I/O Controls

DINEX® Intelligent System Provider

Armando Jimenez
armandoj@iocontrols.com
(626) 610-2293

Presents

DINEX® G4

System Training

Training Agenda

- An Introduction to the DINEX® Multiplex System
- Exploring the G4 Modules
- Understanding Program Structure Through Ladder Logic
- Steps for Downloading Programs to a Module
- Utilizing the Real-Time Monitor
- Overview of the G4/G5-HANDHELD-TOOL
- Essential Troubleshooting Tips
- Q & A

DINEX® G4 Multiplex System

- The DINEX® G4 Multiplex System is an electrical control system designed to interface with bus control systems, managing and regulating specific functions.

DINEX® G4 Multiplex System

- **Master/Node Concept**:
  - All modules communicate with each other.
  - The master module controls the node modules.

- **Master Module Details**:
  - The master module is the G4-MBC-HUB-06A.
  - There is only one master module in the system.
  - The master module is programmable.

- **Node Modules**:
  - There are multiple node modules.
  - Node modules transmit and receive information from the master module.
  - Various types of node modules exist.

Master

Node

DINEX® G4 Multiplex System

- **DINEX® Multiplex Network Specifications**:
  - Utilizes a 250k Baud Rate CAN communication between the Master and Node modules.
  - Only I/O Control modules can be connected to the CAN Network.
  - Requires a 120-ohm "CAN Open" cable.
  - Shielded Cable protects the network from noise interference.

DINEX® *G4* Multiplex System

- DINEX® Multiplex Network
- Consists of 5 wires

FUNCTION
DINEX CAN-H
DINEX CAN-L
DINEX CAN Shield
DINEX +12V Isolated
DINEX GND Isolated

Multiplex Network Power

- PMS = Power Management System
- The PMS module is integrated into the G4-MBC-HUB-06A

Multiplex Network Power

PMS Power Supply is Isolated

- Isolated = Does not utilize the bus chassis for grounding.

Receives 24-32 VDC from batteries

- If battery power drops below 20 VDC, the module will activate a Warning Light.
- If battery power falls below 15 VDC, then the PMS will shut down.

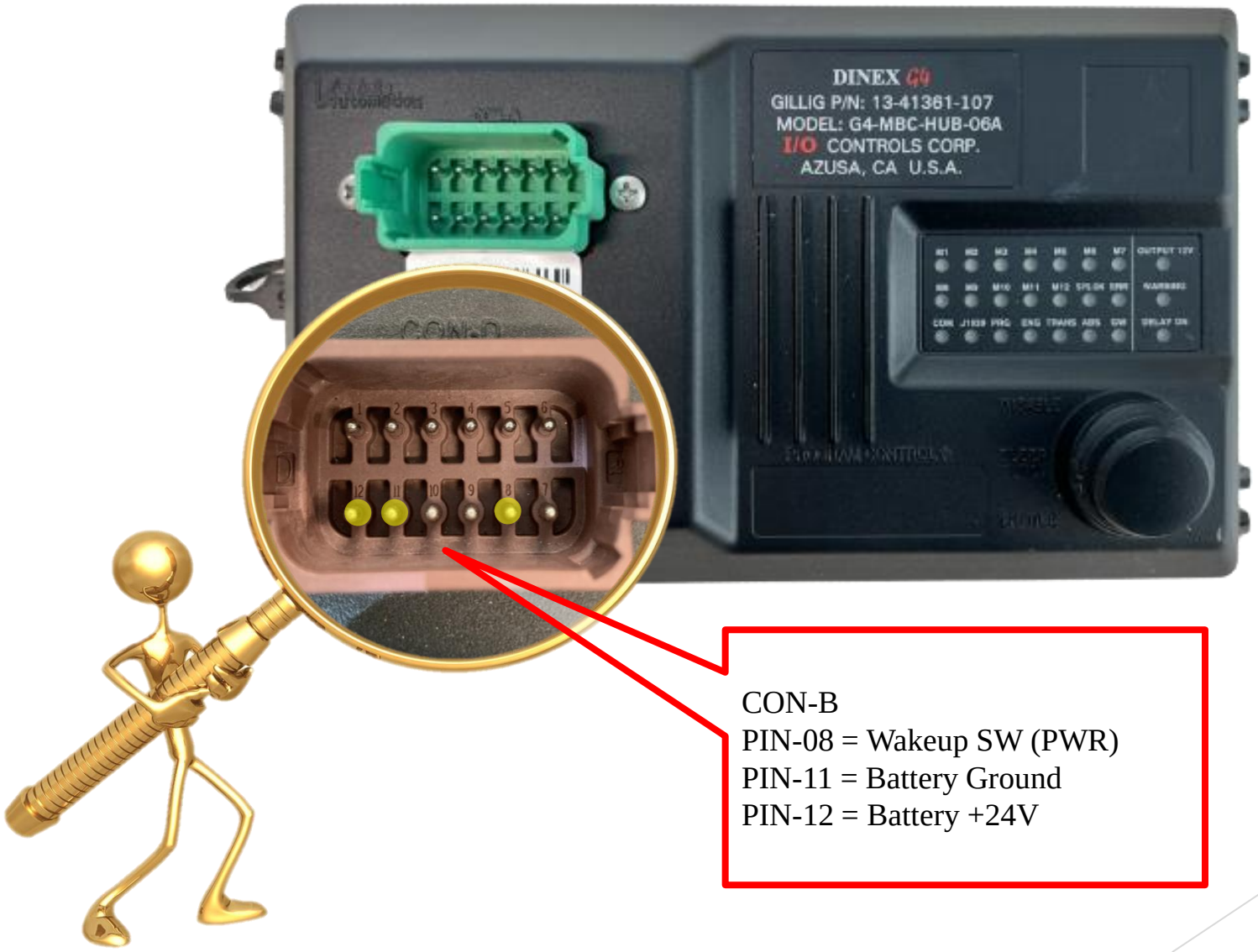
Measure the Multiplex Network power between DINEX +12V Isolated pin and the DINEX GND Isolated pin.

PMS Sleep Function

- The Sleep Function enables the PMS to stop supplying power to the Dinex® system.
  - It conserves battery power.
  - When the Master Switch is OFF, the PMS waits for a pre-programmed duration before entering sleep mode.
    - Other inputs, such as the Hazard Switch and Rear Run Switch, can be used alongside the Master Switch to prevent the PMS from entering sleep mode.
    - The default sleep time is 5 minutes.
  - The Sleep Function can be activated or deactivated using the Sleep Function Switch.

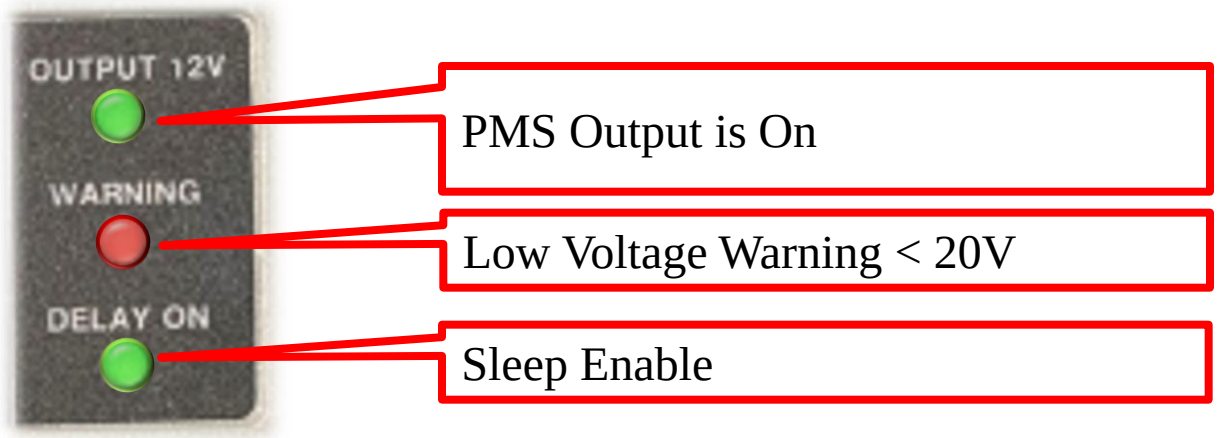
PMS / Battery Power

- The PMS receives +24V from the batteries.



PMS / Ring Loop Power

- There are indicator lights on the PMS module to display its status.



PMS / Sleep Function

- Sleep Function Switch on PMS module

Module and Zone Concept

Modules

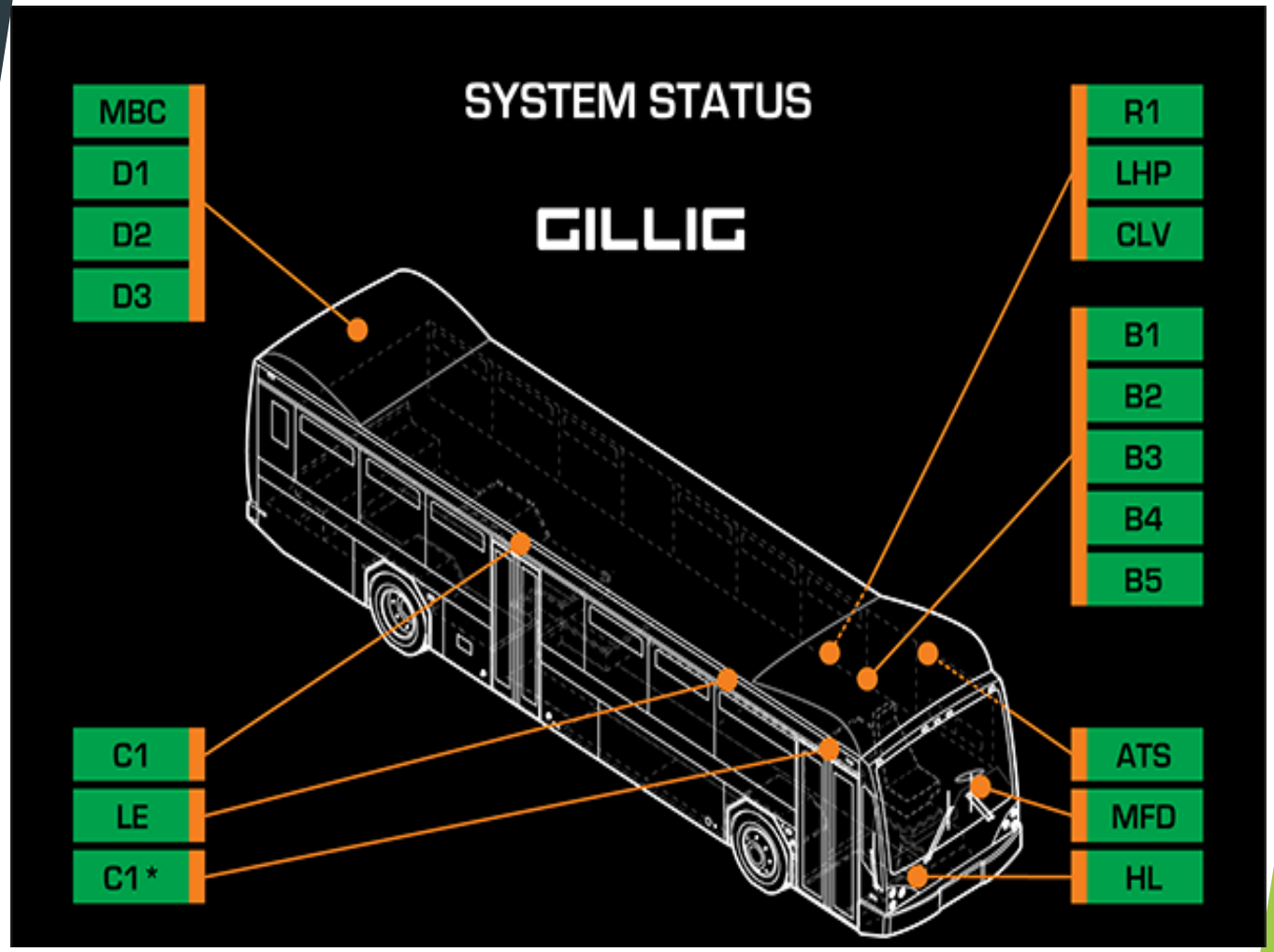
The network functional unit is essential in providing the communication link to input and output (I/O) devices, ensuring effective data transfer between them.

Zones

The exact location of the modules on the bus. It is possible to have multiple modules within one designated zone.

Module and Zone Concept

- Example of Zone Concept



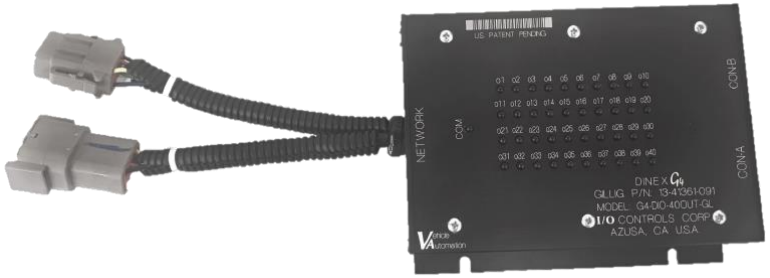
G4 Modules


GILLIG
LAMP TEST


DINEX G4
GILLIG P/N: 13-41361-107
MODEL: G4-MBC-HUB-06A
I/O CONTROLS CORP.
AZUSA, CA U.S.A.


NO DATA
0
MPH
MILES
CHECK 24V SYS
STARTER
SPEED SWITCH
CHECK 12V SYS
AUX MENU
NO CHARGE


DINEX G4
GILLIG P/N: 13-41361-090
MODEL: G4-DIO-16/16-GL
I/O CONTROLS CORP.
AZUSA, CA U.S.A.


US PATENT PENDING
NETWORK
COM
CON-B
CON-A
DINEX G4
GILLIG P/N: 13-41361-091
MODEL: G4-DIO-40OUT-GL
I/O CONTROLS CORP.
AZUSA, CA U.S.A.


MULTIPLEX
DINEX G4
MODEL: G4-GWSYS-01
I/O CONTROLS CORP.
AZUSA, CA U.S.A.
J1939/CAN PORT

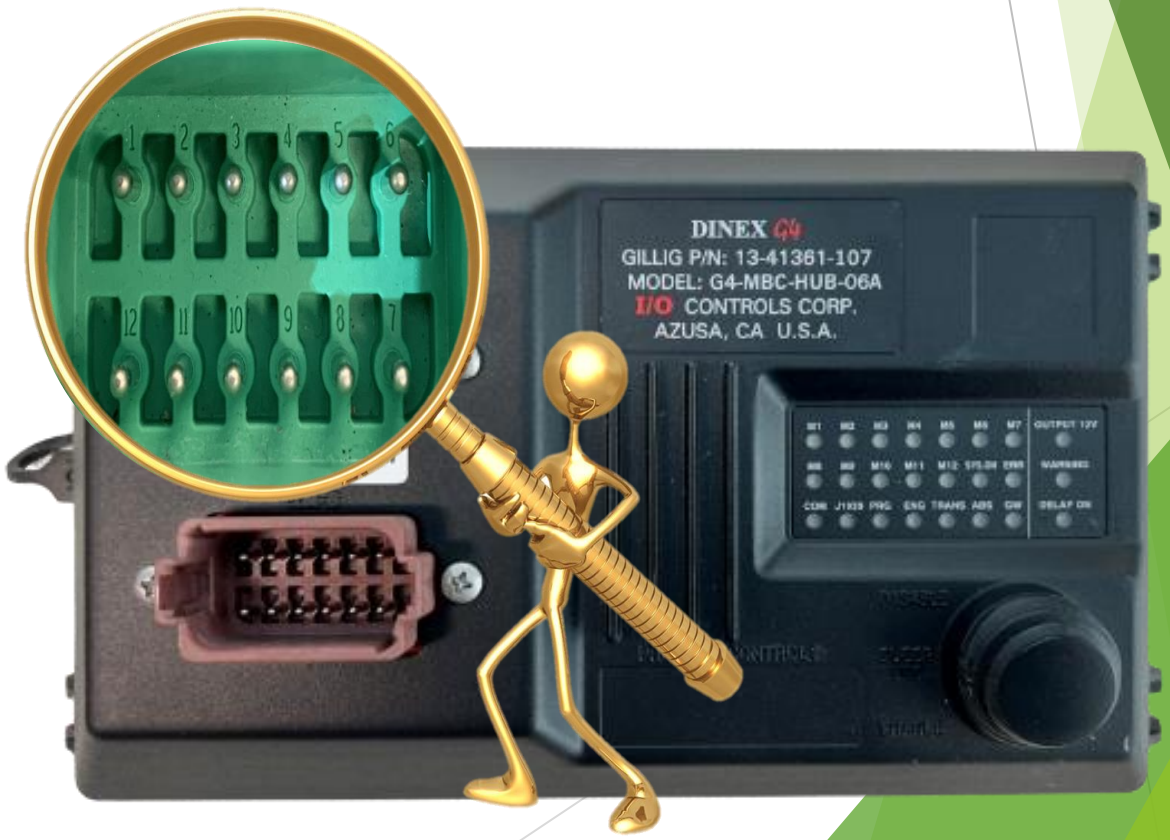
G4 -MBC-HUB-06A

G4-MBC-HUB-06A

- **Master Bus Control:** The MBC Module functions as the Master module, overseeing and controlling the other Node modules.
- **J1939 Heartbeat Monitoring:** It monitors the J1939 heartbeat to ensure continuous and reliable communication.
  - **Engine, ABS, Transmission:** It interfaces with and monitors systems including the engine (Eng.), anti-lock braking system (ABS), and transmission (Trans.).
- **Dual J1939 Gateway:** Equipped with a built-in dual J1939 gateway to manage data flow.
  - **Baud Rate Operations:** The primary J1939 network operates at a baud rate of 500k, while the secondary network operates at 250k.

Green Connector Pinout

CON-A GREEN (DT15-12PC)	
PIN	FUNCTION
1	DINEX CAN-H B
2	DINEX CAN-L B
3	DINEX +12V, Isolated
4	DINEX Ground, Isolated
5	DINEX CAN-SHIELD B
6	N/C
7	Primary J1939 CAN-H 500Kbit
8	Primary J1939 CAN-L 500Kbit
9	Primary J1939 CAN-Shield
10	Secondary CAN-H 250Kbit
11	Secondary CAN-L 250Kbit
12	Secondary CAN-Shield

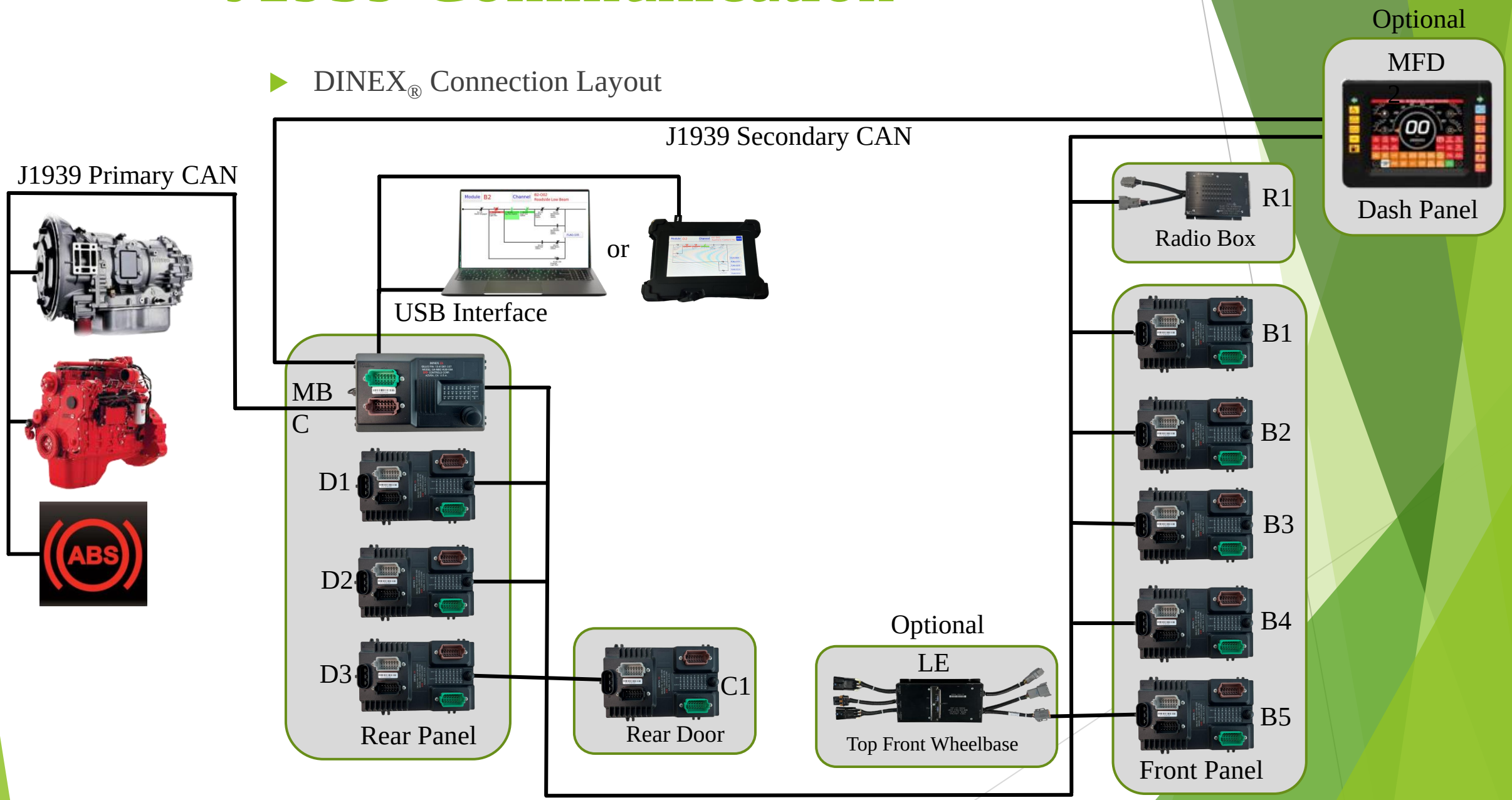


Brown Connector Pinout

CON-B BROWN (DT15-12PD)	
PIN	FUNCTION
1	DINEX CAN-H A
2	DINEX CAN-L A
3	DINEX +12V, Isolated
4	DINEX Ground, Isolated
5	DINEX CAN-SHIELD A
6	Download Enable
7	N/C
8	Wakeup Switch PMS (PWR)
9	DA (Program for PMS)
10	DB (Program for PMS)
11	Battery Ground (PMS)
12	Battery+24V (PMS)

J1939 Communication

- DINEX® Connection Layout



J1939 Communication

- **The DINEX G4 System connects to both a Primary and Secondary J1939 network.**

- **Primary Network Connection:** The Primary network links to critical systems such as the engine, transmission, and anti-lock braking system (ABS).
- **Secondary Network Connection:** The Secondary network connects to various other J1939 systems, including gauges, HVAC, and any additional J1939 components.

- **The G4-MBC-HUB-06A facilitates the transmission and reception of data over the J1939 networks.**

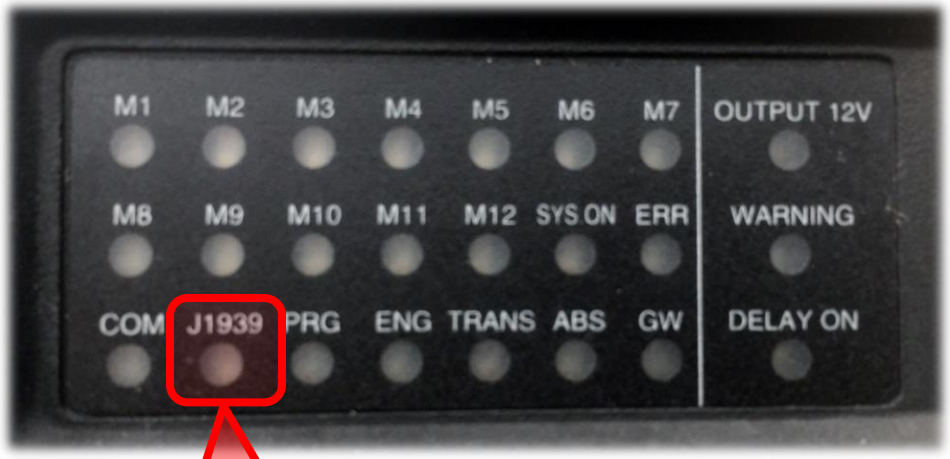
- The received signals are converted into ON/OFF (digital) signals for the MBC program.
- The transmitted signals are defined by the MBC program and are sent in accordance with the SAE J1939 standard.

J1939 Communication

- **Regulates data between the Primary J1939 and the Secondary J1939 networks:**
  - Only data specified by the bus manufacturer is allowed to pass between the J1939 networks.
  - All data is allowed from Primary J1939 to the Secondary J1939, but no data is allowed from the Secondary J1939 to the Primary J1939.
- **Blocks error frames on one J1939 network from affecting the other.**

J1939 Communication

- **J1939** Indicator



J1939 Status: The J1939 is ON when there is CAN bus traffic on the J1939 network.

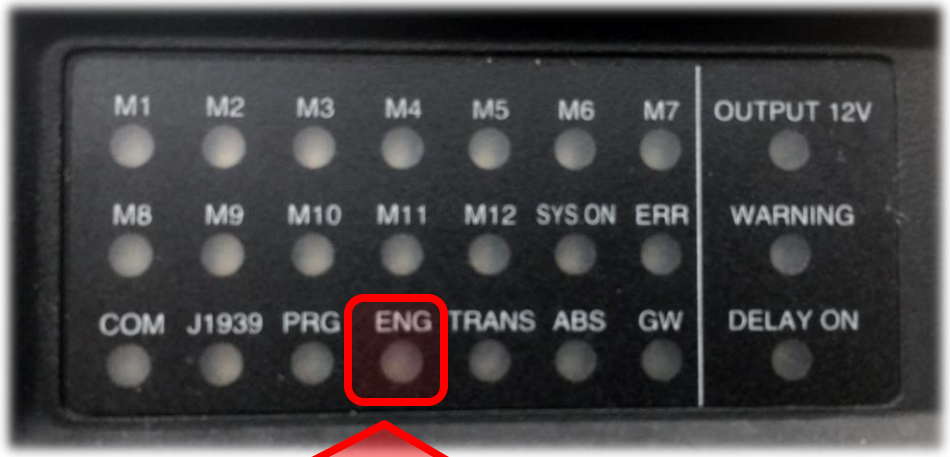
J1939 Communication

- **PRG** Indicator

PRG Status: The PRG is ON when a program is being downloaded to the MBC module or when the Real Time Monitor software is running.

J1939 Communication

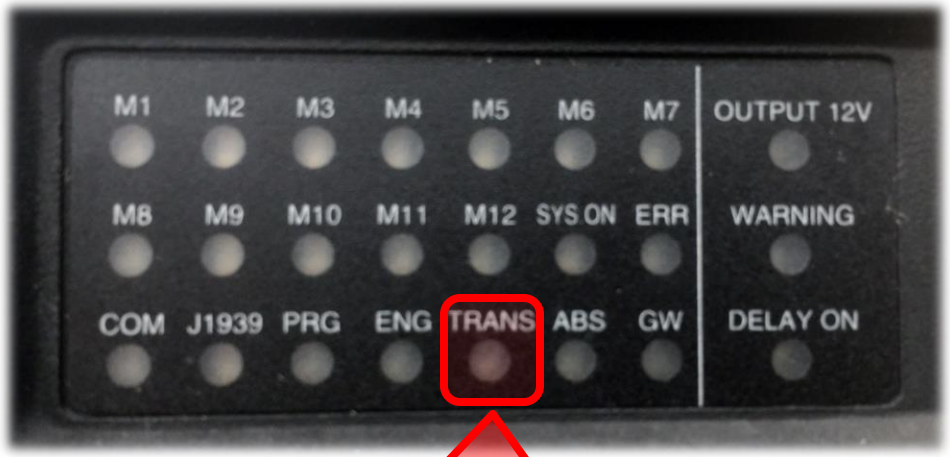
- **ENG** Indicator



ENG Status: The ENG is ON when the MBC detects engine CAN messages.

J1939 Communication

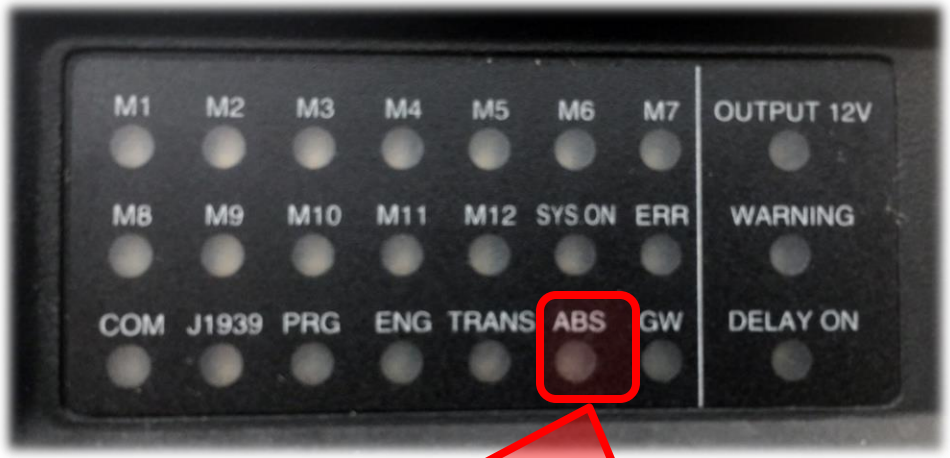
- **TRANS** Indicator



TRANS Status: The TRANS is ON when the MBC detects transmission CAN messages.

J1939 Communication

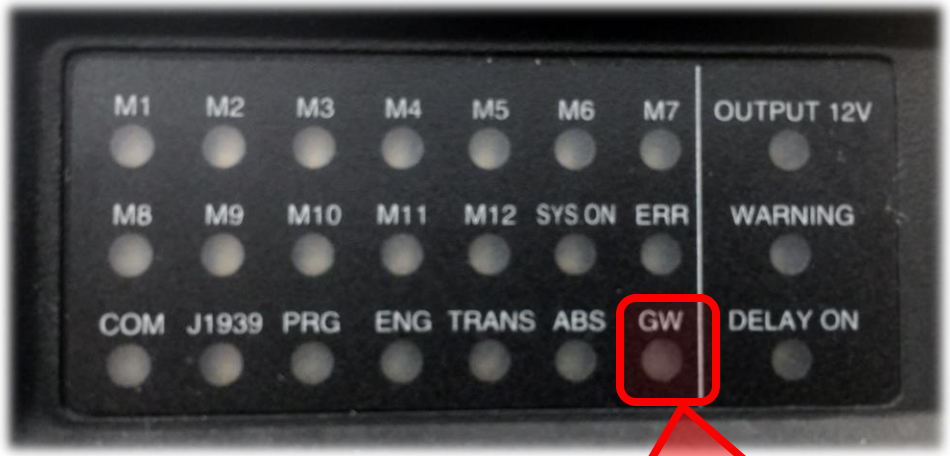
- **ABS** Indicator



ABS Status: The ABS is ON when the MBC detects ABS CAN messages.

J1939 Communication

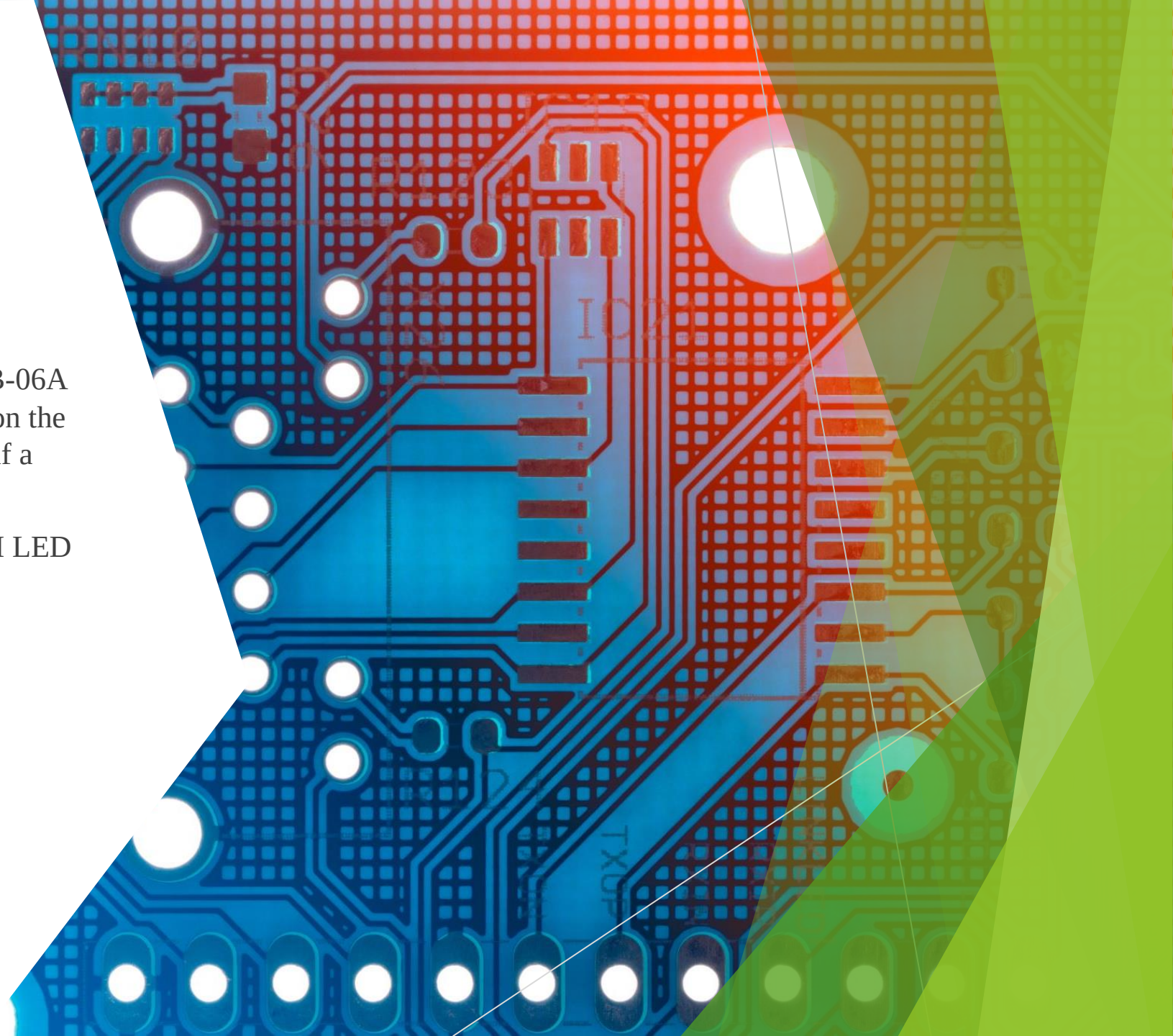
- **GW** Indicator



GW Status: The GW is “ON” when the internal gateway is active and ready to communicate.

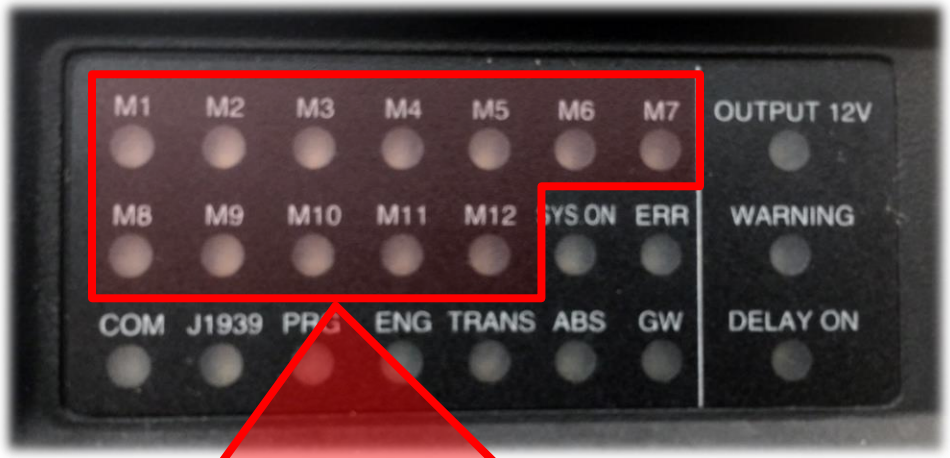
G4-MBC-HUB-06A

- **Communication Indicators:**
  - **Module Monitoring:** The G4-MBC-HUB-06A can monitor up to 12 multiplex modules on the DINEX Multiplex Network and indicate if a module fails to communicate.
  - **COM LED Indicator:** A dedicated COM LED indicates if the program is running.



G4 -MBC-HUB-06A

- **M1 to M12** Indicators



Module Status Indicators (M1 to M12): These indicators are "ON" when a module is communicating with the MBC, and "OFF" when a module is not communicating.

G4 -MBC-HUB-06A

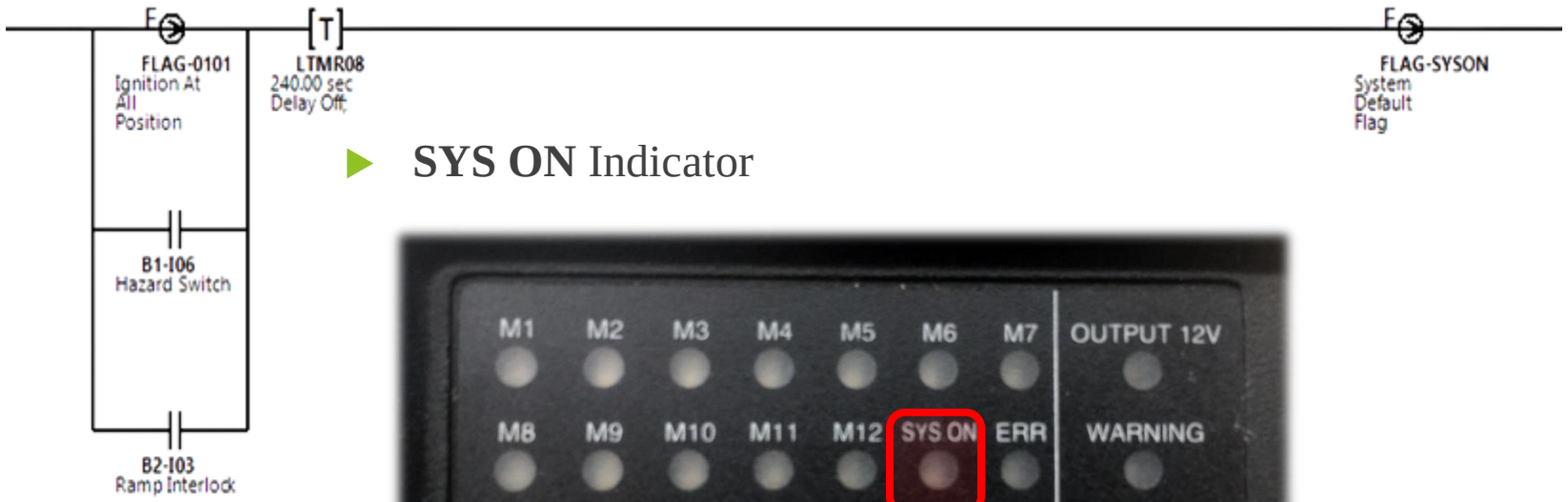
- Dinex Multiplex Communication Status, designated **M1 to M12**
  - **M1** = ID# 64, Module B1 G4-DIO-1616-GL
  - **M2** = ID# 65, Module B2 G4-DIO-1616-GL
  - **M3** = ID# 66, Module B3 G4-DIO-1616-GL
  - **M4** = ID# 67, Module B4 G4-DIO-1616-GL
  - **M5** = ID# 68, Module B5 G4-DIO-1616-GL
  - **M6** = ID# 69, Module C1 G4-DIO-1616-GL
  - **M7** = ID# 70, Module D1 G4-DIO-1616-GL
  - **M8** = ID# 71, Module D2 G4-DIO-1616-GL
  - **M9** = ID# 72, Module D3 G4-DIO-1616-GL
  - **M10** = ID# 88, Module R1 G4-DIO-40OUT-GL
  - **M11** = ID# 93, Module A1 G4-48LED-02-GL
  - **M12** = ID# 84, Module LE DL-CM2-007

G4 -MBC-HUB-XX

- **COM** LED

COM Status: The COM indicator flashes when the MBC program is transmitting and receiving data over the DINEX network.

G4 -MBC-HUB-XX

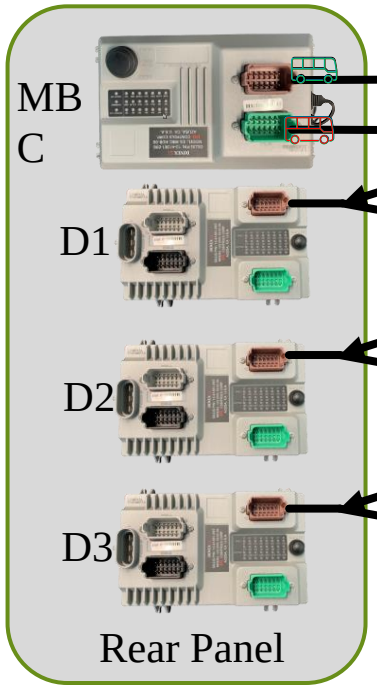


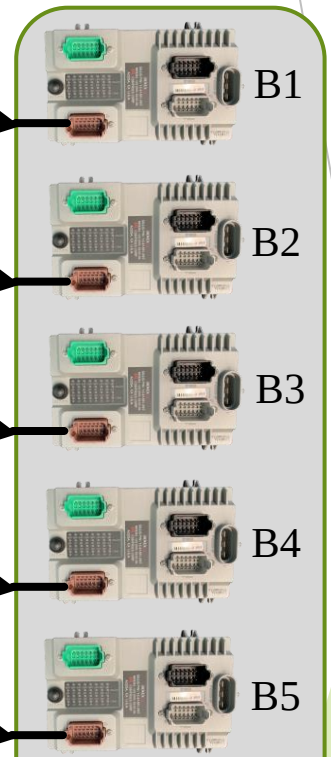
- **SYS ON** Indicator

SYS.ON Status: This is an MBC program keep-awake signal to prevent the Power Management System (PMS) from entering Sleep Mode.

- **ERR** Indicator

ERR Status: The ERR indicator is ON when Dinex Network communication is broken between Dinex Network A and Dinex Network B.






G4 -DIO-1616-GL

G4 -DIO-1616-GL

G4 -DIO-1616-GL Node Module:

- Must be used with an MBC module.
- Digital Input & Output (DIO).
- Not programmable.
- Wire harness configured ID#.
- 16 input channels.
- 2 optional analog channels.
- 16 output channels.

G4-DIO-1616-GL

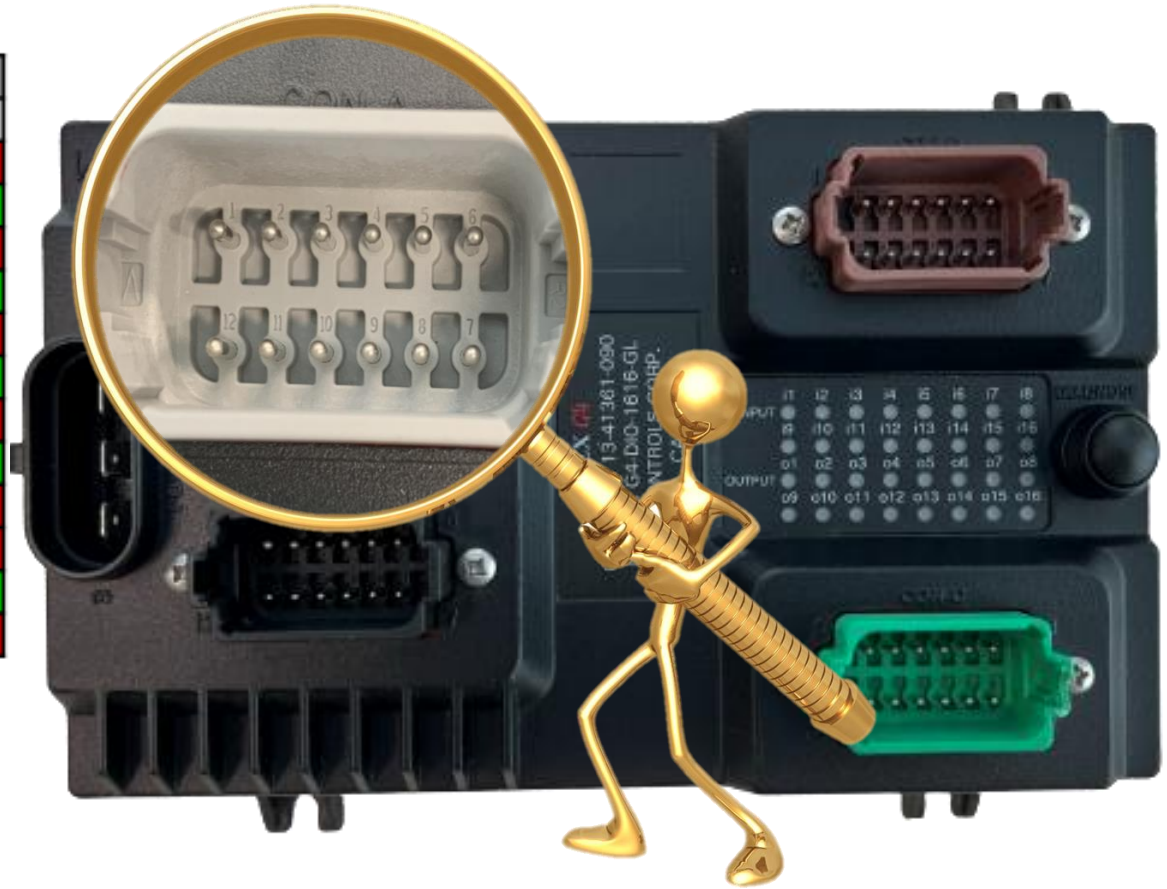
Inputs:

- Can be configured as Power or Ground inputs.
- The Input Common determines the type of input.
- **Input 1-6 Common:** CON-C, PIN-08.
- **Input 7-14 Common:** CON-C, PIN-09.
- **Input 15-16:** Power inputs only.

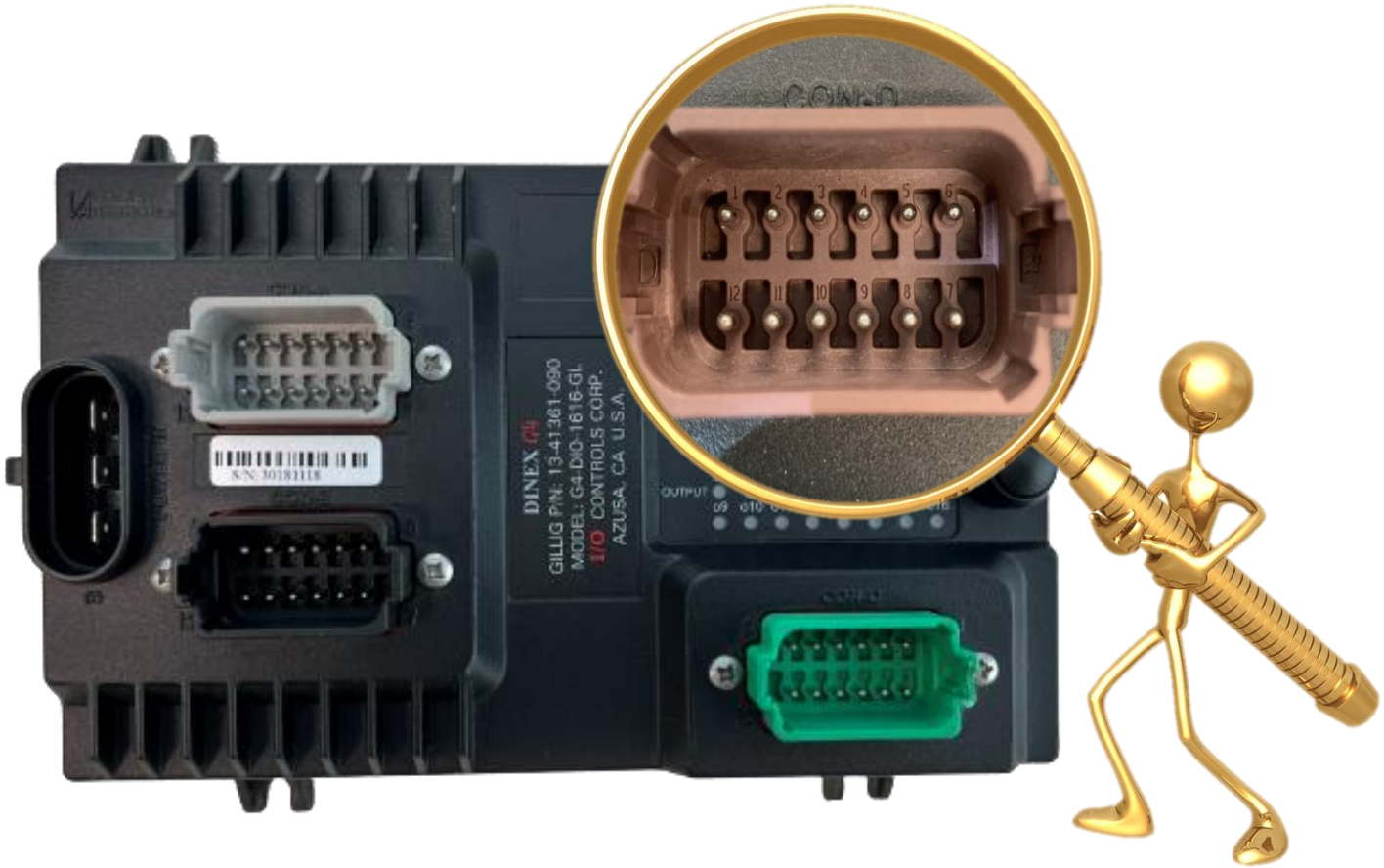
Consult the manufacturer bus information to determine how the inputs are configured.

Gray Connector Pinout

CON-A GREY (DT15-12PA)	
PIN	FUNCTION
1	Output 5 (5.0A)
2	Input 1
3	Output 6 (5.0A)
4	Input 2
5	Output 1 (10.0A)
6	Input 3
7	Output 2 (10.0A)
8	Input 4
9	Output 7 (5.0A)
10	Output 8 (5.0A)
11	Input 5
12	Output 9 (5.0A)



Brown Connector Pinout



CON-D BROWN (DT15-12PD)	
PIN	FUNCTION
1	DINEX CAN-H
2	DINEX CAN-L
3	12, Isolated
4	Ground, Isolated
5	DINEX CAN-Shield
6	Input 15 (Analog 1)
7	Input 16 (Analog 2)
8	ID Select Ground
9	ID Select ADDR1
10	ID Select ADDR2
11	ID Select ADDR3
12	ID Select ADDR4

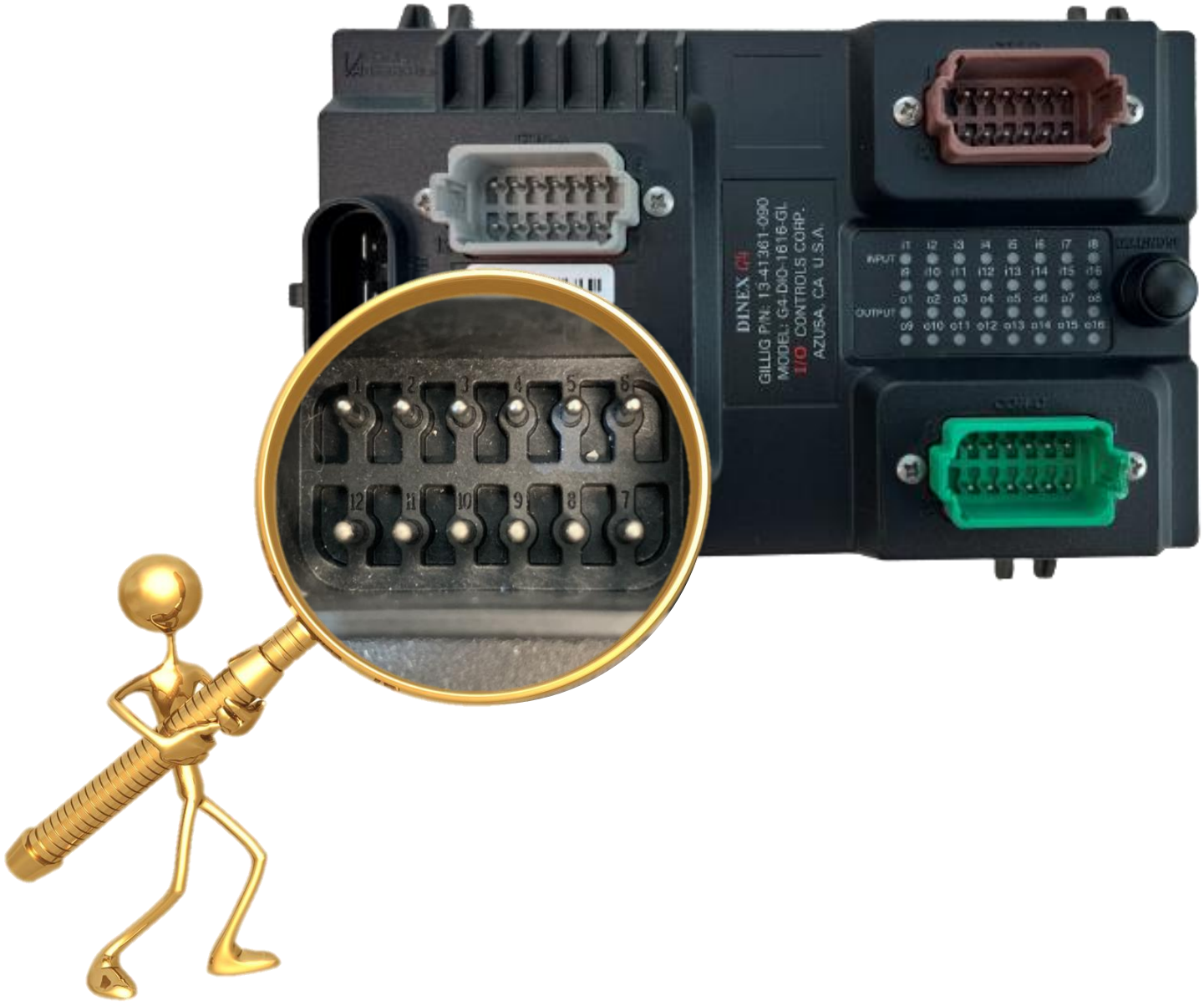
G4-DIO-1616-GL

- **Wire Harness Configured ID#:**
- Each module ID# is configured by the wire harness on CON-D.
- Each module will have a different ID#; modules can't have the same ID#.

CON-D BROWN (DT15-12PD)	
PIN	FUNCTION
1	DINEX CAN-H
2	DINEX CAN-L
3	12, Isolated
4	Ground, Isolated
5	DINEX CAN-Shield
6	Input 15 (Analog 1)
7	Input 16 (Analog 2)
8	ID Select Ground
9	ID Select ADDR1
10	ID Select ADDR2
11	ID Select ADDR3
12	ID Select ADDR4

Module ID Selection/Jump Table (REF: CON D)	
ID	Jump Pins
64	8-9-10-11-12
65	8-10-11-12
66	8-9-11-12
67	8-11-12
68	8-9-10-12
69	8-10-12
70	8-9-12
71	8-12
72	8-9-10-11
73	8-10-11
74	8-9-11
75	8-11
76	8-9-10
77	8-10
78	8-9

Black Connector Pinout

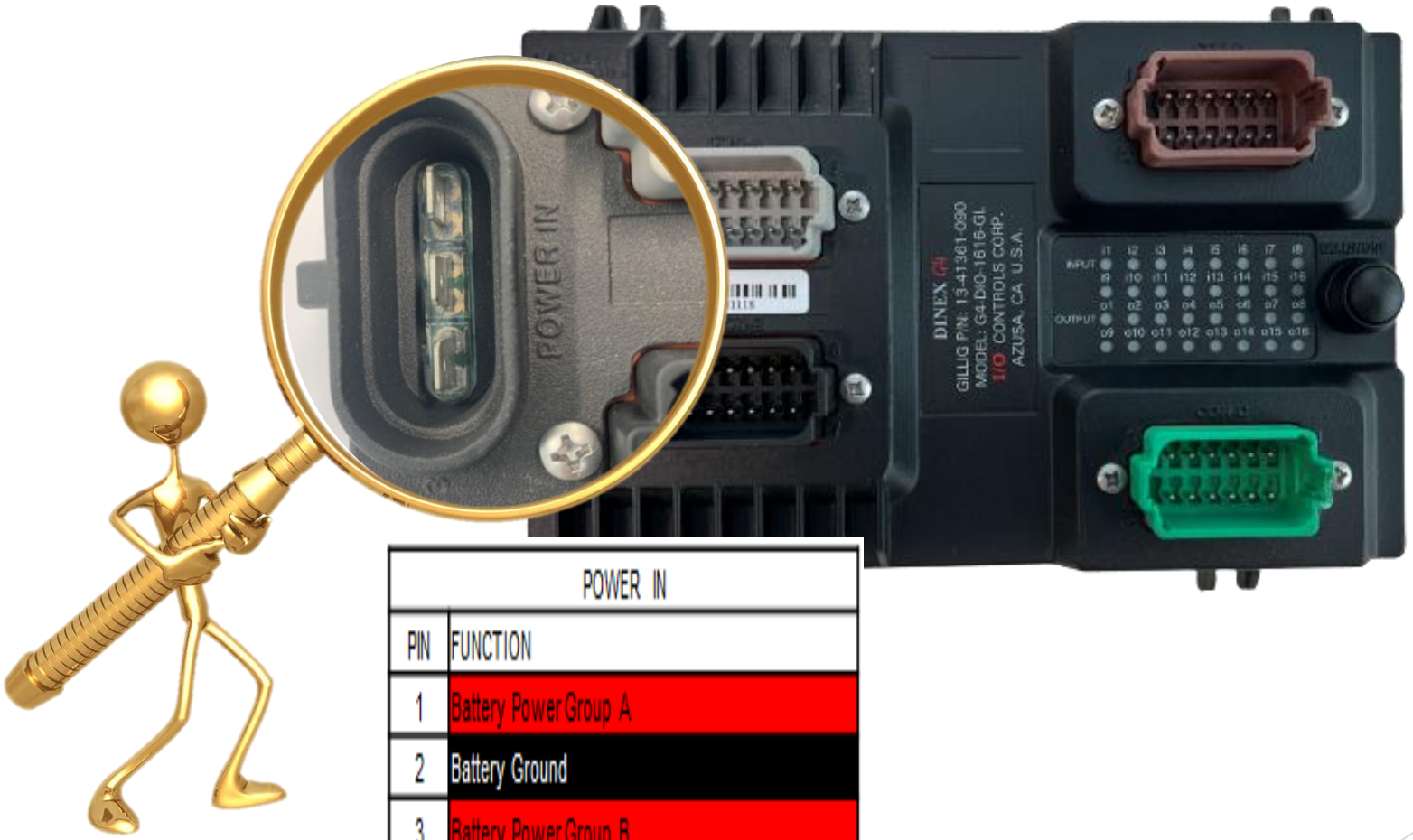


CON-B BLACK (DT15-12PB)	
PIN	FUNCTION
1	Output 10 (5.0A)
2	Input 6
3	Output 11 (5.0A)
4	Output 12 (5.0A)
5	Input 7
6	Output 3 (10.0A)
7	Input 8
8	Output 4 (10.0A)
9	Input 9
10	Output 13 (5.0A)
11	Input 10
12	Input 11

Green Connector Pinout

CON-C GREEN (DT15-12PC)	
PIN	FUNCTION
1	Output 14H (0.12A)
2	Output 14L (0.12A)
3	Output 15 (Sink 1.0A)
4	Output 16 (Sink 1.0A)
5	Output 15-16 COM Ground
6	Input 13
7	Input 14
8	Input COM 1-6
9	Input COM 7-14
10	COM Ground
11	COM Power
12	Input 12

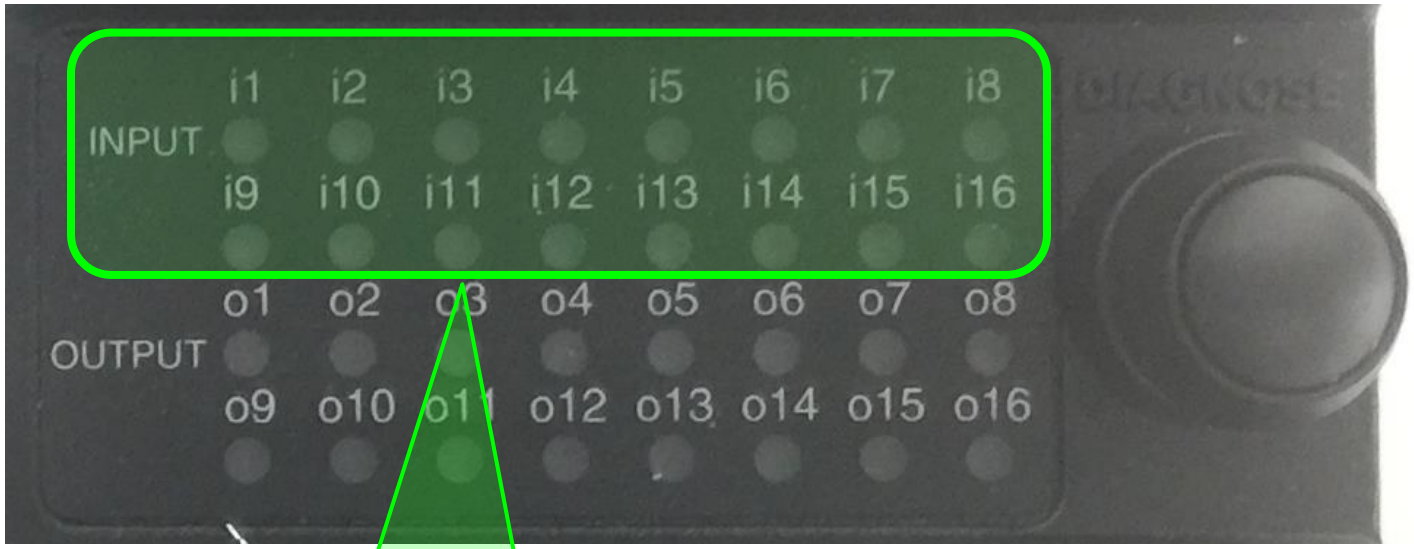
Connector “POWER IN” Pinout



POWER IN	
PIN	FUNCTION
1	Battery Power Group A
2	Battery Ground
3	Battery Power Group B

G4-DIO-1616-GL

- Inputs Indicators



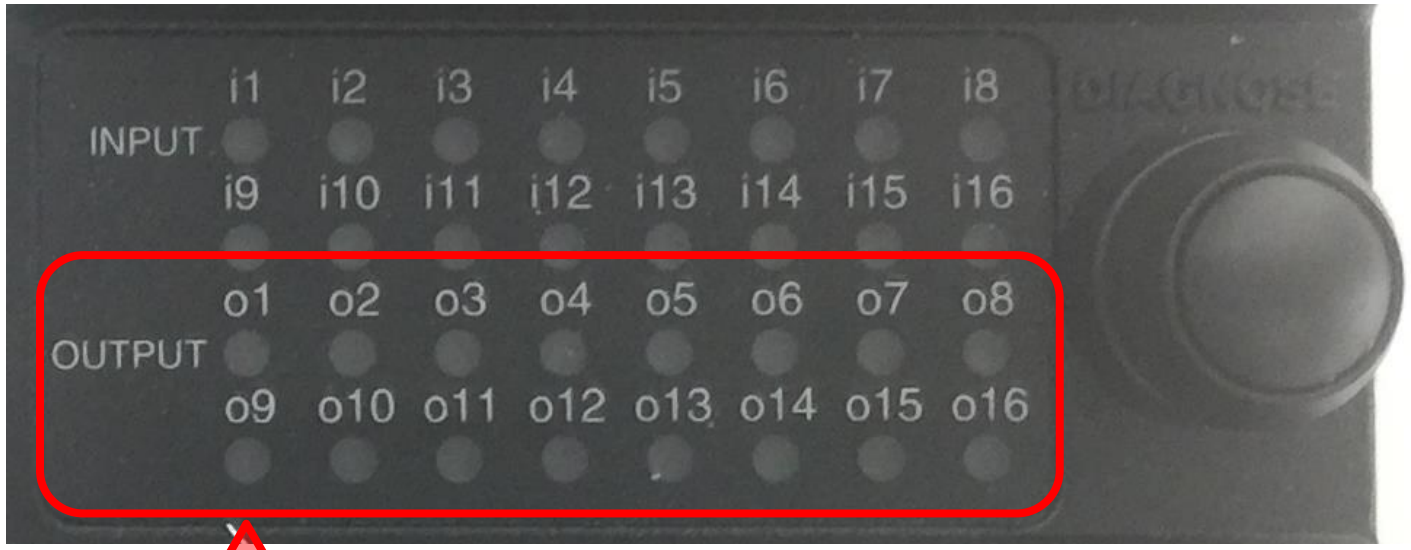
Green Input Indicator Lights:
On = Input is ON
Off = Input is Off

G4 -DIO-1616-GL

- **Inputs 15 & 16:**
- Can be used as either digital or analog inputs.
- Analog inputs will not activate the indicator LED.
- Analog inputs operate between 0 – 5 VDC.
- Analog input data can then be read by the MBC to be used in the program.

G4-DIO-1616-GL

- Output Indicators



Red Output Indicator Lights:
On = Output is ON
Off = Output is Off

G4 -DIO-1616-GL

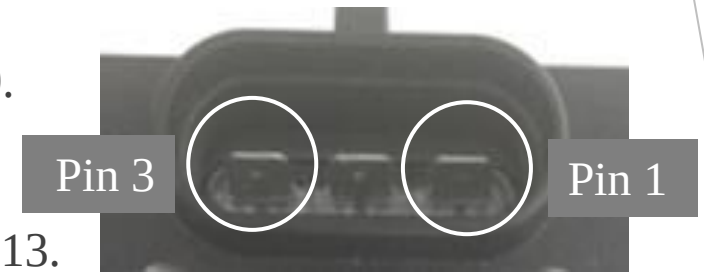
- **Outputs Protection:**
- Outputs are protected by smart fuses.
- If the module detects an overload or short circuit, the smart fuse automatically cuts off power to the output.
- The output indicator light will turn OFF, and no power will be supplied to the load.
- The smart fuse will automatically reset when the output state is cycled (i.e., when the output channel is turned from ON to OFF and then back to the ON state).

G4-DIO-1616-GL

- Outputs 1,2,3 & 4
  - Outputs 1, 2, 3, and 4 can be configured to be PWM outputs.
  - 100 Hz, 10% through 100% duty cycle

G4-DIO-1616-GL

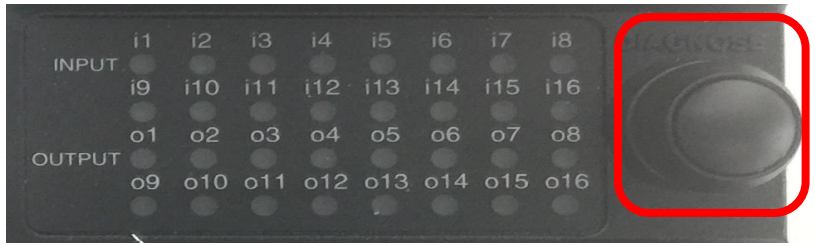
- **POWER IN Connector:**
- **PIN-01:** Output Power for channels 1, 2, 5, 6, 7, 8, and 9.
- **PIN-02:** Chassis Ground (GND).
- **PIN-03:** Output Power for channels 3, 4, 10, 11, 12, and 13.



- **Special Outputs (14, 15 & 16):**
- **Output 14 Configuration:**
  - Can be configured as Power or Ground Output.
  - For Power Output: connect Pin 1 from Con-C OUTPUT 14H to Power and Pin 2 from Con-C OUTPUT 14L to Load (.12A).
  - For Ground Output: connect Pin 2 from Con-C OUTPUT 14L to Ground and Pin 1 from Con-C OUTPUT 14H to Load.
- **Outputs 15 & 16:**
  - Ground Outputs.

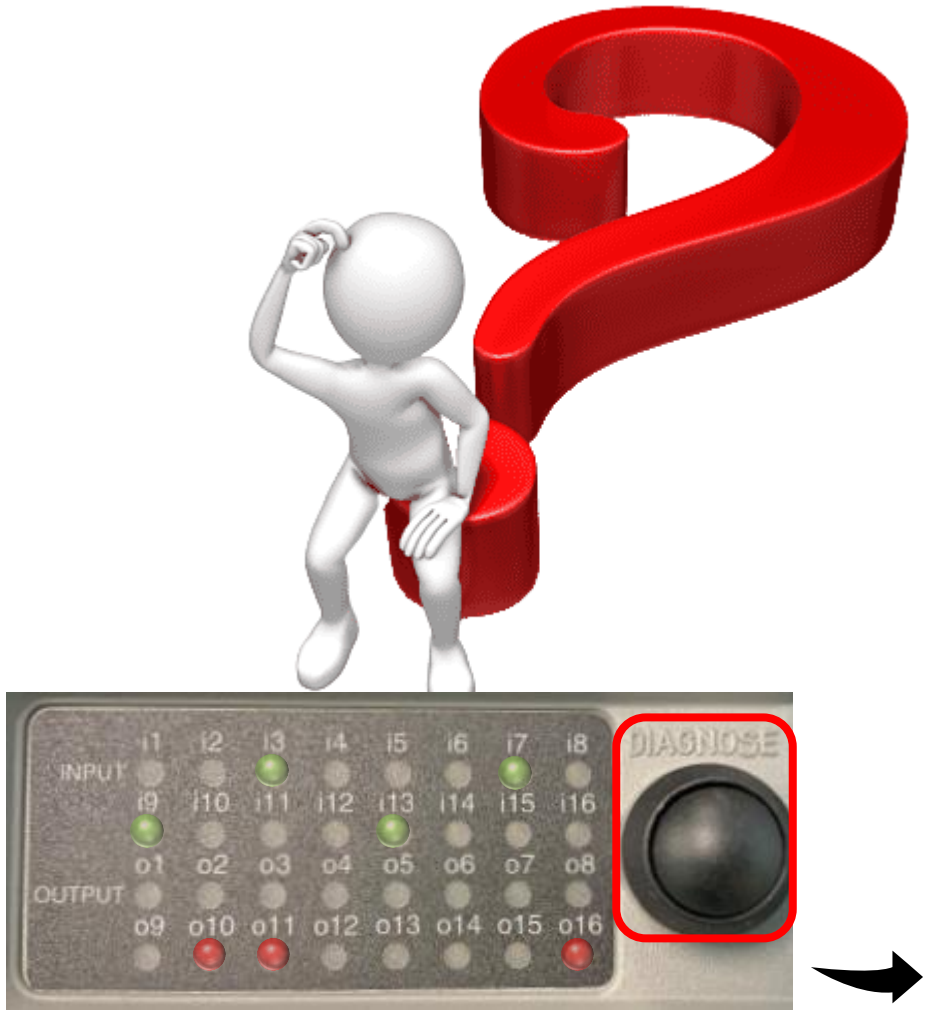
CON-C GREEN (DT15-12PC)	
PIN	FUNCTION
1	Output 14H (0.12A)
2	Output 14L (0.12A)
3	Output 15 (Sink 1.0A)
4	Output 16 (Sink 1.0A)
5	Output 15-16 COM Ground
6	Input 13
7	Input 14
8	Input COM 1-6
9	Input COM 7-14
10	COM Ground
11	COM Power
12	Input 12

G4-DIO-1616-GL



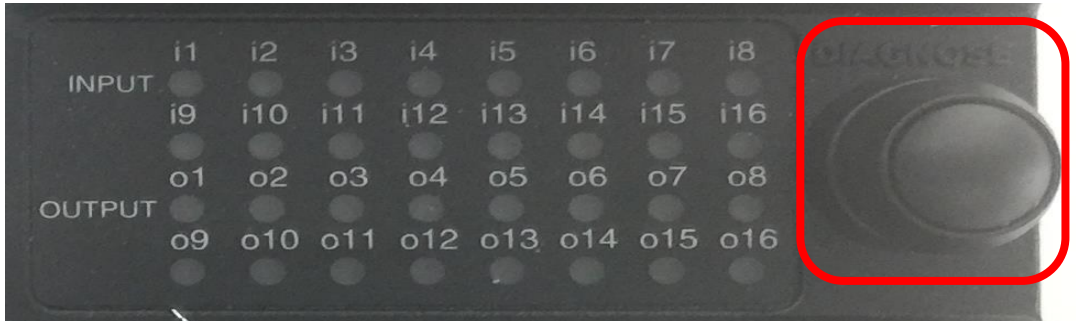
- **Press and Hold the DIAGNOSE Button:**
- The first 10 seconds will display:
  - Inputs status
  - Module ID
    - **O09:** ID Select ADDR1
    - **O10:** ID Select ADDR2
    - **O11:** ID Select ADDR3
    - **O12:** ID Select ADDR4
- **Output, O16:** On = Module Communicating, Off = Module is not Communicating

G4 -DIO-1616-GL

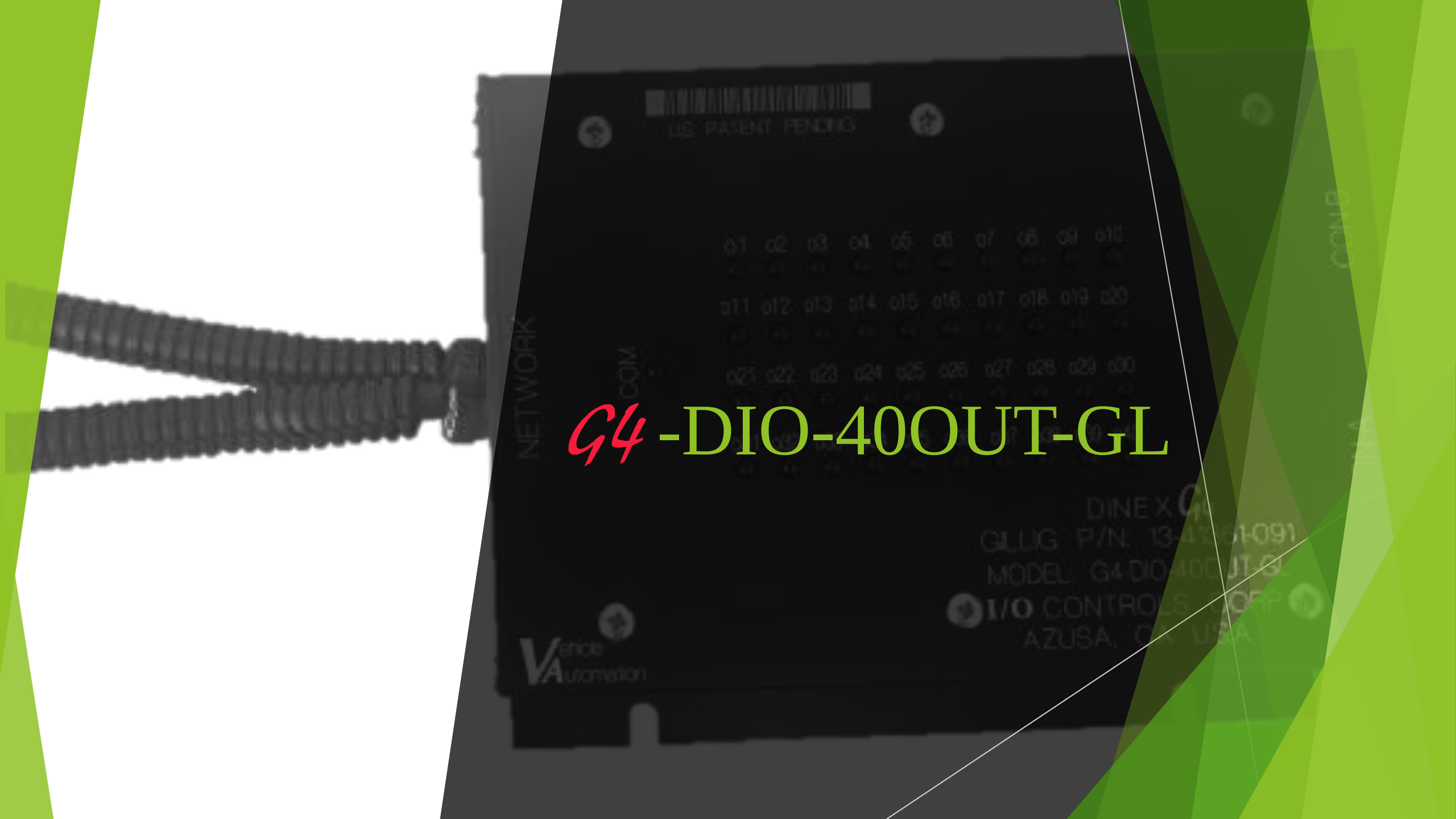


Module ID Selection/Jump Table (REF: CON D)	
ID	Jump Pins
64	8-9-10-11-12
65	8-10-11-12
66	8-9-11-12
67	8-11-12
68	8-9-10-12
69	8-10-12
70	8-9-12
71	8-12
72	8-9-10-11
73	8-10-11
74	8-9-11
75	8-11
76	8-9-10
77	8-10
78	8-9

G4-DIO-1616-GL



- **Press and Hold the DIAGNOSE Button:**
- After 10 seconds, the display will change to show the following:
  - **Input Indicators:** Still display input status.
  - **O01 to O13:** Indicate outputs load status:
    - Load Normal: Off.
    - Load Under Threshold Current: Flashes 800 msec ON, 800 msec OFF.
    - Load Overload: Flashes 400 msec ON, 400 msec OFF.
    - Load Short Circuit: Flashes 60 msec ON, 60 msec OFF.
  - **O15 and O16:** Always Off.



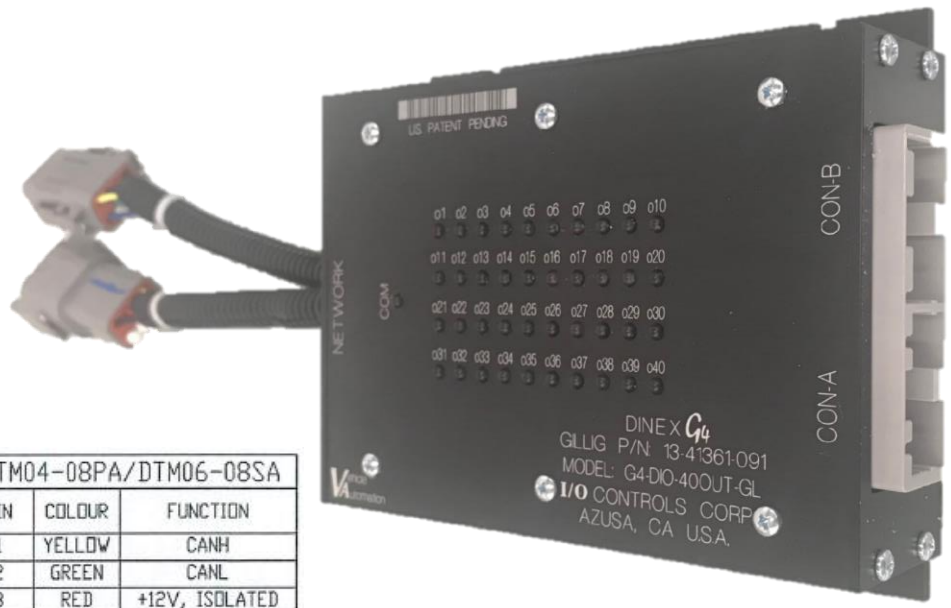
G4-DIO-40OUT-GL

G4-DIO-40OUT-GL

G4-DIO-40OUT-GL Node Module:

- Must be used with an MBC module.
- 40 Low Power Output Module.
- Used in video and ITS systems.
- Not programmable.
- Fixed ID#.

G4 -DIO-40OUT-GL

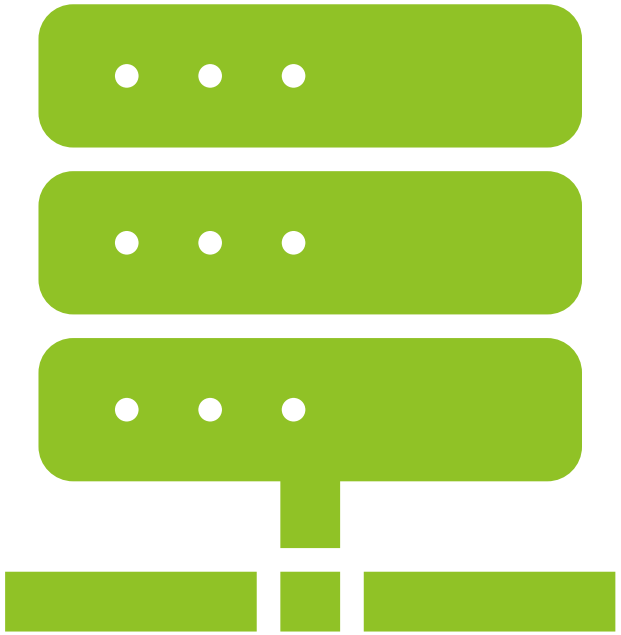


DTM04-08PA/DTM06-08SA		
PIN	COLOUR	FUNCTION
1	YELLOW	CANH
2	GREEN	CANL
3	RED	+12V, ISOLATED
4	BLACK	GOUND, ISOLATED
5	NC	
6	NC	
7	NC	
8	BLUE	CAN SHIELD

CONNECOTR	316370-6(GREY) CON-B																							
PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
OUTPUT CHANNEL	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	COM1 OUTPUT 1-5		COM2 OUTPUT 6-13		COM3 OUTPUT 14-24		COM4 OUTPUT 25-40	

CONNECTOR	316370-6(WHITE) CON-A																							
PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
OUTPUT CHANNEL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24


G4 -GW-SYS-01
MULTIPLEX
DINEX G4
MODEL G4-GW-SYS-01
I/O CONTROLS CORP.
AZUSA, CA USA
U.S. PATENT PENDING
J1939/CAN PORT



G4 -GW-SYS-01

G4 -GW-SYS-01 Gateway Module:

- Used with a Clever Device or other devices.
- Used for sending information about Dinex system inputs and outputs continuously.
- Sends J1939 data to the devices.
- Not programmable.
- Fixed ID#.

G4-GW-SYS-01

J1939/CAN PORT	
PIN#	FUNCTION
A	CAN-H (J1939)
B	CAN-L (J1939)
C	GND

MULTIPLEX DTM04-08PA/DTM06-08SA		
1	YEL	MPX CAN_H
2	GRN	MPX CAN_L
3	RED	+12V, ISOLATED
4	BLK	GROUND, ISOLATED
5	N/C	
6	N/C	
7	N/C	
8	BLU	CAN SHIELD

Select your Display

Light Bar

MFD

G4-48LED-02-GL

G4-48LED-04-GL

G4-48LED-04-GL:

- Must be used in conjunction with an MBC module.
- Equipped with 48 LED outputs.
- This module is not programmable.
- Fix ID#

G4-48LED-04-GL

- Lamp Test Input SW.
- Comm. Fault LED

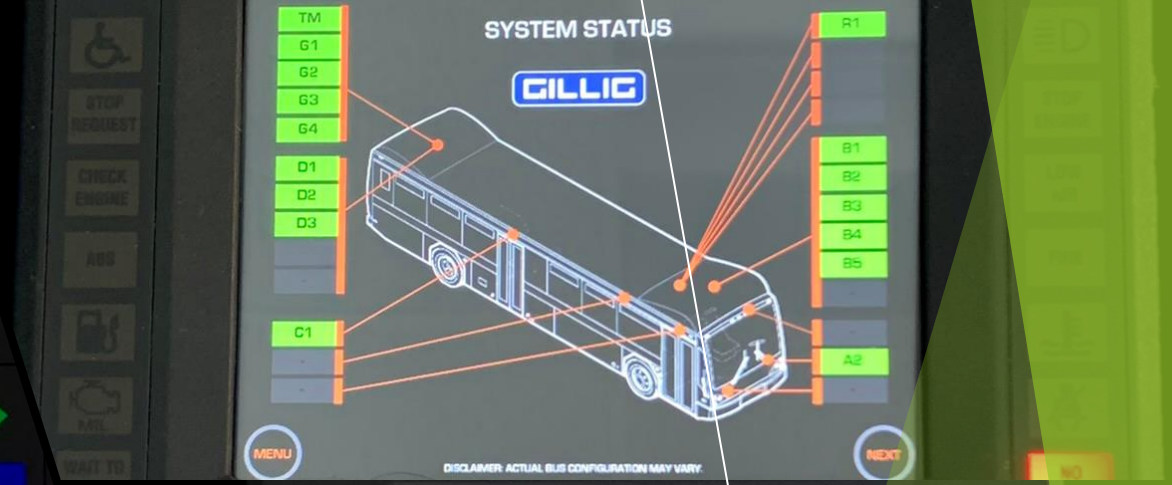
G4-48LED-04-GL

AMP 640501-2 (J1)	
PIN	FUNCTION
1	VDC1 (+24V)
2	VDC2 (+24V)
3	MIL & WTS (+12V)
4	GND
5	PRESS TO TEST
6	GND
7	MALFUNCTION INDICATOR LAMP (MIL)
8	WAIT TO START (WTS) INDICATOR LAMP
9	GND

DTM04-08P/DTM06-08S		
PIN	COLOR	FUNCTION
1	WHITE	CAN_HI
2	BLACK (TWIST W/ WHITE)	CAN_LO
3	RED	+12V, ISOLATED
4	BLACK (TWIST W/RED)	GROUND, ISOLATED
5	NC	
6	NC	
7	NC	
8	GREEN	CAN SHIELD

G4-MFD-02


WARNING - INTERLOCK DEACTIVATED
NO DATA
0
MPH
MILES
STOP REQUEST
CHECK ENGINE
ABS
TRANS FLUID (LOW)
HYD FLUID (LOW)
TRANS TEMP
REAR IGNITION
COOLANT (LOW)
CHECK ROOF LATCH
FAST IDLE
A/C STOP
CHECK TRANS
RAMP
BIKE RACK
KNEEL
DEFUEL
DOOR ALARM
DIAG MENU
SPEED SWITCH
RETARDER APPLIED
RETARDER DISABLED
HEATED MIRROR
COMM FAULT
TRACTION CONTROL
FUEL DOOR
CHECK 12V SYS
AUX MENU
BRAKES
EXIT DOOR
STARTER
DOORS AIR (LOW)
CHECK 24V SYS
STOP ENGINE
LOW AIR
FIRE
NO CHARGE


SYSTEM STATUS
GILLIG
MENU
NEXT
DISCLAIMER: ACTUAL BUS CONFIGURATION MAY VARY.


MULTI-FUNCTION DISPLAY
GILLIG
V3.2.2 G3.0.12


J1939
SYSTEM STATUS
POWERTRAIN HEARTBEATS
MODULE MONITOR
BRIGHTNESS 40
CONTRAST 50
V3.2.2 G3.0.12

G4-MFD-02

G4-MFD-02: This is a node module.

- **Requirement**:
  Must be used with an MBC module.
- **Output**:
  16 Fixed LED Output
- **Display**:
  6.4" Color LCD Display
  Touch Screen
- **Features**:
  Programmable Gauges
  Telltales
  Maintenance Mode
- **Connection**:
  500k J1939 Connection
- **Video Inputs**:
  2 Video Inputs
- **Fix ID#**

G4-MFD-02

- Module Rev.

G4-MFD-02

- **Output**:
- **16 Fixed LED Output**: Provides clear and reliable signaling.
- **Display**:
- **6.4" Color LCD Display**: Offers a vibrant and easy-to-read screen.
- **Touch Screen**: Allows for intuitive user interaction and control.
- **Features**:
- **Programmable Gauges**: Customize and monitor various system parameters.
- **Telltales**: Programmable indicators for alerts and notifications.
- **Connection**:
- **500k J1939 Connection**: Ensures robust communication with other system components.
- **Video Inputs**:
- **2 Video Inputs**: Enables integration with camera systems for enhanced visibility and monitoring.
- **Fix ID#**: The module's ID# is fixed.

G4 -MFD-02

- **Maintenance Mode**: A dedicated mode for system checks and diagnostics.

G4 -MFD-02

- Maintenance mode

DL-CM2-007

DL-CM2-007

MODULE FEATURES

- **250K Baud Communication with Dinex G4 MBC**: Ensuring quick and accurate information exchange between the module and the master control unit.
- **LED Status Indicator**: Offers a visual confirmation of proper communication, making it easy to identify if the system is operating correctly or if there is a need for troubleshooting.
- **LIN Bus Communication at 10K Baud**: Supports communication with up to fourteen individual lamp segments, allowing for flexible and customizable lighting configurations.
- **Fixed ID #84**: Ensures the module can be uniquely identified within the network, preventing communication conflicts and ensuring consistent operation.
- **Optional Sweep Switch**: Enables timed LED activation while the system is in sleep mode, providing additional functionality and convenience.
- **Fuse Protection for Roadside Light and Curbside Light**: Safeguards the lighting components from electrical faults, ensuring the longevity and reliability of the lighting system.

DL-CM2-007

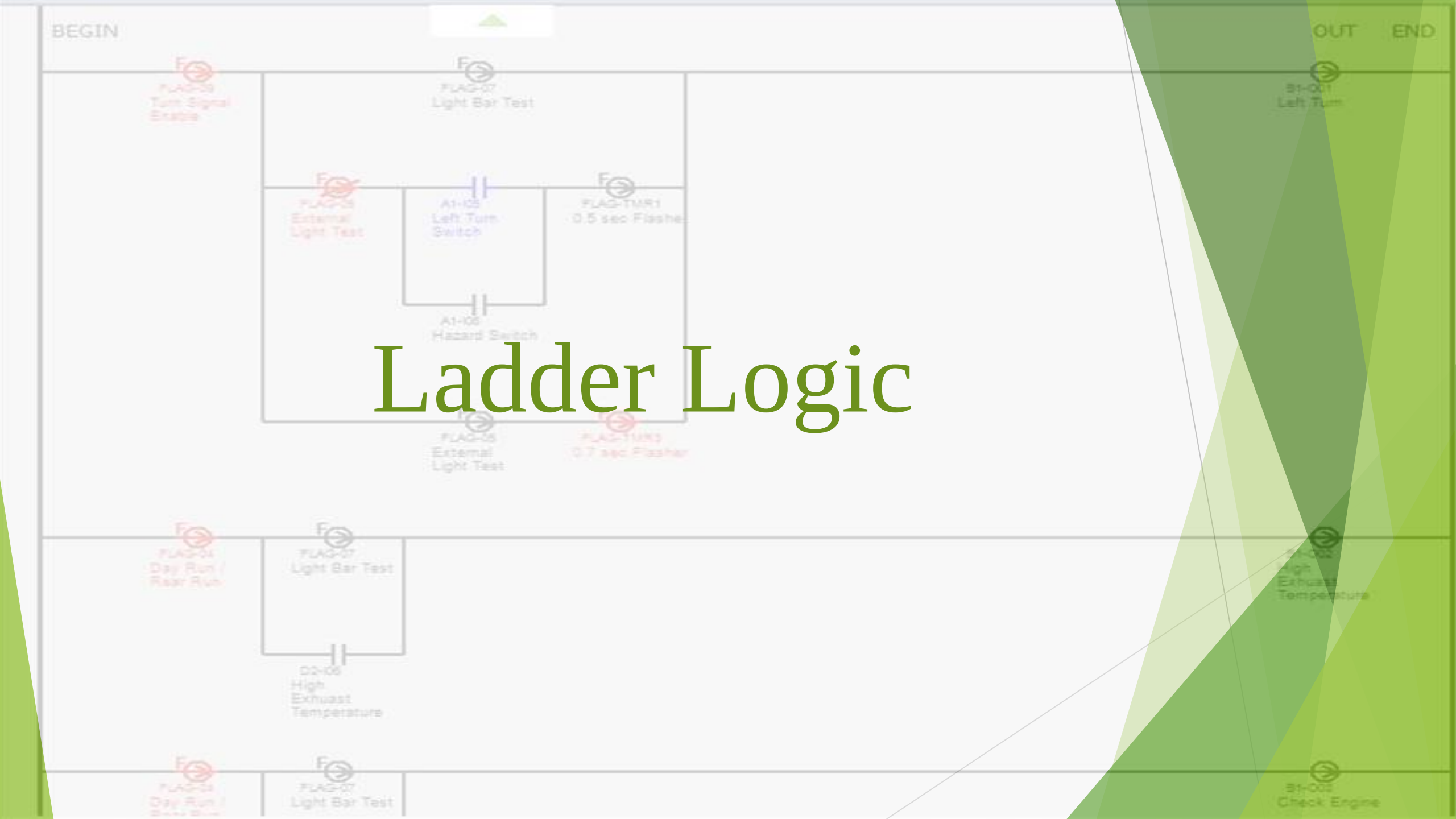
DTM04-08P/DTM06-08S (NETWORK)		
PIN	WIRE COLOR	FUNCTION
1	YELLOW	CAN_HI
2	GREEN	CAN_LO
3	RED	+12V, ISOLATED
4	BLACK	GROUND, ISOLATED
5	N/C	N/C
6	N/C	N/C
7	N/C	N/C
8	BLUE	CAN SHIELD

DTM04-6P (ISP PORT)		
PIN	WIRE COLOR	FUNCTION
1	YELLOW	TIMER PROGRAM PIN 1
2	GREEN	TIMER PROGRAM PIN 2
3	RED	PROGRAMMING +12V
4	BLACK	PROGRAMMING GND
5	ORANGE	SWEEP SWITCH +
6	GRAY	SWEEP SWITCH -

DELPHI 15300003 (CURBSIDE LIGHT)		
PIN		FUNCTION
A		LIN SIGNAL OUTPUT
B		POWER OUTPUT 1 24 V OUTPUT
C		GROUND OUTPUT

DELPHI 12033769 (POWER IN)		
PIN		FUNCTION
A		BATTERY POWER +24 VOLTS INPUT
B		BATTERY GROUND INPUT

DELPHI 15300003 (ROADSIDE LIGHT)		
PIN		FUNCTION
A		LIN SIGNAL OUTPUT
B		POWER OUTPUT 2 24 V OUTPUT
C		GROUND OUTPUT



Ladder Logic

Ladder Logic

Indicates the conditions required for the output to be On/Active.

Each Logic Rung should be read from left to right and then from top to down for proper analysis and troubleshooting.

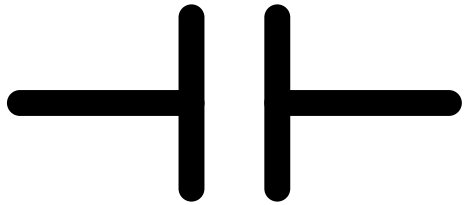
For logic rungs using OR logic (multiple lines), the evaluation should be conducted from the top line to the bottom line. Proceed to the next line down only if the logic conditions of the current line are not met.

Detailed information can be found in bus manufacturer documents.

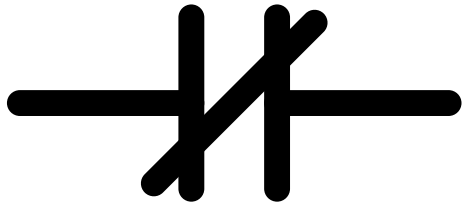
Contact the bus manufacturer to obtain the latest ladder logic.

Inputs

- Ladder logic is composed of a set of inputs required to activate an output.
- There are two important symbols you need to learn.
  - On (active) symbol



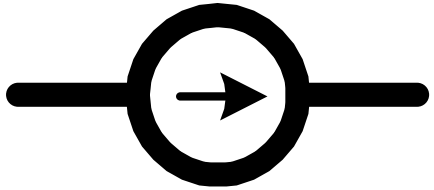
  - Off (inactive) symbol



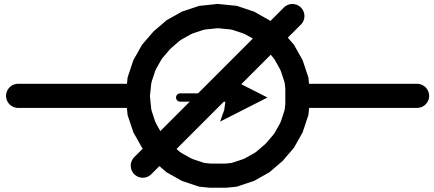
Outputs

- When outputs function as inputs in ladder logic, it's important to check the status of the flag or output.

- On (active) symbol

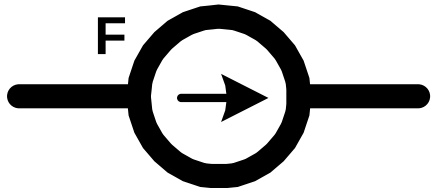


- Off (inactive) symbol

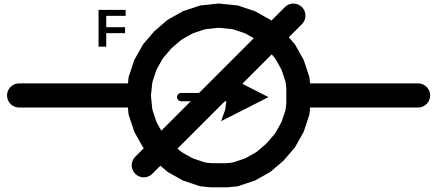


Flags

- When flags are utilized as inputs in ladder logic, it is necessary to check the condition of the flag or output.
  - On (active) symbol



  - Off (inactive) symbol



Timers

- There are four types of timers, and all timer values are measured in seconds.

- Flash Timer

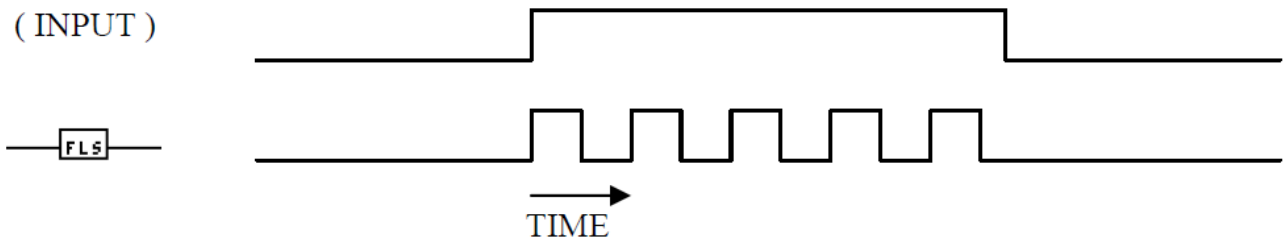
- Delay On Timer

- Delay Off Timer

- Turn On Timer

Timers

- A flash timer will turn on and off at the programmed rate specified in the node descriptions.

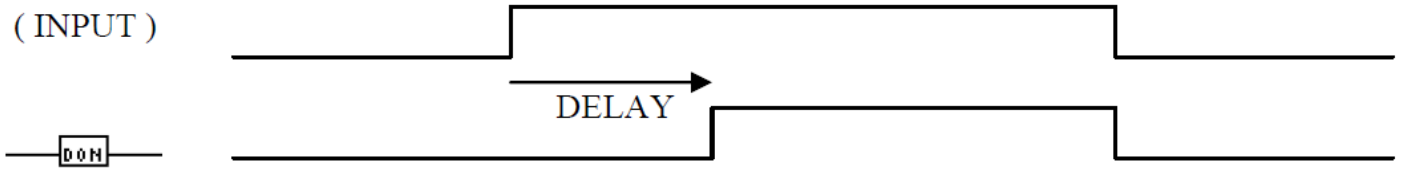


Timer

Name	Timer Type	Time	Time Off	Description
TMR19	DELAY OFF	10	0	10 sec Delay Off
TMR20	DELAY OFF	10	0	10 sec Delay Off
TMR24	FLASH	0.5	0.5	0.5/0.5 Flash Timer

Timers

- A delay-on timer will postpone the output from turning on for the programmed duration.

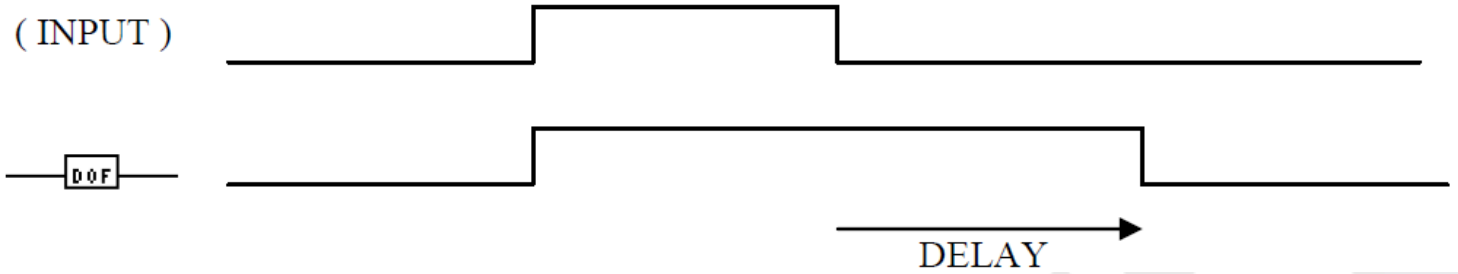


Timer

Name	Timer Type	Time	Time Off	Description
LTMR00	DELAY OFF	15	0	15 sec Dealy Off
LTMR01	TURN ON	120	0	120 sec Turn On
LTMR02	TURN ON	30	0	30 sec Turn On
LTMR03	TURN ON	600	0	10 min Turn On
LTMR05	DELAY ON	1860	0	31 min Delay On
LTMR06	DELAY ON	1200	0	20 min Delay On

Timers

- A delay-off timer will keep the output on for the programmed duration after the ladder logic triggers the output to transition from on to off.

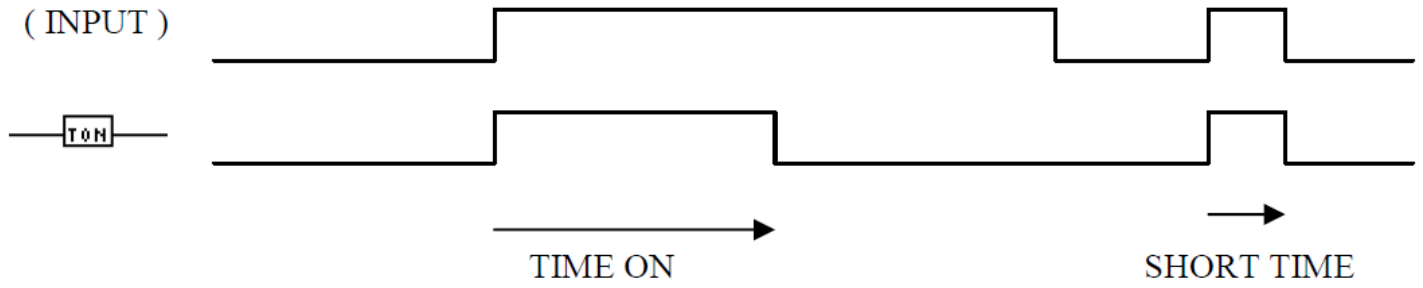


Timer

Name	Timer Type	Time	Time Off	Description
LTMR00	DELAY OFF	15	0	15 sec Dealy Off
LTMR02	TURN ON	30	0	30 sec Turn On
LTMR03	TURN ON	600	0	10 min Turn On
LTMR04	TURN ON	120	0	2 min Turn On

Timers

- A turn-on timer will activate the output for the specified duration only.



Timer

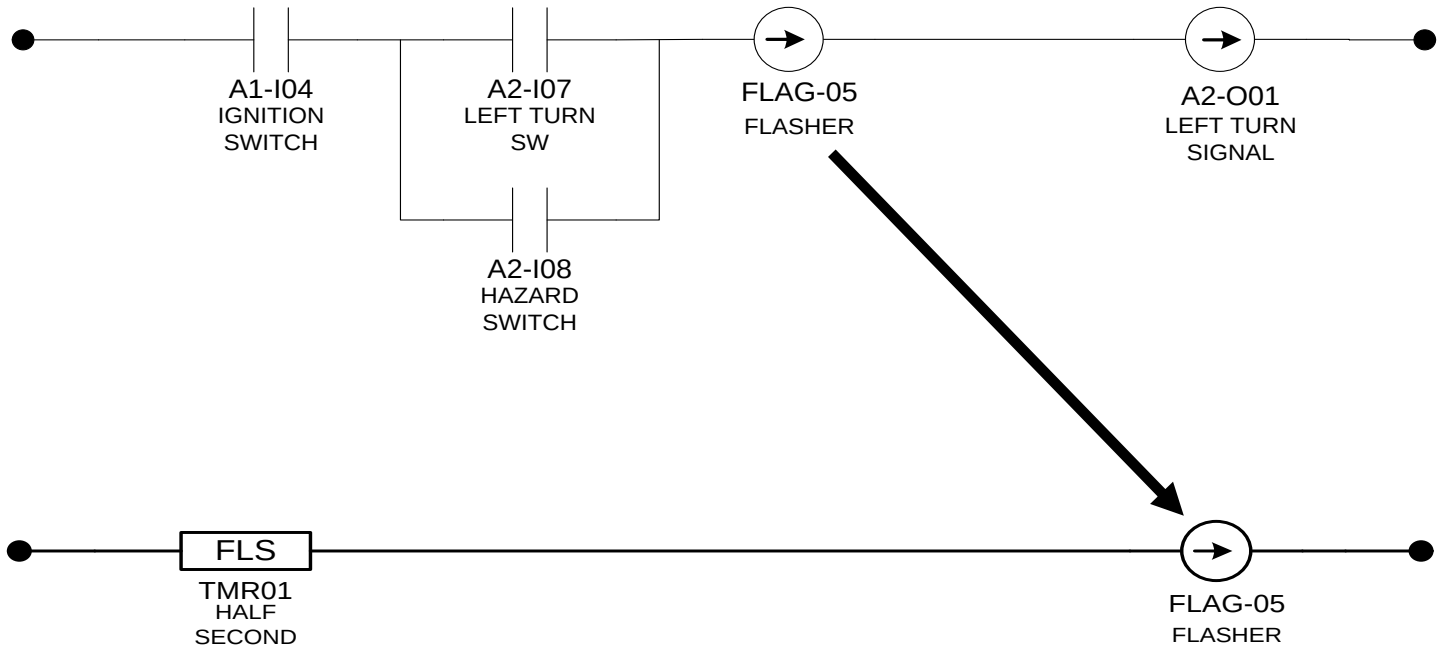
Name	Timer Type	Time	Time Off	Description
LTMR01	TURN ON	120	0	120 sec Turn On
LTMR03	TURN ON	600	0	10 min Turn On
LTMR04	TURN ON	120	0	2 min Turn On

Timers

- All timers will reset when the ladder logic indicates that the output or flag should be off.

Ladder Logic

- Reading a Simple Ladder Logic

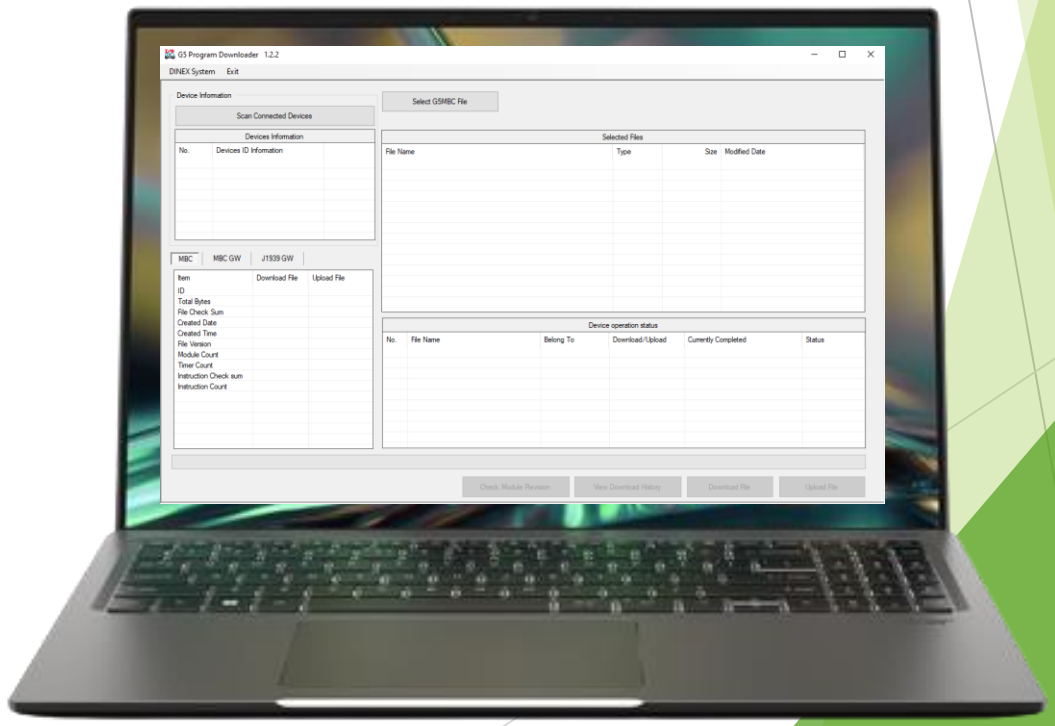


Downloading Program to G4-MBC-HUB-06A

Downloading Program to G4-MBC-HUB-06A

What is required:

- **USB 2.0 Type-A Male to Type-A Male**: Available at online stores.
- **PC**: With G4-MBC-HUB driver and G4 Program Downloader 1.2.2 software installed.
- **No Download Tool Required**.



Downloading Program to G4-MBC-HUB-XX

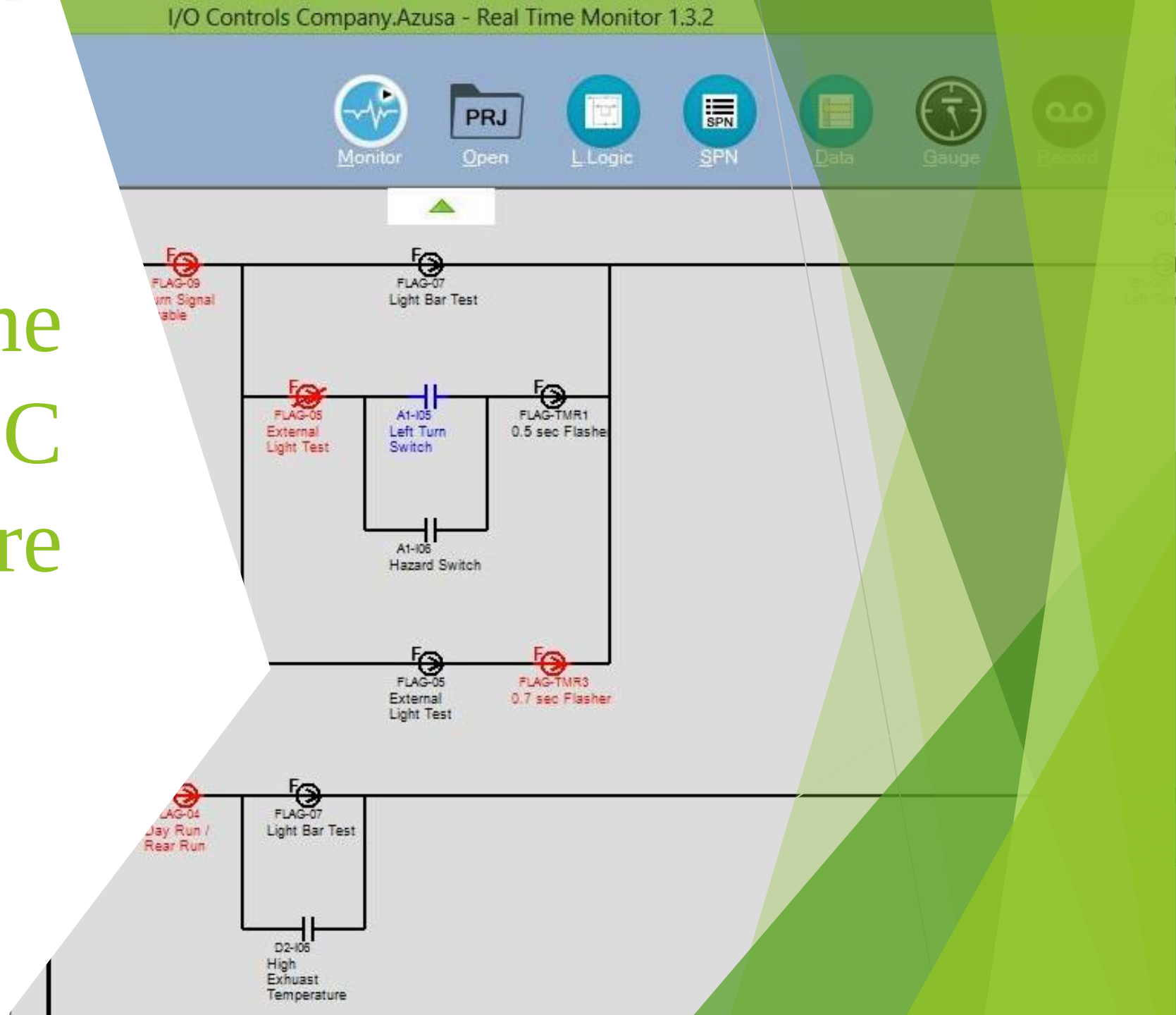
- **Instructions:**

1. Follow the G4-MBC-HUB-XX download instructions in the G4 Program Downloader Instruction V1.3.
2. Cycle power to the G4-MBC-HUB-XX after the program files have completed downloading to the MBC for the new program to take full effect.
    - **Note**: If power is not cycled to the MBC, the updates will not take full effect.

- **Troubleshooting:**
- If there are problems downloading to the MBC, consider the following potential issues:

- G4-MBC-HUB driver not installed correctly.
- Another program is causing the COM port to hang up.
- Loose or no connection to the MBC.
- MBC not powered up.

G4 Real Time Monitor PC Software



G4 Real Time Monitor

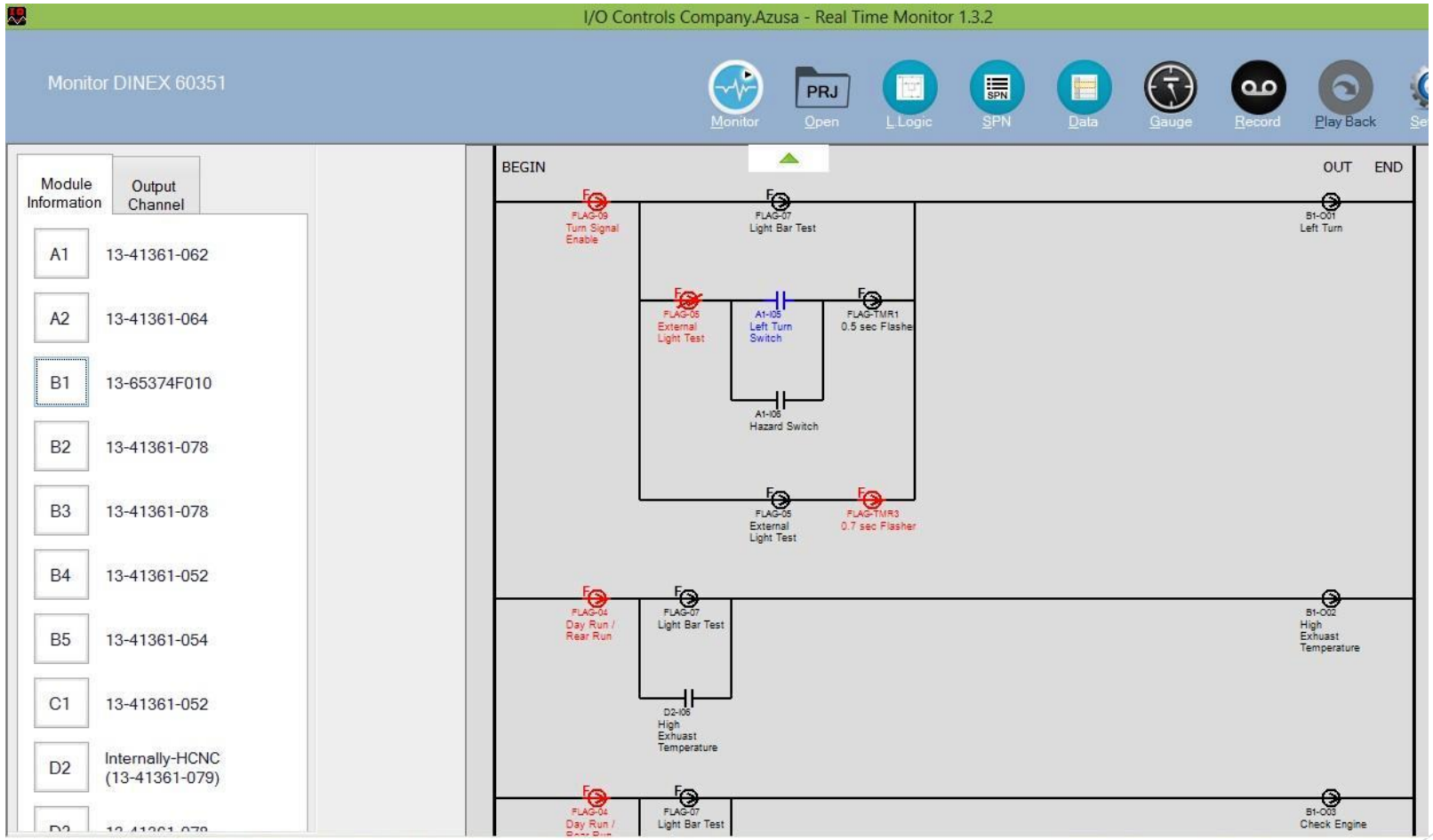
A PC-based program connects to the MBC to display the status of inputs, outputs, flags, and ladder logic in real time.

Requires a USB license with a .PRJ file specific to the bus fleet.

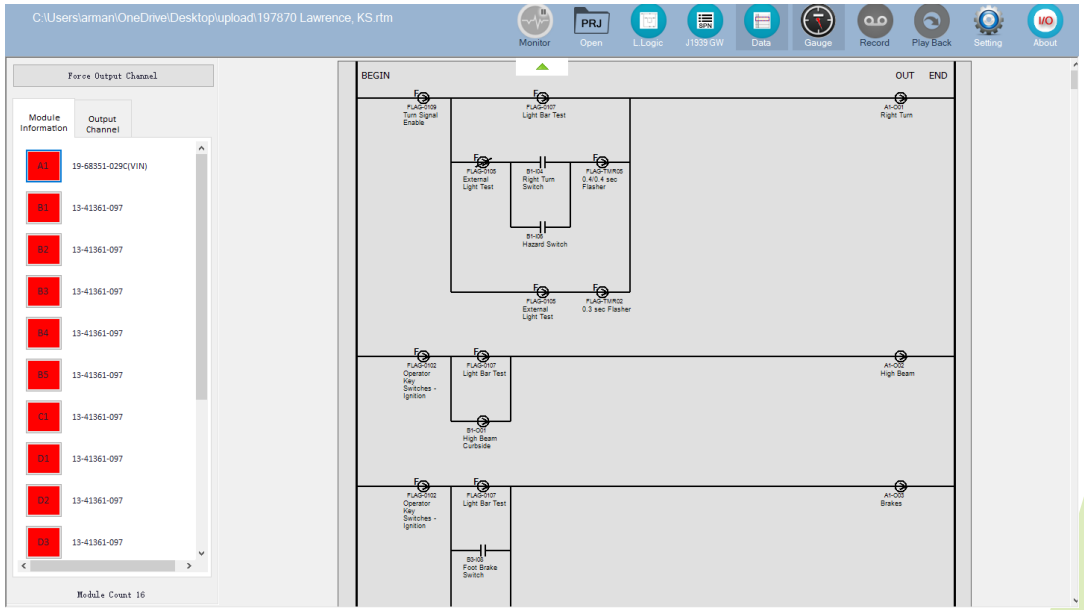
Helps troubleshoot outputs by displaying why an output is not activating.

- Eliminates the need to reference ladder logic and manually check each module for input status.
- Displays the communication status of each module.

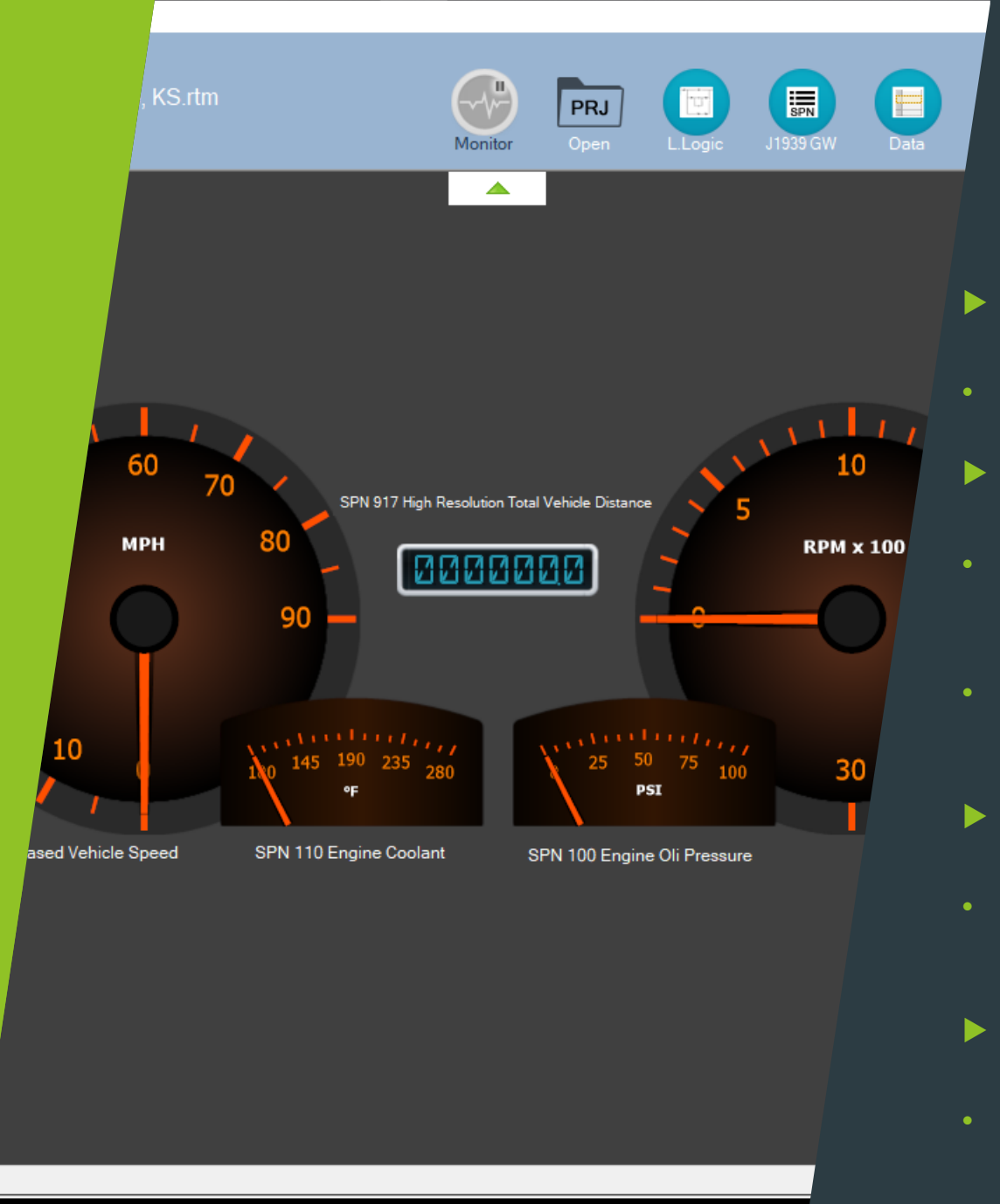
G4 Real Time Monitor



G4 Real Time Monitor

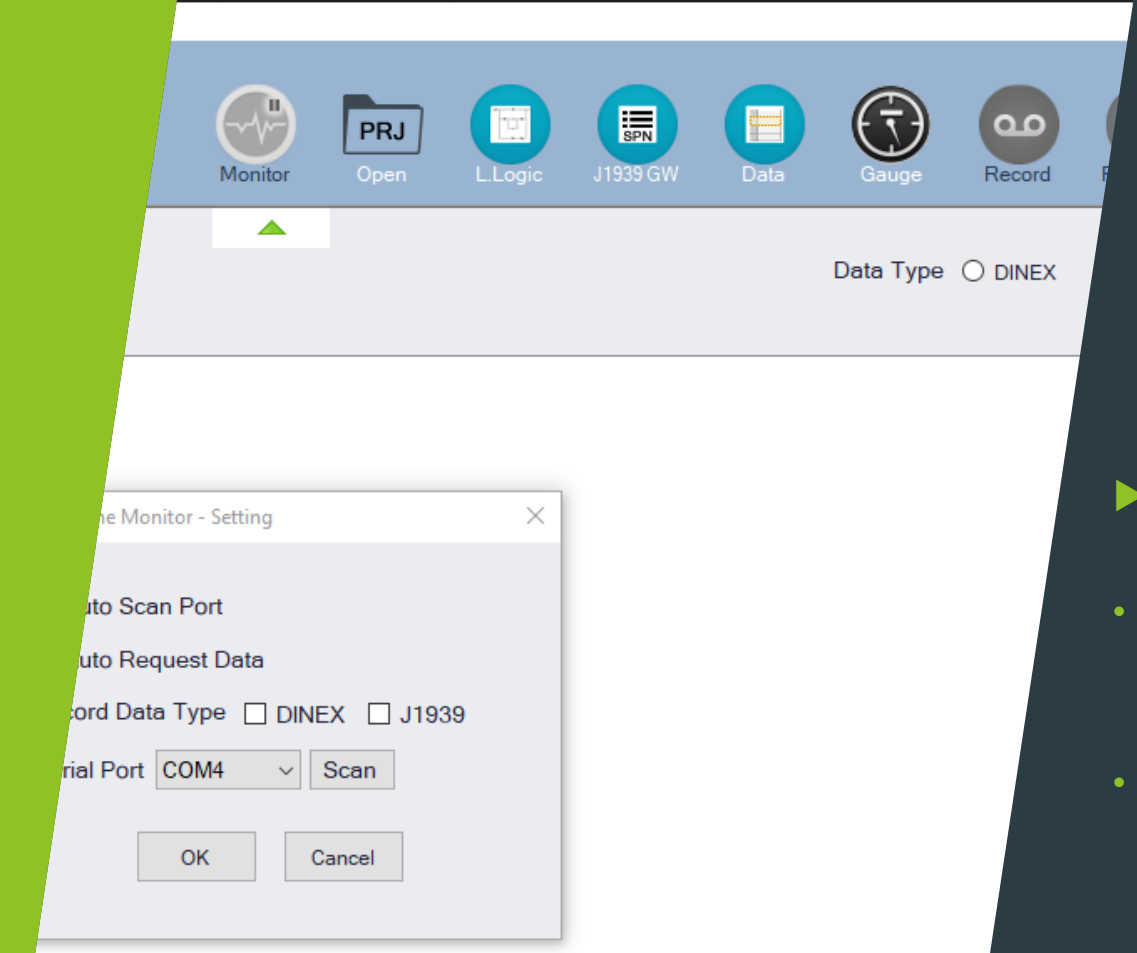


- **Ladder Logic**
  - Clicking on the module will display all outputs for the selected module.
  - Clicking an output channel will display the output ladder logic as well as all other ladder logic rungs associated with that output.
- **SPN**
  - Displays all J1939 data in the converted format.
  - By default, it will only display data specified in the MBC program, but additional signals can be added.



G4 Real Time Monitor

- **Data**
  - View raw J1939 or DINEX Multiplex Data.
- **Gauge**
  - Displays specified J1939 signals in a gauge format.
  - The gauges displayed with that bus fleet can be modified.
- **Record**
  - Allows the J1939 or DINEX Multiplex Data to be recorded to the PC.
- **Playback**
  - Enables the user to play back previously recorded J1939 or DINEX Multiplex Data.



G4 Real Time Monitor

- **Settings**
- Manually select the COM port used to connect to the G4-MBC-HUB-06A.
- Scan for the COM port that the G4-MBC-HUB-06A appears as on your PC.

G4 HANDHELD TOOL

Main Menu

System Status

Power Train Heartbeats

J1939 SPN Information

Diagnostic Trouble Code

Multiplex System Status

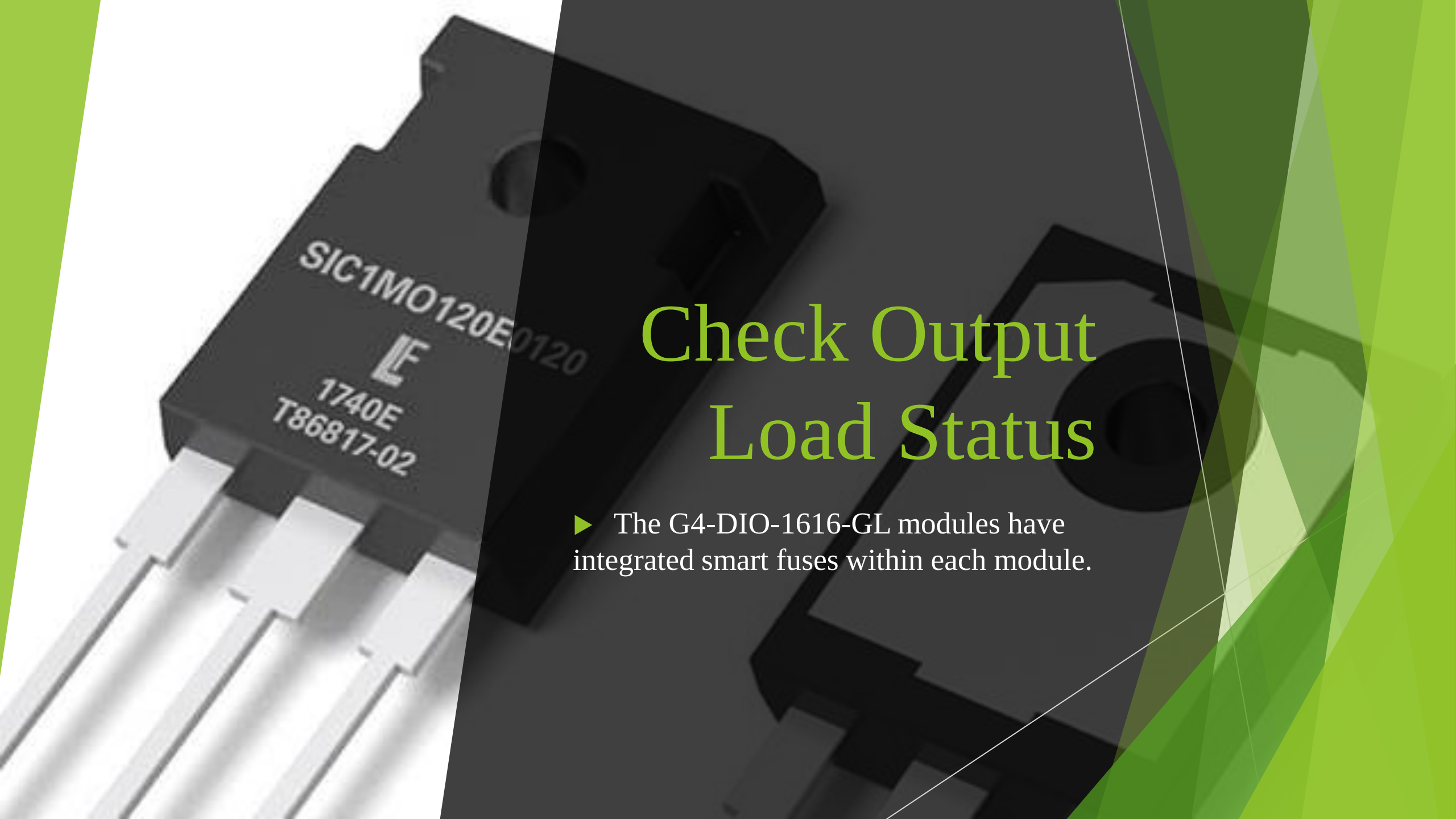
DIO Module Status

Ladder Logic Diagram Monitor

Force Output

Program Loader

Trouble Shooting

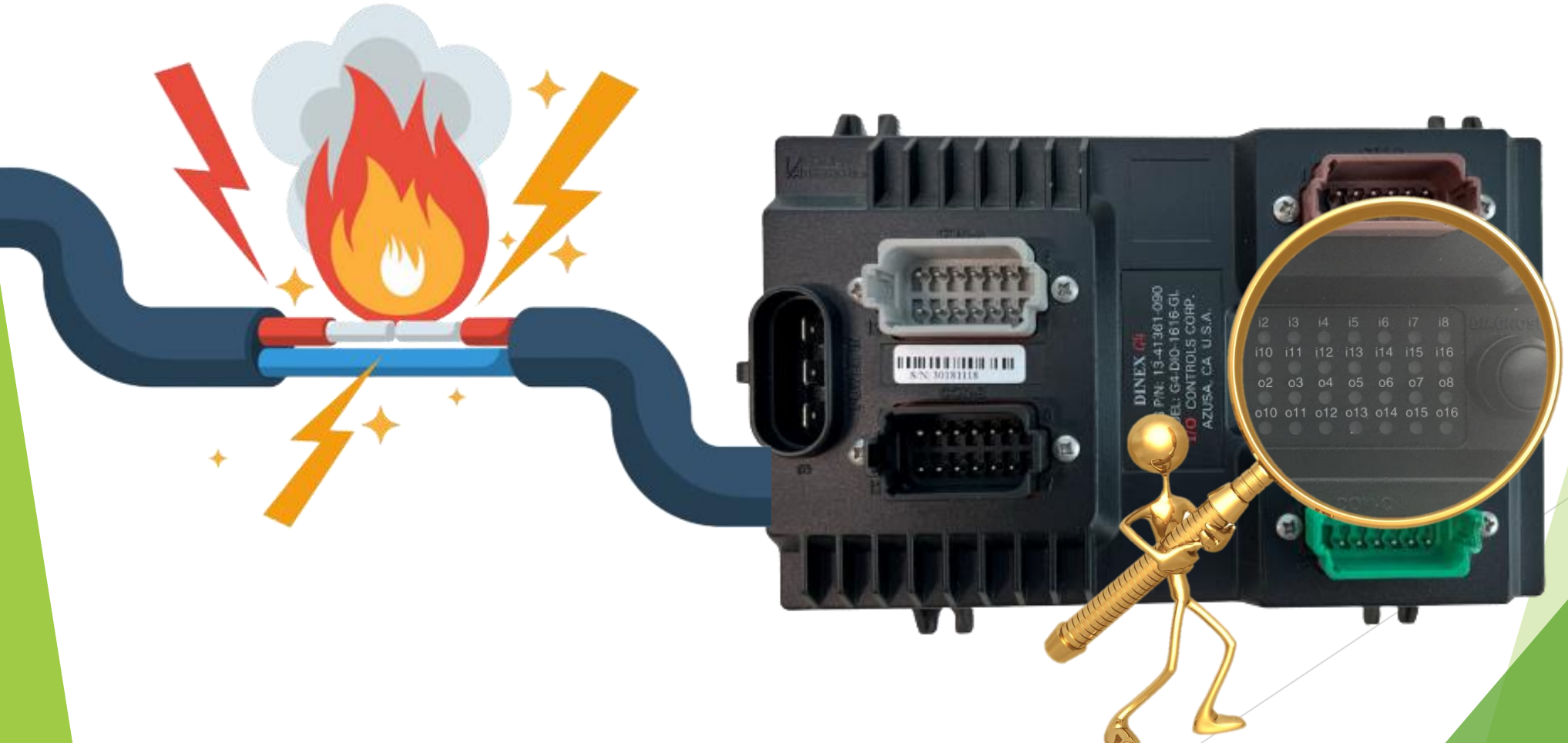


Check Output Load Status

- The G4-DIO-1616-GL modules have integrated smart fuses within each module.

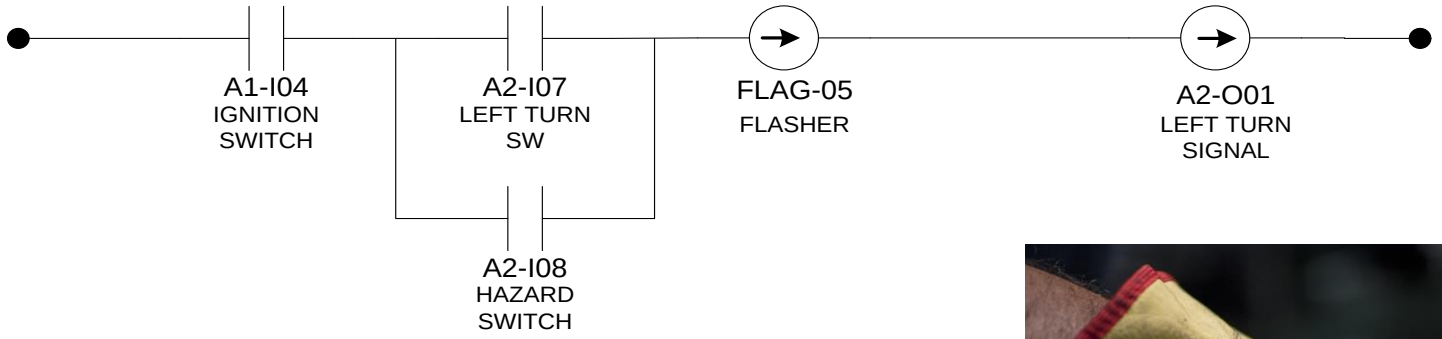
Check Output Load Status

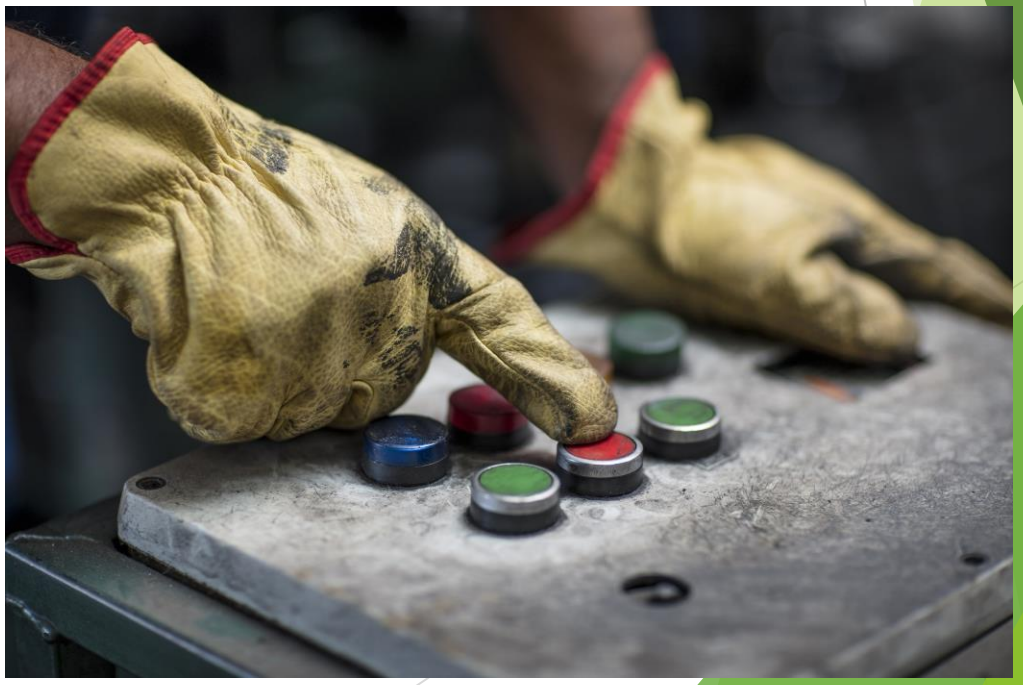
- When an output's smart fuse is tripped, the output status will turn off. The diagnostic button must be used to determine if the smart fuse has been tripped.



Check Output Load Status

- To reset the smart fuse, cycle the output state.





Check Indicator Lights

- Indicator lights provide real-time visual feedback on the status of system inputs and outputs, facilitating efficient diagnostics and monitoring. These indicators help identify the operational state or faults of connected components, allowing for quick intervention and troubleshooting. The status lights may display various states such as:

- **Active (On)**: Indicates that the input or output is currently energized.
- **Inactive (Off)**: Indicates that the input or output is not energized.
- **Fault (Error)**: Signals an issue with the input or output, such as a tripped smart fuse or communication error.

PMS

CON-D BROWN (DT15-12PD)	
PIN	FUNCTION
1	DINEX CAN-H
2	DINEX CAN-L
3	12, Isolated
4	Ground, Isolated

- Multiplex network power should be measured between +12V isolated and GND isolated within the multiplex network cable.

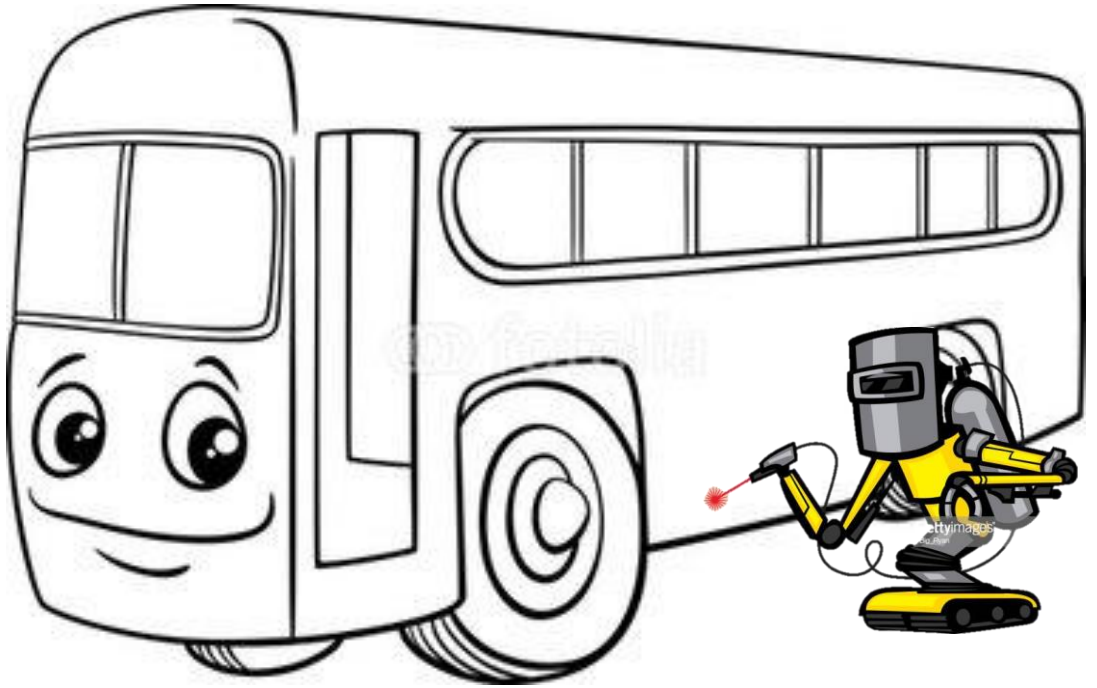
Testing Using Module from Another Bus

- Important Note!!!
  - Modules can be removed from a working bus and used in place of a suspected bad module to determine whether it is the module that has failed or another problem. Ensure that the replacement module is from the same fleet.

What NOT to Do!!

Do not weld on the bus without first disconnecting all connectors to the modules.

- When performing welding operations on a bus, it is crucial to protect the electronic modules from potential damage due to electrical surges and electromagnetic interference (EMI) generated during the welding process.

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Contacting I/O Controls

I/O Controls Main Office
Phone: (626) 812-5353
1357 W. Foothill Blvd
Azusa, CA 91702

I/O Controls Sales Office
Phone: (972) 424-6488
101 E. Park Blvd., Suite 951
Plano, TX 75074

Armando Jimenez
Direct: (626) 610-2293
Cell: (626) 437-0181
armandoj@iocontrols.com

Jodie McLay
Director of Sales & Marketing
Cell: (610) 755-8262
jodiemclay@iocontrols.com

I/O Controls Tech. Support
(626) 610-2291
(626) 610-2292