



ADRES

**Automated Demand Response
and Energy Savings Generator
Control System
Installation Manual for
Kohler Generator with DEC3000
Control Interface**

Version 1.2



Winn Energy Controls, Inc.

Section	Description	Page
1.0	Installation Guide for the ADRES Kohler Generator Controller	
	Introduction	1 - 01
	Compatible Components	1 - 02
	Communication Board Features	1 - 03
	Relay IO Board Features	1 - 04
	Installation Overview	1 - 05
	Installation Procedures	1 - 06
	Startup and Commissioning Procedures	1 - 15
2.0	Wiring Diagrams	
	Power Supply Wiring to the Kohler Generator Main Board	2 - 01
	Power Supply Wiring to Modbus Splitter Communication Board	2 - 02
	RS485 Wiring from Modbus Splitter to ADRES and DEC3000 Control	2 - 03
	Wiring Diagram Drawing	2 - 04
	Wiring Workmanship Standard	2 - 05

ADRES Generator Control INSTALLATION MANUAL

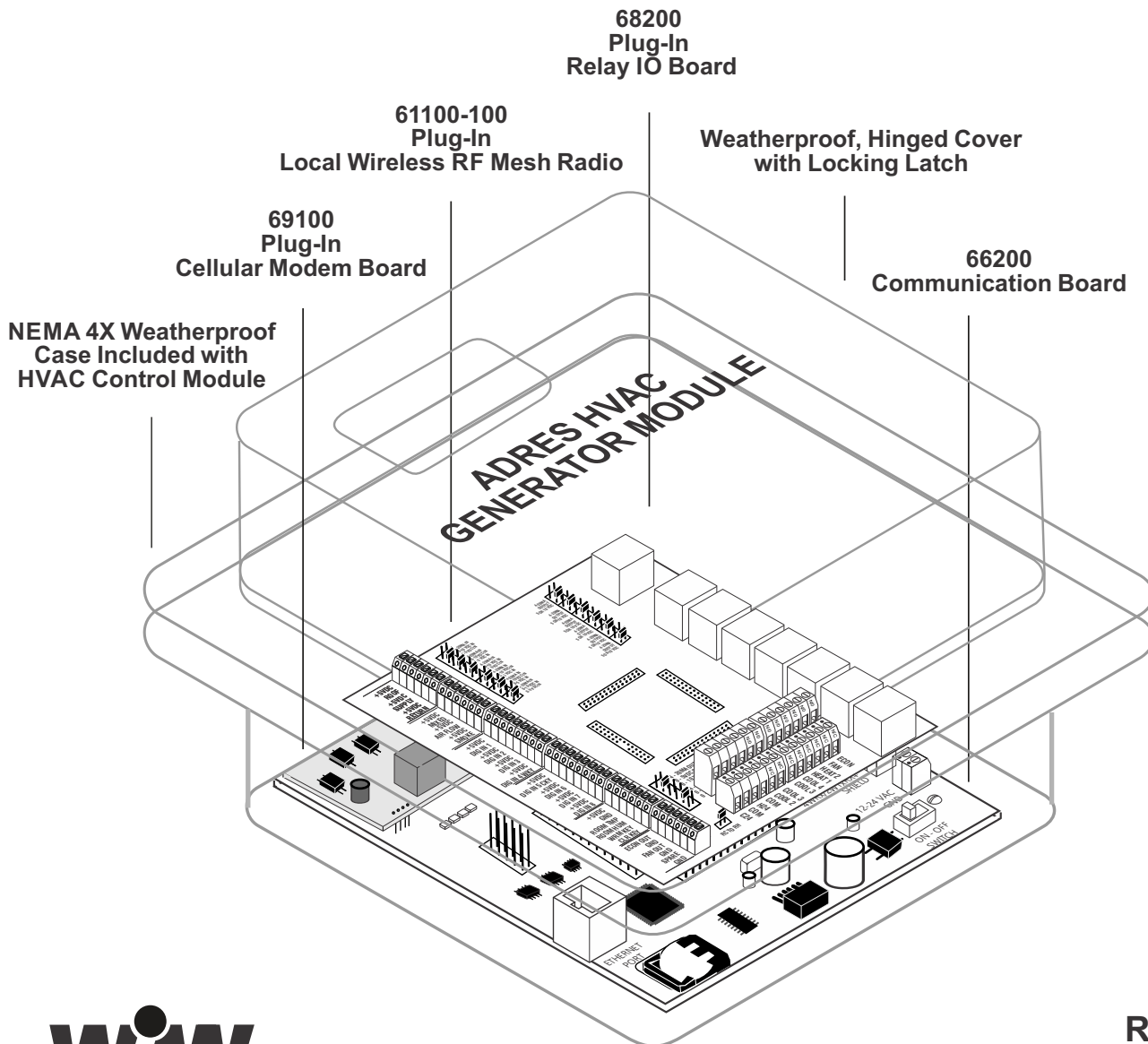
Introduction to the ADRES Control

Introduction

This manual describes the installation and wiring of the ADRES Generator control module series which are supplied in NEMA 4X type UL approved electrical enclosure. The 66200 Communication board can be powered by 12 to 24 VAC or 12 to 24 VDC. The 66200 Communication Board has four two row headers that receive an optional plug-in Relay Input / Output board 68200. The 66200 board also will receive an optional plug-in Cellular modem board (69100) and local wireless RF LAN radio board (61100). The part numbers of compatible boards are shown in Table 1.

Table 1	12-24 VAC / VDC
Generator Communication Board	66200-100
Modbus Splitter Module	tSH-735 CR
Relay IO Board, DEC 3	68200-100
Relay IO Board, DEC 3+	68200-200
Relay IO Board, DEC 3000	68200-200
Cellular Modem, Winn Wireless	69100-100
Cellular LTE Modem, Winn Wireless	70100-100
Local Wireless RF Mesh Radio	61100-100

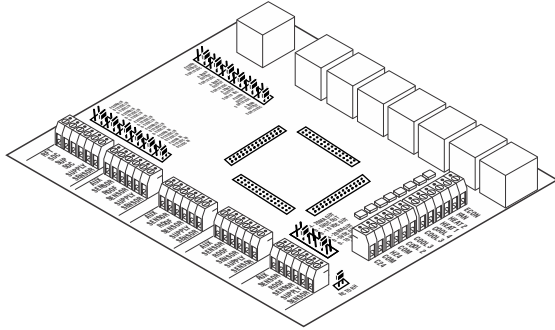
Table 1. Part numbers for compatible Components.



Reference
IG 01

Compatible Components

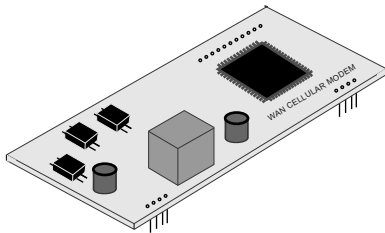
The 68200 Relay IO board plugs on to the Communication board and provides the wiring interface to the Kohler Generator DEC3000 Control. The Relay IO board and controls and monitors any Kohler generator with the DEC3000 Control.



68200-x00
Relay IO Board
for Kohler DEC 3

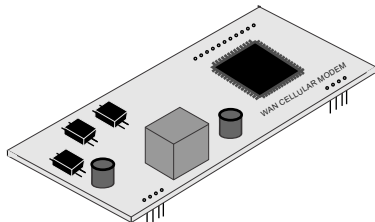
69100-100 Plug-In Cellular WAN Modem

The 69100-100 Plug-In Cellular 2G Modem provides a private (VPN) and secure Internet wide area network (WAN) connection to the ADRES controls. The WAN Cellular Modem allows the ADRES controls to be monitored and controlled from a remote Server through the secure Internet Web browser software interface.



70100-100 Plug-In Cellular LTE CAT M WAN Modem

The 70100-100 Plug-In Cellular LTE CAT M cyber secure Modem provides a private (VPN) and DOD cyber-secure Internet wide area network (WAN) connection to the ADRES controls. The LTE WAN Cellular Modem allows the ADRES controls to be monitored and controlled from a remote Server through the secure Internet Web browser software interface.



Kohler Modbus Interfaces

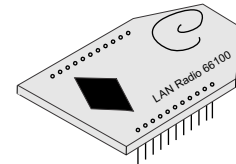
Modbus Splitter tSH-735 CR splitter must be present or installed to allow the ADRES to communicate using Modbus protocol to the Kohler DEC3000 control system with a remote annunciator present.

tSH-735-CR

The P/N tSH-735 CR Modbus Splitter Communication Kit.

61100-100 Optional Plug-In Local LAN Radio

The 61100-100 Plug-In Local Radio Modem provides the wireless communication network between each ADRES module within the building and the Cellular Modem connection. The LAN Radio modem allows the ADRES controls to communicate locally between themselves and the Cellular modem.

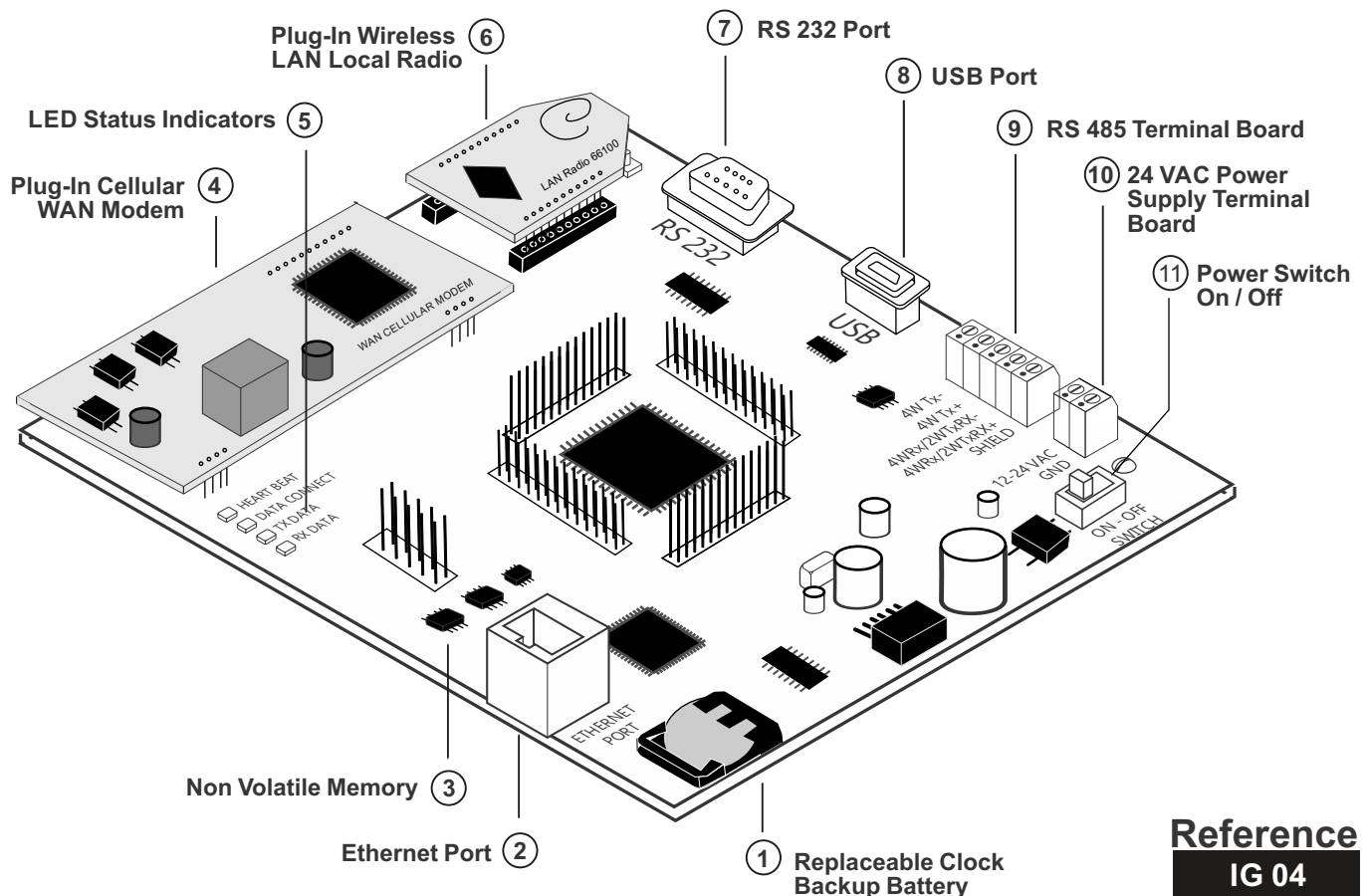


ADRES Generator Control INSTALLATION MANUAL

ADRES Communication Board P/N 66200 Features

Communication Board P/N 66200 Features

- ① **Replaceable Clock Battery**
Replaceable Clock Battery to maintain Day / Date / Time with loss of normal power.
- ② **Ethernet Port (RJ45)**
Optional Ethernet Port (RJ 45) for Internet access through Cellular modem.
- ③ **Non Volatile Memory**
Non volatile memory for up to three months of all program settings, historical performance and energy / demand consumption data.
- ④ **Plug-In Cellular Modem Board**
Plug-in Cellular WAN modem to provide ADRES system access to remote server, OpenADR2.0 and web browser software interface.
- ⑤ **LED Status Lights**
LED status lights to indicate system running and operational status.
- ⑥ **Plug-In Local Wireless Radio Board**
Plug-in wireless local area network radio to provide on-site communication between ADRES modules.
- ⑦ **RS 232 Port (DB 9)**
Jumper selectable RS 232 serial port through the DB 9 connector. Typically used for local programming through PC with EnergyPro software.
- ⑧ **USB Port**
USB port typically used for local programming through PC with EnergyPro software.
- ⑨ **RS 485 Port (2 Wire or 4-Wire)**
Terminal board to land optional hardwired RS 485 communication between ADRES control modules.
- ⑩ **12 to 24 VAC or VDC Power Terminal Board**
Terminal board to land the external 12 - 24 VAC or 12 - 24 VDC power supply.
- ⑪ **Power Switch On / Off**
Power Switch to turn On or Off the power to the ADRES HVAC Control Module.



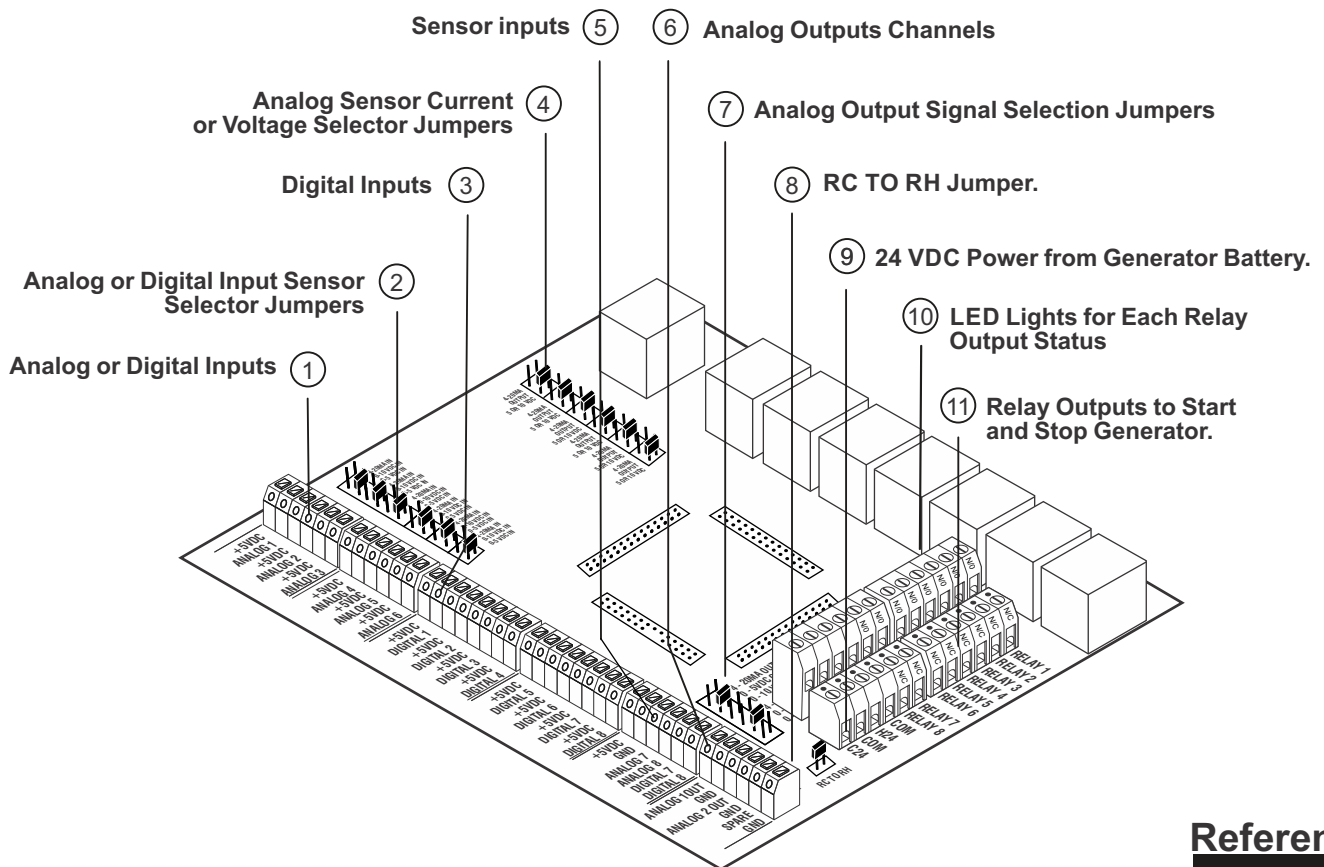
Reference
IG 04

ADRES Generator Control INSTALLATION MANUAL

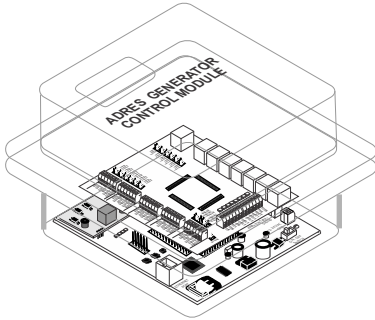
ADRES Relay Input / Output Board P/N 68200 Features

Relay IO Board P/N 68200 Features

- ① **Analog Inputs**
Analog sensor inputs including temperature, pressure, flow, vibration, etc. These inputs can also be used as digital inputs.
- ② **Analog Input Sensor Selector Jumpers**
Select by Jumper from 4-20 ma, 0-5 VDC or 0-10 VDC sensor input. No jumper for 0-5 VDC sensor.
- ③ **Digital Inputs Terminal Board**
Three digital pulse counting inputs for sub-metering.
- ④ **Analog Sensor Voltage or Current Jumpers**
Analog sensor output current or voltage select jumpers. Select 4-24 ma for current sensor or 5 or 10 VDC for voltage sensor.
- ⑤ **Room Temperature Sensor Inputs**
Terminal board for room temperature sensor inputs.
- ⑥ **Analog Outputs**
Analog outputs to control variable and or modulating signals (0-5 VDC, 0-10 VDC or 4-20 ma).
- ⑦ **Analog Output Selection Jumpers**
The Analog Output selection jumpers are used to select the output signal desired, 4-20 ma current, 0-5 VDC or 0-10 VDC voltage.
- ⑧ **RC to RH Jumper**
Jumper RC to RH when the unit has only a single control transformer. Default is jumpered.
- ⑨ **Generator Unit 24 VDC Battery Power**
Terminal board to land the 24 VDC Battery power supply from the Generator.
- ⑩ **LED Lights Track Relay Output Status**
Individual LED lights track each relay output status. Green is off and Red is On.
- ⑪ **Relay Outputs to Generator**
Terminal board to land the ADRES control output relays to Generator Start and Stop contacts.



Reference
IG 04



One ADRES Generator Control Module is required for each individual generator to be monitored and controlled. The ADRES control module can be programmed to operate with most any generator make, model or size. The ADRES module is programmed remotely through the WAN Cellular modem or locally using a PC computer via either a USB or RS232 port.

Once programmed, the operating parameters are stored in non-volatile memory (unaffected by power outages) and controls the Generator independently. All data is stored in the control module and can be accessed via the remote server using the Internet web browser software interface.

Compatible Systems

The ADRES generator control module can be installed, configured and programmed to monitor, control, and alarm a backup generator and optionally its Automatic Transfer Switch (ATS).

Remote Annunciator Interface

Older generators that do not have communication interfaces available to allow the ADRES control to directly communicate with the generator to monitor the generator performance and alarms must use the optional ADRES Relay IO board P/N 68200-100 to wire the ADRES Analog and Digital inputs to the remote Annunciator Digital outputs.

A Kohler DEC3000 model generator is an example of this type of interface. See page 2-04 for Wiring Diagram of DEC3000 controller.

Communication to Generator

The preferred interface between the ADRES generator control and the generator is a hard-wired RS-485 communication link. The ADRES will continually communicate with the generator to read its performance and alarm conditions and relay these to the ADRESpro interface for display and trending.

A separate hard-wired connection should be wired between the ADRES and generator for Start and Stop control.

Communication Wiring

Wire the ADRES Generator control from its RS-485 port to the Generator RS-485 port according to the wiring diagram.

Optionally, use the Ethernet port from the ADRES to the generator control Ethernet port. Again, refer to the individual wiring diagram for the Make and Model of generator being connected.

Generator Start / Stop Wiring

The preferred method for the ADRES generator control to Start and Stop the generator is to hard-wire the ADRES control to the remote start / stop dry contact interface provided by the generator. This typically is a single dry contact on the Generator control terminal board that if jumpered (shorted) will start and run the generator and when opened will stop the generator.

Use an 18 gage twisted pair shielded cable between the ADRES Control and the generator control.

ADRES Power Supply Wiring

The ADRES control should be wired to the battery of the generator (12-24 VDC) to provide the power supply to the control module.

The ADRES has a small replaceable fuse on the Comm board for its protection.

Mechanical Installation

The ADRES generator control module is installed on the inside or outside of a generator enclosure using four sheet metal screws. The control module should be positioned high enough so that it is not subject to water from plugged drains or rain damage.

The ADRES generator control module should be mounted on a non removable panel of the enclosure adjacent to the generator control enclosure. This is typically on the generator itself within the enclosure. There is typically both a 12-24 VDC power supply as well as the terminal board or plug in port for communication (RS-485 or Ethernet) and terminal board for monitoring the individual digital outputs for warning and alarms.

Single or multiple "seal-tite" conduit runs can be made between the ADRES control module and the Generator APM802 control enclosure. A separate 18 Gage or larger 2-conductor shielded cable should be run for power supply. A multi-conductor 16 channel shielded should be run for digital signal monitoring or start / stop control.

Kohler Generator ADRES Control Installation Procedures for Decision Maker DEC3000 Controller.

1. Identify the Make, Model, Serial Number and Control type for the Generator that the ADRES Generator control installed.



Figure 1 Make, Model and Serial Number Tag on Generator

Decision Maker DEC3000 controller is typically identified and listed on the metal tags mounted on the exterior of the Generator housing as shown in Figure 1 above.

2. Open the generator enclosure double doors closest to the air intakes on the left side of the engine to gain access to the DEC3000 monitor and control enclosure that houses and supports the DEC3000 two line screen display as shown in Figure 2 below.



Figure 2 Open the double doors to access the DEC3000 controller.

3. Remove the quantity fourteen (14) twelve screws from the enclosure front panels, top and bottom to reveal the terminal board for +24 VDC power supply and mounting backplane for the Modbus splitter module mounting position. See photo below showing the two panels and screw locations.



Figure 3 DEC3000 Control Enclosure Screws.

4. Once the front two panels are removed, press the RED emergency stop button on the left side of the DEC3000 display. This will lockout the engine / generator from any operation while the controls are being installed. Use the DEC3000 touchscreen to silence the alarm. Also, remove the two screws on top of the black monitor panel to allow the monitor to rotate down to expose the communication terminal block on the back side of the DEC3000 controller. See photograph below showing the Emergency Stop Button and two monitor panel bolts to remove.

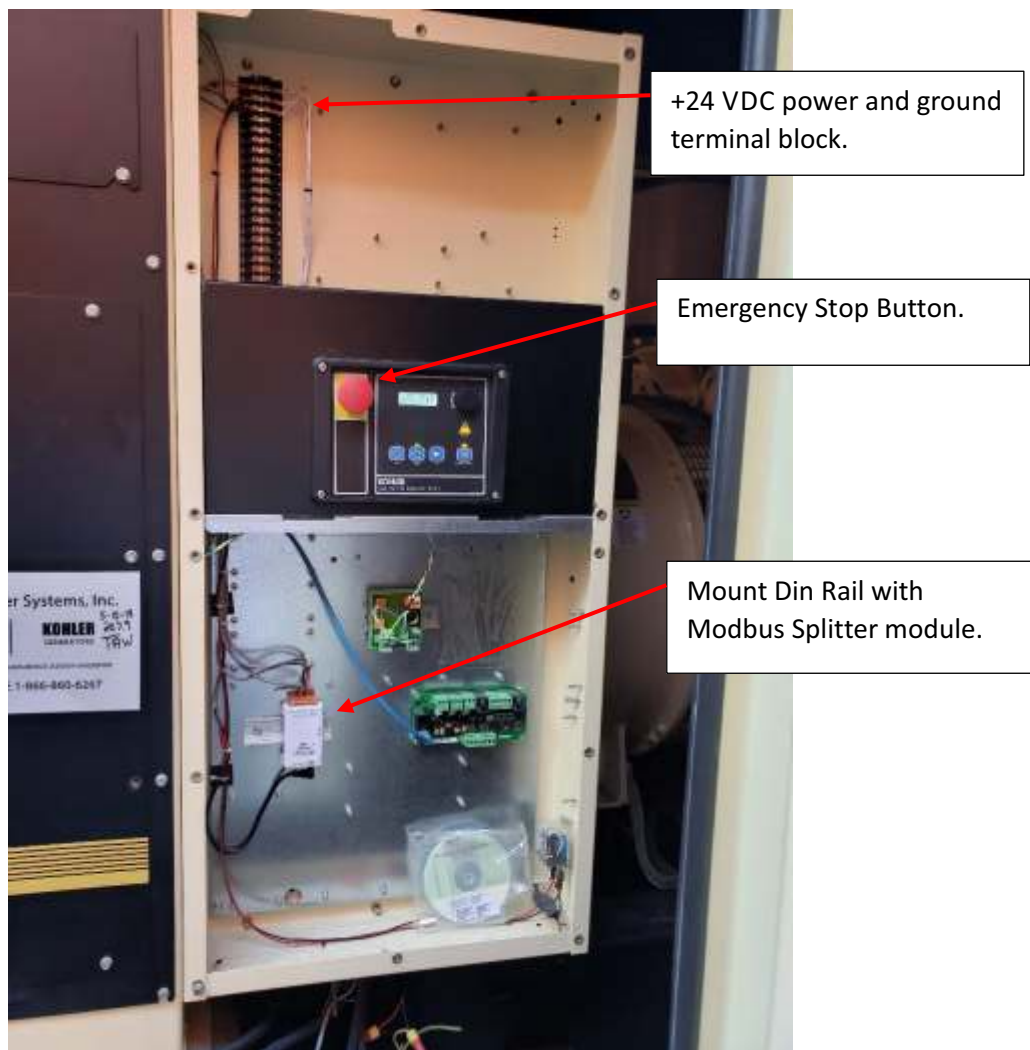
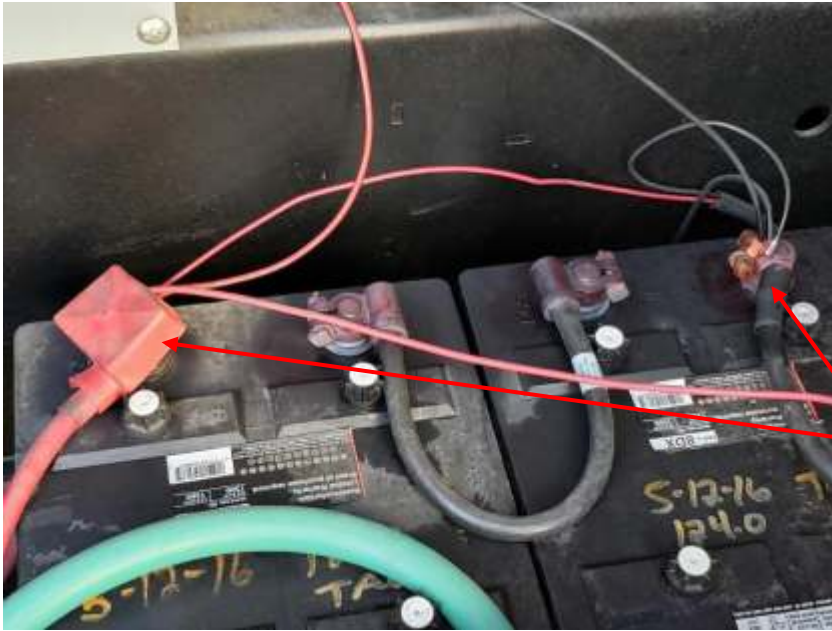


Figure 4 DEC3000 Control Enclosure Screws.

5. Unplug the Battery Charger (s) and then disconnect the battery supply cables to power down the DEC3000 controller.



Turnoff and unplug the Battery Charger.

Remove the +24 VDC positive and negative cables from the battery.

Figure 5 DEC3000 Battery and Battery Cables.

6. Rotate the monitor panel down as shown to gain access to the power supply terminal block in the top left of the enclosure and the removable plug-in connector for the Modbus communication cable to be landed. See the photograph below.



Figure 6 Rotate down the DEC3000 controller as shown.

7. Remove the ADRES controller from the plastic NEMA case and mount the enclosure on the generator enclosure vertical metal channel support upright below and adjacent to the outdoor Emergency Stop switch. Use two self-tapping sheet metal screws to secure NEMA case to upright. Use the existing $\frac{1}{2}$ enclosure knockout to route the 90 Deg elbow fitting in the ADRES NEMA case to the DEC3000 enclosure (Note: Follow the flex conduit carrying the Emergency stop switch wiring. See photograph below on NEMA case installed).

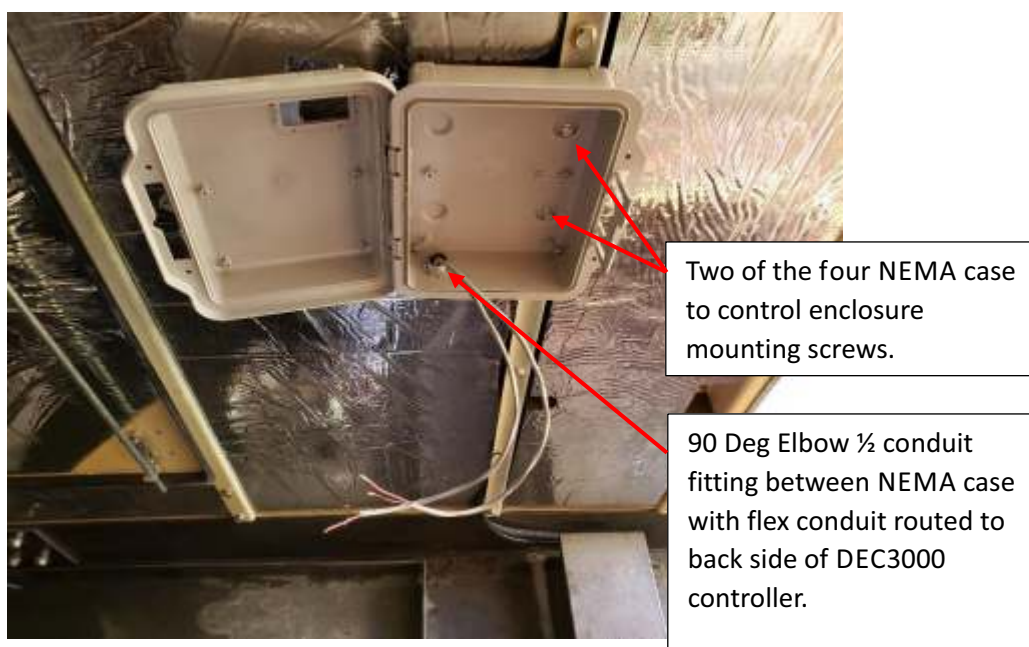
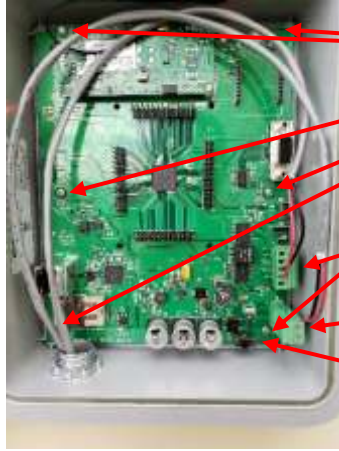


Figure Mount ADRES NEMA Case as shown.

8. Reinstall the ADRES controller in the NEMA case using the quantity 6 #4 x $\frac{3}{16}$ inch long screws. Terminate two 18 – 20 gage belden or equal cables in ADRES controller according to wiring diagrams on page 2-1 and 2-2. Cable length approximately 15 ft. each. See photograph below on NEMA case installed and all wiring terminated.



Six ADRES control to NEMA case screw locations.

ounting.
ADRES Communication terminal board wired..

ADRES + 24 VDC power wiring.

ADRES On / Off switch.

Figure 8 ADREScontroller mounted in NEMA case

9. Feed two belden or equal cables through the elbow and into the DEC3000 enclosure. Note which one is for power and which is for communication.



ADRES Power and Communication cables in flex conduit entering existing hole in back side of DEC30000 control enclosure.

Figure 9 ADRES Comm and Power Cable in Fle Conduit.

10. Install a DIN rail of approximately 4 inches horizontally in the bottom section of the DEC3000 enclosure. Mount the DIN rail on the backplane with two 3/4 long self tapping sheet metal screws. Clip the Modbus splitter module P/N tSH-735 CR onto the DIN rail as shown in the photograph below.

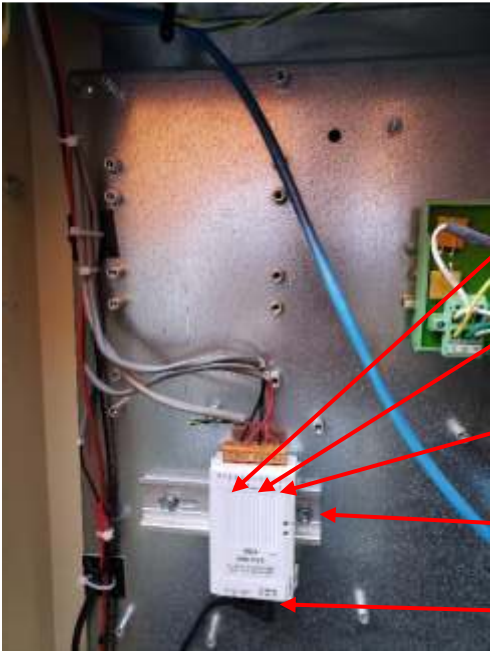


Figure 10 Modbus Splitter installed.

- Modbus splitter COM 3 to DEC3000 controller. Annunciator.
- Modbus splitter COM 2 to ADRES controller.
- Modbus splitter COM 1 to Remote Annunciator. Controller.
- DIN rail mounting.
- Modbus Splitter Power Cable.

11. Take the plug in power connector off the Modbus splitter and land it with the ADRES power supply wires onto the DEC3000 terminal strip. Refer to wiring diagram on page 2-1 and 2-2.



- Terminal 70 is the Red wire and is +24 VDC power supply to ADRES and Modbus splitter.
- Terminal 7N is the Black wire and is the Ground for the power supply to ADRES and Modbus splitter.

Figure 11 ADRES and Modbus Splitter Module Power Supply Terminal Board.

12. Terminate the ADRES communication wire to COM2 terminals of the splitter and the DEC3000 communication wires to COM 3 of the splitter. The remote annunciator (if equipped) will terminate on COM 1 of the splitter. Refer to wiring diagram 2 -3 for detailed connections. The photograph below shows a completed installation with the remote annunciator.

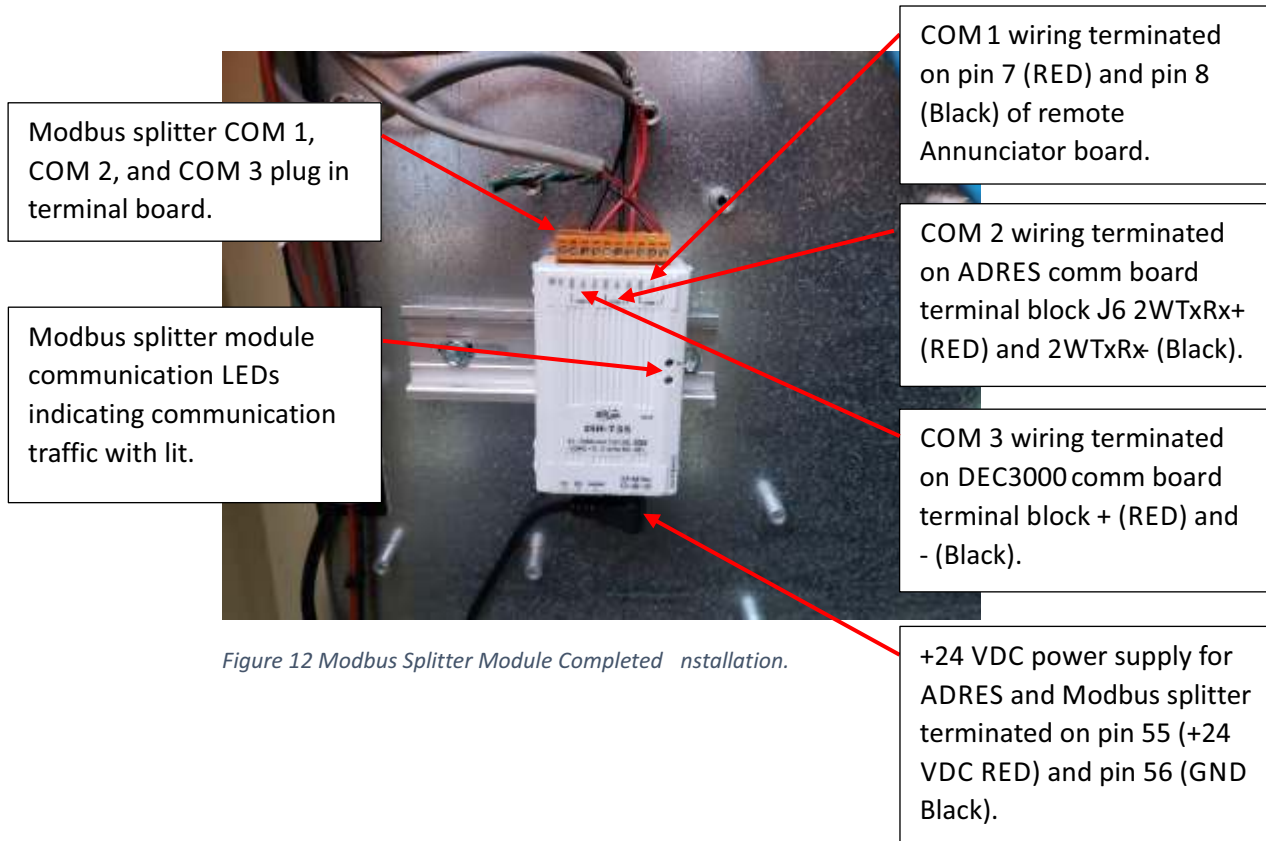
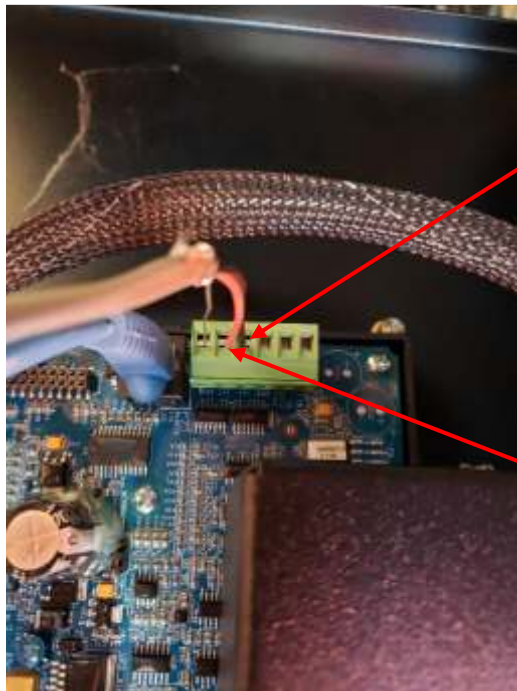


Figure 12 Modbus Splitter Module Completed installation.

13. Remove the plug-in communication six pin terminal board from the DEC3000 Controller. Connect the DEC3000 communication wires as shown to COM 3 of the splitter. Red wire to the (+) terminal and the Black wire to the (-) terminal. See the photograph below.



From Modbus Splitter module COM 3 wiring terminated on (+) (RED) of DEC3000 Controller.

From Modbus Splitter COM 3 wiring terminated on pin (-) (Black) of DEC3000 Controller.

Figure 13 Modbus Splitter Module Completed Installation.

Startup and Commissioning

1. Review the board installations and connections.
2. Disconnect the plug in power connector to the Modbus splitter at the splitter.
3. Disconnect the plug in power connector on the ADRES board.
4. Re-energize +24 VDC power to the DEC3000 control by reconnecting the Battery Cables and Battery Charger (s).
5. Confirm with a voltmeter there is +24 VDC on pin 70 of the DEC3000 terminal board.
6. Confirm there is +24 VDC on the correct terminals of the ADRES control power supply plug in connector. If correct turn on the ADRES power switch.
7. Confirm there is +24 VDC on the Modbus splitter plug. +24 VDC on the inside pin and Ground on the Shell.
8. Plug in the Modbus splitter power supply plug.
9. Reinstall the two screws holding the DEC3000 control panel and monitor.
10. Confirm the ADRES red heartbeat light is blinking on and off.
11. Navigate to the ADRES Controller at our secure web site using the following URL. Login using the user & password assigned by system administrator:

<https://adrespro.com/dashboard>

-
12. Confirm communication with the Kohler Generator. Click on the corresponding generator in the tree on the left. Press the Update Readings on the main page and confirm the ADRES returns the performance data and current generator status.
 13. Note the current alarms/warnings on the DEC3000 display. Confirm that the ADRESPro interface is reflecting the same alarms
 14. Confirm the ADRES Generator Status matches the Kohler Generator annunciator panel.
 15. Obtain permission start the generator from the local Manager and others. Start the Generator while the technician is still local to the Generator.
 16. While the generator is running, wait for the ADRES to report the Generator Running status / alarm on the ADRESprointerface.
 17. Stop the Generator. Refresh the webpage again to verify the new Generator status
 18. In the ADRESproUnit Setup page, confirm all the Make, Model, and Part Numbers to make this information available for future maintenance.
 19. Return the Generator to AUTO mode, confirm all status lights are correct and the Generator Ready to Run is Green.
 20. Close all Enclosure doors and close the ADRES NEMA door.



Confirm all Enclosure Doors are Closed and Latched

ADRES Generator Control INSTALLATION MANUAL

Power Wiring for the ADRES Generator Control Module

Connecting 12 to 24 VAC or VDC Power to the Communication Board.

Description

The 66200 Communication board can be powered by either a 12 to 24 VAC or 12 to 24 VDC power supply. For all Generator applications the ADRES will use the Generator 12 or 24 VDC battery system.

Communication Board 66200-100

The 12 or 24 VDC Generator battery should be used to maintain consistent power even when utility AC power is unavailable. The ADRES control power will peak at 1.0 amp at 24 VDC when all relays are energized and the Cell modem is transmitting.

The ADRES should be connected directly to the battery source and the Communication board using AWG 18 or larger wire.

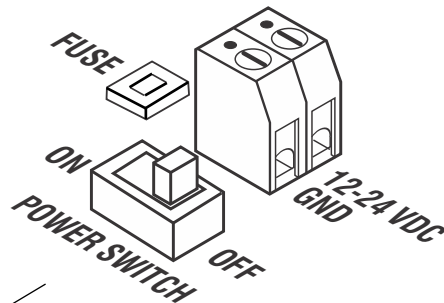
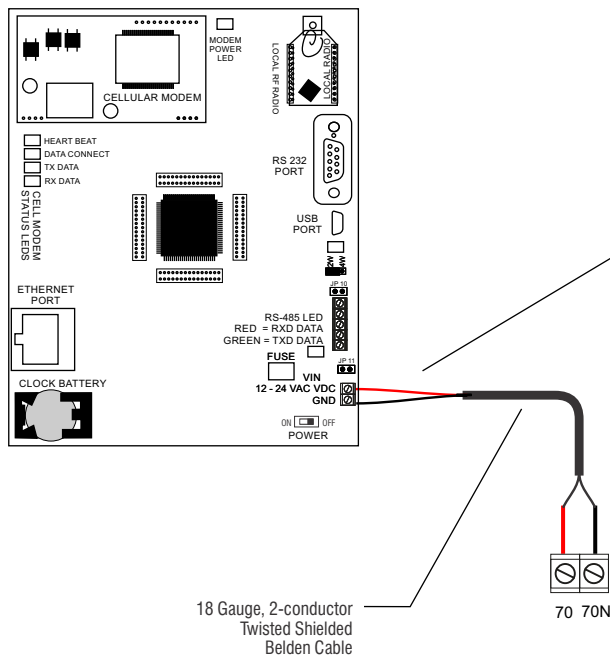
Note: There is a replaceable 5 Amp rated fuse on the communication board just above the On/Off switch SW 1 behind the terminal board.

APPROVED TRANSFORMERS

Model Number	Manufacturer	Available From	Input Rating	Output Rating

Communication Board 66200-XXX

The Communication board operates from 12 to 24 VDC or VAC supplied by the customer. Wiring to the Kohler Generator will always use the 24 VDC from the batteries.



Power On/Off Switch

A switch is provided on the Communication Board for controlling all power to the Modem, Relay IO and Communication boards. Whenever wiring is changed or a board removed or installed, the power should be turned off by simply unplugging the terminal board at the communication board.

Caution!

Be sure to review the Wiring Workmanship requirements before any wiring is done.

To Generator DEC3000
Main Control Board
Terminal Board TB-1
Terminal 70 to +24 VDC
Terminal 70N to Ground.



Reference
WD 01

Connecting 12 to 24 VDC Power to the Modbus Splitter Module

Description

The Modbus splitter module tSH-735 CR communication board can be powered by either a 12 to 24 VDC power supply. For all DEC3000 Generator applications the ADRES will use the Modbus splitter module.

Modbus Communication Board tSH-735 CR

The 12 or 24 VDC Generator battery should be used to maintain consistent power even when utility AC power is unavailable. The Modbus splitter control power will peak at 0.5 amp at 24 VDC.

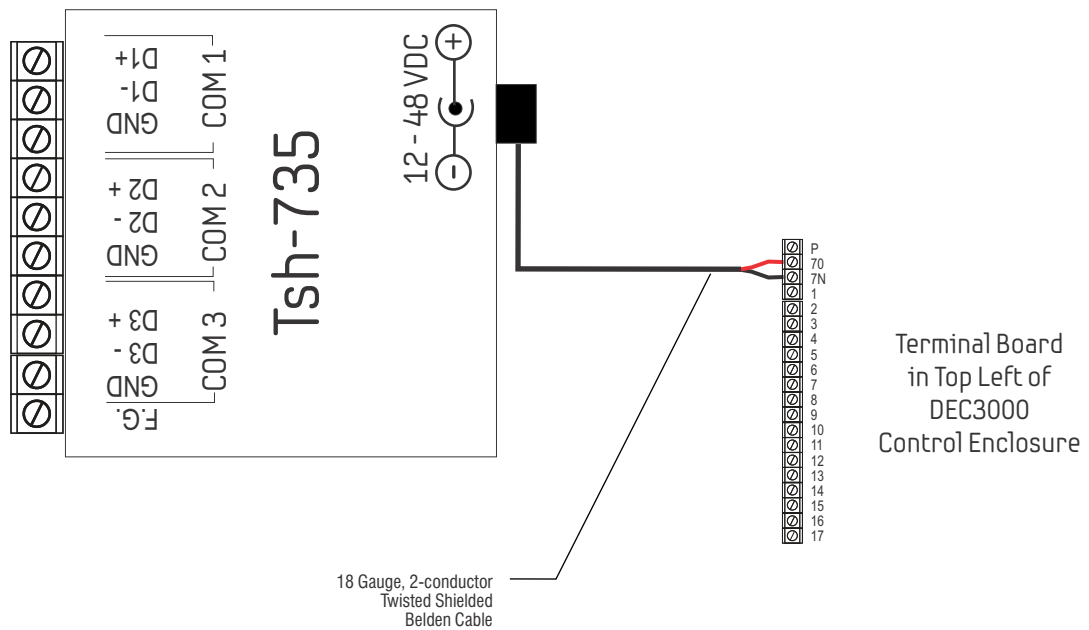
The Modbus splitter module should be connected directly to the battery source and the ADRES Communication board using AWG 18 or larger wire.

APPROVED TRANSFORMERS

Model Number	Manufacturer	Available From	Input Rating	Output Rating

Modbus Splitter Communication Board tSH-735 CR

The Modbus splitter module operates from 12 to 24 VDC supplied by the customer. Wiring to the Kohler Generator will always use the 24 VDC from the batteries.



Caution!

Be sure to review the Wiring Workmanship requirements before any wiring is done.



ADRES Generator Control WIRING INSTRUCTIONS

Communications Hard Wiring for the 66200 Communication Board

Hard wiring the ADRES Generator DEC3000 control module using the RS-485 port on the Kohler Generator

Description

The ADRES Generator control module must be hard wired to the Kohler Generator DEC3000 main board using the RS 485 Port on both the ADRES communication board, the SH-735 CR Modbus splitter and the Kohler Generator main board.

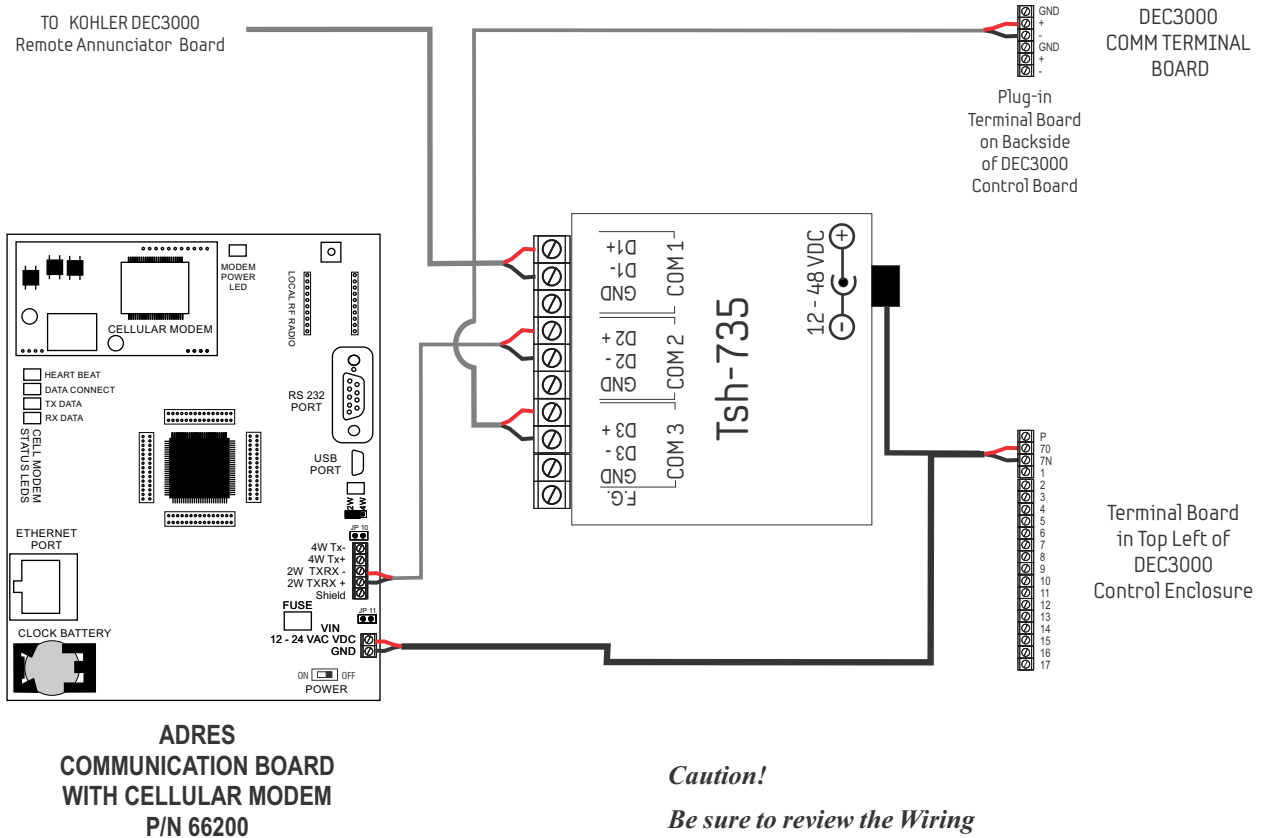
Use Belden communication cable in conduit between the ADRES and the Generator control enclosure, the RS 485 2-wire network can be established following the wiring shown at the below:

After mechanically installing the Communication board and NEMA enclosure, connect the Belden Cable wires from the Comm board to the Kohler Generator main board DEC3000 as follows:

At the ADRES Comm Board	Modbus Splitter tSH-735 CR	To the Kohler Main Board	Wire Color
2W Tx Rx -	COM 3 D +		RED
2W Tx Rx +	COM 3 D -		BLK
	COM 2 D +	Terminal +	RED
	COM 2 D -	Terminal -	BLK
	COM 1 D +	To Remote Annunciator	RED
	COM 1 D -	To Remote Annunciator	BLK

Wiring Materials Required

1. Belden Communication Twisted Shielded, 2, 3 or 4-Conductor, AWG20.



Caution!
Be sure to review the Wiring Workmanship requirements before any wiring is done.

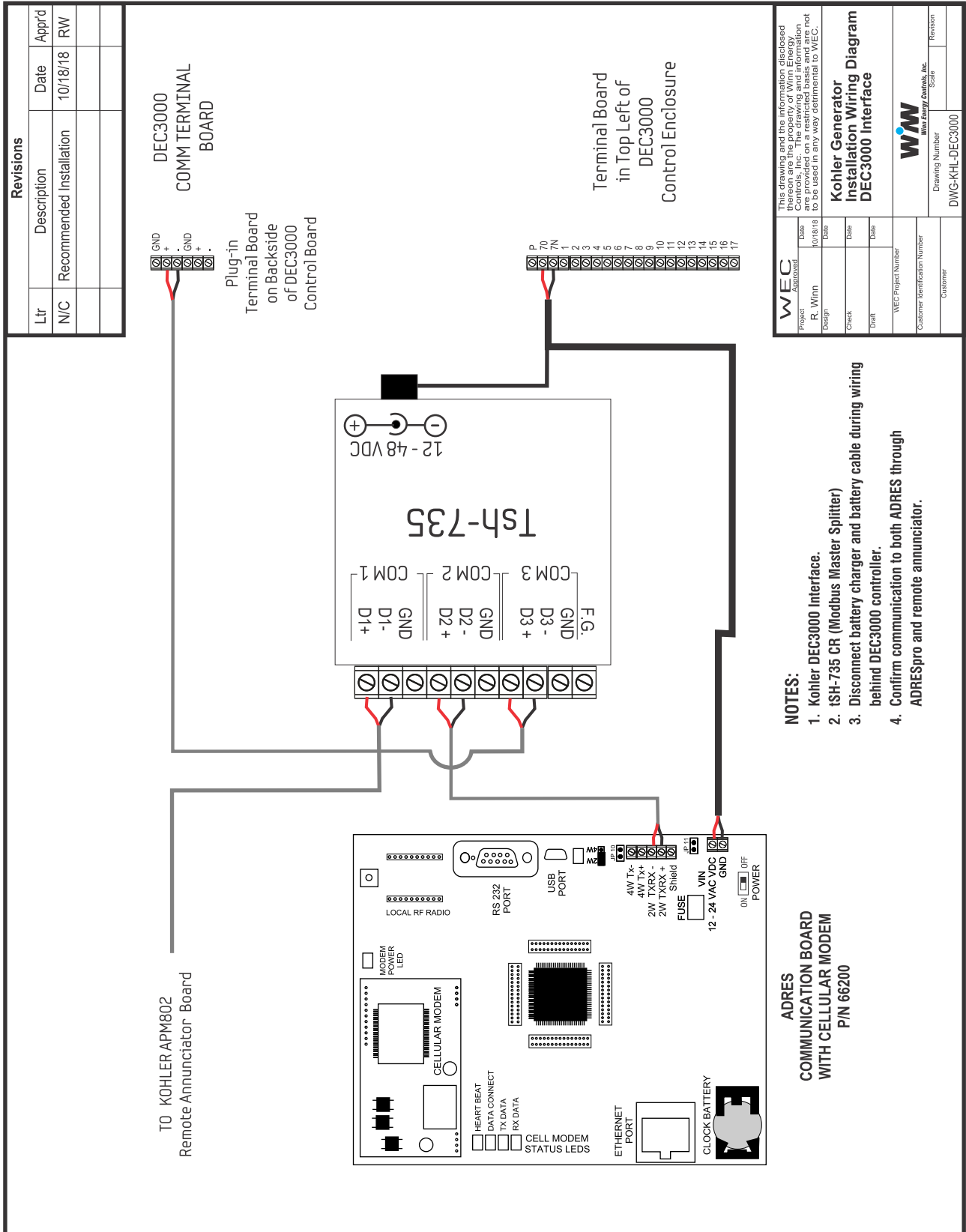
Reference
WD 03



ADRES Generator Control

WIRING INSTRUCTIONS

DEC3000 Wiring Drawing



Safety First

Before you perform any wiring be sure you turn Off the power at the Generator. Failure to do so can result in personal injury and damage to the ADRES controls.

Local Electrical Codes

All wiring should meet all applicable electrical codes including any permit requirements.

Professional Installers

Only professional, experienced and qualified technicians should install these controls.

Approved Materials

Where applicable, only UL approved wire and supplies shall be used in the installation of these controls. Use only the size and type wire specified in the Wiring Diagrams.

Stripping and Installing Wires

The insulation on wires that are installed in the terminals on the control boards should be stripped about 1/4-inch being careful not to damage the conductor.

Insert the stripped conductor into the terminal and secure it with the screw. Always check that the wire is secure by gently tugging on it.

Insulation Damage Causes Electrical Shorts

The insulation on wires can be cut by sharp sheet metal and cause the conductor to short to earth ground. This provides a path for electrical damage during lightning strikes and can cause damage to the equipment.

Securing the NEMA Enclosure

The NEMA enclosure should be secured so that it cannot be damaged by technicians on the roof or be damaged by vibration. An unsecured NEMA enclosure can pose a personal hazard and potential damage to the equipment.



Winn Energy Controls, Inc.

2637 Ariane Drive

San Diego, CA 92117

Tel: (858) 274-1330

Fax: (858) 274-1362

Web: www.winnenergy.com

Email: sales@winnenergy.com