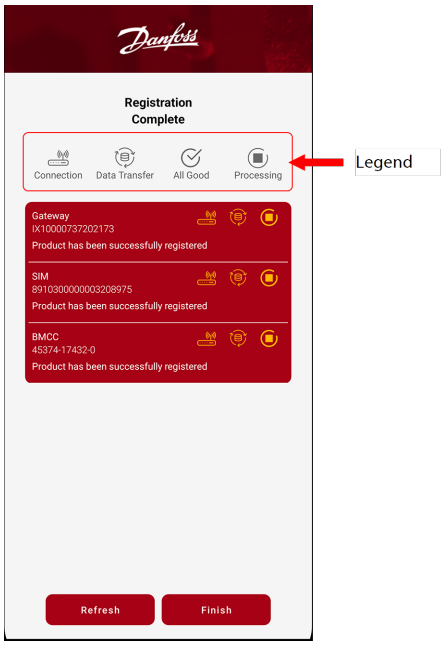
Figure 4-33 Compressor Scan Complete



NOTE
The registration process can take up to 24 hours to process.

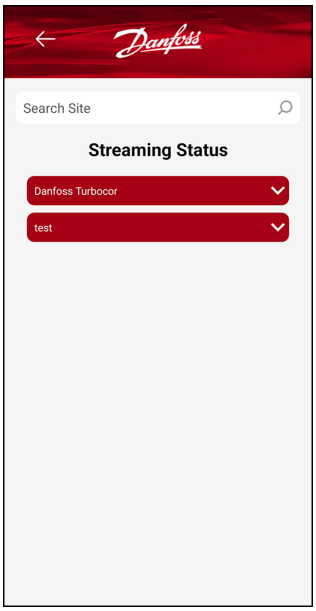
44. You should see the Registration Complete screen once the registration process has been completed. Click **Finish** to close this page and return the home page. Refer to Figure 4-34 Registration Complete.

Figure 4-34 Registration Complete



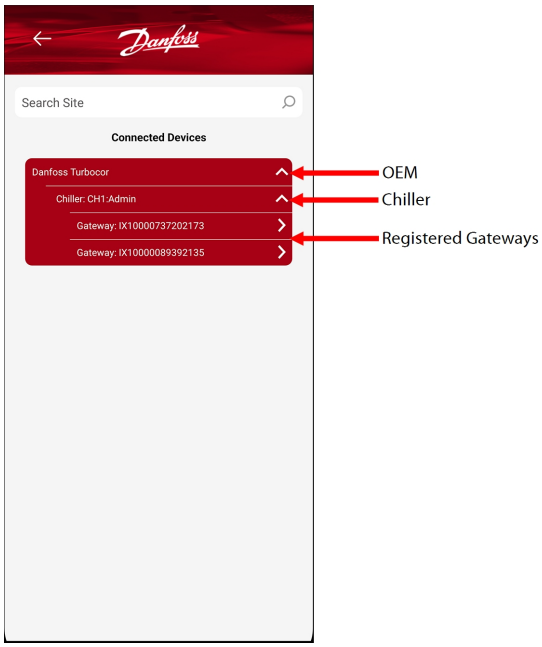
45. Once the registration process is complete, open the app and click **Streaming Status** from the Main Menu. The Streaming Status page should now show the newly added Gateway device(s). Refer to Figure 4-35 Streaming Status.

Figure 4-35 Streaming Status



46. You can expand the entered sites to show further details such as chillers and registered gateway information. Refer to Figure 4-36 Expanded View.

Figure 4-36 Expanded View



47. Click the **Registered Gateway** information to view the details. This page will display the OEM, Site, Chiller Name, and the general details of the Connected Compressor. If multiple compressors are registered, they will all be shown on this page.

48. Click the **desired connected compressor** to view the specific compressor details. Refer to Figure 4-38 Compressor Details for the information displayed.

Figure 4-37 Registered Gateway Details

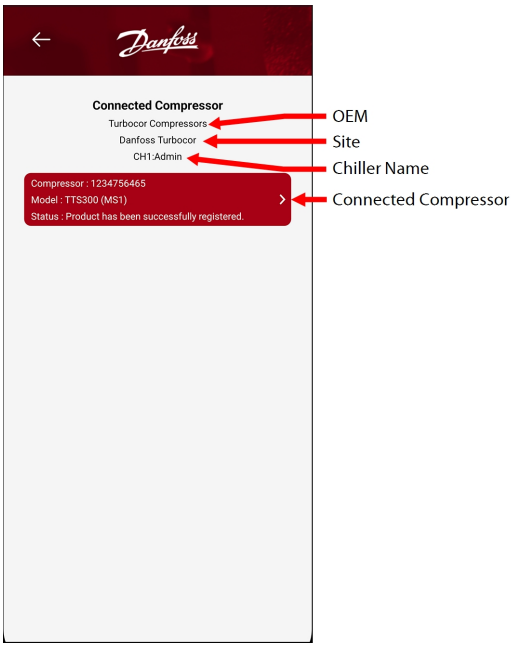
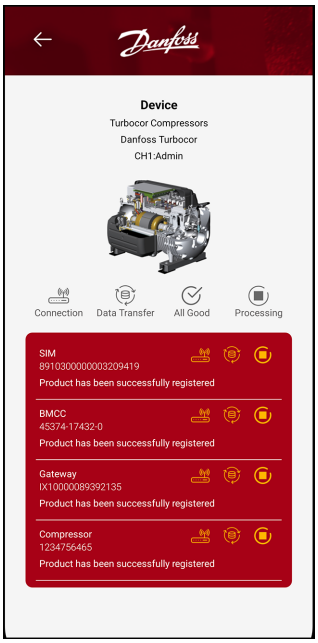


Figure 4-38 Compressor Details



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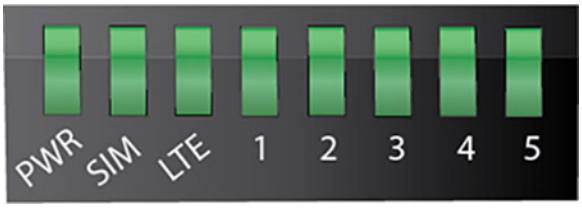
Chapter 5.0 Connection to the Cloud

5.1 Gateway LEDs

During bootup, the front-panel LEDs light up in sequence to indicate connection progress. Refer to Figure 5-1 LED Indicators for details.

Figure 5-1 LED Indicators



5.2 Power LED Status

The PWR LED provides the power and Internet connection status. Refer to Table 5-1 PWR Status for a description of the modes of the Power Status LED. Refer to Appendix A Troubleshooting on page 53 when the Power Status LED does not turn to cyan.

Table 5-1 PWR Status

Status Color	ColorDisplayed	Description
Off		No power
Green		DC power is connected to the device, but not connected to the Internet
Flashing Green and Cyan		Has power, but in the process of connecting to the Internet
Cyan		Device is ON and connected to the Internet

5.3 SIM LED Status

The SIM LED provides the SIM Card status. Table 5-2 SIM Card Status provides the description of the modes of the SIM LED. Refer to Appendix A Troubleshooting on page 53 when the SIM Card Status does not turn to green.

Table 5-2 SIM Card Status

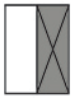
Status Color	Description	Color
Off	No SIM Card is present	
Green	SIM1 Card is active	

Status Color	Description	Color
Blue	SIM2 Card is active	
Red	SIM Card failure	

5.4 LTE LED Status

The LTE Status LED provides the status of the cellular network connection. Table 5-3 LTE Status for a description of the LTE LED modes. Refer to Appendix A Troubleshooting on page 53 if the LED does not go to solid blue or green after approximately 10 minutes.

Table 5-3 LTE Status

Status Color	Color Displayed	Description
Yellow		Initializing or starting up
Flashing Yellow/Orange		In the process of connecting to the cellular network and/or to a device on its Ethernet port
Flashing White		Ethernet port connection established and in the process of connecting to the cellular network
Flashing Green		Connected to 2G or 3G and/or is in the process of connecting to any device on its Ethernet port, or nothing is connected to the port
Green		Connected to 2G or 3G and/or has a device linked to its Ethernet port
Flashing Blue		Connected to 4G LTE and/or in the process of connecting to a device on its Ethernet port
Blue		Connected to the 4G LTE and/or has a device link to its Ethernet port
Alternating Red/Yellow (or orange)		Upgrading firmware

• • • CAUTION • • •

Do not power off during firmware upgrade. Powering off the device during this time could corrupt the firmware thus making the device unusable.

5.5 LEDs 1 Through 4 Status

LEDs 1 through 3 indicate the signal stregnth of the cellular signal. Table 5-4 LEDs 1 Through 3 provides the details on the illuminated LEDs and the relationship to the signal strength.

Table 5-4 LEDs 1 Through 3

LED Bars	Description	Quality
	No Signal	No Data Transmission
	1 to 25%	Bad
	51 - 50%	Fair
	74 to 100%	Good

5.6 LED 4 Status

The number 4 LED identifies the connection to the Internet of Things (IOT) Hub, the data collection point on the cloud. Table 5-5 LED Number 4 provides the description of the modes for the number 4 LED.

Refer to Appendix A Troubleshooting on page 53 if the LED continues flashing after approximately 10 minutes or turns off. This is an indication that the Gateway is unable to send data to the cloud.

Table 5-5 LED Number 4

LED Bars	Description
 (Off)	Gateway not connected to IOT Hub
 (Flashing)	Attempting to connect the gateway to the IOT Hub (may take 5 - 10 minutes)
 (Solid)	Gateway is connected to the IOT Hub and sending data to the cloud

5.7 LED 5 Status

The number 5 LED identifies the connection of a compressor. Table 5-6 LED Number 5 provides the description of the modes for the number 5 LED.

Refer to Appendix A Troubleshooting on page 53 if the LED continues flashing after approximately 10 minutes or turns off. This is an indication that no compressor is connected to the gateway.

Table 5-6 LED Number 5

LED Bars	Description
 (Off)	Compressor Connection is not active
 (Flashing)	Attempting to connect to a compressor (may take up to five minutes)
 (Solid)	Compressor Connection is active and at least one valid compressor connection is active

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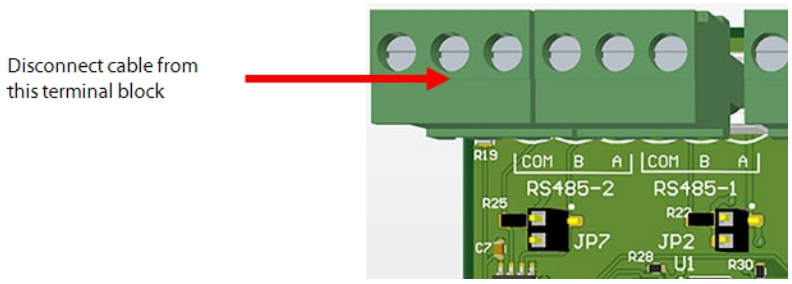
Chapter 6.0 SMT Connection for TTS/TGS Series Compressors

Once the new I/O Board has been installed, the technician is still able to connect to the compressor via the RS485 port (the same port to which the Gateway is connected).

The connection to the Gateway will need to be removed/disconnected temporarily while the technician is on-site.

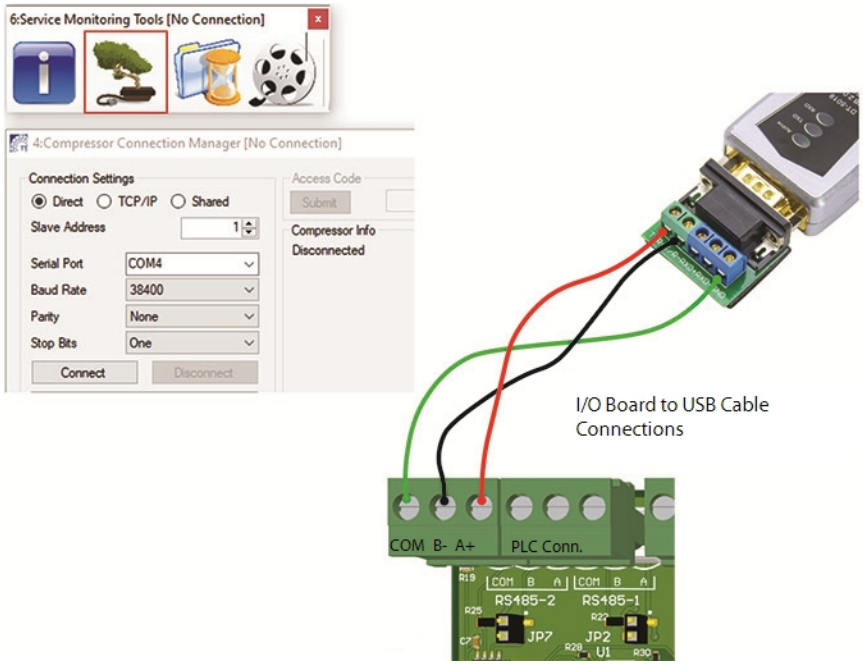
1. In order to connect to the compressor directly via the SMT, remove the cable that is plugged in to the I/O Board at RS485-2.

Figure 6-1 RS485-2 Connection



2. Utilize a RS485 to USB adapter cable (refer to Figure 6-2 SMT Cable Connection) to connect between the Compressor I/O Board or CIM to your computer. This connection will work the same as with RS232 connection. Refer to the TT/TG Series Service Manual for more information.
3. Connect the adapter cable to the terminal block.
4. Open up the SMT Tool program. Refer to the SMT User Manual for the desired tasks.

Figure 6-2 SMT Cable Connection



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Appendix A Troubleshooting

This troubleshooting guide is designed to assist technicians with diagnosing and resolving common technical issues that may arise.

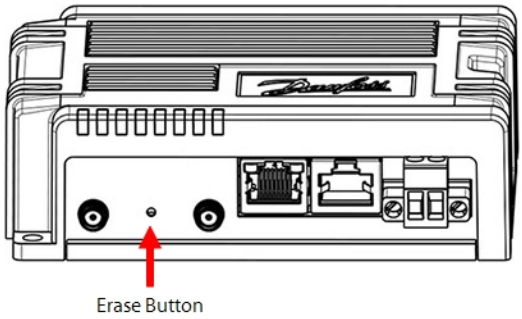
A.1 Before You Start

While troubleshooting, never power cycle the Gateway device if the LTE LEDs are alternating red/yellow (or orange). Power cycling the device during a firmware update will cause the device to not work as expected.

• • • CAUTION • • •

Do not press the Erase button on the Gateway device more than one time within a 15-minute period. This will factory reset the device and will require replacement of the Gateway. Refer to Figure A-1 Reset Button Location.

Figure A-1 Reset Button Location



A.2 Safety Precautions

Before beginning any troubleshooting, ensure the following safety measures are taken:

- Wear appropriate personal protective equipment (PPE).
- Ensure you are isolated from any high-voltage that may be close to where the Gateway device is installed.
    - Follow lockout/tagout procedures if applicable to access a gateway device that is near high-voltage

A.3 Common Issues and Solutions

Many Gateway issues can be identified and resolved with the following instructions below.

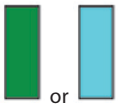
NOTE

The Gateway devices stream compressor data hourly when the compressor is idle. If you do not see data streaming on TurbocorCloud, this could be why. While the compressor is running, the Gateway will stream data every minute.

A.3.1 Issue - LTE LED Flashing Yellow

Indication:

The LED behavior defined below is expected when the Gateway is first powered on and is attempting to connect to the compressor(s). Refer to the Troubleshooting procedures below if the flashing continues for more than 10 minutes.

Status Color	Color Displayed	Description
LTE LED flashing Yellow		Indicating that the Gateway is attempting to connect to the cellular network.
PWR LED flashing Green and Cyan		Indicating that the Gateway is in the process of connecting to the Internet.
SIM LED may be solid green or blue	 or	Indicating that the Gateway is attempting to connect to the cellular network, The Gateway will attempt to connect over SIM1 first (green) and will switch to trying to connect via SIM2 (blue).

Troubleshooting Procedures:

1. Ensure that the SIM Card is inserted correctly into the SIM Card slot. Refer to Section 2.1 SIM Card Installation on page 15 for more details.
2. Ensure that the antenna(s) are installed correctly. Refer to Section 2.3 Antenna Installation on page 18 for more details.
3. Ensure that the antenna(s) are installed in a location that has a strong cellular signal.
4. Inspect the antenna and the antenna port for damage. If possible, swap the antennas to verify that the equipment is not defective.
5. Insert the SIM card into the other SIM Card slot.
6. If possible, insert a different SIM Card.
7. Power cycle the Gateway device.

If the issue still occurs, reach out to Danfoss LLC for support.

A.3.2 Issue - LED 4 Flashing Green

Indication:

This LED behavior is expected when the Gateway is first powered on and is attempting to connect to the Gateway's server. Refer to the Troubleshooting procedures below if the flashing continues for more than 10 minutes.

Status Color	Color Displayed	Description
LED 4 is flashing green		Indicating that the Gateway is attempting to connect to the server.

Troubleshooting Procedures:

1. If this occurs, the Gateway device may be in an error state. Press the Erase button once to reset the device. Wait 10 minutes to see if the device recovers to a healthy state.
2. Insert the SIM Card into the other SIM Card slot.

3. If possible, insert a different SIM Card.
4. Power cycle the Gateway device.

• • • CAUTION • • •
Do not press the Erase button on the Gateway device more than one time within a 15-minute period. This will factory reset the device and will require replacement of the Gateway. Refer to Figure A-1 Reset Button Location

If the issue still occurs, reach out to Danfoss LLC for support.

A.3.3 Issue - LED 5 Flashing Green

Indication:

This LED behavior is expected when the Gateway is first powered on and is attempting to connect to the compressor(s). Refer to the Troubleshooting procedures below if the flashing continues for more than 10 minutes.

Status Color	Color Displayed	Description
LED 5 is flashing green		Indicating that the Gateway is attempting to connect to the compressor(s).

Troubleshooting Procedures:

1. Ensure that the serial communication is properly connected to the **serial port** and not the **Ethernet port** on the back of the Gateway device.
2. Review the RS-485 Cable Wiring defined in Chapter 3.0 Connection to the Turbocor Compressor on page 21 to ensure the cabling is setup properly.
3. Ensure that the compressor(s) are powered on.
4. Power cycle the Gateway device.

If the issue still occurs, reach out to Danfoss LLC for support.

A.3.4 Issue - All LEDs are Off

Indication:

Refer to the Troubleshooting procedures below if all LEDs are not turned on.

Status Color	Color Displayed	Description
All Gateway status LEDs are turned off		This indicates no power to the Gateway.

Troubleshooting Procedures:

1. Ensure that the terminal block is securely inserted into the back of the Gateway device and that the wires running into the terminal block are properly tightened. Refer to Section 2.4 Power on page 20 for more details.
2. Power cycle the Gateway device.

If the issue still occurs, reach out to Danfoss LLC for support.

A.3.5 Issue - SIM LED is Solid Red

Indication:

Refer to the Troubleshooting procedures below if the SIM LED is red and not flashing.

Status Color	Color Displayed	Description
SIM LED is solid red		This indicates a SIM Card failure.

Troubleshooting Procedures:

1. Attempt the troubleshooting steps outlined for the LTE LED Flashing Yellow issue. Refer to Section A.3.1 Issue - LTE LED Flashing Yellow on page 54.
2. Insert the SIM Card into the other SIM Card slot.
3. If possible, insert a different SIM Card.
4. Power cycle the Gateway device and wait 10 minutes.

If the issue still occurs, reach out to Danfoss LLC for support.

A.3.6 Issue - SIM LED is Off

Indication:

Refer to the Troubleshooting procedures below if the SIM LED is not turned on.

Status Color	Color Displayed	Description
SIM LED is off		This indicates the SIM Card is not detected.

Troubleshooting Procedures:

1. Ensure that the SIM Card is inserted correctly into the SIM Card slot. Refer to Section 2.1 SIM Card Installation on page 15 for more details.
2. Insert the SIM card into the other SIM Card slot.
3. If possible, insert a different SIM Card.
4. Power cycle the Gateway device and wait 10 minutes.

If the issue still occurs, reach out to Danfoss LLC for support.

A.3.7 Issue - Missing Compressor Data

Indication:

On a chiller with multiple compressors daisy-chained to a single Gateway, each compressor must have a unique slave address. However, one of the compressor's data may still not be updating properly, while other compressors that are connected to the same gateway are properly updated and uploading to the cloud. If compressor data is not updating properly, refer to the troubleshooting procedures below.

Troubleshooting Procedures:

1. The Gateway device depends on each compressor having a unique slave address. Connect to the compressors with SMT to verify and/or change the slave address.

2. Ensure the serial communication cabling is correctly connected to all the compressors on the chiller. Review the RS-485 Cable Wiring defined in Chapter 3.0 Connection to the Turbocor Compressor on page 21 to ensure the cabling is set up properly.

A.4 Reporting Issue to Danfoss LLC

When needing to report an issue that cannot be resolved with the instructions above, record the following information so the Danfoss LLC technicians can further investigate the issue.

1. Identify the problem. A good description of the issue will help Danfoss LLC technicians provide additional instructions on how to resolve the issue.
2. Take a photo of the label on the bottom of the Gateway device.
3. Take a photo of the SIM Card being used with the Gateway device.
4. Take a 5-10 second video of the LED light behavior.
5. Take a photo of the front of the Gateway device with all of the connection cables in view.
6. Visually inspect and report any obvious signs of damage or wear to the Gateway device.
7. Provide this information to the following email address: **dtccloudservices@danfoss.com**

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Appendix B Frequently Asked Questions

1. Do we need one Gateway per compressor?

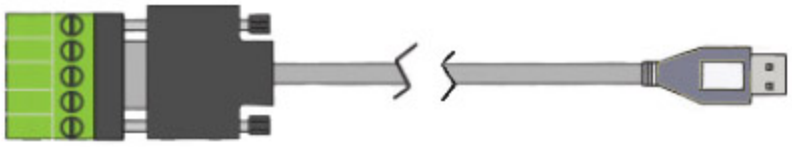
   One Gateway per chiller should usually suffice. Each Gateway is able to communicate via RS232 or RS485. However, the RS232 communication protocol is limited to monitoring only one device at a time. Therefore, on TT/TG Series Compressors, the I/O Boards will need to be replaced with a Dual RS485-style I/O Board. This new style is identical to the standard I/O Board, except the RS232 serial connector has been replaced with an additional RS485 connector.

   In some cases, either the I/O Board is not able to be replaced or the programmable logic controller (PLC) requires that all compressors on the chiller be addressed with the same MODBUS ID (aka slave ID). In these special cases, one Gateway per compressor will be necessary. See answers to FAQs #3, #4 & #5 below.

2. Because the I/O Board has been replaced with the Dual RS485 style I/O Board, how does a service technician connect into the compressor if there is no RS232 connector?

   Most troubleshooting can be performed remotely. However, some activities, such as completing a bearing calibration, will still require a technician to be on-site and connect to the compressor. The connection to the Gateway will need to be removed/disconnected temporarily while the technician is on-site. In order to connect to the compressor directly via the SMT, remove the cable that is plugged into the I/O Board (on TT/TG Series Compressors) or CIM (on VT Series Compressors). If the connection is RS485, then utilize a RS485 to USB adapter cable (refer to Figure B-1 RS485 to USB Adapter Cable) to connect between the Compressor I/O Board or CIM to your computer. This connection will work the same as with RS232 connection. Refer to the TT/TG Series Service Manual (M-SV-001) for more information.

Figure B-1 RS485 to USB Adapter Cable



3. We want to keep the original I/O Board, are there any other options?

   If the I/O Board cannot be replaced, then a Gateway will need to be used for each compressor. This will allow each compressor to connect to the cloud without having to replace the I/O Board with the new version. See FAQ #5 below.

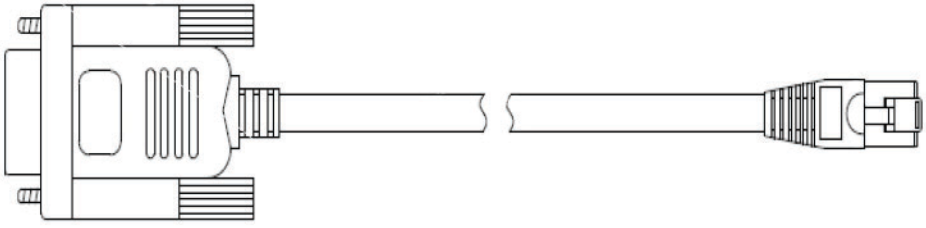
4. All compressors on the chiller are addressed with the same MODBUS ID (aka slave ID), how does the Gateway handle this?

   If the chiller PLC requires that multiple compressors on the chiller have the same MODBUS ID (aka slave ID), then installing one Gateway per compressor will allow the Gateway to communicate with each compressor on its own RS232 network. See FAQ #5 below.

5. How does the Gateway communicate to the Standard RS232/RS485 I/O Board?

   The Gateway is able to connect to the RS232 port on the Standard RS232/RS485 I/O Board via an RS232-RJ45 Serial cable.

Figure B-2 RS232-RJ45 Serial Cable



6. Does the Gateway have write capability?

   No. The Gateway has no ability to write demand or parameters to the compressor. Any adjustments to parameters will still need to be completed through use of the SMT using the standard operation. Refer to the TT/TG Series Service Manual (M-SV-001) for more information.

7. How do I access the data on the cloud?

   To access the compressor remotely, please contact the Danfoss LLC Digital Services Team at DTCCloudServices@danfoss.com.

Appendix C Acronyms and Terms

Acronym/Term	Definition
2G	Second generation mobile network standard
3G	Third generation mobile network standard
4G	Fourth generation mobile network standard
CIM / I/O Board	Compressor Interface Module; the part of the compressor electronics where the user connects all field connection wiring such as RS485, EXV, and analog / digital wiring. Also known as the I/O board.
DC	Direct Current
DIN	The DIN Rail allows the gateway box to be mounted inside the electrical panel. DIN stands for "Deutsches Institut fur Normung", which means "German Institute for Standardization.
IATF	International Automotive Task Force
ICCID	Integrated Circuit Card Identifier
LED	Light-Emitting Diode
LTE	Long Term Evolution. 4G Mobile communications standard
Modbus	Data communications protocol
PLC	Programmable Logic Controller
PPE	Personal Protective Equipment
PWR	Power
RS-232	A standard that defines the electrical characteristics of drivers and receivers used in serial communications systems. Uses 9 pin connection.
RS-485	A standard that defines the electrical characteristics of drivers and receivers used in serial communications systems. Uses 3 wire connection for Positive, Negative and Common Reference.
SIM	Subscriber Identity Module/Subscriber Identification Module
SMA	SMA connector - SubMiniature version A
SMT	Service Monitoring Tool: A PC program provided by Danfoss LLC. A graphical user interface displaying compressor data to the user and offer adjustment of predetermined parameters. The user interface adjusts itself according to the active access level at the compressor.
Gateway	The Gateway is a rugged, secure and reliable LTE router that transmits data from a connected compressor to the TurbocorCloud™ Services Gateway
IOT	Internet of Things
USB	Universal Serial Bus
VDC	Volts Direct Current or Volts DC
WWAN	Wireless Wide Area Network

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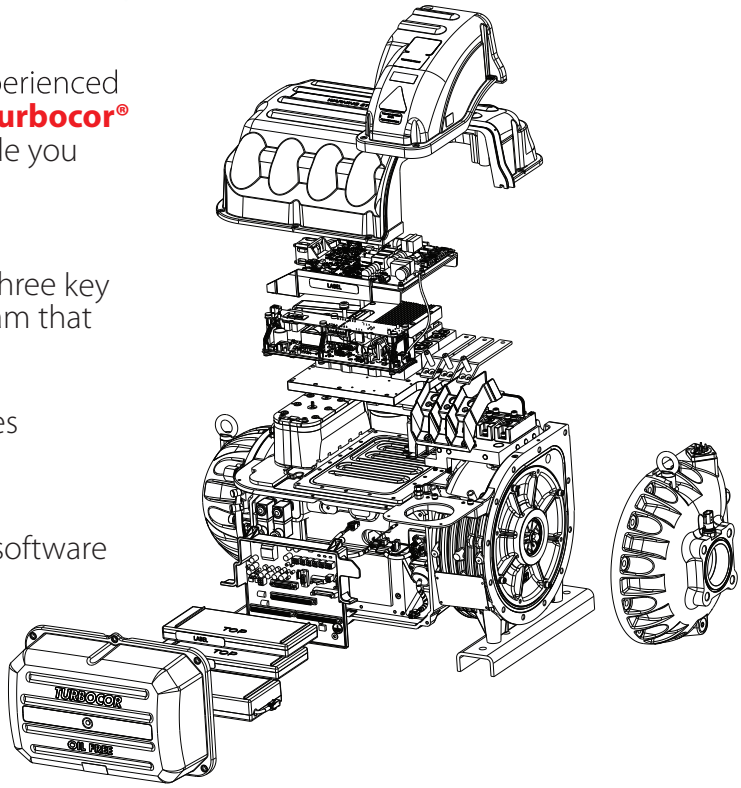

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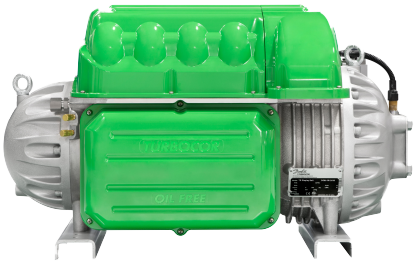

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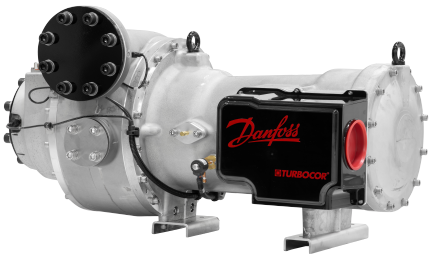
TTH Compressors



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