

ETS MODBUS TABLES

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NOTES



MODBUS addresses provided are based on PLC Addressing (Base 1). If the MODBUS master system being used to communicate with the EIM is based on Protocol Addressing (Base 0), all addresses requested will have to be decremented by one.

For more information on the MODBUS implementation in ETS, see the document “ETS Modbus”.

UNIT CONVERSIONS

For subsequent tables, any line where the “Resolution/Bit” is not 1 or the “Offset” is not 0 needs to be decoded. To decode a value:

Actual value = (Read Value) * (Resolution / bit) + (offset)

As an example, many temperature lines are “Resolution/bit = 0.03125” and “Offset = -273”. If a Modbus access to a register returns 15,000 then the actual value is

$(15000) * (0.03125) + (-273) = 195.75$ degrees

MODULE IDs

As discussed in the “ETS Modbus” help document, each module has a separate configurable Modbus ID. The registers for that module will be accessed from that ID. These IDs are changeable in case there is other equipment on the bus that initially uses a same ID.

The default IDs are shown above each table in this document, but the Modbus setup screen should be checked to make sure these have not been changed to another value.

TROUBLESHOOTING

See the last section of this document for troubleshooting steps.

UNIFIED SUMMARY DATA TABLE

The following data table provides a simplified group of data that is always accessed from the **EIM ID**. The EIM will fill in data into these registers as it is available depending on what modules are present.

For example, register 32000 is engine speed. If a governor is present, the engine speed will come from the governor. If the EDT is present and connected to an ECU (e.g. ADEM), the engine speed might come from that module. For the end Modbus user, it doesn't matter what modules are present or how this unit is set up- if engine speed is available it will be in that register.

This table's registers are read from the configured EIM ID



Some data will not be relevant for a given situation or not available, for example Right Bank items for a single bank engine. If data is not available, that register will return the value 0xFFFF (65,535).

For more detailed data that is only available on single modules (e.g. "Ignition Average Spark Duration", which is only available on the ignition), see the individual module tables on the rest of the pages.

EIM UNIFIED COMMON DATA TABLE							
Register FC 0x04	Address	Item	Units	Range	Resolution /Bit	Offset	Min SW
32000	2000	Engine speed	RPM	0 to 8191.875	0.125/bit	0	1.90
32001	2001	Battery voltage	V	0 to 3212.75V	0.05V/bit	0	1.90
32002	2002	Manifold Pressure Left Absolute	PSIA	-250 to 262	0.0078125	-250	1.90
32003	2003	Manifold Pressure Right Absolute	PSIA	-250 to 262	0.0078125	-250	1.90
32004	2004	Manifold Pressure Left Gauge	PSIG	-250 to 262	0.0078125	-250	1.90
32005	2005	Manifold Pressure Right Gauge	PSIG	-250 to 262	0.0078125	-250	1.90
32006	2006	Engine oil pressure	PSIG	-250 to 262	0.0078125	-250	1.90
32007	2007	Current Ignition timing	Degrees BTDC	-200 to 312	0.0078125	-200	1.90
32008	2008	Throttle Position	%	0 to 163.8	0.0025	0	1.90
32009	2009	Engine Oil Temperature	Deg C/F**	-273 to 1775 degrees	0.03125	-273	1.90
32010	2010	Precatalyst Temperature	Deg C/F**	-273 to 1775 degrees	0.03125	-273	1.90
32011	2011	Postcatalyst Temperature	Deg C/F**	-273 to 1775 degrees	0.03125	-273	1.90
32012	2012	Engine hours low word	-	0-65535	1	0	1.90
32013	2013	Engine hours high word	-	0-65535	1	0	1.90
32014	2014	Left DPV steps	Steps	0-500	1 Step/Bit	0	1.90
32015	2015	Right DPV steps	Steps	0-500	1 Step/Bit	0	1.90
32016	2016	Left Narrowband voltage, if used	Volts	0-6.5535	0.0001	0	1.90
32017	2017	Right Narrowband voltage, if used	Volts	0-6.5535	0.0001	0	1.90
32018	2018	Left Wideband lambda, if used	Lambda	0-6.5535	0.0001	0	1.90
32019	2019	Right Wideband lambda, if used	Lambda	0-6.5535	0.0001	0	1.90

32020	2020	First engine DTC	-	0-65535	1	0	2.00
32021	2021	Engine % load at current RPM	%	0-255	1	0	2.10
32022	2022	Engine Jacket Water Temp	Deg C/F**	-273 to 1775 degrees	0.03125	-273	2.12
32030	2030	Suction Pressure	PSI	0-65535	1	0	1.90
32031	2031	Final discharge stage pressure	PSI	0-65535	1	0	1.90
32032	2032	Compressor oil pressure	PSI	0-65535	1	0	1.90
32033	2033	Discharge cylinder 1 temperature	Deg C/F**	-273 to 1775 degrees	0.03125	-273	1.90
32034	2034	Discharge cylinder 2 temperature	Deg C/F**	-273 to 1775 degrees	0.03125	-273	1.90
32035	2035	Discharge cylinder 3 temperature	Deg C/F**	-273 to 1775 degrees	0.03125	-273	1.90
32036	2036	Discharge cylinder 4 temperature	Deg C/F**	-273 to 1775 degrees	0.03125	-273	1.90
32037	2037	Compressor oil temperature	Deg C/F**	-273 to 1775 degrees	0.03125	-273	1.90
32038	2038	Discharge Stage 1 Pressure	PSI	0-65535	1	0	2.00
32039	2039	Discharge Stage 2 Pressure	PSI	0-65535	1	0	2.00
32040	2040	Discharge Stage 3 Pressure	PSI	0-65535	1	0	2.00
32041	2041	Annunciator Run Status (See table for Annunciator register 31001)	-	0-65525	1	0	2.00
32042	2042	Annuncaitor Fault and Run Code (Equivalent to Annunciator reg 35015)	-	0-65525	1	0	2.00

**For temperatures, the value will be returned in the user-selected units on the EIM

Note on engine hours

To determine engine hours (Registers 32012 and 32013), use the following formula:

$$\text{Engine Hours} = (\text{Engine Hours High Word}) * (65536) + (\text{Engine Hours Low Word})$$

If a third-party ECU is present (e.g. Waukesha ESM or Caterpillar ADEM) and is used with the EDT, the value in these registers will be the engine hours from that ECU. Otherwise, the EIM will return the engine hours stored on the EIM.

UNIFIED SUMMARY DATA TABLE, 4xxxx Registers (Supported on EIM version 2.09 and newer)

This data table is a duplicate of the above table, except for:

1. The registers are in the 4xxxx area (Function Code 0x03)
2. Most values are not scaled. If negative, the value will be sent as zero. If not available, 65535 will be sent.

This table's registers are read from the configured EIM ID



Register FC 0x03*	Address	Item	Units	Range	Resolution/ Bit	Offset	Min SW
42000	2000	Engine speed	RPM	0 to 8000	1	0	2.09
42001	2001	Battery voltage	V	0 to 3212	1	0	2.09
42002	2002	Manifold Pressure Left Absolute	PSIA	0 - 262	1	0	2.09
42003	2003	Manifold Pressure Right Absolute	PSIA	0 - 262	1	0	2.09
42004	2004	Manifold Pressure Left Gauge	PSIG	0 - 262	1	0	2.09
42005	2005	Manifold Pressure Right Gauge	PSIG	0 - 262	1	0	2.09
42006	2006	Engine oil pressure	PSIG	0 - 262	1	0	2.09
42007	2007	Current Ignition timing	Degrees BTDC	0 to 312	1	0	2.09
42008	2008	Throttle Position	%	0 to 163	1	0	2.09
42009	2009	Engine Oil Temperature	Deg C/F**	0 to 1775 degrees	1	0	2.09
42010	2010	Precatalyst Temperature	Deg C/F**	0 to 1775 degrees	1	0	2.09
42011	2011	Postcatalyst Temperature	Deg C/F**	0 to 1775 degrees	1	0	2.09
42012	2012	Engine hours low word	-	0-65535	1	0	2.09
42013	2013	Engine hours high word	-	0-65535	1	0	2.09
42014	2014	Left DPV steps	Steps	0-500	1	0	2.09
42015	2015	Right DPV steps	Steps	0-500	1	0	2.09
42016	2016	Left Narrowband voltage, if used	Volts	0-6.5535	0.0001	0	2.09
42017	2017	Right Narrowband voltage, if used	Volts	0-6.5535	0.0001	0	2.09
42018	2018	Left Wideband lambda, if used	Lambda	0-6.5535	0.0001	0	2.09
42019	2019	Right Wideband lambda, if used	Lambda	0-6.5535	0.0001	0	2.09
42020	2020	First engine DTC	-	0-65535	1	0	2.09
42021	2021	Engine % load at current RPM	%	0-255	1	0	2.09
42022	2022	Engine Jacket Water Temp	Deg C/F**	0 to 1775 degrees	1	0	2.09
42030	2030	Suction Pressure	PSI	0-65535	1	0	2.09
42031	2031	Final discharge stage pressure	PSI	0-65535	1	0	2.09
42032	2032	Compressor oil pressure	PSI	0-65535	1	0	2.09

42033	2033	Discharge cylinder 1 temperature	Deg C/F**	0 to 1775 degrees	1	0	2.09
42034	2034	Discharge cylinder 2 temperature	Deg C/F**	0 to 1775 degrees	1	0	2.09
42035	2035	Discharge cylinder 3 temperature	Deg C/F**	0 to 1775 degrees	1	0	2.09
42036	2036	Discharge cylinder 4 temperature	Deg C/F**	0 to 1775 degrees	1	0	2.09
42037	2037	Compressor oil temperature	Deg C/F**	0 to 1775 degrees	1	0	2.09
42038	2038	Discharge Stage 1 Pressure	PSI	0-65535	1	0	2.09
42039	2039	Discharge Stage 2 Pressure	PSI	0-65535	1	0	2.09
42040	2040	Discharge Stage 3 Pressure	PSI	0-65535	1	0	2.09
42041	2041	Annunciator Run Status (See table for Annunciator register 31001)	-	0-65525	1	0	2.09
42042	2042	Annuncaitor Fault and Run Code (Equivalent to Annunciator reg 35015)	-	0-65525	1	0	2.09

**For temperatures, the value will be returned in the user-selected units on the EIM

Note on engine hours

To determine engine hours (Registers 32012 and 32013), use the following formula:

$$\text{Engine Hours} = (\text{Engine Hours High Word}) * (65536) + (\text{Engine Hours Low Word})$$

If a third-party ECU is present (e.g. Waukesha ESM or Caterpillar ADEM) and is used with the EDT, the value in these registers will be the engine hours from that ECU. Otherwise, the EIM will return the engine hours stored on the EIM.

EIM MODBUS TABLE

This table's registers are read from the configured EIM ID

EIM ID: 10

EIM READ-ONLY INPUT REGISTERS- FUNCTION CODE 0x04							
Register	Address	Item	Units	Range	Resolution /Bit	Offset	Min SW
37000	7000	EIM Serial Number	U16	0-65535	1	0	1.60
37001	7001	EIM Product Part Number	U16	0-65535	1	0	1.60
37002	7002	EIM Major Software Version	U16	0-65535	1	0	1.60
37003	7003	EIM Major Software Version	U16	0-65535	1	0	1.60
37004	7004	Active Security Access	U16	0 = Operator 1 = Setup 2 = Engineering	1	0	1.60
37005	7005	Engine Total Runtime	Hours	0-65535	1	0	1.70
37006	7006	Engine Total Runtime Highword (If > 65535)	Hours	0-65535	1	0	1.75
37007	7007	Current Engine Uptime	Hours	0-65535	1	0	1.75
37008	7008	Any timer expired	U16	0 = No 1 = Yes	1	0	1.75

ANNUNCIATOR MODBUS TABLE

These values are at the Annunciator ID, set on the Modbus setup screen.

This table's registers are read from the configured Annunciator ID

Annunciator ID: 70

ANNUNCIATOR READ-ONLY INPUT REGISTERS – FUNCTION CODE 0x04							
Register	Address	Item	Units	Range	Resolution /Bit	Offset	Min SW
31001	1001	Annunciator State	(see table)	0-255	1	0	1.73
31002	1002	Engine Speed	RPM	0-8191.875	0.125/bit	0	1.73
31003	1003	B timer status bitmap	---	0-255	1	0	1.75
31004	1004	No Flow 1 Previous cycle time	Seconds	0-255	1	0	1.75
31005	1005	No Flow 1 recent Avg cycle time	Seconds	0-255	1	0	1.75
31006	1006	No Flow 2 Previous cycle time	Seconds	0-255	1	0	1.75
31007	1007	No Flow 2 recent Avg cycle time	Seconds	0-255	1	0	1.75
31008	1008	No Flow 3 Previous cycle time	Seconds	0-255	1	0	1.75
31009	1009	No Flow 3 recent Avg cycle time	Seconds	0-255	1	0	1.75
35002	5002	Last shutdown category	(see table)	0-255	1	0	1.73
35003	5003	Last shutdown index	---	0-255	1	0	1.73
35004	5004	Last shutdown high/low	0 = low, 1 = high	0-1	1	0	1.75
35005	5005	Throw 1 current rod load (T)	lbf	0-65535	1	0	1.75
35006	5006	Throw 2 current rod load (T)	lbf	0-65535	1	0	1.75
35007	5007	Throw 3 current rod load (T)	lbf	0-65535	1	0	1.75
35008	5008	Throw 1 current rod load (C)	lbf	0-65535	1	0	1.75
35009	5009	Throw 2 current rod load (C)	lbf	0-65535	1	0	1.75
35010	5010	Throw 3 current rod load (C)	lbf	0-65535	1	0	1.75
35011	5011	NoFlow 1 flow pct of rated rate	%	0-65535	1	0	1.75
35012	5012	NoFlow 2 flow pct of rated rate	%	0-65535	1	0	1.75
35013	5013	NoFlow 3 flow pct of rated rate	%	0-65535	1	0	1.75
35014	5014	Last shutdown combined	(see note)	0-65535	1	0	1.75
35015	5015	Run/ Fault status (separate table available)	---	0-65535	1	0	1.96
35016	5016	Run/ Fault status 2 (separate table available)	---	0-65535	1	0	1.96
35017	5017	Run/ Fault status 3 (separate table available)	---	0-65535	1	0	2.02
35018	5018	Run / Fault status 4 – by name (separate table available)					2.17
35019	5019	Throw 4 Rod load (T)	lbf	0-65535	1	0	2.19
35020	5020	Throw 4 Rod load (C)	lbf	0-65535	1	0	2.19
35101	5101	Thermocouple 1 Reading	Deg C/F*	0-65535	1	0	1.73
35102	5102	Thermocouple 2 Reading	Deg C/F*	0-65535	1	0	1.73
35103	5103	Thermocouple 3 Reading	Deg C/F*	0-65535	1	0	1.73
35104	5104	Thermocouple 4 Reading	Deg C/F*	0-65535	1	0	1.73
35105	5105	Thermocouple 5 Reading	Deg C/F*	0-65535	1	0	1.73
35106	5106	Thermocouple 6 Reading	Deg C/F*	0-65535	1	0	1.73
35107	5107	Thermocouple 7 Reading	Deg C/F*	0-65535	1	0	1.73
35108	5108	Thermocouple 8 Reading	Deg C/F*	0-65535	1	0	1.73

35109	5109	Thermocouple 9 Reading	Deg C/F*	0-65535	1	0	1.73
35110	5110	Thermocouple 10 Reading	Deg C/F*	0-65535	1	0	1.73
35111	5111	Thermocouple 11 Reading	Deg C/F*	0-65535	1	0	1.73
35112	5112	Thermocouple 12 Reading	Deg C/F*	0-65535	1	0	1.73
35113	5113	Thermocouple 13 Reading	Deg C/F*	0-65535	1	0	1.73
35114	5114	Thermocouple 14 Reading	Deg C/F*	0-65535	1	0	1.73
35115	5115	Thermocouple 15 Reading	Deg C/F*	0-65535	1	0	1.73
35116	5116	Thermocouple 16 Reading	Deg C/F*	0-65535	1	0	1.73
35117	5117	Thermocouple 17 Reading	Deg C/F*	0-65535	1	0	1.73
35118	5118	Thermocouple 18 Reading	Deg C/F*	0-65535	1	0	1.73
35119	5119	Thermocouple 19 Reading	Deg C/F*	0-65535	1	0	1.73
35120	5120	Thermocouple 20 Reading	Deg C/F*	0-65535	1	0	1.73
35121	5121	Thermocouple 21 Reading	Deg C/F*	0-65535	1	0	1.77
35122	5122	Thermocouple 22 Reading	Deg C/F*	0-65535	1	0	1.77
35123	5123	Thermocouple 23 Reading	Deg C/F*	0-65535	1	0	1.77
35124	5124	Thermocouple 24 Reading	Deg C/F*	0-65535	1	0	1.77
35125	5125	Thermocouple 25 Reading	Deg C/F*	0-65535	1	0	1.77
35126	5126	Thermocouple 26 Reading	Deg C/F*	0-65535	1	0	1.77
35127	5127	Thermocouple 27 Reading	Deg C/F*	0-65535	1	0	1.77
35128	5128	Thermocouple 28 Reading	Deg C/F*	0-65535	1	0	1.77
35129	5129	Thermocouple 29 Reading	Deg C/F*	0-65535	1	0	1.77
35130	5130	Thermocouple 30 Reading	Deg C/F*	0-65535	1	0	1.77
35131	5131	Thermocouple 31 Reading	Deg C/F*	0-65535	1	0	1.77
35132	5132	Thermocouple 32 Reading	Deg C/F*	0-65535	1	0	1.77
35133	5133	Thermocouple 33 Reading	Deg C/F*	0-65535	1	0	1.77
35134	5134	Thermocouple 34 Reading	Deg C/F*	0-65535	1	0	1.77
35135	5135	Thermocouple 35 Reading	Deg C/F*	0-65535	1	0	1.77
35136	5136	Thermocouple 36 Reading	Deg C/F*	0-65535	1	0	1.77
35150	5150	Analog In 1 Reading	(user)**	0-65535	1	0	1.75
35151	5151	Analog In 2 Reading	(user)**	0-65535	1	0	1.75
35152	5152	Analog In 3 Reading	(user)**	0-65535	1	0	1.75
35153	5153	Analog In 4 Reading	(user)**	0-65535	1	0	1.75
35154	5154	Analog In 5 Reading	(user)**	0-65535	1	0	1.75
35155	5155	Analog In 6 Reading	(user)**	0-65535	1	0	1.75
35156	5156	Analog In 7 Reading	(user)**	0-65535	1	0	1.75
35157	5157	Analog In 8 Reading	(user)**	0-65535	1	0	1.75
35158	5158	Analog In 9 Reading	(user)**	0-65535	1	0	1.75
35159	5159	Analog In 10 Reading	(user)**	0-65535	1	0	1.75
35160	5160	Analog In 11 Reading	(user)**	0-65535	1	0	1.75
35161	5161	Analog In 12 Reading	(user)**	0-65535	1	0	1.75
35162	5162	Analog In 13 Reading	(user)**	0-65535	1	0	1.82
35163	5163	Analog In 14 Reading	(user)**	0-65535	1	0	1.82
35164	5164	Analog In 15 Reading	(user)**	0-65535	1	0	1.82
35165	5165	Analog In 16 Reading	(user)**	0-65535	1	0	1.82
35166	5166	Analog In 17 Reading	(user)**	0-65535	1	0	1.82
35167	5167	Analog In 18 Reading	(user)**	0-65535	1	0	1.82
35168	5168	Analog In 19 Reading	(user)**	0-65535	1	0	1.82
35169	5169	Analog In 20 Reading	(user)**	0-65535	1	0	1.82
35170	5170	Reset Source (0=Local, 1=Remote, 2=Auto)	--	0-3	1	0	1.92
35171	5171	Engine Running Flag	--	0-1	1	0	1.92
35172	5172	Remote reset counts	--	0-15	1	0	1.92
35173	5173	Auto reset counts	--	0-15	1	0	1.92
35174	5174	Auto restart successful	--	0-1	1	0	1.92

35175	5175	Unit in reactive speed ctrl	--	0-1	1	0	1.92
35176	5176	Annunciator in "Remote" mode	--	0-1	1	0	1.92
36150	6150	Analog In 1 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36151	6151	Analog In 2 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36152	6152	Analog In 3 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36153	6153	Analog In 4 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36154	6154	Analog In 5 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36155	6155	Analog In 6 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36156	6156	Analog In 7 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36157	6157	Analog In 8 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36158	6158	Analog In 9 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36159	6159	Analog In 10 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36160	6160	Analog In 11 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36161	6161	Analog In 12 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36162	6162	Analog In 13 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36163	6163	Analog In 14 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36164	6164	Analog In 15 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36165	6165	Analog In 16 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36166	6166	Analog In 17 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36167	6167	Analog In 18 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36168	6168	Analog In 19 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36169	6169	Analog In 20 Reading (High res)	(user)**	0-65535	0.1	0	1.96
36200	6200	Analog out 1, pct of range	Pct	0-65535	1	0	2.23.52
36201	6201	Analog out 2, pct of range	Pct	0-65535	1	0	2.23.52
36202	6202	Analog out 3A (Expansion module), pct of range	Pct	0-65535	1	0	2.23.52
36203	6203	Analog out 4A (Expansion module), pct of range	Pct	0-65535	1	0	2.23.52
36204	6204	Analog out 5, pct of range	Pct	0-65535	1	0	2.23.52
36205	6205	Analog out 6, pct of range	Pct	0-65535	1	0	2.23.52
38000-38020	8000 - 8020	Currently faulted sensor string		ASCII, 2 chars per reg.			1.75
			--		1	0	

*The temperature reading unit (C or F) will depend on the EIM temperature unit setting.

** The analog input reading will be scaled to the user-configured units on the EIM

This table's registers are read from the configured Annunciator ID

Annunciator ID: 70

ANNUNCIATOR OUTPUT HOLDING REGISTERS – READ FCN CODE 0x03, WRITE FCN CODE 0x06*

Register	Address	Item	Units	Range	Resolution /Bit	Offset	Min SW
46001	6001	Annunciator Flag Send (1 = reset, 2= stop, 11= autostart, 3 = goto local mode, 4= goto remote mode)	--	--	1	0	1.73
46010	6010	Thermocouple 1 low alarm	Deg C/F**				1.75
46011	6011	Thermocouple 1 high alarm	Deg C/F**				1.75
46012	6012	Thermocouple 2 low alarm	Deg C/F**				1.75
46013	6013	Thermocouple 2 high alarm	Deg C/F**				1.75
46014	6014	Thermocouple 3 low alarm	Deg C/F**				1.75
46015	6015	Thermocouple 3 high alarm	Deg C/F**				1.75
46016	6016	Thermocouple 4 low alarm	Deg C/F**				1.75
46017	6017	Thermocouple 4 high alarm	Deg C/F**				1.75
46018	6018	Thermocouple 5 low alarm	Deg C/F**				1.75
46019	6019	Thermocouple 5 high alarm	Deg C/F**				1.75
46020	6020	Thermocouple 6 low alarm	Deg C/F**				1.75
46021	6021	Thermocouple 6 high alarm	Deg C/F**				1.75
46022	6022	Thermocouple 7 low alarm	Deg C/F**				1.75
46023	6023	Thermocouple 7 high alarm	Deg C/F**				1.75
46024	6024	Thermocouple 8 low alarm	Deg C/F**				1.75
46025	6025	Thermocouple 8 high alarm	Deg C/F**				1.75
46026	6026	Thermocouple 9 low alarm	Deg C/F**				1.75
46027	6027	Thermocouple 9 high alarm	Deg C/F**				1.75
46028	6028	Thermocouple 10 low alarm	Deg C/F**				1.75
46029	6029	Thermocouple 10 high alarm	Deg C/F**				1.75
46030	6030	Thermocouple 11 low alarm	Deg C/F**				1.75
46031	6031	Thermocouple 11 high alarm	Deg C/F**				1.75
46032	6032	Thermocouple 12 low alarm	Deg C/F**				1.75
46033	6033	Thermocouple 12 high alarm	Deg C/F**				1.75
46034	6034	Thermocouple 13 low alarm	Deg C/F**				1.75
46035	6035	Thermocouple 13 high alarm	Deg C/F**				1.75

46036	6036	Thermocouple 14 low alarm	Deg C/F**				1.75
46037	6037	Thermocouple 14 high alarm	Deg C/F**				1.75
46038	6038	Thermocouple 15 low alarm	Deg C/F**				1.75
46039	6039	Thermocouple 15 high alarm	Deg C/F**				1.75
46040	6040	Thermocouple 16 low alarm	Deg C/F**				1.75
46041	6041	Thermocouple 16 high alarm	Deg C/F**				1.75
46042	6042	Thermocouple 17 low alarm	Deg C/F**				1.75
46043	6043	Thermocouple 17 high alarm	Deg C/F**				1.75
46044	6044	Thermocouple 18 low alarm	Deg C/F**				1.75
46045	6045	Thermocouple 18 high alarm	Deg C/F**				1.75
46046	6046	Thermocouple 19 low alarm	Deg C/F**				1.75
46047	6047	Thermocouple 19 high alarm	Deg C/F**				1.75
46048	6048	Thermocouple 20 low alarm	Deg C/F**				1.75
46049	6049	Thermocouple 20 high alarm	Deg C/F**				1.75
46050	6050	Thermocouple 21 low alarm	Deg C/F**				1.82
46051	6051	Thermocouple 21 high alarm	Deg C/F**				1.82
46052	6052	Thermocouple 22 low alarm	Deg C/F**				1.82
46053	6053	Thermocouple 22 high alarm	Deg C/F**				1.82
46054	6054	Thermocouple 23 low alarm	Deg C/F**				1.82
46055	6055	Thermocouple 23 high alarm	Deg C/F**				1.82
46056	6056	Thermocouple 24 low alarm	Deg C/F**				1.82
46057	6057	Thermocouple 24 high alarm	Deg C/F**				1.82
46058	6058	Thermocouple 25 low alarm	Deg C/F**				1.82
46059	6059	Thermocouple 25 high alarm	Deg C/F**				1.82
46060	6060	Thermocouple 26 low alarm	Deg C/F**				1.82
46061	6061	Thermocouple 26 high alarm	Deg C/F**				1.82
46062	6062	Thermocouple 27 low alarm	Deg C/F**				1.82
46063	6063	Thermocouple 27 high alarm	Deg C/F**				1.82
46064	6064	Thermocouple 28 low alarm	Deg C/F**				1.82
46065	6065	Thermocouple 28 high alarm	Deg C/F**				1.82
46066	6066	Thermocouple 29 low alarm	Deg C/F**				1.82
46067	6067	Thermocouple 29 high alarm	Deg C/F**				1.82
46068	6068	Thermocouple 30 low alarm	Deg C/F**				1.82
46069	6069	Thermocouple 30 high alarm	Deg C/F**				1.82
46070	6070	Thermocouple 31 low alarm	Deg C/F**				1.82
46071	6071	Thermocouple 31 high alarm	Deg C/F**				1.82
46072	6072	Thermocouple 32 low alarm	Deg C/F**				1.82
46073	6073	Thermocouple 32 high alarm	Deg C/F**				1.82
46074	6074	Thermocouple 33 low alarm	Deg C/F**				1.82

46075	6075	Thermocouple 33 high alarm	Deg C/F**				1.82
46076	6076	Thermocouple 34 low alarm	Deg C/F**				1.82
46077	6077	Thermocouple 34 high alarm	Deg C/F**				1.82
46078	6078	Thermocouple 35 low alarm	Deg C/F**				1.82
46079	6079	Thermocouple 35 high alarm	Deg C/F**				1.82
46080	6080	Thermocouple 36 low alarm	Deg C/F**				1.82
46081	6081	Thermocouple 36 high alarm	Deg C/F**				1.82
46100	6100	Analog In 1 Low Limit	(user)***				1.75
46101	6101	Analog In 1 High Limit	(user)***				1.75
46102	6102	Analog In 2 Low Limit	(user)***				1.75
46103	6103	Analog In 2 High Limit	(user)***				1.75
46104	6104	Analog In 3 Low Limit	(user)***				1.75
46105	6105	Analog In 3 High Limit	(user)***				1.75
46106	6106	Analog In 4 Low Limit	(user)***				1.75
46107	6107	Analog In 4 High Limit	(user)***				1.75
46108	6108	Analog In 5 Low Limit	(user)***				1.75
46109	6109	Analog In 5 High Limit	(user)***				1.75
46110	6110	Analog In 6 Low Limit	(user)***				1.75
46111	6111	Analog In 6 High Limit	(user)***				1.75
46112	6112	Analog In 7 Low Limit	(user)***				1.75
46113	6113	Analog In 7 High Limit	(user)***				1.75
46114	6114	Analog In 8 Low Limit	(user)***				1.75
46115	6115	Analog In 8 High Limit	(user)***				1.75
46116	6116	Analog In 9 Low Limit	(user)***				1.75
46117	6117	Analog In 9 High Limit	(user)***				1.75
46118	6118	Analog In 10 Low Limit	(user)***				1.75
46119	6119	Analog In 10 High Limit	(user)***				1.75
46120	6120	Analog In 11 Low Limit	(user)***				1.75
46121	6121	Analog In 11 High Limit	(user)***				1.75
46122	6122	Analog In 12 Low Limit	(user)***				1.75
46123	6123	Analog In 12 High Limit	(user)***				1.75
46124	6124	Analog In 13 Low Limit	(user)***				1.82
46125	6125	Analog In 13 High Limit	(user)***				1.82
46126	6126	Analog In 14 Low Limit	(user)***				1.82
46127	6127	Analog In 14 High Limit	(user)***				1.82
46128	6128	Analog In 15 Low Limit	(user)***				1.82
46129	6129	Analog In 15 High Limit	(user)***				1.82
46130	6130	Analog In 16 Low Limit	(user)***				1.82
46131	6131	Analog In 16 High Limit	(user)***				1.82

46132	6132	Analog In 17 Low Limit	(user) ^{***}				1.82
46133	6133	Analog In 17 High Limit	(user) ^{***}				1.82
46134	6134	Analog In 18 Low Limit	(user) ^{***}				1.82
46135	6135	Analog In 18 High Limit	(user) ^{***}				1.82
46136	6136	Analog In 19 Low Limit	(user) ^{***}				1.82
46137	6137	Analog In 19 High Limit	(user) ^{***}				1.82
46138	6138	Analog In 20 Low Limit	(user) ^{***}				1.82
46139	6139	Analog In 20 High Limit	(user) ^{***}				1.82
46200	6200	PID1 Setpoint	(user)				1.82
46201	6201	PID2 Setpoint	(user)				1.82
46202	6202	Speed Setpoint, in units of speed control target (e.g., if fixed RPM mode this is the target RPM, if controlling to suction pressure this is the PSI target, etc.)	(user)				1.92
46203	6203	Speed deadband (If not fixed speed)	(user)				1.92

*Writes are only supported with write single register (function code 0x06). Write multiple (function code 0x10) is not supported

**The temperature reading unit (C or F) will depend on the EIM temperature unit setting.

*** The analog input reading will be scaled to the user-configured units on the EIM

This table's registers are read from the configured Annunciator ID

Annunciator ID: 70

ANNUNCIATOR READ-ONLY DISCRETE INPUT CONTACTS – FUNCTION CODE 0x02							
Register	Address	Item	Units	Range	Resolution/ Bit	Offset	Min SW
15001	5001	Digital In 1 currently faulted		0 = Clear 1 = Faulted			1.73
15002	5002	Digital In 2 currently faulted		0 = Clear 1 = Faulted			1.73
15003	5003	Digital In 3 currently faulted		0 = Clear 1 = Faulted			1.73
15004	5004	Digital In 4 currently faulted		0 = Clear 1 = Faulted			1.73
15005	5005	Digital In 5 currently faulted		0 = Clear 1 = Faulted			1.73
15006	5006	Digital In 6 currently faulted		0 = Clear 1 = Faulted			1.73
15007	5007	Digital In 7 currently faulted		0 = Clear 1 = Faulted			1.73
15008	5008	Digital In 8 currently faulted		0 = Clear 1 = Faulted			1.73
15009	5009	Digital In 9 currently faulted		0 = Clear 1 = Faulted			1.73
15010	5010	Digital In 10 currently faulted		0 = Clear 1 = Faulted			1.73
15011	5011	Digital In 11 currently faulted		0 = Clear 1 = Faulted			1.73
15012	5012	Digital In 12 currently faulted		0 = Clear 1 = Faulted			1.73
15013	5013	Digital In 13 currently faulted		0 = Clear 1 = Faulted			1.73
15014	5014	Digital In 14 currently faulted		0 = Clear 1 = Faulted			1.73
15015	5015	Digital In 15 currently faulted		0 = Clear 1 = Faulted			1.73
15016	5016	Digital In 16 currently faulted		0 = Clear 1 = Faulted			1.73
15017	5017	Digital In 17 currently faulted		0 = Clear 1 = Faulted			1.73
15018	5018	Digital In 18 currently faulted		0 = Clear 1 = Faulted			1.73
15019	5019	Digital In 19 currently faulted		0 = Clear 1 = Faulted			1.73
15020	5020	Digital In 20 currently faulted		0 = Clear 1 = Faulted			1.73
15021	5021	Digital In 21 currently faulted		0 = Clear 1 = Faulted			1.73

15022	5022	Digital In 22 currently faulted	0 = Clear 1 = Faulted	1.73
15023	5023	Digital In 23 currently faulted	0 = Clear 1 = Faulted	1.73
15024	5024	Digital In 24 currently faulted	0 = Clear 1 = Faulted	1.73
15025	5025	Digital In 25 currently faulted	0 = Clear 1 = Faulted	1.73
15026	5026	Digital In 26 currently faulted	0 = Clear 1 = Faulted	1.73
15027	5027	Digital In 27 currently faulted	0 = Clear 1 = Faulted	1.73
15028	5028	Digital In 28 currently faulted	0 = Clear 1 = Faulted	1.73
15029	5029	Analog In 1 currently faulted	0 = Clear 1 = Faulted	1.73
15030	5030	Analog In 2 currently faulted	0 = Clear 1 = Faulted	1.73
15031	5031	Analog In 3 currently faulted	0 = Clear 1 = Faulted	1.73
15032	5032	Analog In 4 currently faulted	0 = Clear 1 = Faulted	1.73
15033	5033	Analog In 5 currently faulted	0 = Clear 1 = Faulted	1.73
15034	5034	Analog In 6 currently faulted	0 = Clear 1 = Faulted	1.73
15035	5035	Analog In 7 currently faulted	0 = Clear 1 = Faulted	1.73
15036	5036	Analog In 8 currently faulted	0 = Clear 1 = Faulted	1.73
15037	5037	Analog In 9 currently faulted	0 = Clear 1 = Faulted	1.73
15038	5038	Analog In 10 currently faulted	0 = Clear 1 = Faulted	1.73
15039	5039	Analog In 11 currently faulted	0 = Clear 1 = Faulted	1.73
15040	5040	Analog In 12 currently faulted	0 = Clear 1 = Faulted	1.73
15041	5041	Analog In 13 currently faulted	0 = Clear 1 = Faulted	1.82
15042	5042	Analog In 14 currently faulted	0 = Clear 1 = Faulted	1.82
15043	5043	Analog In 15 currently faulted	0 = Clear 1 = Faulted	1.82
15044	5044	Analog In 16 currently faulted	0 = Clear 1 = Faulted	1.82
15045	5045	Analog In 17 currently faulted	0 = Clear 1 = Faulted	1.82
15046	5046	Analog In 18 currently faulted	0 = Clear 1 = Faulted	1.82
15047	5047	Analog In 19 currently faulted	0 = Clear 1 = Faulted	1.82
15048	5048	Analog In 20 currently faulted	0 = Clear 1 = Faulted	1.82
15100	5100	Thermocouple 1 currently faulted	0 = Clear 1 = Faulted	1.82
15101	5101	Thermocouple 2 currently faulted	0 = Clear 1 = Faulted	1.82

15102	5102	Thermocouple 3 currently faulted		0 = Clear 1 = Faulted		1.82
15103	5103	Thermocouple 4 currently faulted		0 = Clear 1 = Faulted		1.82
15104	5104	Thermocouple 5 currently faulted		0 = Clear 1 = Faulted		1.82
15105	5105	Thermocouple 6 currently faulted		0 = Clear 1 = Faulted		1.82
15106	5106	Thermocouple 7 currently faulted		0 = Clear 1 = Faulted		1.82
15107	5107	Thermocouple 8 currently faulted		0 = Clear 1 = Faulted		1.82
15108	5108	Thermocouple 9 currently faulted		0 = Clear 1 = Faulted		1.82
15109	5109	Thermocouple 10 currently faulted		0 = Clear 1 = Faulted		1.82
15110	5110	Thermocouple 11 currently faulted		0 = Clear 1 = Faulted		1.82
15111	5111	Thermocouple 12 currently faulted		0 = Clear 1 = Faulted		1.82
15112	5112	Thermocouple 13 currently faulted		0 = Clear 1 = Faulted		1.82
15113	5113	Thermocouple 14 currently faulted		0 = Clear 1 = Faulted		1.82
15114	5114	Thermocouple 15 currently faulted		0 = Clear 1 = Faulted		1.82
15115	5115	Thermocouple 16 currently faulted		0 = Clear 1 = Faulted		1.82
15116	5116	Thermocouple 17 currently faulted		0 = Clear 1 = Faulted		1.82
15117	5117	Thermocouple 18 currently faulted		0 = Clear 1 = Faulted		1.82
15118	5118	Thermocouple 19 currently faulted		0 = Clear 1 = Faulted		1.82
15119	5119	Thermocouple 20 currently faulted		0 = Clear 1 = Faulted		1.82
15120	5120	Thermocouple 21 currently faulted		0 = Clear 1 = Faulted		1.82
15121	5121	Thermocouple 22 currently faulted		0 = Clear 1 = Faulted		1.82
15122	5122	Thermocouple 23 currently faulted		0 = Clear 1 = Faulted		1.82
15123	5123	Thermocouple 24 currently faulted		0 = Clear 1 = Faulted		1.82
15124	5124	Thermocouple 25 currently faulted		0 = Clear 1 = Faulted		1.82
15125	5125	Thermocouple 26 currently faulted		0 = Clear 1 = Faulted		1.82
15126	5126	Thermocouple 27 currently faulted		0 = Clear 1 = Faulted		1.82
15127	5127	Thermocouple 28 currently faulted		0 = Clear 1 = Faulted		1.82
15128	5128	Thermocouple 29 currently faulted		0 = Clear 1 = Faulted		1.82
15129	5129	Thermocouple 30 currently faulted		0 = Clear 1 = Faulted		1.82
15130	5130	Thermocouple 31 currently faulted		0 = Clear 1 = Faulted		1.82

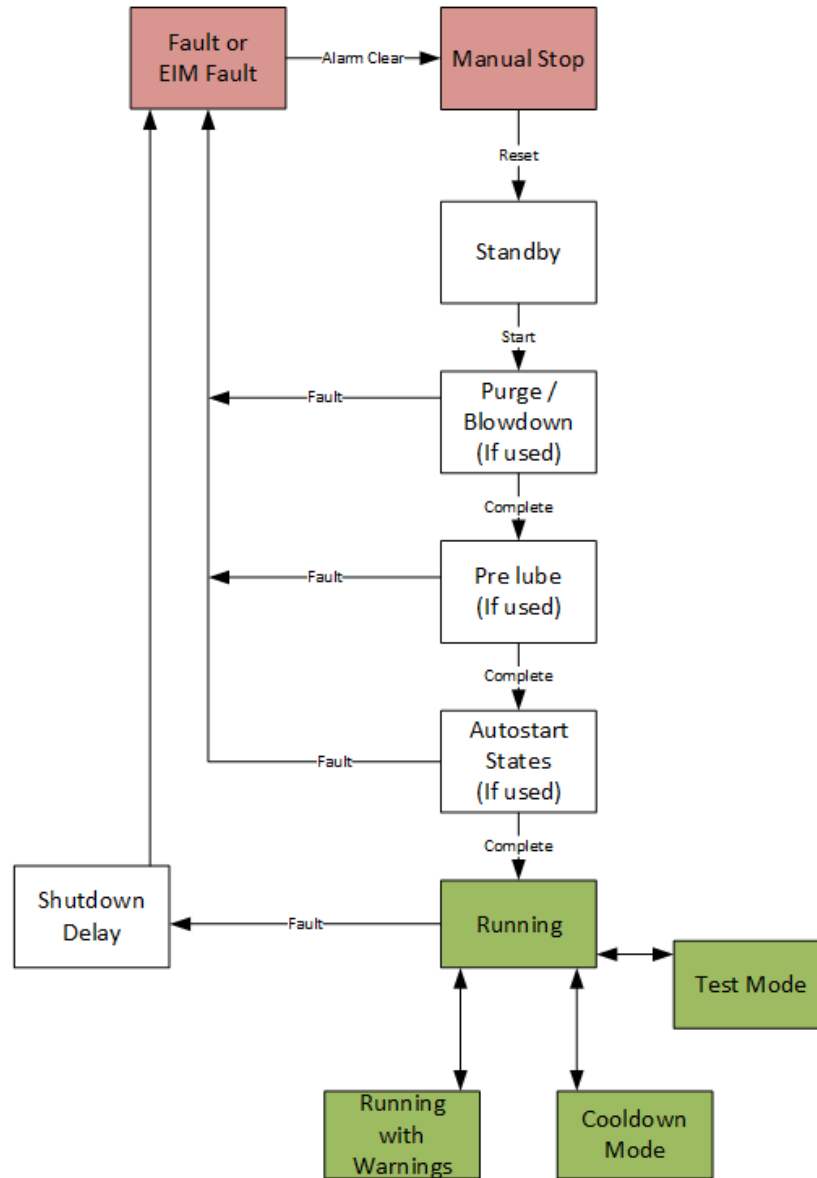
15131	5131	Thermocouple 32 currently faulted		0 = Clear 1 = Faulted			1.82
15132	5132	Thermocouple 33 currently faulted		0 = Clear 1 = Faulted			1.82
15133	5133	Thermocouple 34 currently faulted		0 = Clear 1 = Faulted			1.82
15134	5134	Thermocouple 35 currently faulted		0 = Clear 1 = Faulted			1.82
15135	5135	Thermocouple 36 currently faulted		0 = Clear 1 = Faulted			1.82

ANNUNCIATOR STATES

Annunciator States (Register 31001)	
0	Board startup
1	Stopped (Manual stop)
2	Engine startup
3	Fault shutdown
4	Engine running
5	Engine running with warnings
6	Test mode
7	Shutdown Delay
8	EIM Fault (A User-configured alarm from another module faulted)
9	Waiting for pre-lube to complete
10	Auto start begin
11	Auto start warning delay
12	Auto start purge 1
13	Auto start cranking waiting for engine start
14	Auto start wait for idle to complete
15	Auto start wait for governor to go to run
16	Auto start load delay
17	Auto start ready to start
18	Auto restart pending
19	Blowdown or purge before prelube
25	Manual cooldown mode
30	VFD Starting
31	VFD Warming up
32	VFD Idling
33	VFD Manual
34	VFD Auto normal
35	VFD Auto pressure override
50	Standby
60	Blowdown warning

GENERIC ANNUNCIATOR STATE DIAGRAM

The general sequence of operations is shown below. Each state may have more complex changes than are shown here, but the general order is correct.



ANNUNCIATOR SHUTDOWN TYPE

The registers 35002 and 35003 can be used to see the previous shutdown reason. The register 35002 maps to the table below and gives the shutdown type. For inputs, the register 35003 gives the input index.

For example, if the annunciator state (Register 31001) is 3 (Faulted), and the register 35002 is 1 (Digital Input), and the register 35003 is 10, then the shutdown was on contact Digital In 10.

Note: For RPM shutdown, input index 0 is underspeed and input index 1 is overspeed.

Annunciator Previous Shutdown Type (Register 35002)	
0	Thermocouple
1	Digital Input
2	Analog Input
3	Manual Stop
4	(unused)
5	EIM Shutdown (Usually from another module)
6	MPU (RPM)
7	Power on Reset
8	Prelube expired before start
9	Autostart sequence failed
10	<i>(Unused)</i>
11	ECU failed to start
12	Manual shutdown through Modbus
13	Blowdown failed
14	Purge failed
15	Expansion module dropped

The annunciator register 35014 contains the faulted input as a combined number. Bit 14 represents if the fault was a high alarm. Bits 8-13 represent the input number. Bits 0-7 represent the contact group (which is the above table).

B TIMER STATUS (REGISTER 31003)

B Timers Bitmap Value	
0	B1 and B2 are both running
1	B1 is running, B2 is armed
2	B1 is armed, B2 is running
3	B1 and B2 are both armed

GOVERNOR MODBUS TABLE

This table's registers are read from the configured Governor ID

Governor ID: 60

GOVERNOR READ-ONLY INPUT REGISTERS – FUNCTION CODE 0x04							
Register	Address	Item	Units	Range	Resolution/ Bit	Offset	Min SW
30103	103	Manifold Pressure Current	milliAmps	0 - 655.35mA	0.01mA/bit	0	1.90
30105	105	Discharge Pressure Current	milliAmps	0 - 655.35mA	0.01mA/bit	0	1.70
30107	107	Suction Pressure Current	milliAmps	0 - 655.35mA	0.01mA/bit	0	1.70
30110	110	Battery Volts	Volts	0 - 3212.75V	0.05V/bit	0	1.70
31000	1000	Engine Speed	RPM	0-8191.875	0.125/bit	0	1.70
31001	1001	Error Code	(see table)	0-255	1	0	1.70
31002	1002	Governor State	(see table)	0-255	1	0	1.70
31003	1003	Current Control Mode	(see table)	0-255	1	0	1.70
31004	1004	RPM Setpoint	RPM	0-8191.875	0.125/bit	0	1.70
31005	1005	Throttle Position	%	0-100%	0.0025/bit	0	1.70
31006	1006	Idle RPM Setting	RPM	0-8191.875	0.125/bit	0	1.70
31007	1007	Governor Control Mode In Auto	(see table)	0-255	1	0	1.70
31008	1008	RPM Setpoint In Auto	RPM	0-8191.875	0.125/bit	0	1.70
31009	1009	Discharge Setpoint In Auto	milliAmps	0 - 655.35mA	0.01mA/bit	0	1.70
31010	1010	Suction Setpoint In Auto	milliAmps	0 - 655.35mA	0.01mA/bit	0	1.70
31011	1011	Flywheel Teeth	-	0-65535	1	0	1.70
31012	1012	Pressure Control – Min RPM	RPM	0-8191.875	0.125/bit	0	1.70
31013	1013	Pressure Control – Max RPM	RPM	0-8191.875	0.125/bit	0	1.70
35001	5001	Suction – Low PSI at 4mA	PSI	0-65535	1	0	1.70
35002	5002	Suction – High PSI at 20mA	PSI	0-65535	1	0	1.70
35003	5003	Discharge – Low PSI at 4mA	PSI	0-65535	1	0	1.70
35004	5004	Discharge – High PSI at 20mA	PSI	0-65535	1	0	1.70
35005	5005	Suction current reading PSI	PSI	0-65535	1	0	1.96
35006	5006	Discharge current reading PSI	PSI	0-65535	1	0	1.96

This table's registers are read from the configured Governor ID

Governor ID: **60**

Supported in EIM versions 1.89 and newer:

GOVERNOR OUTPUT HOLDING REGISTERS – READ FCN CODE 0x03, WRITE FCN CODE 0x06*							
Register	Addresses	Item	Units	Range	Resolution/Bit	Offset	Min SW
45100	5100	Governor Speed Setpoint (Only used if control mode is "Fixed RPM")	RPM	0- Overspeed	1	0	1.92
45101	5101	Governor auto RPM range low speed (Only used if control mode is suction or discharge)	RPM	0- Overspeed	1	0	1.92
45102	5102	Governor auto RPM range high speed (Only used if control mode is suction or discharge)	RPM	0- Overspeed	1	0	1.92
45103	5103	Suction setpoint (Only used if control mode is "Suction")	PSI	---	1	0	1.92
45104	5104	Discharge setpoint (Only used if control mode is "Discharge")	PSI	---	1	0	1.92
45105	5105	Pressure deadband (Only used if control mode is suction or discharge)	PSI	---	1	0	1.92
45106	5106	Control mode (when panel switch is in AUTO) 0 = Fixed RPM 1 = Suction Pressure 2 = Discharge Pressure	---	0-2	1	0	1.92
45107	5107	Request pressure control override time, seconds (Governor will go to MAX auto range for this time)	Seconds	30-1800 (30 seconds – 30 minutes)	1	0	1.92

*Writes are only supported with write single register (function code 0x06). Write multiple (function code 0x10) is not supported



CAUTION: Take great care when changing governor settings remotely. It is generally safest to change to fixed RPM mode, change any pressure settings, then change back to pressure mode.

GOVERNOR ERROR CODES

Governor Error Codes (Register 31000)	
0	No error
1	Configuration write fail
2	Runtime data write fail
3	Unknown reset
4	Throttle feedback difference too large
5	Overspeed alarm
6	Underspeed alarm
7	Loss of pressure control high
8	Loss of pressure control low
9	EIM Triggered alarm (Usually a pressure input out of range)
10	Manual switch error

GOVERNOR STATE CODES

Governor State Codes (Register 31001)	
0	Power on
1	Engine off
2	Cranking
3	Ramp to idle
4	Running
5	Stopping
6	Error

GOVERNOR CONTROL MODE CODES

Governor Control Mode Codes (Register 31003 and 31007)	
0	Fixed speed (Auto)
1	Suction pressure (Auto)
2	Discharge pressure (Auto)
3	Idle
4	Manual

Note: Register 31007, "Governor Control Mode In Auto" will never be 3 or 4

EDT MODBUS TABLE

The EDT Modbus table below is in the same location whether an ESM or an ADEM is used. As such, not all values will be present for every engine. Values that are not available will return 65,535.

Note: This table is duplicated starting at 47,001 in US units, and read as an integer. E.g. Engine oil temp can be read at 47,008 in deg F. This is supported in 2.26 and newer.

This table's registers are read from the configured EDT ID



EDT READ-ONLY INPUT REGISTERS – FUNCTION CODE 0x04							
Register	Address	Item	Units	Range	Resolution /Bit	Offset	Min SWt
30001	1	Engine speed	RPM	0 to 8191 RPM	0.125	0	1.90
30002	2	Battery voltage	V	0 to 3276.75 V	0.05	0	1.90
30003	3	(CAT) Manifold pressure left absolute	KPa-a	0 to 510 KPa	2	0	1.90
30004	4	Reserved	-	-	-	-	-
30005	5	Engine oil pressure	KPa-g	0 to 1000 KPa	4	0	1.90
30006	6	Ignition actual timing	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30007	7	Desired speed	RPM	0 to 8191 RPM	0.125	0	1.90
30008	8	Engine oil temp	C	-273 to 1775 C	0.03125	-273	1.90
30009	9	Engine coolant temp	C	-40 to 215 C	1	-40	1.90
30010	10	Precat Temp	C	-273 to 1775 C	0.03125	-273	1.90
30011	11	Postcat Temp	C	-273 to 1775 C	0.03125	-273	1.90
30012	12	Differential catalyst temp	C	-273 to 1775 C	0.03125	-273	1.90
30013	13	Engine hours low word	-	0-65536	1	0	1.90
30014	14	Engine hours high word	-	0-65536	1	0	1.90
30015	15	Fuel Temperature	C	-40 to 215 C	1	-40	2.26
30016	16	Fuel Specific Gravity	-	-	.0001	0	2.26
30017	17	Desired Timing 1	° BTDC	-200 to 312 deg	0.0078125	-200	2.26
30018	18	Desired Timing 2	° BTDC	-200 to 312 deg	0.0078125	-200	2.26
30025	25	(ESM Only) WKI Value	-	16-144	0.125	-2500	1.90
30026	26	Throttle position	%	0-100 %	.4	0	1.90
30027	27	(ESM Only) Left Manifold Absolute Pressure	KPa-a	0-6553.5 KPa	.1	0	1.90
30028	28	(ESM Only) Right Manifold Absolute Pressure	KPa-a	0-6553.5 KPa	.1	0	1.90
30029	29	(ESM Only) Exhaust manifold temp left	C	-273 to 1775 C	0.03125	-273	1.90
30030	30	(ESM Only) Exhaust manifold temp right	C	-273 to 1775 C	0.03125	-273	1.90
30031	31	Air intake temp	C	-40 to 215 C	1	-40	1.90
30032	32	(ESM Only) Ambient air temp	C	-40 to 215 C	1	-40	1.90
30033	33	(ESM Only) Ignition timing cyl 1 (in firing order)	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30034	34	(ESM Only) Ignition timing cyl 2	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30035	35	(ESM Only) Ignition timing cyl 3	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30036	36	(ESM Only) Ignition timing cyl 4	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30037	37	(ESM Only) Ignition timing	° BTDC	-200 to 312 deg	0.0078125	-200	1.90

		cyl 5					
30038	38	(ESM Only) Ignition timing cyl 6	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30039	39	(ESM Only) Ignition timing cyl 7	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30040	40	(ESM Only) Ignition timing cyl 8	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30041	41	(ESM Only) Ignition timing cyl 9	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30042	42	(ESM Only) Ignition timing cyl 10	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30043	43	(ESM Only) Ignition timing cyl 11	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30044	44	(ESM Only) Ignition timing cyl 12	° BTDC	-200 to 312 deg	0.0078125	-200	1.90
30045	45	(ESM Only) Spark reference 1 (in firing order)	-	0 to 255	1	0	1.90
30046	46	(ESM Only) Spark reference 2 (in firing order)	-	0 to 255	1	0	1.90
30047	47	(ESM Only) Spark reference 3 (in firing order)	-	0 to 255	1	0	1.90
30048	48	(ESM Only) Spark reference 4 (in firing order)	-	0 to 255	1	0	1.90
30049	49	(ESM Only) Spark reference 5 (in firing order)	-	0 to 255	1	0	1.90
30050	50	(ESM Only) Spark reference 6 (in firing order)	-	0 to 255	1	0	1.90
30051	51	(ESM Only) Spark reference 7 (in firing order)	-	0 to 255	1	0	1.90
30052	52	(ESM Only) Spark reference 8 (in firing order)	-	0 to 255	1	0	1.90
30053	53	(ESM Only) Spark reference 9 (in firing order)	-	0 to 255	1	0	1.90
30054	54	(ESM Only) Spark reference 10 (in firing order)	-	0 to 255	1	0	1.90
30055	55	(ESM Only) Spark reference 11 (in firing order)	-	0 to 255	1	0	1.90
30056	56	(ESM Only) Spark reference 12 (in firing order)	-	0 to 255	1	0	1.90
30100	100	Fuel valve 1 absolute pressure	KPa	0 – 6553.5 KPa	0.1	0	1.96
30101	101	Fuel valve differential pressure	KPa	0 – 6553.5 KPa	0.1	0	1.96
30102	102	Unfiltered oil pressure	KPa	0 – 1020 KPa	4	0	1.96
30103	103	Turbocharger 1 intake temp	C	-273 to 1775 C	0.03125	-273	1.96
30104	104	Turbocharger 1 outlet temp	C	-273 to 1775 C	0.03125	-273	1.96
30105	105	Turbocharger 2 intake temp	C	-273 to 1775 C	0.03125	-273	1.96
30106	106	Turbocharger 2 outlet temp	C	-273 to 1775 C	0.03125	-273	1.96
30107	107	Cyl 1 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30108	108	Cyl 2 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30109	109	Cyl 3 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30110	110	Cyl 4 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30111	111	Cyl 5 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30112	112	Cyl 6 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96

30113	113	Cyl 7 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30114	114	Cyl 8 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30115	115	Cyl 9 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30116	116	Cyl 10 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30117	117	Cyl 11 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30118	118	Cyl 12 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30119	119	Cyl 13 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30120	120	Cyl 14 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30121	121	Cyl 15 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30122	122	Cyl 16 Exhaust Temp	C	-273 to 1775 C	0.03125	-273	1.96
30123	123	Oil Filter differential pressure	KPa	0-125 KPa	0.5	0	1.96
30124	124	Coolant Pressure	KPa	0-500 KPa	2	0	1.96
30125	125	First DTC (Fault Code)	---	0-65535	1	0	2.00
30126	126	Engine % load at current RPM	%	0-255	1	0	2.10
30129	129	Exhaust current Nox	-	-200-3076	0.05	-200	2.26
30130	130	Fuel correction factor	%	0-255	1	0	2.26
30300	300	Detonation level	-	0-255	1	0	2.26
30301	301	Detonation level cyl 1	-	0-255	1	0	2.26
30302	302	Detonation level cyl 2	-	0-255	1	0	2.26
30303	303	Detonation level cyl 3	-	0-255	1	0	2.26
30304	304	Detonation level cyl 4	-	0-255	1	0	2.26
30305	305	Detonation level cyl 5	-	0-255	1	0	2.26
30306	306	Detonation level cyl 6	-	0-255	1	0	2.26
30307	307	Detonation level cyl 7	-	0-255	1	0	2.26
30308	308	Detonation level cyl 8	-	0-255	1	0	2.26
30309	309	Detonation level cyl 9	-	0-255	1	0	2.26
30310	310	Detonation level cyl 10	-	0-255	1	0	2.26
30311	311	Detonation level cyl 11	-	0-255	1	0	2.26
30312	312	Detonation level cyl 12	-	0-255	1	0	2.26
30313	313	Detonation level cyl 13	-	0-255	1	0	2.26
30314	314	Detonation level cyl 14	-	0-255	1	0	2.26
30315	315	Detonation level cyl 15	-	0-255	1	0	2.26
30316	316	Detonation level cyl 16	-	0-255	1	0	2.26
30317	317	Actual exhaust oxygen	%	0-163	0.0025	0	2.26
30318	318	Desired rated exhaust oxygen	%	0-163	0.0025	0	2.26
30319	319	Actual AFR	-	0-25	0.1	0	2.26
30320	320	Desired AFR	-	0-25	0.1	0	2.26
30321	321	Desired full load exhaust O2	-	0-2.55	0.01	0	2.26
30322	322	Desired NOX ppm	Ppm	-200-3076	0.05	-200	2.26
30323	323	Fuel quality setting	-	0-65535	1	0	2.26
30324	324	Engine rated speed	-	0-8191	0.125	0	2.26
30325	325	Cooldown minutes config	-	0-65535	1	0	2.26
30326	326	Low Idle config	-	0-8191	0.125	0	2.26
30327	327	Max hi idle config	-	0-8191	0.125	0	2.26
30328	328	Min hi idle config	-	0-8191	0.125	0	2.26
30329	329	Percent fuel position	%	0-255	1	0	2.26
30330	330	Fuel valve position	-	0-65535	1	0	2.26
30331	331	Fuel rate	SCFM	0-65535	1	0	2.26
30332	332	Air to fuel diff pressure	KPa	0-6553	0.1	0	2.26
30333	333	Gas fuel flow	SCFM	0-65535	1	0	2.26

30334	334	Fuel actuator command position	-	0-2.55	0.01	0	2.26
30335	335	Wastegate command position	-	0-255	1	0	2.26
30336	336	Choke command position	-	0-255	1	0	2.26
30337	337	Turbo bypass command	KPa	0-6553	0.1	0	2.26
30338	338	Throttle actuator command position	-	0-2.55	0.01	0	2.26
30339	339	Throttle valve diff pressure	KPa	0-6553	0.1	0	2.26
30340	340	Jacket water to oil temp diff pressure	C	-40 - 215	1	-40	2.26
30341	341	Desired combustion time	Ms	0-655	0.01	0	2.26
30342	342	Actual air pressure	KPa	0-6553	0.1	0	2.26
30343	343	Desired intake manifold pressure	KPa	0-6553	0.1	0	2.26
30344	344	Intake manifold air flow	?	0-65535	1	0	2.26
30345	345	Specific heat ratio	-	0-65	0.001	0	2.26
30346	346	Transformer volts cyl 1	V	0-64255	1	0	2.26
30347	347	Transformer volts cyl 2	V	0-64255	1	0	2.26
30348	348	Transformer volts cyl 3	V	0-64255	1	0	2.26
30349	349	Transformer volts cyl 4	V	0-64255	1	0	2.26
30350	350	Transformer volts cyl 5	V	0-64255	1	0	2.26
30351	351	Transformer volts cyl 6	V	0-64255	1	0	2.26
30352	352	Transformer volts cyl 7	V	0-64255	1	0	2.26
30353	353	Transformer volts cyl 8	V	0-64255	1	0	2.26
30354	354	Transformer volts cyl 9	V	0-64255	1	0	2.26
30355	355	Transformer volts cyl 10	V	0-64255	1	0	2.26
30356	356	Transformer volts cyl 11	V	0-64255	1	0	2.26
30357	357	Transformer volts cyl 12	V	0-64255	1	0	2.26
30358	358	Transformer volts cyl 13	V	0-64255	1	0	2.26
30359	359	Transformer volts cyl 14	V	0-64255	1	0	2.26
30360	360	Transformer volts cyl 15	V	0-64255	1	0	2.26
30361	361	Transformer volts cyl 16	V	0-64255	1	0	2.26
30370	370	Mass fuel flow	kg/Hr	0-65535	1	0	2.27
31000	1000	(VFD Only) Motor Speed	RPM	0 to 8191 RPM	0.125	0	1.92
31001	1001	(VFD Only) Output frequency	Hz	0-6553.5	0.1	0	1.92
31002	1002	(VFD Only) Motor current	A	0-6553.5	0.1	0	1.92
31003	1003	(VFD Only) Motor torque	% total	0-6553.5	0.1	0	1.92
31004	1004	(VFD Only) Motor voltage	V	0-65535	1	0	1.92
31005	1005	(VFD Only) Motor power	% total	0-6553.5	0.1	0	1.92
31006	1006	(VFD Only) Frequency reference before ramp	Hz	0-6553.5	0.1	0	1.92
31007	1007	(VFD Only) Frequency reference after ramp	Hz	0-6553.5	0.1	0	1.92
31008	1008	(VFD Only) Speed reference before ramp	RPM	0-65535	1	0	1.92
31009	1009	(VFD Only) Speed reference after ramp	RPM	0-65535	1	0	1.92
31010	1010	(VFD Only) Mains voltage	V	0-6553.5	0.1	0	1.92
31011	1011	(VFD Only) Consumption	Kwh	0-6553.5	0.1	0	1.92
31012	1012	(VFD Only) Statusword 1	--	0-65535	1	0	1.92
31013	1013	(VFD Only) Statusword 2	--	0-65535	1	0	1.92
31014	1014	(VFD Only) Statusword 3	--	0-65535	1	0	1.92
31015	1015	(VFD Only) Statusword 4	--	0-65535	1	0	1.92



31016	1016	(VFD Only) Statusword 5	--	0-65535	1	0	1.92
31017	1017	(VFD Only) Statusword 6	--	0-65535	1	0	1.92
31018	1018	(VFD Only) Statusword 7	--	0-65535	1	0	1.92
31019	1019	(VFD Only) Statusword 8	--	0-65535	1	0	1.92

AFRC ADVANCED MODBUS TABLE

This table's registers are read from the configured AFRCA ID

AFRC
 Adv. ID:

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AFRC ADVANCED READ-ONLY COILS- FUNCTION CODE 0x01							
Register	Address	Item	Units	Range	Resolution/ Bit	Offset	Min SW
00001	1	Auto/Manual Control Mode		0=Manual 1=Auto			1.60
00002	2	Single/Dual Bank		0=Single 1=Dual			1.60
00003	3	Setpoint/Auto Control Mode		0=Setpoint Ctrl 1=Auto Ctrl			1.60
00004	4	System Temp. Units		0=Deg C 1=Deg F			1.60
05600	5600	Left/Single Manifold Pressure Enable		0=Disabled 1=Enabled			1.60
05601	5601	Right Manifold Pressure Enable		0=Disabled 1=Enabled			1.60
05602	5602	Analog Enable		0=Disabled 1=Enabled			1.60
05603	5603	Oil Pressure Enable		0=Disabled 1=Enabled			1.60
05607	5607	Pre-Cat TC Enable		0=Disabled 1=Enabled			1.60
05608	5608	Post-Cat TC Enable		0=Disabled 1=Enabled			1.60
05609	5609	Diff Temp Enable		0=Disabled 1=Enabled			1.60
05610	5610	Ambient Therm. Enable		0=Disabled 1=Enabled			1.60
05611	5611	Manifold TC Enable		0=Disabled 1=Enabled			1.60
05616	5616	RPM Enable		0=Disabled 1=Enabled			1.60
05700	5700	Alarm Enable 0		0=Disabled 1=Enabled			1.60
05701	5701	Alarm Enable 1		0=Disabled 1=Enabled			1.60
05702	5702	Alarm Enable 2		0=Disabled 1=Enabled			1.60
05703	5703	Alarm Enable 3		0=Disabled 1=Enabled			1.60
05704	5704	Alarm Enable 4		0=Disabled 1=Enabled			1.60
05705	5705	Alarm Enable 5		0=Disabled 1=Enabled			1.60
05706	5706	Alarm Enable 6		0=Disabled 1=Enabled			1.60
05707	5707	Alarm Enable 7		0=Disabled 1=Enabled			1.60

05800	5800	Rich/Lean Burn		0=Lean 1=Rich			1.60
05801	5801	Narrowband/Wideband O2		0=Narrowband 1=Wideband			1.60
05802	5802	Left/Single Mapping Enable		0=Disabled 1=Enabled			1.60
05803	5803	Right Mapping Enable		0=Disabled 1=Enabled			1.60

AFRC ADVANCED READ-ONLY DISCRETE INPUTS- FUNCTION CODE 0x02							
Register	Address	Item	Units	Range	Resolution/Bit	Offset	Min SW
10002	2	Oil Pressure Switch		0=Open 1=Closed			1.60
10100	100	Run Signal		0=Off 1=Run			1.60
10200	200	Error Relay		0=Open 1=Closed			1.60
10300	300	Left/Single Bank Closed Loop		0=Inactive 1=Active			1.60
10301	301	Right Bank Closed Loop		0=Inactive 1=Active			1.60
15000	5000	High temperature alarm		0=No alarm 1=Alarming			1.60

AFRC ADVANCED READ-ONLY ANALOG INPUT REGISTERS- FUNCTION CODE 0x04							
Register	Address	Item	Units	Range	Resolution /Bit	Offset	Min SW
30001	1	Pre-Cat Exhaust Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30002	2	Post-Cat Exhaust Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30003	3	Differential Exhaust Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30004	4	Ambient Temp. Thermistor	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30005	5	Manifold TC	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30100	100	Left/Single Manifold Pressure	See sensor table	0 - 655.35mA	0.01mA/bit	0	1.60
30101	101	Right Manifold Pressure	See sensor table	0 - 655.35mA	0.01mA/bit	0	1.60
30102	102	Analog Voltage 1	Volts	0 - 6.5535V	0.0001V/bit	0	1.60
30103	103	Analog Current 1	milliamps	0 - 655.35mA	0.01mA/bit	0	1.60
30110	110	Battery Volts	Volts	0 - 3212.75V	0.05V/bit	0	1.60
30200	200	Left/Single Wideband Lambda	Lambda	0-6.5535	0.0001	0	1.60
30201	201	Left/Single DPV Position 0-499 Steps	Steps	0-65535	1 Step/Bit	0	1.60
30202	202	Left/Single Nernst Cell Resis.	Ohms	0-6553.5	0.1	0	1.60
30203	203	Left/Single Narrowband Voltage	Volts	0-6.5535	0.0001	0	1.60
30204	204	Right Wideband Lambda	Lambda	0-6.5535	0.0001	0	1.60

30205	205	Right DPV Position 0-499 Steps	Steps	0-65535	1 Step/Bit	0	1.60
30206	206	Right Nernst Cell Resistance	Ohms	0-6553.5	0.1	0	1.60
30207	207	Right Narrowband Voltage	Volts	0-6.5535	0.0001	0	1.60
30210	210	Left Home position	%	0-163.8375%	0.0025 %/bit	0	1.60
30211	211	Right Home position	%	0-163.8375%	0.0025 %/bit	0	1.60
30400	400	Product Part Number	U16	0-65535	1	0	1.60
30401	401	Product Software Version	U16	0-65535	1	0	1.60
31000	1000	Engine Speed	RPM	0-8191.875	0.125/bit	0	1.60

AFRC LITE MODBUS TABLE

This table's registers are read from the configured AFRCL ID

AFRC Lite ID: 20

AFRC LITE READ-ONLY COILS- FUNCTION CODE 0x01							
Register	Address	Item	Units	Range	Resolution/Bit	Offset	Min SW
00001	1	Auto/Manual Control Mode		0=Manual 1=Auto			1.60
00004	4	System Temp. Units		0=Deg C 1=Deg F			1.60
05600	5600	Manifold Pressure Enable		0=Disabled 1=Enabled			1.60
05607	5607	Pre-Cat TC Enable		0=Disabled 1=Enabled			1.60
05608	5608	Post-Cat TC Enable		0=Disabled 1=Enabled			1.60
05609	5609	Diff Temp Enable		0=Disabled 1=Enabled			1.60
05700	5700	Alarm Enable 0		0=Disabled 1=Enabled			1.60
05701	5701	Alarm Enable 1		0=Disabled 1=Enabled			1.60
05702	5702	Alarm Enable 2		0=Disabled 1=Enabled			1.60
05703	5703	Alarm Enable 3		0=Disabled 1=Enabled			1.60
05704	5704	Alarm Enable 4		0=Disabled 1=Enabled			1.60
05705	5705	Alarm Enable 5		0=Disabled 1=Enabled			1.60
05706	5706	Alarm Enable 6		0=Disabled 1=Enabled			1.60
05707	5707	Alarm Enable 7		0=Disabled 1=Enabled			1.60
05800	5708	Rich/Lean Burn		0=Lean 1=Rich			1.60
05801	5801	Narrowband/Wideband O2		0=Narrowband 1=Wideband			1.60
05802	5802	Mapping Enable		0=Disabled 1=Enabled			1.60

AFRC LITE READ-ONLY DISCRETE INPUTS – FUNCTION CODE 0x02							
Register	Address	Item	Units	Range	Resolution/Bit	Offset	Min SW
10100	100	Run Signal		0=Off 1=Run			1.60
10200	200	Error Relay		0=Open 1=Closed			1.60
10300	300	Closed Loop		0=Inactive 1=Active			1.60

AFRC LITE READ-ONLY INPUT REGISTERS – FUNCTION CODE 0x04							
Register	Addresses	Item	Units	Range	Resolution /Bit	Offset	Min SW
30001	1	Pre-Cat Exhaust Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30002	2	Post-Cat Exhaust Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30003	3	Differential Exhaust Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30100	100	Manifold Pressure	See sensor table	0 - 655.35mA	0.01mA/bit	0	1.60
30110	110	Battery Volts		0 - 3212.75V	0.05V/bit	0	1.60
30200	200	Wideband Lambda	Lambda	0-6.5535	0.0001	0	1.60
30201	201	DPV Position 0-499 Steps	Steps	0-65535	1 Step/Bit	0	1.60
30202	202	Wideband Nernst Cell Resist.	Ohms	0-6553.5	0.1	0	1.60
30203	203	Narrowband Voltage	Volts	0-6.5535	0.0001	0	1.60
30400	400	Product Part Number	U16	0-65535	1	0	1.60
30401	401	Product Software Version	U16	0-65535	1	0	1.60

EMD MODBUS TABLE

This table's registers are read from the configured EMD ID

EMD ID: 40

EMD READ-ONLY COILS- FUNCTION CODE 0x01							
Register	Address	Item	Units	Range	Resolution/Bit	Offset	Min SW
00004	4	System Temp. Units		0=Deg C 1=Deg F			1.60
05600	5600	Analog1 Enable		0=Disabled 1=Enabled			1.60
05601	5601	Analog2 Enable		0=Disabled 1=Enabled			1.60
05602	5602	Analog3 Enable		0=Disabled 1=Enabled			1.60
05603	5603	Diff Press Enable		0=Disabled 1=Enabled			1.60
05604	5604	Fuel Flow Enable		0=Disabled 1=Enabled			1.60
05605	5605	Oil Pressure Enable		0=Disabled 1=Enabled			1.60
05606	5605	Discrete Input Enable		0=Disabled 1=Enabled			1.60
05607	5607	Pre-Cat TC Enable		0=Disabled 1=Enabled			1.60
05608	5608	Post-Cat TC Enable		0=Disabled 1=Enabled			1.60
05609	5609	Diff Temp Enable		0=Disabled 1=Enabled			1.60
05610	5610	Ambient TC Enable		0=Disabled 1=Enabled			1.60
05611	5611	Fuel TC Enable		0=Disabled 1=Enabled			1.60
05612	5612	Aux1 TC Enable		0=Disabled 1=Enabled			1.60
05613	5613	Aux2 TC Enable		0=Disabled 1=Enabled			1.60
05614	5614	Ambient Therm. Enable		0=Disabled 1=Enabled			1.60
05615	5615	Fuel Therm. Enable		0=Disabled 1=Enabled			1.60

EMD READ-ONLY DISCRETE INPUTS- FUNCTION CODE 0x02							
Register	Address	Item	Units	Range	Resolution /Bit	Offset	Min SW
10001	1	Discrete Input		0=Open, 1=Closed			1.60
10002	2	Oil Pressure Switch		0=Open, 1=Closed			1.60
10100	100	Run Signal		0=Off, 1=Run			1.60
10200	200	Error Relay		0=Open, 1=Closed			1.60

EMD READ-ONLY INPUT REGISTERS- FUNCTION CODE 0x04							
Register	Address	Item	Units	Range	Resolution /Bit	Offset	Min SW
30001	1	Pre-Cat Exhaust Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30002	2	Post-Cat Exhaust Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30003	3	Differential Exhaust Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30004	4	Ambient Temp. Thermistor	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30005	5	Aux1 Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30006	6	Aux2 Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30007	7	Ambient Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30008	8	Fuel Temperature	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30009	9	Fuel Temp Thermistor	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30102	102	Analog Voltage 1	Volts	0 - 6.5535V	0.0001V /bit	0	1.60
30103	103	Analog Current 1	milliamps	0 - 655.35mA	0.01mA/ bit	0	1.60
30104	104	Analog Voltage 2	Volts	0 - 6.5535V	0.0001V /bit	0	1.60
30105	105	Analog Current 2	milliamps	0 - 655.35mA	0.01mA/ bit	0	1.60
30106	106	Analog Voltage 3	Volts	0 - 6.5535V	0.0001V /bit	0	1.60
30107	107	Analog Current 3	milliamps	0 - 655.35mA	0.01mA/ bit	0	1.60
30108	108	Catalyst Differential Pressure	milliamps	0 - 655.35mA	0.01mA/ Bit	0	1.60
30109	109	Fuel Flow Current	milliamps	0 - 655.35mA	0.01mA/ Bit	0	1.60
30110	110	Battery Volts	Volts	0 - 3212.75V	0.05 V/Bit	0	1.60
30150	150	Regulatory Pre-Cat Temp. 4-Hour	System Units	-273 to 1775 degrees	0.03125	-273	1.60
30151	151	Regulatory Diff Pressure 15-Min	milliamps	0 - 655.35mA	0.01mA/ Bit	0	1.60
30400	400	Product Part Number	U16	0-65535	1	0	1.60
30401	401	Product Software Version	U16	0-65535	1	0	1.60

IGNITION MODBUS TABLE

This table's registers are read from the configured Ignition ID

Ignition ID: **50**

IGNITION READ-ONLY COILS- FUNCTION CODE 0x01							
Register	Address	Item	Units	Range	Resolution/Bit	Offset	Min SW
00100	100	Load Advance Enabled		0=Disabled, 1=Enabled			1.60
00101	101	RPM Advance Enabled		0=Disabled 1=Enabled			1.60

IGNITION READ-ONLY DISCRETE INPUTS- FUNCTION CODE 0x02							
Register	Address	Item	Units	Range	Resolution/Bit	Offset	Min SW
10400	400	Fuel Relay		0=Off, 1=On			1.60
10401	401	Coil Power		0=Off 1=On (firing)			1.60

IGNITION READ-ONLY INPUT REGISTERS – FUNCTION CODE 0x04							
Register	Address	Item	Units	Range	Resolution /Bit	Offset	Min SW
30050	50	Serial number					1.60
30051	51	Hardware ID		0 - 65535	1	0	1.60
30052	52	Application ID		0 - 65535	1	0	1.60
			See sensor table				1.60
30100	100	Manifold Pressure		0 - 655.35mA	0.01mA/bit	0	
30110	110	Battery volts	Volts	0 - 3212.75V	0.05V/bit	0	1.60
31000	1000	Engine speed	RPM	0-8191.875	0.125/bit	0	1.60
31001	1001	Base timing	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31002	1002	Current RPM Advance	Degrees	-200 - 511.100	0.0078125 deg/bit	-200	1.60
31003	1003	Current Load Advance	Degrees	-200 - 511.101	0.0078125 deg/bit	-200	1.60
31004	1004	Current Total Advance	Degrees	-200 - 511.102	0.0078125 deg/bit	-200	1.60
31005	1005	Desired fixed dwell time	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31006	1006	Flywheel teeth configured	Teeth	0-65535		0	1.60
31007	1007	Number of cylinders	Cylinders	0-256		0	1.60
31008	1008	RPM Advance low rpm	RPM	0-8191.875	0.125/bit	0	1.60
31009	1009	RPM Advance high rpm	RPM	0-8191.875	0.125/bit	0	1.60

31010	1010	RPM Advance low angle	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31011	1011	RPM Advance high angle	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31012	1012	Load Advance low pressure	See sensor table	0 - 655.35 mA	0.01 mA/bit	0	1.60
31013	1013	Load Advance high pressure	See sensor table	0 - 655.35 mA	0.01 mA/bit	0	1.60
31014	1014	Load Advance low angle	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31015	1015	Load Advance high angle	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31016	1016	Ignition state	See ignition state table			0	1.60
31017	1017	Fault Bitmap	See ignition fault table			0	1.60
31050	1050	Average spark duration	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31051	1051	Average primary current	A	0 - 65.535 A	0.001 A/bit	0	1.60
31052	1052	Average cyclic variation	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31053	1053	Average dwell	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31054	1054	Average dwell percent	%	0 - 163.8375 %	0.0025 %/bit	0	1.60
31100	1100	Knock Level Cyl 1	%	0 - 65535%	1 %/bit	0	1.60
31101	1101	Knock Level Cyl 2	%	0 - 65535%	1 %/bit	0	1.60
31102	1102	Knock Level Cyl 3	%	0 - 65535%	1 %/bit	0	1.60
31103	1103	Knock Level Cyl 4	%	0 - 65535%	1 %/bit	0	1.60
31104	1104	Knock Level Cyl 5	%	0 - 65535%	1 %/bit	0	1.60
31105	1105	Knock Level Cyl 6	%	0 - 65535%	1 %/bit	0	1.60
31106	1106	Knock Level Cyl 7	%	0 - 65535%	1 %/bit	0	1.60
31107	1107	Knock Level Cyl 8	%	0 - 65535%	1 %/bit	0	1.60
31108	1108	Knock Level Cyl 9	%	0 - 65535%	1 %/bit	0	1.60
31109	1109	Knock Level Cyl 10	%	0 - 65535%	1 %/bit	0	1.60
31110	1110	Knock Level Cyl 11	%	0 - 65535%	1 %/bit	0	1.60
31111	1111	Knock Level Cyl 12	%	0 - 65535%	1 %/bit	0	1.60
31112	1112	Knock Level Cyl 13	%	0 - 65535%	1 %/bit	0	1.60
31113	1113	Knock Level Cyl 14	%	0 - 65535%	1 %/bit	0	1.60
31114	1114	Knock Level Cyl 15	%	0 - 65535%	1 %/bit	0	1.60
31115	1115	Knock Level Cyl 16	%	0 - 65535%	1 %/bit	0	1.60
31116	1116	Spark Duration Cyl 1	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31117	1117	Spark Duration Cyl 2	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31118	1118	Spark Duration Cyl 3	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31119	1119	Spark Duration Cyl 4	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31120	1120	Spark Duration Cyl 5	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31121	1121	Spark Duration Cyl 6	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31122	1122	Spark Duration Cyl 7	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31123	1123	Spark Duration Cyl 8	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31124	1124	Spark Duration Cyl 9	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31125	1125	Spark Duration Cyl 10	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31126	1126	Spark Duration Cyl 11	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31127	1127	Spark Duration Cyl 12	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31128	1128	Spark Duration Cyl 13	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60

31129	1129	Spark Duration Cyl 14	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31130	1130	Spark Duration Cyl 15	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31131	1131	Spark Duration Cyl 16	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31132	1132	Timing offset Cyl 1	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31133	1133	Timing offset Cyl 2	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31134	1134	Timing offset Cyl 3	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31135	1135	Timing offset Cyl 4	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31136	1136	Timing offset Cyl 5	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31137	1137	Timing offset Cyl 6	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31138	1138	Timing offset Cyl 7	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31139	1139	Timing offset Cyl 8	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31140	1140	Timing offset Cyl 9	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31141	1141	Timing offset Cyl 10	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31142	1142	Timing offset Cyl 11	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31143	1143	Timing offset Cyl 12	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31144	1144	Timing offset Cyl 13	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31145	1145	Timing offset Cyl 14	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31146	1146	Timing offset Cyl 15	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31147	1147	Timing offset Cyl 16	Degrees	-200 - 511.99	0.0078125 deg/bit	-200	1.60
31148	1148	Coil Voltage Cyl 1	Volts	0 - 65535 V	1 V/bit	0	1.60
31149	1149	Coil Voltage Cyl 2	Volts	0 - 65535 V	1 V/bit	0	1.60
31150	1150	Coil Voltage Cyl 3	Volts	0 - 65535 V	1 V/bit	0	1.60
31151	1151	Coil Voltage Cyl 4	Volts	0 - 65535 V	1 V/bit	0	1.60
31152	1152	Coil Voltage Cyl 5	Volts	0 - 65535 V	1 V/bit	0	1.60
31153	1153	Coil Voltage Cyl 6	Volts	0 - 65535 V	1 V/bit	0	1.60
31154	1154	Coil Voltage Cyl 7	Volts	0 - 65535 V	1 V/bit	0	1.60
31155	1155	Coil Voltage Cyl 8	Volts	0 - 65535 V	1 V/bit	0	1.60
31156	1156	Coil Voltage Cyl 9	Volts	0 - 65535 V	1 V/bit	0	1.60
31157	1157	Coil Voltage Cyl 10	Volts	0 - 65535 V	1 V/bit	0	1.60
31158	1158	Coil Voltage Cyl 11	Volts	0 - 65535 V	1 V/bit	0	1.60
31159	1159	Coil Voltage Cyl 12	Volts	0 - 65535 V	1 V/bit	0	1.60
31160	1160	Coil Voltage Cyl 13	Volts	0 - 65535 V	1 V/bit	0	1.60
31161	1161	Coil Voltage Cyl 14	Volts	0 - 65535 V	1 V/bit	0	1.60
31162	1162	Coil Voltage Cyl 15	Volts	0 - 65535 V	1 V/bit	0	1.60
31163	1163	Coil Voltage Cyl 16	Volts	0 - 65535 V	1 V/bit	0	1.60
31164	1164	Cyclic Variation Cyl 1	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31165	1165	Cyclic Variation Cyl 2	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31166	1166	Cyclic Variation Cyl 3	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31167	1167	Cyclic Variation Cyl 4	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31168	1168	Cyclic Variation Cyl 5	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60

31169	1169	Cyclic Variation Cyl 6	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31170	1170	Cyclic Variation Cyl 7	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31171	1171	Cyclic Variation Cyl 8	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31172	1172	Cyclic Variation Cyl 9	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31173	1173	Cyclic Variation Cyl 10	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31174	1174	Cyclic Variation Cyl 11	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31175	1175	Cyclic Variation Cyl 12	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31176	1176	Cyclic Variation Cyl 13	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31177	1177	Cyclic Variation Cyl 14	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31178	1178	Cyclic Variation Cyl 15	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31179	1179	Cyclic Variation Cyl 16	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31180	1180	Coil Current Cyl 1	A	0 - 65.535 A	0.001 A/bit	0	1.60
31181	1181	Coil Current Cyl 2	A	0 - 65.535 A	0.001 A/bit	0	1.60
31182	1182	Coil Current Cyl 3	A	0 - 65.535 A	0.001 A/bit	0	1.60
31183	1183	Coil Current Cyl 4	A	0 - 65.535 A	0.001 A/bit	0	1.60
31184	1184	Coil Current Cyl 5	A	0 - 65.535 A	0.001 A/bit	0	1.60
31185	1185	Coil Current Cyl 6	A	0 - 65.535 A	0.001 A/bit	0	1.60
31186	1186	Coil Current Cyl 7	A	0 - 65.535 A	0.001 A/bit	0	1.60
31187	1187	Coil Current Cyl 8	A	0 - 65.535 A	0.001 A/bit	0	1.60
31188	1188	Coil Current Cyl 9	A	0 - 65.535 A	0.001 A/bit	0	1.60
31189	1189	Coil Current Cyl 10	A	0 - 65.535 A	0.001 A/bit	0	1.60
31190	1190	Coil Current Cyl 11	A	0 - 65.535 A	0.001 A/bit	0	1.60
31191	1191	Coil Current Cyl 12	A	0 - 65.535 A	0.001 A/bit	0	1.60
31192	1192	Coil Current Cyl 13	A	0 - 65.535 A	0.001 A/bit	0	1.60
31193	1193	Coil Current Cyl 14	A	0 - 65.535 A	0.001 A/bit	0	1.60
31194	1194	Coil Current Cyl 15	A	0 - 65.535 A	0.001 A/bit	0	1.60
31195	1195	Coil Current Cyl 16	A	0 - 65.535 A	0.001 A/bit	0	1.60
31196	1196	Dwell Time Cyl 1	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31197	1197	Dwell Time Cyl 2	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31198	1198	Dwell Time Cyl 3	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31199	1199	Dwell Time Cyl 4	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31200	1200	Dwell Time Cyl 5	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31201	1201	Dwell Time Cyl 6	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31202	1202	Dwell Time Cyl 7	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31203	1203	Dwell Time Cyl 8	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31204	1204	Dwell Time Cyl 9	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31205	1205	Dwell Time Cyl 10	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31206	1206	Dwell Time Cyl 11	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31207	1207	Dwell Time Cyl 12	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31208	1208	Dwell Time Cyl 13	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31209	1209	Dwell Time Cyl 14	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31210	1210	Dwell Time Cyl 15	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60
31211	1211	Dwell Time Cyl 16	ms	0 - 655.35 ms	0.01 ms/bit	0	1.60

IGNITION STATE TABLE

State Number	State
0	Configuration required
1	Ready to start
2	Engine operation detected
3	Ignition started
4	Engine is running
5	Engine is running with warnings
6	Engine stopped- Critical alarm
7	Compression test mode
8	Firing order test mode
9	User disabled
10	Externally disabled

IGNITION FAULT TABLE

Fault value from Modbus is a bitmap- a bitwise OR of the fault code with the fault value will return non-zero if the fault is occurring.

Fault Code (hex)	Fault
0x0001	Bad peak count
0x0002	Missing cam event
0x0004	Interpolation bad input count (currently unused)
0x0008	Missing index
0x0010	Min flywheel rotations not reached
0x0020	Overspeed alarm
0x0040	Engine stall / flywheel not detected
0x0080	Bad configuration
0x0100	Underspeed alarm
0x0200	Critical timing error alarm
0x0400	Spark timer counting error

TROUBLESHOOTING

SYMPTOM: No data is returned at all (timeout)

1. Verify that the A/B wires are in the right order, or try swapping them
2. Verify that the baud rate is correct. If the connection physically runs to the EIM, check that the baud rate is set on the Modbus setup page. If the connection physically runs to the EDT, check that the baud rate is correct under EDT -> Setup -> Slave MB Port Settings.
3. Verify that the IDs are correct on the Modbus setup page
4. Verify that the switch next to the Modbus port is terminated if at the end of the network, but unterminated if in the middle of a network
 - a. A node is at the end of a network if only one set of wires is running into the plug or terminal blocks

SYMPTOM: Data is returned, but values are 65,535 (-1) or some other corrupted value

1. Check that the EIM software version is high enough for the registers being requested. This is shown in the last column in each table
2. Verify that the correct node ID is used. Note that for each Modbus table in this document, the top of the page shows the proper module ID to use.
 - a. E.g. If the EIM ID is 10 but a value in the annunciator register table is requested, it will only return 65,535 at ID 10. In this case the annunciator node ID should have been used.
3. Note that many rows have special scaling. For example, engine RPM is in units of 0.125 / bit, so a value of 1000 RPM will return a value of 8000 in the register.
4. If using an EDT, make sure that it is on the correct mode.
 - a. If there is no ADEM, be sure to set the EDT to “Modbus slave only” mode. Otherwise the system will try to pull data values from the ADEM which is not present.
5. If using an EDT on an A3 engine, make sure both CDL and CAN links are connected as shown in the panel drawing
6. If some compressor temperatures or pressures are missing in the unified data table(s), verify that:
 - a. The inputs are using the default names
 - b. The units for pressures are set to PSI or KPA