ADRES
Automated Demand Response and Energy Savings Generator Control System
Installation Manual for Kohler Generator with APM802 Control Interface

Version 1.2

Winn Energy Controls, Inc.

Section	Description	Page

wn

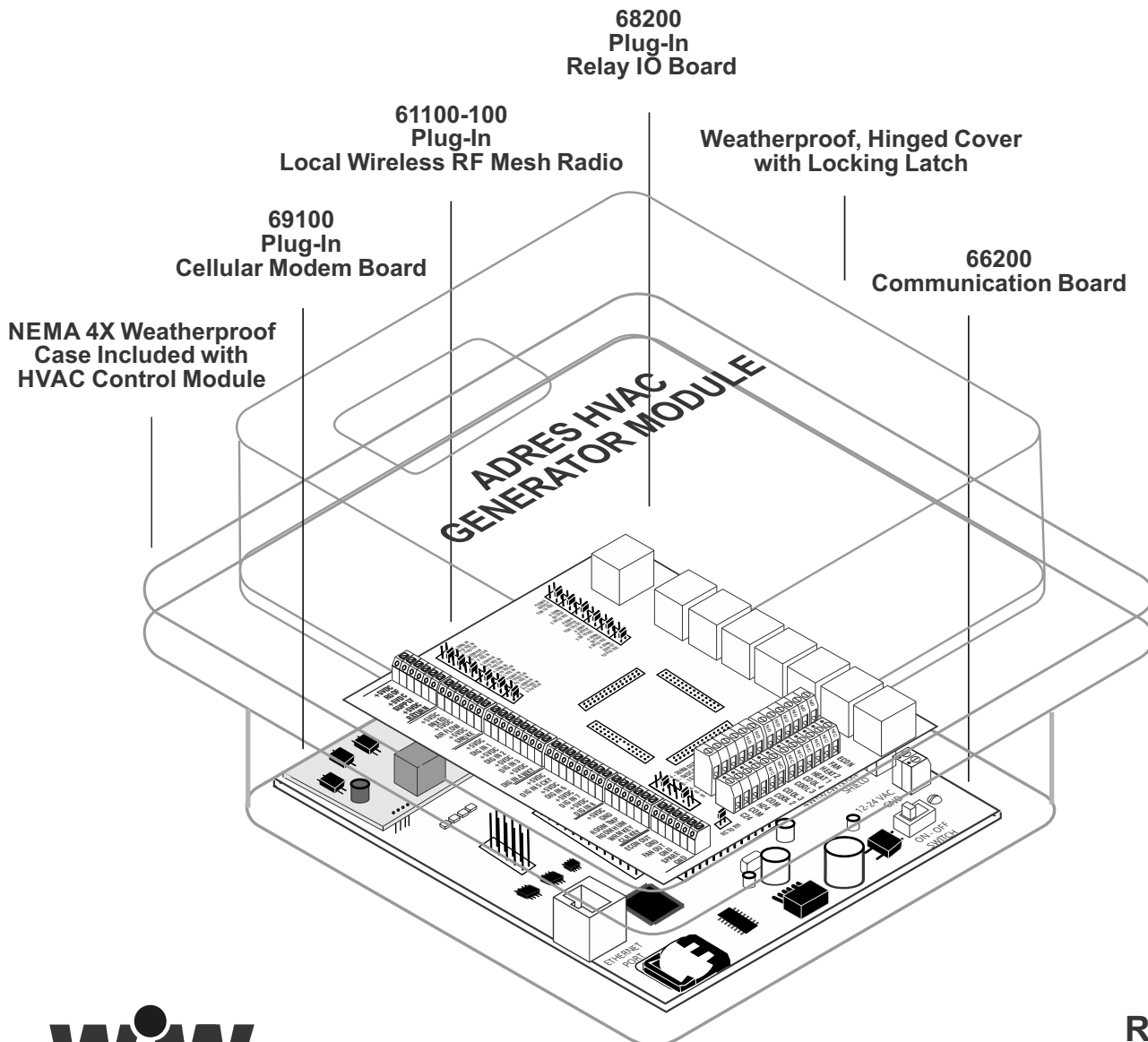*Winn Energy Controls, Inc.*

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.

68200
Plug-In
Relay IO Board

61100-100
Plug-In
Local Wireless RF Mesh Radio

Weatherproof, Hinged Cover
with Locking Latch

69100
Plug-In
Cellular Modem Board

66200
Communication Board

NEMA 4X Weatherproof
Case Included with
HVAC Control Module

ADRES HVAC
GENERATOR MODULE
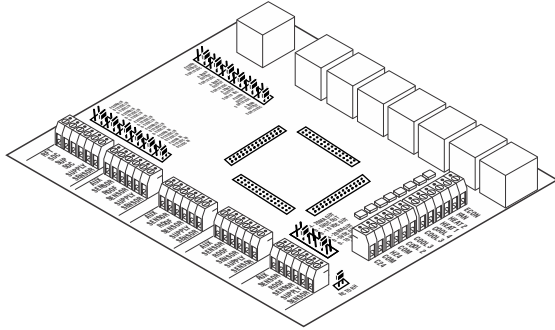
Compatible Components

The 68200 Relay IO board plugs on to the Communication board and provides the wiring interface to the Kohler Generator APM802 Control. The Relay IO board and controls and monitors any Kohler generator with the APM802 Control.
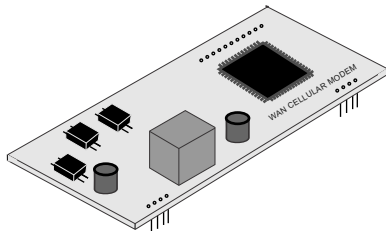
68200-x00
Relay IO Board
for Kohler DEC 3

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 APM802 control system with a remote annunciator present.

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

69100-100
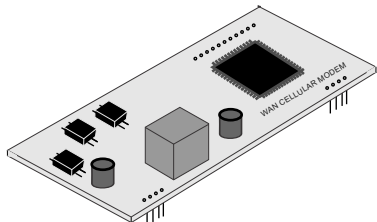Plug-In Cellular WAN Modem

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.

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.

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.

Reference
IG 02
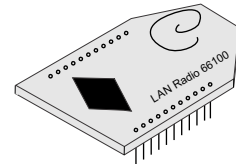
Communication Board P/N 66200 Features

(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.
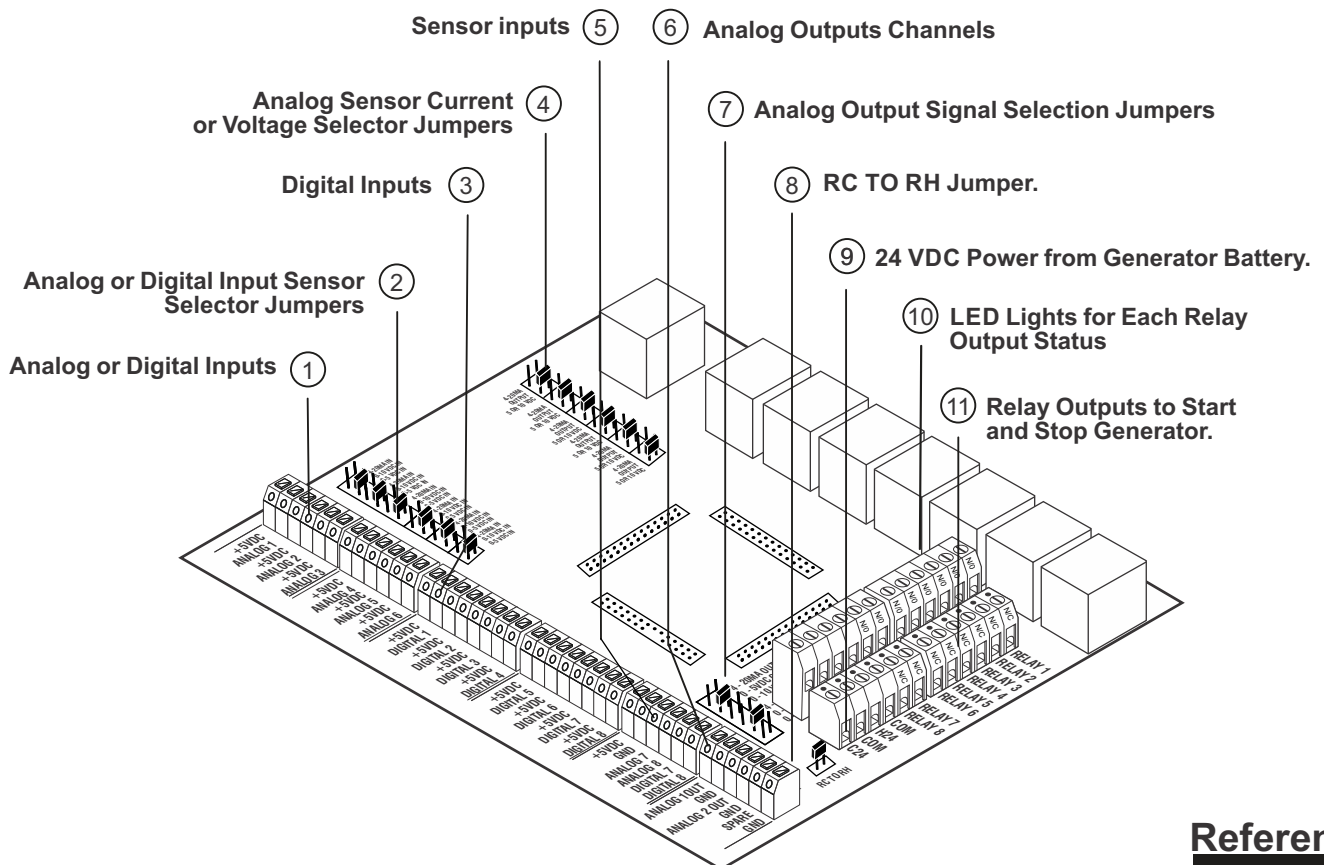
(9) RS 485 Port (2 Wire or 4-Wire)

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.

Plug-In Wireless LAN Local Radio (6)

(7) RS 232 Port

(8) USB Port

LED Status Indicators (5)

(9) RS 485 Terminal Board

Plug-In Cellular WAN Modem (4)

(10) 24 VAC Power Supply Terminal Board

(11) Power Switch On / Off

Non Volatile Memory (3)

Ethernet Port (2)
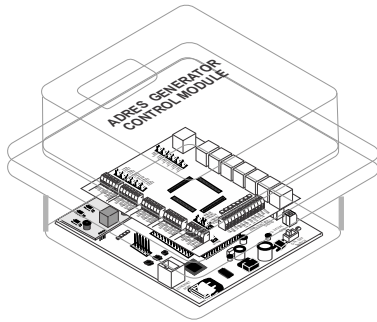
(1) Replaceable Clock Backup Battery

Reference
IG 04

1 - 3
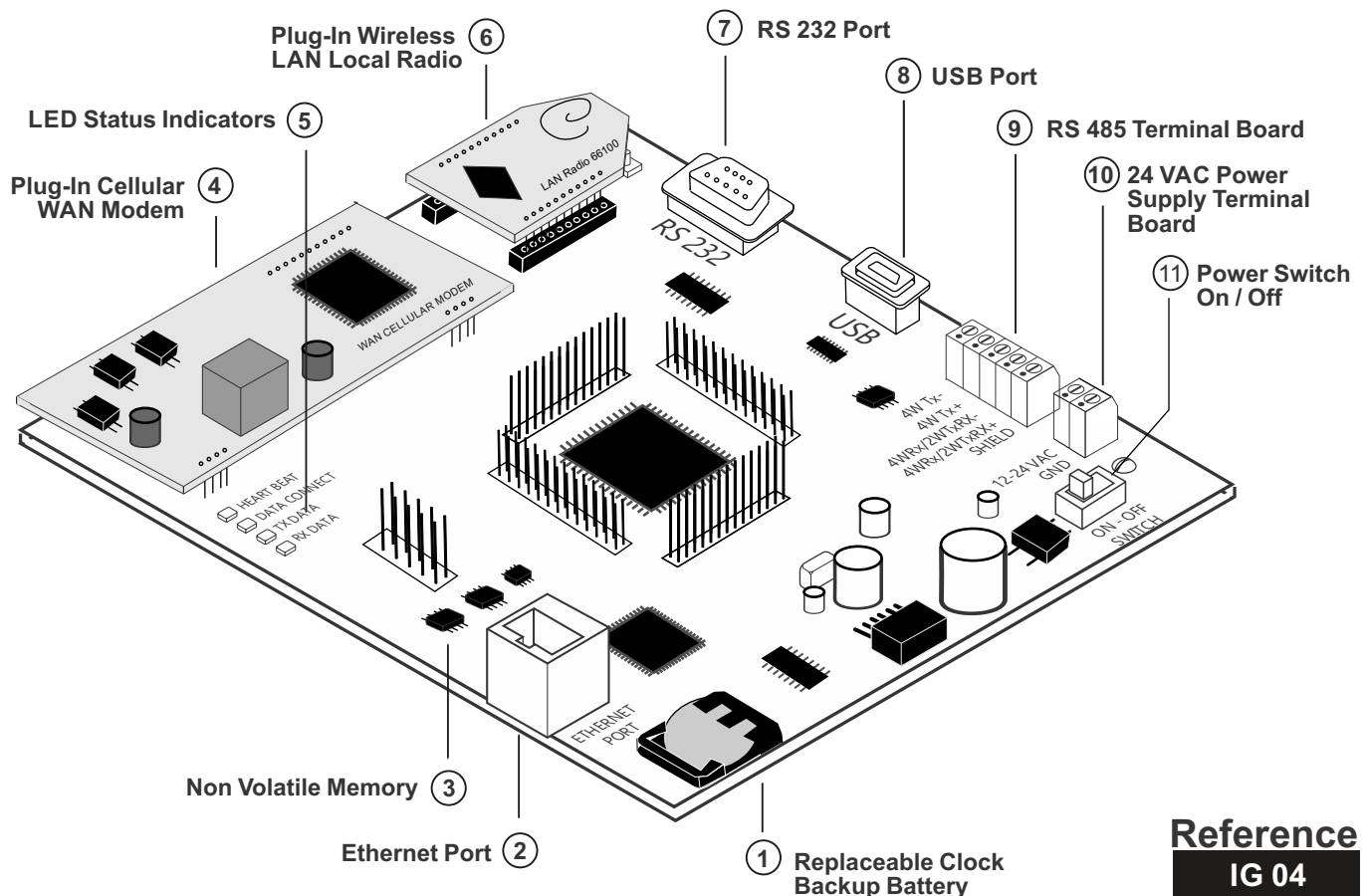
Relay IO Board P/N 68200 Features

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.

Sensor inputs ⑤
⑥ Analog Outputs Channels
Analog Sensor Current or Voltage Selector Jumpers ④
⑦ Analog Output Signal Selection Jumpers
Digital Inputs ③
⑧ RC TO RH Jumper.
⑨ 24 VDC Power from Generator Battery.
Analog or Digital Input Sensor Selector Jumpers ②
⑩ LED Lights for Each Relay Output Status
Analog or Digital Inputs ①
⑪ Relay Outputs to Start and Stop Generator.

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 APM802 model generator is an example of this type of interface. See page 2-04 for Wiring Diagram of APM802 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.

Reference
IG 05

Kohler Generator ADRES Control Installation Procedures for APM802 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

   a. APM802 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 APM802 monitor and control enclosure that houses and supports the APM802 touch screen display as shown in Figure 2 below.

Figure 2 APM802 Control Enclosure Doors.

3. Remove the quantity (8) eight screws from the enclosure front panel on the bottom to reveal the terminal board and mounting backplane for the Modbus splitter module mounting position. See photo below showing the panel and screw locations.
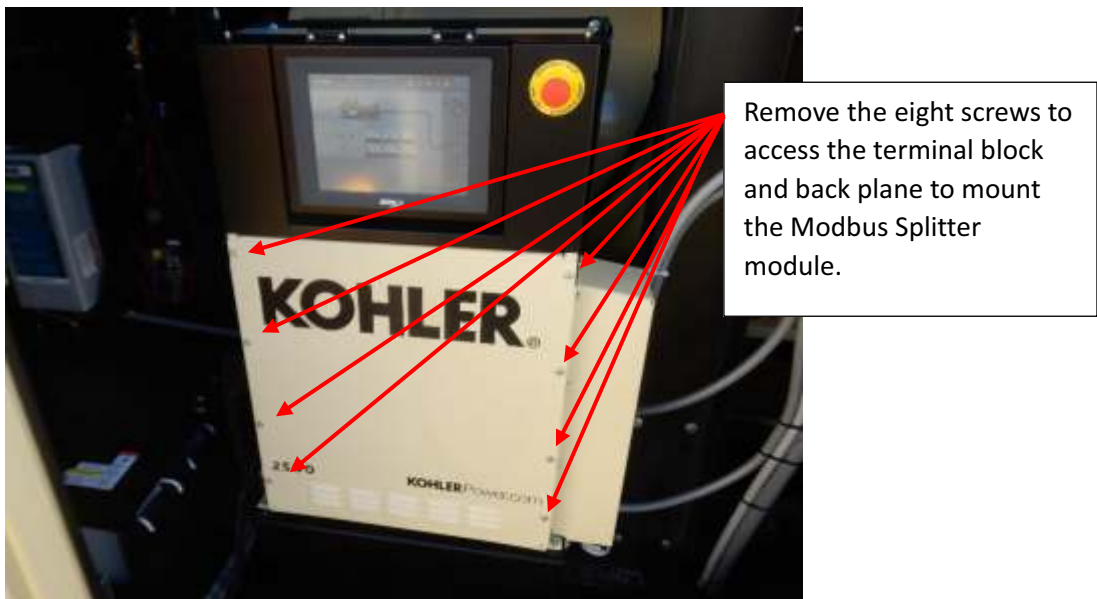

Remove the eight screws to access the terminal block and back plane to mount the Modbus Splitter module.

Figure 3 APM802 Control Enclosure front panel to remove.

4. Once the front panel is removed, press the RED emergency stop button on the right side of the APM802 display. This will lockout the engine / generator from any operation while the controls are being installed. Use the APM802 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 fuse block. See photograph below showing the Emergency Stop Button and two monitor panel bolts to remove.

Remove two screws to allow touch screen display to rotate down to get to Fuse blocks.

Emergency Stop Button.

APM802 touch screen display.
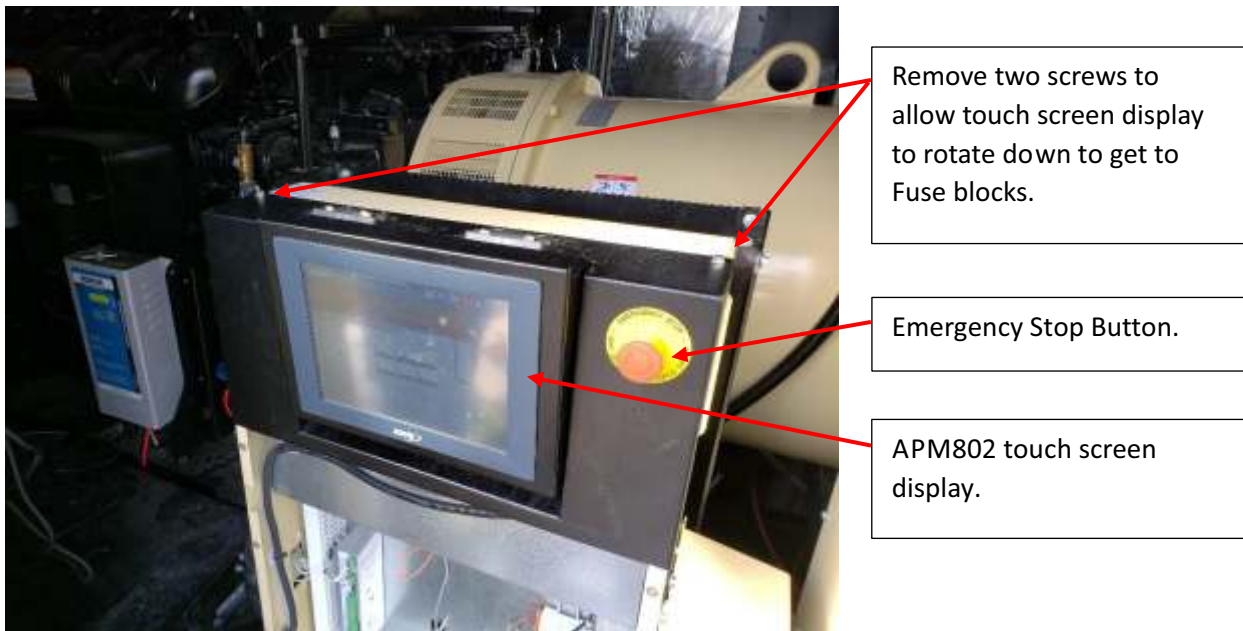
Figure 4 APM802 Control Emergency Stop Button and two retaining screws.

5. Rotate the monitor panel down and remove the KLK 6A fuse to power down the terminal block that the ADRES system will connect to. The 4th Fuse from the left can be pulled down to power down the terminal block. See the photograph below.
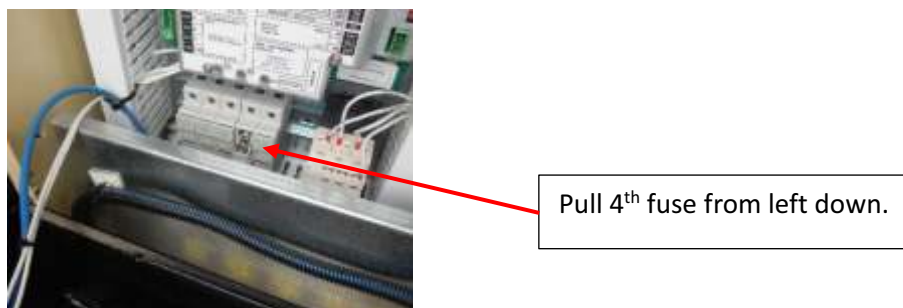

Pull 4th fuse from left down.

Figure 5 Pull down to disconnect 4th Fuse from left of panel as shown.

6. Remove the ADRES controller from the plastic NEMA case and mount the enclosure on the backside of the APM802 enclosure toward to bottom left. Use four self tapping sheet metal screws to secure NEMA case to enclosure. Use the existing ½ enclosure knockout to route the 90 Deg elbow fitting in the ADRES NEMA case through the APM802 enclosure. See photograph below on NEMA case installed.

Two of the four NEMA case to control enclosure mounting screws.

90 Deg Elbow ½ conduit fitting between NEMA case to control enclosure. mounting screws.
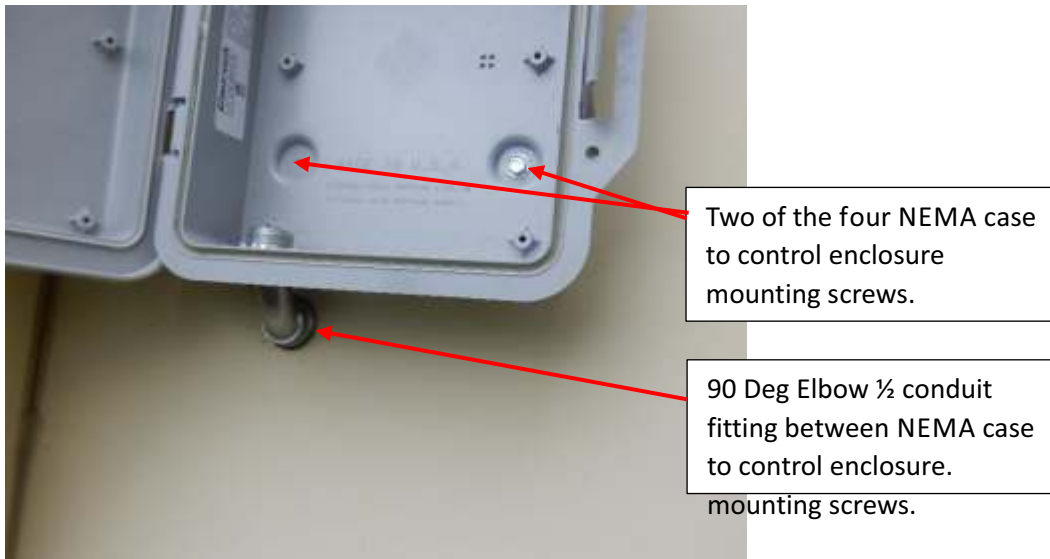
Figure 6 ADRES NEMA case installed on back of AKPM802 enclosure showing 90 Deg elbow.

7. Reinstall the ADRES controller in the NEMA case using the quantity 6 #4 x 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 5 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 7 ADRES controller mounted in NEMA case.

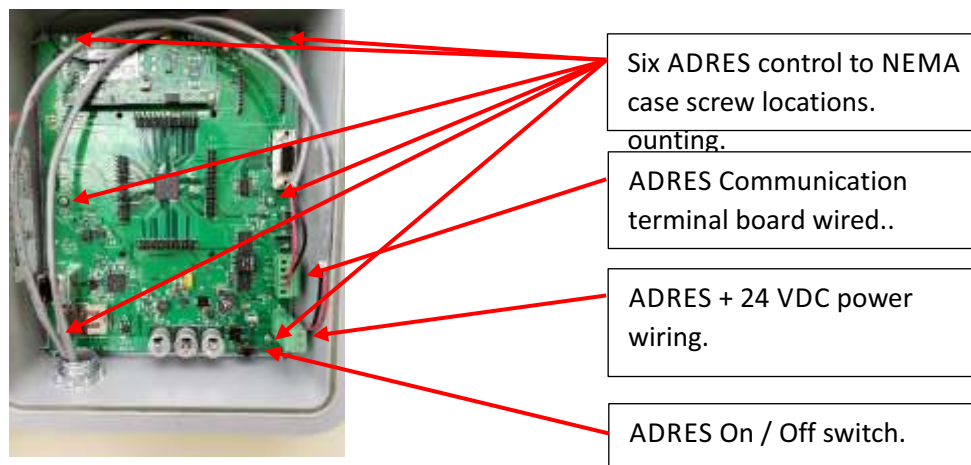8. Feed two belden or equal cables through the elbow and into the APM802 enclosure. Note which one is for power and which is for communication.

9. Install a DIN rail of approximately 4 inches vertically in the APM802 enclosure backplane with two ¾ long self tapping sheet metal screws under the upper horizontal mounted Terminal Board pins 55 and 56 on the right side of the terminal strip. Clip the Modbus splitter module P/N tSH-735 CR onto the DIN rail as shown in the photograph below.

DIN rail mounting.

Modbus splitter COM 1 to Remote Annunciator.

Modbus splitter COM 2 to ADRES controller.

Modbus splitter COM 3 to APM802 Controller.
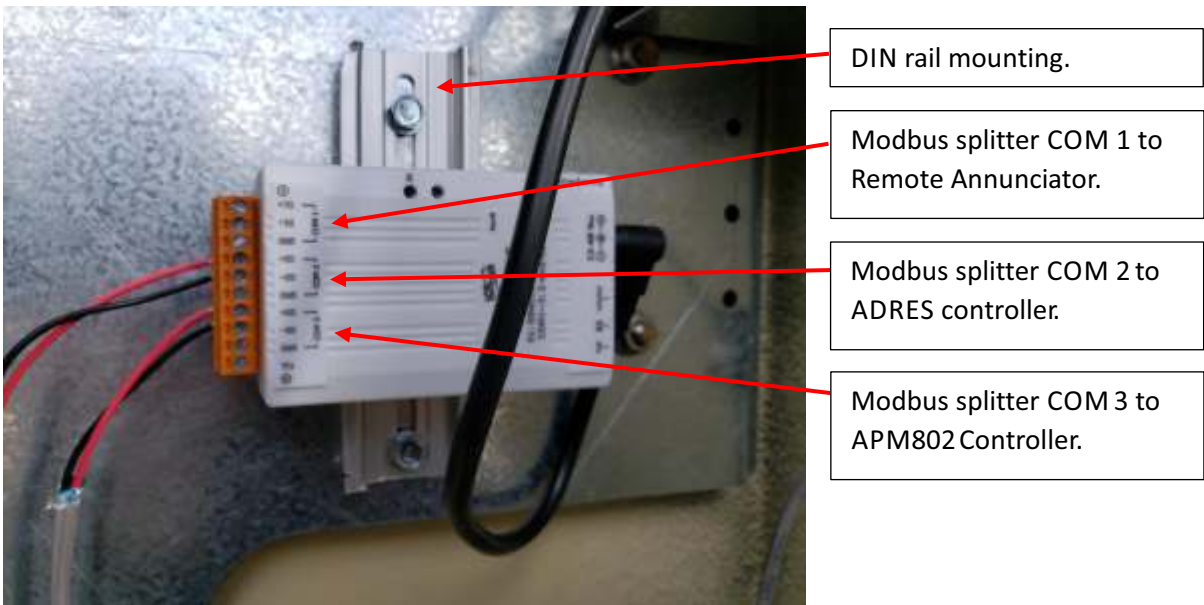
Figure 8 Modbus Splitter on DIN Rail.

10. Land the +24 VDC power supply wires for both the ADRES and Modbus splitter onto pin 70 (+24 VDC RED) and pin7N (GND Black) of the terminal strip. Refer to wiring diagram on page 2-1 and 2-2.

11. Terminate the ADRES communication wire to COM2 terminals of the splitter, the APM802 communication wires (pin7 and pin8 of terminal strip) 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 without a remote annunciator.
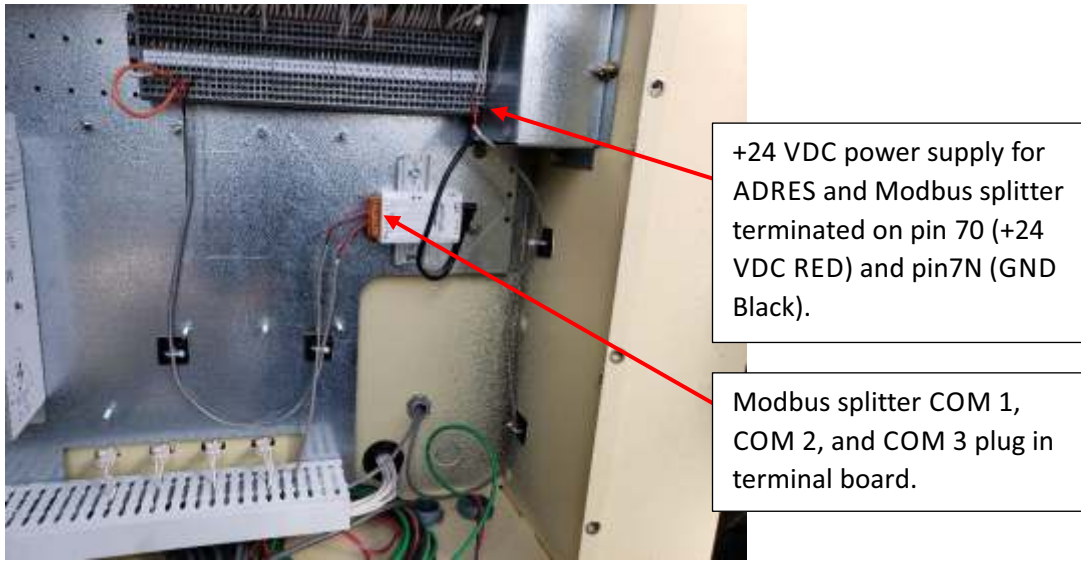
+24 VDC power supply for ADRES and Modbus splitter terminated on pin 70 (+24 VDC RED) and pin7N (GND Black).

Modbus splitter COM 1, COM 2, and COM 3 plug in terminal board.

Figure 9 Completed Installation.

Reference
IG 11

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 APM802 control by reconnecting the fuse holder with the KLK-6A fuse.
5. Confirm with a voltmeter there is +24 VDC on pin 55 of the APM802 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 APM802 touch screen 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 APM802 touchscreen. Confirm that the ADRESPro interface is reflecting the same alarms

14. Obtain permission start the generator from the local Manager and others. Start the Generator while the technician is still local to the Generator.

15. While the generator is running, after about 2 minutes, refresh the ADRESpro webpage to verify that the interface reflects the correct Generator Running status / alarms.

16. Stop the Generator. Refresh the webpage again to verify the n ew Generator status

17. In the ADRESpro Unit Setup page, confirm all the Make, Model, and Part Numbers to make this information available for future maintenance.

18. Return the Generator to AUTO mode, confirm all status lights are correct and the Generator Ready to Run is Green.

19. Close all Enclosure doors and close the ADRES NEMA door.

Figure 2 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.
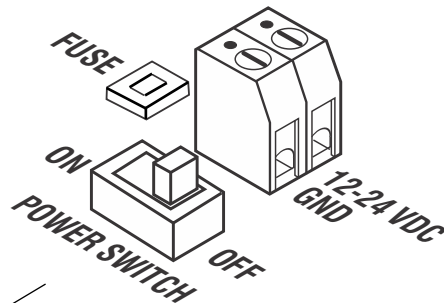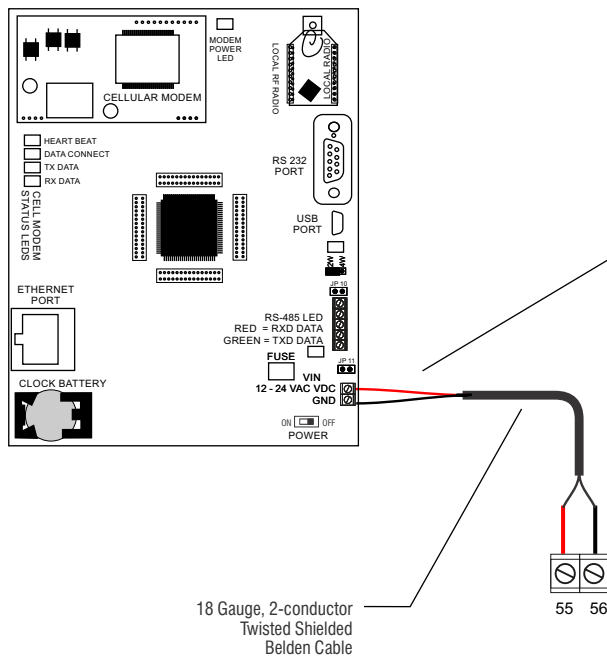
Power On/Off Switch

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.

18 Gauge, 2-conductor Twisted Shielded Belden Cable

To Generator APM802 Main Control Board Terminal Board TB-1 Terminal 55 to +24 VDC Terminal 56 to Ground.

Power Wiring for the ADRES Generator Control Module

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 APM802 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.
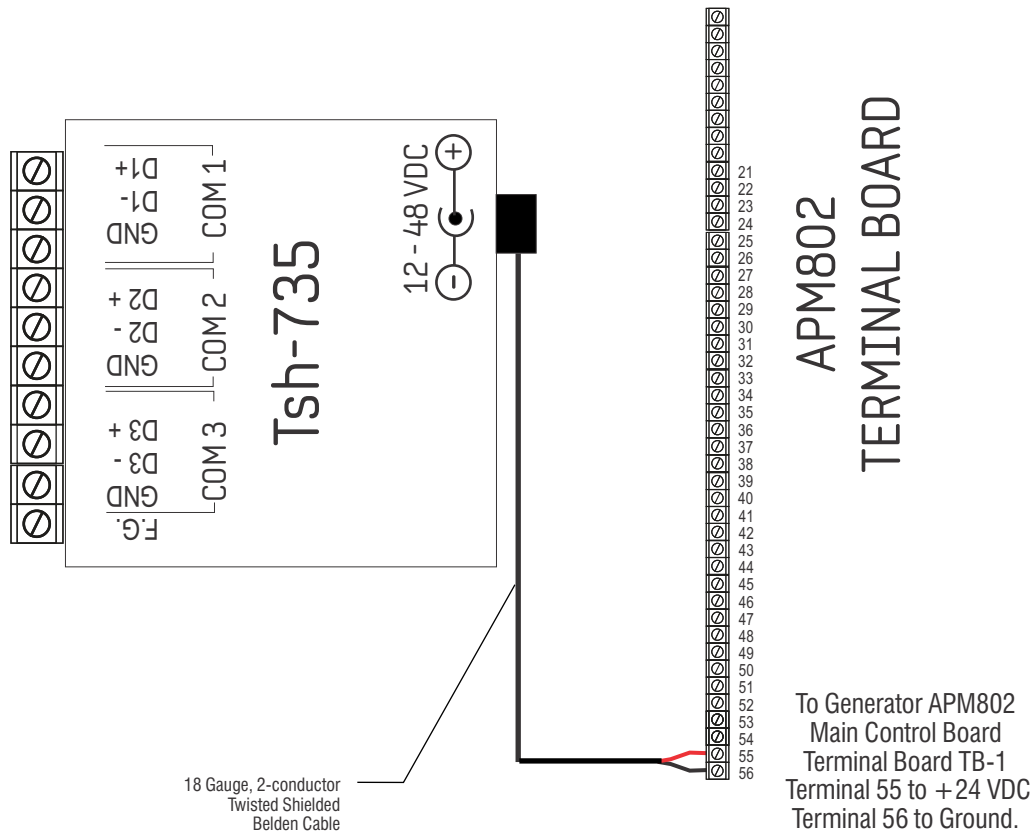
The Modbus splitter module should be connected directly to the battery source and the ADRES Communication board using AWG 18 or larger wire.

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.

To Generator APM802 Main Control Board Terminal Board TB-1 Terminal 55 to +24 VDC Terminal 56 to Ground.

Caution!

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

18 Gauge, 2-conductor Twisted Shielded Belden Cable

ADRES Generator Control
WIRING INSTRUCTIONS

Communications Hard Wiring for the 66200 Communication Board

Hard wiring the ADRES Generator APM802 control module using the RS-485 port on the Kohler Generator

Description

The ADRES Generator control module must be be hard wired to the Kohler Generator APM802 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 APM802 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 7	RED
	COM 2	D -	Terminal 8	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.

TO KOHLER APM802 Remote Annunciator Board

ADRES COMMUNICATION BOARD WITH CELLULAR MODEM P/N 66200
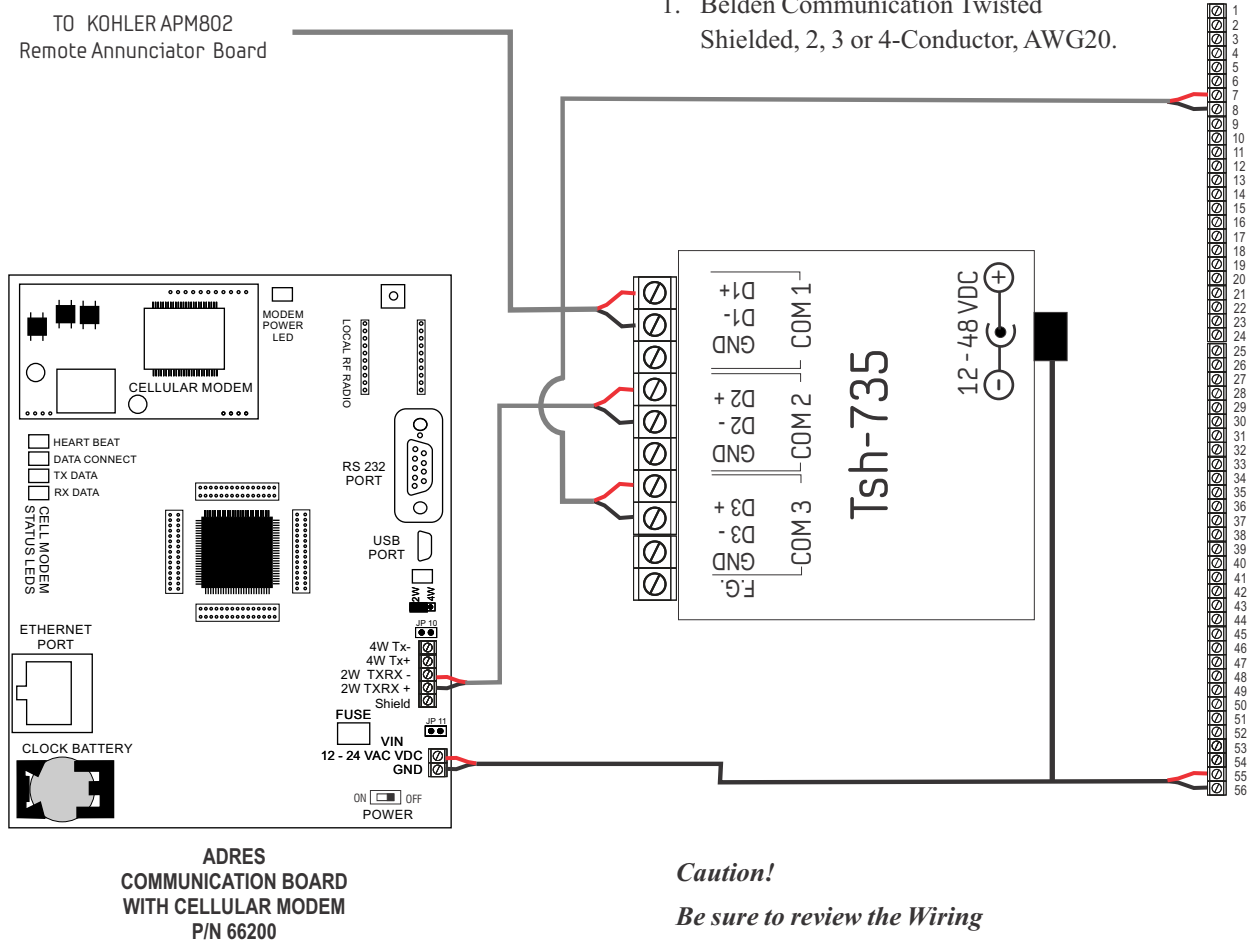
Caution!

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

Reference
WD 03

Revisions

Ltr	Description	Date	Appr'd
N/C	Recommended Installation	10/18/18	RW
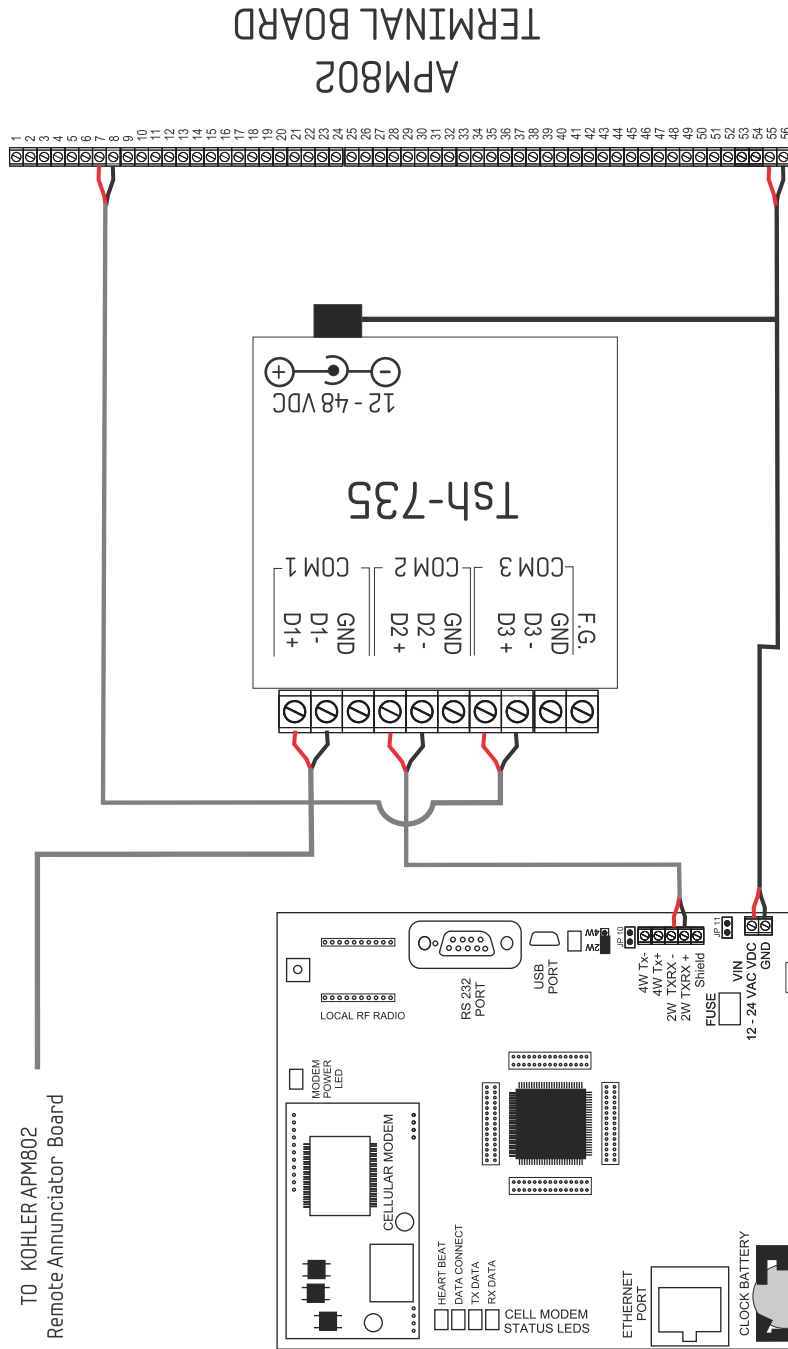
This drawing and the information disclosed thereon are the property of Winn Energy Controls, Inc. The drawing and information are provided on a restricted basis and are not to be used in any way detrimental to WEC.

Kohler Generator
Installation Wiring Diagram
APM802 Interface

	Date	
Project Approved		
R. Winn	10/18/18	
Design	Date	
Check	Date	
Draft	Date	

WEC Project Number

Customer Identification Number

Customer

Winn Energy Controls, Inc.

Drawing Number

DWG-KHL-APM802

Scale

Revision

APM802
TERMINAL BOARD

tSH-735

12 - 48 VDC (+) (−)

COM 1 — D1+ D1- GND
COM 2 — D2+ D2- GND
COM 3 — D3+ D3- GND F.G.

TO KOHLER APM802
Remote Annunciator Board

LOCAL RF RADIO
RS 232 PORT
USB PORT
4W Tx-
4W Tx+
2W TXRX -
2W TXRX +
Shield
FUSE
VIN
12 - 24 VAC VDC
GND
ON OFF POWER

MODEM POWER LED
CELLULAR MODEM
HEART BEAT
DATA CONNECT
TX DATA
RX DATA
CELL MODEM STATUS LEDS
ETHERNET PORT
CLOCK BATTERY

ADRES
COMMUNICATION BOARD
WITH CELLULAR MODEM
P/N 66200

NOTES:
1. Kohler APM802 Interface.
2. tSH-735 CR (Modbus Master Splitter)
3. Remove littlefuse KLK 6A fuse during wiring behind APM802 screen (4th fuse from the left).
4. Confirm communication to both ADRES through ADRESpro and remote annunciator.

Wiring Workmanship Standard

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