REMOTE ENGINE THROTTLE
MODEL: ETA400
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Overview

The InfinityPRO series of remote engine throttles use optical technology. There is no potentiometer, electromechanical switch, or mechanical stop. The engine RPM control signal is set at idle when power is applied regardless of the control knob position.

The throttle uses an Infrared Encoder (IRE) to detect the direction and speed of the control knob when it is rotated. The electrical signal from the encoder is interpreted by the microprocessor and the engine RPM control signal is adjusted. The InfinityPRO responds to how fast the control knob is rotated and increases or decreases the engine RPM proportionally.

Pressing the idle button immediately sets the engine RPM to idle.

The InfinityPRO is programmed to interface with a specific type of engine. It can be preprogrammed from the factory or programmed at installation as required with an FRC field programming unit.

Features

- Always Starts From Idle RPM
- No Mechanical Stops
- Senses How Fast the Control Knob is Rotated
- Interlock Signal Recognition
- Provides Throttle Enable Signal
- Idle Button
- Field Programmable for Engine Type
- Multiple Remote Throttles (Option)
- Remote to a Primary FRC Governor (Option)
FIELD PROGRAMMING UNIT

The InfinityPRO is programmed to interface with a specific type of engine. It can be pre-programmed from the factory or programmed in the field for some engines as required.

The FRC programming unit (P/N ETA500) can be used to check or program the InfinityPRO for the following engine types.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>ENGINE</th>
<th>PROGRAM CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETA400</td>
<td>Generic</td>
<td>19</td>
</tr>
<tr>
<td>ETA401</td>
<td>Cummins IS Series</td>
<td>1</td>
</tr>
<tr>
<td>ETA402</td>
<td>Detroit Diesel (Series 50 and 60)</td>
<td>2</td>
</tr>
<tr>
<td>ETA404-A</td>
<td>Navistar</td>
<td>13</td>
</tr>
<tr>
<td>ETA404-D</td>
<td>Navistar MaxxForce</td>
<td>4</td>
</tr>
<tr>
<td>ETA405</td>
<td>Caterpillar</td>
<td>5</td>
</tr>
<tr>
<td>ETA406-A</td>
<td>Ford 7.3L</td>
<td>6</td>
</tr>
<tr>
<td>ETA406-B*</td>
<td>Ford 6.0L, 6.4L</td>
<td>12</td>
</tr>
<tr>
<td>ETA407</td>
<td>Mack</td>
<td>7</td>
</tr>
<tr>
<td>ETA408-B</td>
<td>Scania P, R, and T series</td>
<td>6</td>
</tr>
<tr>
<td>ETA409*</td>
<td>GMC</td>
<td>9</td>
</tr>
<tr>
<td>ETA410-A</td>
<td>Mercedes</td>
<td>10</td>
</tr>
</tbody>
</table>

*Note: An adapter and cable assembly replaces the basic InfinityPRO cable when connecting the throttle to a Ford 6.0 or GMC engine.

The following engine types are not programmable and must be set at FRC.

  ETA408-A Scania
  ETA410-B Mercedes Euro
  ETA418 Iveco

Program Check/Change

1. Connect the programming unit cable to the ETA400 throttle.
2. Press the power button to ON.
3. The throttle programmed model number will show in the display.
4. Press the IDLE button on the throttle to change the model number and program it for the correct engine.
5. Press the power button to OFF and disconnect the throttle.
This page intentionally left blank.
INSTALLATION

There are three screws in the knob. One slotted head screw is the detent adjustment for the knob and is set at the factory. This screw should not be adjusted in the field. The two socket head set screws are used to secure the control knob on the outer shaft. Refer to Figure 1 for component nomenclature and dimensions.

Tools Required

Drill Motor (with 7/8" bit)
3/32 Inch Hex Wrench
1-1/8 Inch Open End Wrench

Pre-Installation

1. Mark location for mounting hole. (The decal supplied with the InfinityPRO is 3.25-in. high by 3-in. wide. Allow for clearance around the mounting hole location.)
2. Drill a 0.875" (7/8") diameter hole in mounting surface.
3. Remove control knob by loosening two set screws.
4. Remove outer nut from nipple.

Install Remote Throttle

1. Set inner nut and star washer to allow 0.85-inch (approximately one thread) to be exposed after outer nut is tightened.
2. Install InfinityPro plate, install and tighten outer nut.
3. Slide control knob over idle button and onto outer shaft. Ensure that there is clearance between the back of the knob, nut, and mounting surface. (The knob should spin freely.) If there is any rubbing, reset the position of both nuts per step 1.
4. Tighten two socket head set screws.
5. Connect cables. (Refer to Wiring section.)
Figure 1. ETA Nomenclature and Dimensions

**A**
Drill a 0.875" hole in the mounting surface.

**B**
Position the inner nut so that this dimension is 0.85". This will leave approximately one thread exposed after the outer nut is tightened.

---

**Note:** There are two socket head set screws 120° apart that hold the control knob on the outer shaft.

**Do not adjust**
the slotted head screw.

---

**Note:** The panel decal for the InfinityPRO is 3.25" high by 3" wide.
The InfinityPRO throttle always starts from idle when the pump interlock signal is recognized regardless of the control knob position. It senses how fast the control knob is rotated and increase or decrease the engine RPM proportionally.

If the control knob is rotated quickly; the RPM changes quickly.

If the control knob is rotated slowly; the RPM changes slowly.

- Rotate the control knob clockwise to increase engine RPM.
- Rotate the control knob counterclockwise to decrease engine RPM.
- Press the red IDLE button to immediately return the engine to idle.
The following figures include the schematics, wiring diagrams, block diagrams, and cable for the InfinityPRO remote throttle.

**Connector and Cable**

Note: An adapter and cable assembly replaces the basic InfinityPRO cable when connecting the throttle to a GMAC engine. Refer to the engine specific wiring diagram.

### InfinityPRO Connector/Cable

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red</td>
<td>Supply Voltage (9 - 30 VDC)</td>
</tr>
<tr>
<td>2</td>
<td>Black</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Orange</td>
<td>+5 VDC Reference From ECM</td>
</tr>
<tr>
<td>4</td>
<td>White</td>
<td>Throttle Signal To ECM</td>
</tr>
<tr>
<td>5</td>
<td>Green</td>
<td>Signal Return From ECM</td>
</tr>
<tr>
<td>6</td>
<td>Yellow</td>
<td>Interlock Input (12 or 24 VDC)</td>
</tr>
<tr>
<td>7</td>
<td>Blue</td>
<td>Throttle Enable Signal (or IVS)</td>
</tr>
<tr>
<td>8</td>
<td>Brown</td>
<td>Foot Pedal Signal Input</td>
</tr>
</tbody>
</table>

**Note:** Not all wires are used for all engines. Refer to the engine specific wiring diagram for InfinityPRO interface connections.

Figure 2. ETA Connector and Cable
Interface Information

The ECM Remote Accelerator (Throttle) Option has to be set to ON. The diagnostic tool cannot be used to do this, an Insight service tool must be used. Refer to an authorized dealer to program this option.

Figure 3. Cummins ETA401 Wiring
(Sheet 1 of 2)
Figure 3. Cummins ETA401 Wiring (Sheet 2 of 2)
Detroit Diesel (Series 50 and 60) Harness Connections

Interface Information

InfinityPRO Cable (Refer to Figure 2)

Vehicle Interface Harness

2007 Engine DDEC VI Vehicle Interface Harness

21-PIN Connector #3

Older Model Engines/ECMs

Vehicle Interface Harness Connector

DDEC III, IV

DDEC V

ECM

Sensor Supply (5 VDC)

Sensor Return

Variable Speed Governor

$+12 \ (24) \ VDC$

Ignition Key

Vehicle Interface Harness

Remote Throttle Select Switch

Remote PTO Switch

Sensor Supply

Remote PTO

Sensor Return

$+12 \ (24) \ VDC$

Pump Engaged Interlock

Figure 4. Detroit Diesel (Series 50 and 60) ETA402 Wiring
Navistar Harness Connections

Interface Information

The ECM must be programmed for remote variable throttle operation.

Voltage Control
Post 2007 MAXXFORCE 7, DT, 9, 10, 11, and 13 Engines

InfinityPRO Cable
(Refer to Figure 2)

![Diagram of Navistar ETA404 Wiring](image)

<table>
<thead>
<tr>
<th>Red Wire</th>
<th>Black Wire</th>
<th>Yellow Wire</th>
<th>Ignition Key</th>
<th>+12 (24) VDC</th>
</tr>
</thead>
</table>

Voltages:
- Post 2007 MAXXFORCE 7, DT, 9, 10, 11, and 13 Engines

ECM Function
- Voltage Ref 5V
- REM Accelerator
- Signal Return
- Variable PTO Enable
- Transfer Case

12VZA Circuit # (I6):
- K97FV
- K99F
- K97WA
- K97CC
- Split Shaft Only

12VZA Circuit # (V8):
- K95
- K97RPS
- K95R
- K97RVAR
- X1-27
- X1-50
- X1-35
- X1-60
- X1-11

12VZB Circuit # (IBBE):
- K92A4
- K92A5
- K92A3
- K92A12
- X1-14
- X1-20
- X1-6
- X3-20
- X4-6

Wires:
- Red Wire
- Black Wire
- Yellow Wire
- Orange Wire
- White Wire
- Green Wire
- Blue Wire

Figure 5. Navistar ETA404 Wiring
Caterpillar Harness Connections

Interface Information

The ECM Remote Throttle Option has to be enabled. Refer to an authorized dealer to program this option.

C7,C9,C10,C11,C12,C13,C15 Engine Interface

Engines with 70-pin OEM connector.

Figure 6. Caterpillar ETA405 Wiring
(Sheet 1 of 3)
C10, C12 Engine Interface

Engines with 40-pin OEM connector.

Figure 6. Caterpillar ETA405 Wiring
(Sheet 2 of 3)
Older Engine Interface

Engines with 40-pin OEM connector.

Note: Use a plug and receptacle on the Throttle Position Input wire (C986-BR) so the ends can be reconnected if the InfinityPRO is removed.
Ford Harness Connections

7.3L Power Stroke Engine Interface

The InfinityPRO cable needs to be wired to the cab foot throttle harness. Use a voltmeter to determine which pins are 5 V Reference, Idle Validation, and Engine Control Signal.

Idle Validation will be at ground. When the foot pedal is pressed it will rise to 12 VDC.

Engine Control Signal will be 0.6 volts at idle and rise to approximately 2.7 volts as the foot pedal is pressed.

Figures 7A. Ford 7.3L ETA406-A Wiring

Note: Use a plug and receptacle on the Engine Control Signal wire so the ends can be reconnected if the InfinityPRO is removed.
Stationary Elevated Idle Control (SEIC)

**Note:** Do not press the accelerator or service brake pedal when engaging the fire pump, this prevents the switch into SEIC.

Note: Refer to Figure 2. ETA Connector and Cable for power and interlock wire connections.

Access wires for SEIC are located in cabin, tagged and bundled above the parking brake pedal assembly behind datalink connector.

### Stationary Mode

<table>
<thead>
<tr>
<th>Pin 3 Orange Wire</th>
<th>LE434 White/Brown</th>
<th>C1232B-</th>
<th>PCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 5 Green Wire</td>
<td>RE327 Gray/Violet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin 4 White Wire</td>
<td>CE914 Green</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+12 (24) VDC</td>
<td>CE912 Yellow/Green</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin 3 Orange Wire</th>
<th>LE434 White/Brown</th>
<th>C1232B-</th>
<th>PCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 5 Green Wire</td>
<td>RE327 Gray/Violet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin 4 White Wire</td>
<td>CE914 Green</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+12 (24) VDC</td>
<td>CE912 Yellow/Green</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Split Shaft Mode

<table>
<thead>
<tr>
<th>Pin 3 Orange Wire</th>
<th>LE434 White/Brown</th>
<th>C1232B-</th>
<th>PCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 5 Green Wire</td>
<td>RE327 Gray/Violet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin 4 White Wire</td>
<td>CE914 Green</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+12 (24) VDC</td>
<td>CE933 Blue/Orange</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Split Shaft Mode is activated by applying supply voltage to both the PTORS1 and PTORS2 PCM circuits simultaneously.

1. Assure engine is running and fully warmed-up.
2. Apply parking brake.
3. Transmission in neutral to disengage drive wheels.
4. With foot off brake and accelerator, switch Split-Shaft PTO on.
5. Without pressing the brake, shift transmission into drive. If vehicle unexpectedly lurches or moves, immediately press brake pedal and shift transmission into park or neutral to secure vehicle.

Once the system enablers are met voltage may be added to the SEIC system for activation. If power is applied prior to the enablers being met, a system error may occur, and the SEIC system will have to be reset.

If an SEIC disabler occurs the engine requires a change-of-state, meaning the operator is required to turn off voltage to the PTO-Request circuit, and back on again to re-invoke SEIC and PTO operation.
Mack Harness Connections

Interface Information

The infinityPRO cable needs to be wired to the cab foot throttle harness. Use a voltmeter to determine which pins are 5 V Reference and Engine Control Signal.

Engine Control Signal will be 0.7 volts at idle and rise to approximately 3.8 volts as the foot pedal is pressed.

Figure 8. Mack ETA407 Wiring

Note: Use a plug and receptacle on the Engine Control Signal wire so the ends can be reconnected if the InfinityPRO is removed.
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Scania Harness Connections ETA408-A

Interface Information

The infinityPRO cable needs to be wired to the cab foot throttle harness. Use a voltmeter to determine which pins are 5 V Reference, Idle Validation Switch, and Engine Control Signal.

Idle Validation Switch (white wire) will be at 24 VDC. When the foot pedal is pressed it will drop to ground.

Engine Control Signal will be 0.4 volts at idle and rise to approximately 3.1 volts as the foot pedal is pressed.

Note: Use a plug and receptacle on the Engine Control Signal wire so the ends can be reconnected if the infinityPRO is removed.

---

**Figure 9A. Scania ETA408-A Wiring**
This procedure is provided as instructions for changing the IVS set point. The set point will establish the voltage level on pin 4 (white wire) that will cause the IVS output at pin 7 (blue wire) to be set to ground.

1. Connect a voltmeter to ETA408 pin 4 (white wire) to monitor the Engine Control Signal output voltage level from the ETA408 to the ECM.

2. Have the engine running and the pump engaged interlock circuit closed.

3. Press and hold the IDLE button, wait for 10 seconds.

4. Hold the IDLE button in and rotate the control knob to obtain the desired output voltage level at pin 4.

5. Release the IDLE button to store the new IVS set point in the memory.
Scania Harness Connections ETA408-B

Interface Information

For use on P, R, and T-series trucks equipped with a bodywork control unit (BWS). Connector C259 is available on all vehicles ordered with any of the bodywork options. It is located on the plate for the electrical bodywork interface for body builders. Connector C259 is white and has 21 pins. (February 2005 and newer.)

The EXT switch must be in the ON position when operating the Infinity.

Note: Signal to pin 10 is 0.6 to 3.0 V
GMC Harness Connections

Interface Information

An adapter and cable assembly is needed to interface the ETA409 with GMC engines. There are multiple types available for diesel or gas in variations that depend on the model and year of the engine.

![Diagram of GMC ETA409 Wiring](image)

- **GMC InfinityPRO Adapter and Cable Assembly**
  - Mount in the cab, no more than 12” from the foot pedal.

- **Connector is located near foot throttle.**

**Figure 10. GMC ETA409 Wiring**
Mercedes Harness Connections

ETA410-A Interface Information

InfinityPRO Cable (Refer to Figure 2)

2007 Engine
DDEC® VI
Vehicle Interface Harness

2006 and Older Connectors

Remote Throttle Select Switch
Remote PTO Switch
Sensor Supply
Remote PTO
Sensor Return

VCU 18-Pin Connector

VCU 21-Pin Connector

Figure 11A. Mercedes ETA410-A Wiring
ETA410-B Euro Version Interface Information

It is required that parameter 500 output from the manual throttle actuator speed has YES stored as a parameter.
Iveco Harness Connections

Interface Information

Programming by IVECO service is not required
Enable EDC mode-3 when throttle is active.
(Use external relay to short pin 19 to pin 16 on 20-Way Connector.)
Default setting in EDC mode-3 are:
Min\Max RPM 1900\700
RPM ramp rate 250RPM/s
TAP function Enabled.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire Color</th>
<th>Description</th>
<th>To 20-Way Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red</td>
<td>Supply Voltage (+12/24 VDC)</td>
<td>Pin 3</td>
</tr>
<tr>
<td>2</td>
<td>Black</td>
<td>Supply Ground</td>
<td>Pin 9</td>
</tr>
<tr>
<td>3</td>
<td>Orange</td>
<td>N/C</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>White</td>
<td>SET + Output To ECM</td>
<td>Pin 14</td>
</tr>
<tr>
<td>5</td>
<td>Green</td>
<td>Ground</td>
<td>Pin 9</td>
</tr>
<tr>
<td>6</td>
<td>Yellow</td>
<td>Interlock Input (Supply +12/24 VDC to Activate Throttle)</td>
<td>Pin 9</td>
</tr>
<tr>
<td>7</td>
<td>Blue</td>
<td>SET - Output To ECM</td>
<td>Pin 13</td>
</tr>
<tr>
<td>8</td>
<td>Brown</td>
<td>N/C</td>
<td></td>
</tr>
</tbody>
</table>

Figure 12. Iveco ETA418 Wiring
A remote throttle that is to be used with a governor as the primary controller has a short cable adjacent to the 8-pin Deutsch connector. This is the FRC datalink cable that is used to interconnect the remote throttle to the governor.

The remote throttle 8-pin Deutsch connector cable is for wiring to power only.

**Remote Throttle Connected to a Primary FRC Governor**

**Table 1:**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Red</td>
<td>FRC Datalink (+)</td>
</tr>
<tr>
<td>B</td>
<td>Black</td>
<td>FRC Datalink (–)</td>
</tr>
<tr>
<td>C</td>
<td>N/C</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2:**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red</td>
<td>Supply Voltage</td>
</tr>
<tr>
<td>2</td>
<td>Black</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Oragne</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>White</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Green</td>
<td>N/C</td>
</tr>
<tr>
<td>6</td>
<td>Yellow</td>
<td>N/C</td>
</tr>
<tr>
<td>7</td>
<td>Blue</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>Brown</td>
<td>N/C</td>
</tr>
</tbody>
</table>

**Figure 13. Remote Throttle to a Primary FRC Governor Wiring**

*Note: The remote throttle cable only connects to power and ground.*
OPTIONAL MULTIPLE REMOTE THROTTLES

A throttle that is to be used for multiple throttle configurations will have a short cable adjacent to the 8-pin Deutsch connector. This is the datalink cable and is used to interconnect the primary remote throttle (or FRC governor) to any secondary remote throttles.

The primary remote throttle 8-pin Deutsch connector cable is for wiring to power, interlocks, and the engine interface. Refer to the engine specific wiring diagram for interface connections.

![Diagram of cable connections]

Note: The secondary remote throttle cable only connects to power and ground.

### Primary FRC Governor With One Secondary Remote Throttle

![Diagram of cable connections]

Note: The secondary remote throttle 8-Pin connector cable only connects to power and ground. (Pins 1 and 2)

### Secondary Remote Connector/ Cable

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red</td>
<td>Supply Voltage</td>
</tr>
<tr>
<td>2</td>
<td>Black</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Orange</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>White</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Green</td>
<td>N/C</td>
</tr>
<tr>
<td>6</td>
<td>Yellow</td>
<td>N/C</td>
</tr>
<tr>
<td>7</td>
<td>Blue</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>Brown</td>
<td>N/C</td>
</tr>
</tbody>
</table>

Figure 14. Multiple ETA Remote Throttles Wiring (Sheet 1 of 2)
**Primary Remote Throttle With One or More Secondary Remote Throttles**

*Note:* Refer to the engine specific wiring diagram for the primary remote throttle interface connections.

---

*Note:* The secondary remote throttle 8-Pin connector cable only connects to power and ground. (Pins 1 and 2)

**Figure 14. Multiple ETA Remote Throttles Wiring**
*(Sheet 2 of 2)*
DANGER

PERSONAL RESPONSIBILITY CODE

The member companies of FEMSA that provide emergency response equipment and services want responders to know and understand the following:

1. Firefighting and Emergency Response are inherently dangerous activities requiring proper training in their hazards and the use of extreme caution at all times.

2. It is your responsibility to read and understand any user’s instructions, including purpose and limitations, provided with any piece of equipment you may be called upon to use.

3. It is your responsibility to know that you have been properly trained in Firefighting and/or Emergency Response and in the use, precautions, and care of any equipment you may be called upon to use.

4. It is your responsibility to be in proper physical condition and to maintain the personal skill level required to operate any equipment you may be called upon to use.

5. It is your responsibility to know that your equipment is in operable condition and has been maintained in accordance with the manufacturer’s instructions.

6. Failure to follow these guidelines may result in death, burns or other severe injury.

Fire and Emergency Manufacturers and Services Association, Inc.
P.O. Box 147, Lynnfield, MA 01940 www.FEMSA.org

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