

# Dynamic Control Touchscreen Modbus



## General Information

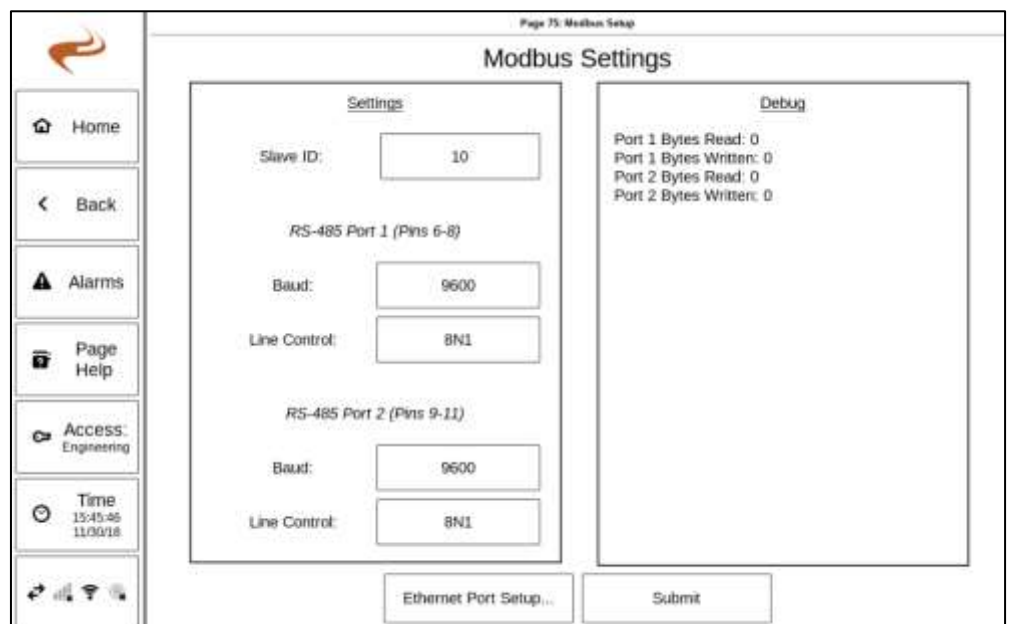
The Dynamic Control Touchscreen (20370) features two RS-485 Modbus RTU ports, along with an Ethernet port for Modbus/TCP. These can be used to gather data into a remote SCADA system.

General Modbus configuration is on the Modbus setup screen, which is found at “Setup” -> “System Settings” -> “Modbus”.

**Slave ID:** There is one slave ID for the system. The SCADA setup should match this ID, and make sure no other device on the bus has the same ID.

**Port Settings:** Each port can be configured to have individual baud rates and line control modes. Each port will still target the same ID, however.

The right side of the screen shows the bytes received on each port.



Section	Field	Value
Settings	Slave ID	10
	RS-485 Port 1 (Pins 6-8)	
	Baud	9600
	Line Control	8N1
	RS-485 Port 2 (Pins 9-11)	
	Baud	9600
Debug	Port 1 Bytes Read	0
	Port 1 Bytes Written	0
	Port 2 Bytes Read	0
	Port 2 Bytes Written	0



This can help with debugging if the modem is attempting to communicate with the DCT. On newer versions the latest bytes received are also shown.

## Modbus/TCP

The screen features one ethernet port that can be used for Modbus/TCP. The ethernet and port settings are found under Settings -> System/Global Settings -> Ethernet. The software will support multiple simultaneous connections if needed.

Note that if the wired network uses the 192.168.0.XXX subnet, the WiFi address should be changed under System/Global Settings -> WiFi so that the addresses don't collide.

## Data

Data that is available to be collected from the system is shown in the below tables. The first table features common items that are collected from various modules- the system will determine where valid data can come from without any user setup needed. The subsequent tables are more specific items, with each table covering one specific module.

Each value can be read from the holding registers (4xxxx) or input registers (3xxxx). The holding registers will return as an integer without any scaling, while the input registers will return with an offset of 32768 and a resolution of 0.1 / bit.

*Example: Register 32001 is battery voltage. If it read 32995, then "32995" -> (32995-32768)/10 = 22.7*



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## Table List

- Unified Data Table: Data can come from any module and will be identified by name.
- Brain Registers: Data from the EMIT Brain (annunciator) module or expansion modules
- System Registers: Data from the touchscreen itself
- AFRC Registers: Data from the EMIT AFRC
- Ignition and EMIT ECU Registers: Data from the EMIT ignition system or EMIT ECU
- Speed Controller Registers: Data from the EMIT speed control module
- Data Translator Registers: Data from the internal data translator connected to another engine controller such as CAT ADEM ® or Waukesha ESM ® .

Note that if EMIT engine control modules are used then the data translator registers are not relevant. Conversely if a 3<sup>rd</sup> party ECU is used then the Ignition and Speed controller registers are not relevant and instead the data translator registers are used.

## Min SW

The "Min SW" column in the table shows the minimum DCT software version where the value was first supported. The current software version can be seen under 'Information' – 'Software Versions'. If the software is older than this value, that register will not be supported. The DCT can always be updated in this case if the register is needed.



## Unified Data Table

Note: Items in the unified table can come from any module, the DCT tries to identify a valid source for the data on its own. For Brain (annunciator) inputs, the DCT will find the input number by looking at the input names, so be sure to use the built-in default names when possible.

Input Register	Holding Register	Description	Unit	Min SW
32000	42000	Engine Speed	RPM	1.00
32001	42001	Battery Voltage	V	1.00
32002	42002	Intake Manifold Pressure Left Absolute	PSIA	1.00
32003	42003	Intake Manifold Pressure Right Absolute	PSIA	1.00
32004	42004	Intake Manifold Pressure Left	PSI Gauge	1.00
32005	42005	Intake Manifold Pressure Right	PSI Gauge	1.00
32006	42006	Engine Oil Pressure	PSI Gauge	1.00
32007	42007	Current Ignition Timing	Deg	1.00
32008	42008	Current throttle position	Pct	1.00
32009	42009	Engine Oil Temp	C/F*	1.00
32010	42010	Precat Temp	C/F*	1.00
32011	42011	Postcat Temp	C/F*	1.00
32012	42012	Engine Hours Low		1.00
32013	42013	Engine Hours High		1.00
32014	42014	Left DPV Steps		1.00
32015	42015	Right DPV Steps		1.00
32016	42016	Left Narrowband mv	mv	1.00
32017	42017	Right Narrowband mv	mv	1.00
32018	42018	Left Wideband	lambda	1.00
32019	42019	Right Wideband	lambda	1.00
32020	42020	EDT First DTC		1.00
32021	42021	Engine Pct Load	Pct	1.00
32022	42022	Jacket Water Temp	C/F*	1.00
32023	42023	Intake Air Temp	C/F*	1.43
32024	42024	Engine oil to coolant temp differential	C/F*	1.59
32025	42025	Desired RPM	RPM	1.59
32026	42026	Engine fuel gas correction factor		1.59
32027	42027	Aux Water Temp	C/F*	1.63
32028-32029	42028-42029	RESERVED		1.00



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32030	42030	Suction Pressure	**	1.00
32031	42031	Final Discharge Pressure	**	1.00
32032	42032	Compressor Oil Pressure	**	1.00
32033	42033	Discharge 1 Temp	C/F*	1.00
32034	42034	Discharge 2 Temp	C/F*	1.00
32035	42035	Discharge 3 Temp	C/F*	1.00
32036	42036	Discharge 4 Temp	C/F*	1.00
32037	42037	Compressor Oil Temp	C/F*	1.00
32038	42038	Discharge 1 Pressure	**	1.00
32039	42039	Discharge 2 Pressure	**	1.00
32040	42040	Discharge 3 Pressure	**	1.00
32041	42041	Brain Run Status (Same as 41001)		1.00
32042	42042	Brain Run/Shutdown code (Same as 41121)		1.00
32043	42043	Signal Strength	Pct	1.02
32044	42044	Suction Temperature	C/F*	1.34
32045	42045	Packing Pressure 1	**	1.40
32046	42046	Fuel Pressure	PSI	1.59
32047	42047	Board Ambient Temp	F	1.59
32048	42048	Discharge Stg 4 Pressure	**	1.63
32049	42049	Discharge Cylinder 1B Temperature	C/F*	1.63
32050	42050	Discharge Cylinder 3B Temperature	C/F*	1.63



## Brain Registers

Input Register	Holding Register	Description	Unit	Min SW
31001	41001	Current State <sup>1</sup>		1.00
31002	41002	Engine Speed	RPM	1.00
31003	41003	B Timer Status		1.00
31004	41004	Noflow 1 Previous Seconds	s	1.00
31005	41005	Noflow 1 Average Seconds	s	1.00
31006	41006	Noflow 2 Previous Seconds	s	1.00
31007	41007	Noflow 2 Average Seconds	s	1.00
31008	41008	Noflow 3 Previous Seconds	s	1.00
31009	41009	Noflow 3 Average Seconds	s	1.00
31010	41010	TC1 Reading	C/F*	1.00
31011	41011	TC2 Reading	C/F*	1.00
31012	41012	TC3 Reading	C/F*	1.00
31013	41013	TC4 Reading	C/F*	1.00
31014	41014	TC5 Reading	C/F*	1.00
31015	41015	TC6 Reading	C/F*	1.00
31016	41016	TC7 Reading	C/F*	1.00
31017	41017	TC8 Reading	C/F*	1.00
31018	41018	TC9 Reading	C/F*	1.00
31019	41019	TC10 Reading	C/F*	1.00
31020	41020	TC11 Reading	C/F*	1.00
31021	41021	TC12 Reading	C/F*	1.00
31022	41022	TC13 Reading	C/F*	1.00
31023	41023	TC14 Reading	C/F*	1.00
31024	41024	TC15 Reading	C/F*	1.00
31025	41025	TC16 Reading	C/F*	1.00
31026	41026	TC17 Reading	C/F*	1.00
31027	41027	TC18 Reading	C/F*	1.00
31028	41028	TC19 Reading	C/F*	1.00
31029	41029	TC20 Reading	C/F*	1.00
31030	41030	TC21 Reading	C/F*	1.00
31031	41031	TC22 Reading	C/F*	1.00
31032	41032	TC23 Reading	C/F*	1.00
31033	41033	TC24 Reading	C/F*	1.00

<sup>1</sup> See next section, "Brain Enumerations"



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31034	41034	TC25A Reading	C/F*	1.00
31035	41035	TC26A Reading	C/F*	1.00
31036	41036	TC27A Reading	C/F*	1.00
31037	41037	TC28A Reading	C/F*	1.00
31038	41038	TC29A Reading	C/F*	1.00
31039	41039	TC30A Reading	C/F*	1.00
31040	41040	TC31A Reading	C/F*	1.00
31041	41041	TC32A Reading	C/F*	1.00
31042	41042	TC33A Reading	C/F*	1.00
31043	41043	TC34A Reading	C/F*	1.00
31044	41044	TC35A Reading	C/F*	1.00
31045	41045	TC36A Reading	C/F*	1.00
31046	41046	TC25B Reading	C/F*	1.44
31047	41047	TC26B Reading	C/F*	1.44
31048	41048	TC27B Reading	C/F*	1.44
31049	41049	TC28B Reading	C/F*	1.44
31050	41050	TC29B Reading	C/F*	1.44
31051	41051	TC30B Reading	C/F*	1.44
31052	41052	TC31B Reading	C/F*	1.44
31053	41053	TC32B Reading	C/F*	1.44
31054	41054	TC33B Reading	C/F*	1.44
31055	41055	TC34B Reading	C/F*	1.44
31056	41056	TC35B Reading	C/F*	1.44
31057	41057	TC36B Reading	C/F*	1.44
31070	41070	Analog Input 1 Reading	**	1.00
31071	41071	Analog Input 2 Reading	**	1.00
31072	41072	Analog Input 3 Reading	**	1.00
31073	41073	Analog Input 4 Reading	**	1.00
31074	41074	Analog Input 5 Reading	**	1.00
31075	41075	Analog Input 6 Reading	**	1.00
31076	41076	Analog Input 7 Reading	**	1.00
31077	41077	Analog Input 8 Reading	**	1.00
31078	41078	Analog Input 9 Reading	**	1.00
31079	41079	Analog Input 10 Reading	**	1.00
31080	41080	Analog Input 11 Reading	**	1.00
31081	41081	Analog Input 12 Reading	**	1.00
31082	41082	Analog Input 13A Reading	**	1.00
31083	41083	Analog Input 14A Reading	**	1.00
31084	41084	Analog Input 15A Reading	**	1.00



31085	41085	Analog Input 16A Reading	**	1.00
31086	41086	Analog Input 17A Reading	**	1.00
31087	41087	Analog Input 18A Reading	**	1.00
31088	41088	Analog Input 19A Reading	**	1.00
31089	41089	Analog Input 20A Reading	**	1.00
31090	41090	Analog Input 13B Reading	**	1.44
31091	41091	Analog Input 14B Reading	**	1.44
31092	41092	Analog Input 15B Reading	**	1.44
31093	41093	Analog Input 16B Reading	**	1.44
31094	41094	Analog Input 17B Reading	**	1.44
31095	41095	Analog Input 18B Reading	**	1.44
31096	41096	Analog Input 19B Reading	**	1.44
31097	41097	Analog Input 20B Reading	**	1.44
31100	41100	Reset Source		1.00
31101	41101	Engine Running Flag		1.00
31102	41102	Remote Reset Counts		1.00
31103	41103	Auto Reset Counts		1.00
31104	41104	Auto Restart Successful		1.00
31105	41105	In Reactive Speed Mode		1.00
31106	41106	In Remote Mode		1.00
31107	41107	Current Shutdown Category		1.00
31108	41108	Current Shutdown Index		1.00
31109	41109	Current Shutdown is High Limit		1.00
31110	41110	Current Rod load 1 Tension	lbf	1.00
31111	41111	Current Rod load 2 Tension	lbf	1.00
31112	41112	Current Rod load 3 Tension	lbf	1.00
31113	41113	Current Rod load 4 Tension	lbf	1.00
31114	41114	Current Rod load 1 Compression	lbf	1.00
31115	41115	Current Rod load 2 Compression	lbf	1.00
31116	41116	Current Rod load 3 Compression	lbf	1.00
31117	41117	Current Rod load 4 Compression	lbf	1.00
31118	41118	Current noflow lube rate pct of rated 1	%	1.00
31119	41119	Current noflow lube rate pct of rated 2	%	1.00
31120	41120	Current noflow lube rate pct of rated 3	%	1.00
31121	41121	Run and fault code 1 <sup>2</sup>		1.00
31122	41122	Run and fault code 2		1.00

<sup>2</sup> These enumeration tables can be generated using a config file uploaded to <https://data.emittechnologies.com/tools/>



31123	41123	Run and fault code 3		1.00
31124	41124	Run and fault code 4		1.00
31125	41125	Brain input voltage	V	1.00
31126	41126	Digital input fault bitmap low (inputs 1 – 16)		1.10
31127	41127	Digital input fault bitmap high (inputs 17-30)		1.10
31128	41128	Analog out 1 current output, pct of range	%	1.25
31129	41129	Analog out 2 current output, pct of range	%	1.25
31130	41130	Analog out 3A (Expansion module) current output, pct of range	%	1.25
31131	41131	Analog out 4A (Expansion module) current output, pct of range	%	1.25
31132	41132	Analog out 5 current output, pct of range	%	1.25
31133	41133	Analog out 6 current output, pct of range	%	1.25
31134	41134	Target RPM	RPM	1.58
31135	41135	PID 1 Loop Status	See table	1.59
31136	41136	PID 2 Loop Status	See table	1.59
31137	41137	PID 3 Loop Status	See table	1.59
31138	41138	PID 4 Loop Status	See table	1.59
31139	41139	PID 5 Loop Status	See table	1.59
31140	41140	Dual Recycle Loop Status	See table	1.59
31141	41141	Analog out 7A current output, pct of range	%	1.64
31142	41142	Analog out 8A current output, pct of range	%	1.64
31143	41143	No flow 1 recent average consumption (if avg time of last 10 cycles continued for a day)	Pints / day	1.67
31144	41144	No flow 2 recent average consumption (if avg time of last 10 cycles continued for a day)	Pints / day	1.67
31145	41145	No flow 3 recent average consumption (if avg time of last 10 cycles continued for a day)	Pints / day	1.67
31146	41146	No flow 1 actual 24h consumption (last 24 h)	Pints	1.67
31147	41147	No flow 2 actual 24h consumption (last 24 h)	Pints	1.67
31148	41148	No flow 3 actual 24h consumption (last 24 h)	Pints	1.67
31149	41149	Speed switch position (0 = not used, 1 = manual, 2 = auto, 3 = idle)		1.67



## Brain Enumerations

<b>State- 41001</b>	
<b>0</b>	Board startup
<b>1</b>	Stopped (Manual stop)
<b>2</b>	Engine startup
<b>3</b>	Fault shutdown
<b>4</b>	Engine running
<b>5</b>	Engine running with warnings
<b>6</b>	Test mode
<b>7</b>	Shutdown Delay
<b>8</b>	Touchscreen generated Fault (A User-configured alarm from another module faulted)
<b>9</b>	Waiting for pre-lube to complete
<b>10</b>	Auto start begin
<b>11</b>	Auto start warning delay
<b>12</b>	Auto start purge 1
<b>13</b>	Auto start cranking waiting for engine start
<b>14</b>	Auto start wait for idle to complete
<b>15</b>	Auto start wait for governor to go to run
<b>16</b>	Auto start load delay
<b>17</b>	Auto start ready to start
<b>18</b>	Auto restart pending
<b>19</b>	Simple Blowdown, waiting for final pressure
<b>25</b>	Manual cooldown mode
<b>27</b>	Blowdown to header, opening suction
<b>28</b>	Blowdown to header, waiting for final pressure
<b>30</b>	VFD Starting
<b>31</b>	VFD Warming up
<b>32</b>	VFD Idling
<b>33</b>	VFD Manual
<b>34</b>	VFD Auto normal
<b>35</b>	VFD Auto pressure override
<b>36</b>	Waiting for engine controller to start engine
<b>40</b>	Purge cycle before prelube
<b>41</b>	Blowdown after fault pending auto restart
<b>42</b>	Bypass equalize
<b>43</b>	Reset VFD Versadrive
<b>50</b>	Standby
<b>60</b>	Blowdown warning
<b>61</b>	Remote reset warning (siren before starting on remote trigger)



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<b>Shutdown category- 41107</b>	
<b>0</b>	Thermocouple
<b>1</b>	Digital Input
<b>2</b>	Analog Input
<b>3</b>	Manual Stop
<b>4</b>	(unused)
<b>5</b>	EIM Shutdown (Usually from another module)
<b>6</b>	MPU (RPM)
<b>7</b>	Power on Reset
<b>8</b>	Prelube expired before start
<b>9</b>	Autostart sequence failed
<b>10</b>	(Unused)
<b>11</b>	ECU failed to start
<b>12</b>	Manual shutdown through Modbus
<b>13</b>	Blowdown failed
<b>14</b>	Purge failed
<b>15</b>	Expansion module dropped
<b>18</b>	Low purge
<b>19</b>	Voltage
<b>20</b>	Cyl temp deviation
<b>23</b>	Analog input disconnect
<b>24</b>	Valve feedback fault
<b>30</b>	Digital input feedback block short
<b>31</b>	Digital input feedback pin short
<b>32</b>	Purge failed total time expired
<b>33</b>	Purge failed stage 1 failed to meet pressure
<b>34</b>	Purge failed valve feedback fault
<b>35</b>	Start rejected because run signal not stopped
<b>44</b>	Misc. start permissive not met

<b>PID Status- 41135-41140</b>	
<b>0</b>	Off or disabled
<b>1</b>	Waiting for activation criteria to start
<b>2</b>	Waiting for timeout after activation
<b>3</b>	Running normally
<b>4</b>	Manual hold
<b>5</b>	Under purge sequence control
<b>6</b>	Under blowdown sequence control
<b>99</b>	Under load control mode control



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## System Registers

<b>Input Register</b>	<b>Holding Register</b>	<b>Description</b>	<b>Unit</b>	<b>Min SW</b>
30100	40100	Run hours		1.00
30101	40101	Run hours high word		1.00
30102	40102	Software Major version (E.g "1" if software is 1.04)		1.02
30103	40103	Software Minor version (E.g. "4" if software is 1.04)		1.02
30104	40104	Signal strength	Pct	1.02
30105	40105	DCT Serial Number		1.02
30106	40106	Board ambient temperature	F	1.56
30107	40107	Clock Seconds (0-59)		1.69.79
30108	40108	Epoch time low word (seconds since Jan 1 1970)		1.69.79
30109	40109	Epoch time high word (seconds since Jan 1 1970)		1.69.79



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## AFRC Registers

<b>Input Register</b>	<b>Holding Register</b>	<b>Description</b>	<b>Unit</b>	<b>Min SW</b>
<b>33000</b>	43000	Precat Temperature	C/F*	1.00
<b>33001</b>	43001	Postcat Temperature	C/F*	1.00
<b>33002</b>	43002	Differential Temperature	C/F*	1.00
<b>33003</b>	43003	Aux Temperature	C/F*	1.00
<b>33004</b>	43004	Ambient Thermistor Temperature	C/F*	1.00
<b>33005</b>	43005	Manifold Left Pressure	PSIG	1.00
<b>33006</b>	43006	Manifold Right Pressure	PSIG	1.00
<b>33007</b>	43007	Analog voltage 1	V	1.00
<b>33008</b>	43008	Analog current 1	mA	1.00
<b>33009</b>	43009	AFR Battery Potential	V	1.00
<b>33010</b>	43010	Left wideband reading	lambda	1.00
<b>33011</b>	43011	Left DPV position (steps)		1.00
<b>33012</b>	43012	Left narrowband reading	mV	1.00
<b>33013</b>	43013	Right wideband reading	lambda	1.00
<b>33014</b>	43014	Right DPV position (steps)		1.00
<b>33015</b>	43015	Right narrowband reading	mV	1.00



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## Ignition and EMIT ECU Registers

<b>Input Register</b>	<b>Holding Register</b>	<b>Description</b>	<b>Unit</b>	<b>Min SW</b>
33050	43050	ICM Input voltage	V	1.00
33051	43051	Engine speed		1.00
33052	43052	Left Manifold Pressure	PSI	1.00
33053	43053	Current total timing	deg	1.00
33054	43054	Desired dwell time	ms	1.00
33055	43055	Ignition state		1.00
33056	43056	Fault bitmap		1.00
33057	43057	Average spark duration	ms	1.00
33058	43058	Average primary current	A	1.00
33075	43075	EMIT ECU Oil Temp	C/F*	1.35
33076	43076	EMIT ECU Coolant Temp	C/F*	1.35
33077	43077	EMT ECU Oil Pressure	PSI <sub>g</sub>	1.35

\*Temperature unit will match screen setting



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## Speed Controller Registers

<b>Input Register</b>	<b>Holding Register</b>	<b>Description</b>	<b>Unit</b>	<b>Min SW</b>
33150	43150	Engine speed		1.00
33151	43151	Governor state		1.00
33152	43152	Current control mode		1.00
33153	43153	Current rpm setpoint		1.00
33154	43154	Current throttle position		1.00
33155	43155	Error code		1.00
33156	43156	Analog current 1	mA	1.00
33157	43157	Analog current 2	mA	1.00
33158	43158	Analog current 3	mA	1.00
33159	43159	Input voltage	V	1.00
33160	43160	Control is in auto		1.00
33161	43161	Suction	PSI	1.00
33162	43162	Discharge	PSI	1.00



## Data Translator (Engine Data) Registers

Note: Starting with v1.48 these registers are also duplicated at the 47,000 area with US units. E.g. engine oil pressure is at both 44,005 below and also at 44,005 + 2,999 = 47,004 in PSI.

Input Register	Holding Register	Description	Unit	Min SW
34000	44000	EDT Comms Status (See table below)		1.64
34001	44001	Engine speed	RPM	1.00
34002	44002	Battery voltage	V	1.00
34003	44003	Intake manifold 1 absolute pressure	KpaA	1.00
34005	44005	Engine oil pressure	KpaG	1.00
34006	44006	Engine actual timing	Deg	1.00
34007	44007	Desired speed	RPM	1.00
34008	44008	Engine oil temp	C	1.00
34009	44009	Engine coolant temp	C	1.00
34010	44010	Precat Temp	C	1.00
34011	44011	Postcat Temp	C	1.00
34012	44012	Diff CAT Temp	C	1.00
34013	44013	Engine hours low		1.00
34014	44014	Engine hours high		1.00
34015	44015	Fuel Temperature	C	1.19
34016	44016	Fuel specific gravity * 1000		1.19
34017	44017	Desired Timing 1	Deg	1.19
34018	44018	Desired Timing 2	Deg	1.48
34025	44025	WKI Value		1.00
34026	44026	Throttle valve 1 position	Pct	1.00
34027	44027	Intake manifold 1 absolute pressure high resolution	KpaA	1.00
34028	44028	Intake manifold 2 absolute pressure high resolution	KpaA	1.00
34029	44029	Exhaust manifold L temp	C	1.00
34030	44030	Exhaust manifold R temp	C	1.00
34031	44031	Air intake temp	C	1.00
34032	44032	Ambient air temp	C	1.00
34033	44033	Ignition Timing Cyl 1	Deg	1.00
34034	44034	Ignition Timing Cyl 2	Deg	1.00
34035	44035	Ignition Timing Cyl 3	Deg	1.00
34036	44036	Ignition Timing Cyl 4	Deg	1.00
34037	44037	Ignition Timing Cyl 5	Deg	1.00
34038	44038	Ignition Timing Cyl 6	Deg	1.00
34039	44039	Ignition Timing Cyl 7	Deg	1.00



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34040	44040	Ignition Timing Cyl 8	Deg	1.00
34041	44041	Ignition Timing Cyl 9	Deg	1.00
34042	44042	Ignition Timing Cyl 10	Deg	1.00
34043	44043	Ignition Timing Cyl 11	Deg	1.00
34044	44044	Ignition Timing Cyl 12	Deg	1.00
		(Note: For ignition timing 13-20 see below at 44384)		
34045	44045	Wauk Spark Reference #1		1.00
34046	44046	Wauk Spark Reference #2		1.00
34047	44047	Wauk Spark Reference #3		1.00
34048	44048	Wauk Spark Reference #4		1.00
34049	44049	Wauk Spark Reference #5		1.00
34050	44050	Wauk Spark Reference #6		1.00
34051	44051	Wauk Spark Reference #7		1.00
34052	44052	Wauk Spark Reference #8		1.00
34053	44053	Wauk Spark Reference #9		1.00
34054	44054	Wauk Spark Reference #10		1.00
34055	44055	Wauk Spark Reference #11		1.00
34056	44056	Wauk Spark Reference #12		1.00
34100	44100	Fuel valve one intake absolute pressure	Kpa	1.00
34101	44101	Fuel valve differential pressure	Kpa	1.00
34102	44102	Unfiltered oil pressure	Kpa	1.00
34103	44103	Turbocharger 1 inlet temp	C	1.00
34104	44104	Turbocharger 1 outlet temp	C	1.00
34105	44105	Turbocharger 2 inlet temp	C	1.00
34106	44106	Turbocharger 2 outlet temp	C	1.00
34107	44107	Engine exhaust port temp 1	C	1.00
34108	44108	Engine exhaust port temp 2	C	1.00
34109	44109	Engine exhaust port temp 3	C	1.00
34110	44110	Engine exhaust port temp 4	C	1.00
34111	44111	Engine exhaust port temp 5	C	1.00
34112	44112	Engine exhaust port temp 6	C	1.00
34113	44113	Engine exhaust port temp 7	C	1.00
34114	44114	Engine exhaust port temp 8	C	1.00
34115	44115	Engine exhaust port temp 9	C	1.00
34116	44116	Engine exhaust port temp 10	C	1.00
34117	44117	Engine exhaust port temp 11	C	1.00
34118	44118	Engine exhaust port temp 12	C	1.00
34119	44119	Engine exhaust port temp 13	C	1.00
34120	44120	Engine exhaust port temp 14	C	1.00



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34121	44121	Engine exhaust port temp 15	C	1.00
34122	44122	Engine exhaust port temp 16	C	1.00
		(For exhaust temps 17-20 see below at 44131)		
34123	44123	Oil filter differential pressure	KPa	1.00
34124	44124	Engine coolant pressure	KPa	1.00
34125	44125	First DTC detected		1.00
34126	44126	Engine pct load at current speed	%	1.00
34127	44127	CDL Code at last shutdown*		1.19
34128	44128	Latest CDL Error code*		1.19
34129	44129	Exhaust current NOx	Ppm	1.19
34130	44130	Fuel Correction Factor	%	1.47
34131	44131	Engine exhaust port temp 17	C	1.63
34132	44132	Engine exhaust port temp 18	C	1.63
34133	44133	Engine exhaust port temp 19	C	1.63
34134	44134	Engine exhaust port temp 20	C	1.63
34144	44144	Engine main bearing temp 1	C	1.69.82
34145	44145	Engine main bearing temp 2	C	1.69.82
34146	44146	Engine main bearing temp 3	C	1.69.82
34147	44147	Engine main bearing temp 4	C	1.69.82
34148	44148	Engine main bearing temp 5	C	1.69.82
34149	44149	Engine main bearing temp 6	C	1.69.82
34150	44150	Engine main bearing temp 7	C	1.69.82
34151	44151	Engine main bearing temp 8	C	1.69.82
34152	44152	Engine main bearing temp 9	C	1.69.82
34200	44200	Engine RPM (duplicate)	RPM	1.00
34201	44201	VFD Output frequency	Hz	1.00
34202	44202	VFD Motor Current	A	1.00
34203	44203	VFD Motor torque pct	%	1.00
34204	44204	VFD Motor voltage	V	1.00
34205	44205	VFD Motor Power pct	%	1.00
34206	44206	VFD Frequency Reference before Ramp	Hz	1.00
34207	44207	VFD Frequency Reference after Ramp	Hz	1.00
34208	44208	VFD Speed reference before ramp	RPM	1.00
34209	44209	VFD Speed reference after ramp	RPM	1.00
34210	44210	Mains voltage	V	1.00
34211	44211	VFD Consumption	Kwh	1.00
34212	44212	ATV71 Status Word 1		1.00
34213	44213	ATV71 Status Word 2		1.00
34214	44214	ATV71 Status Word 3		1.00



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34215	44215	ATV71 Status Word 4		1.00
34216	44216	ATV71 Status Word 5		1.00
34217	44217	ATV71 Status Word 6		1.00
34218	44218	ATV71 Status Word 7		1.00
34219	44219	ATV71 Status Word 8		1.00
34300	44300	Detonation Level (0-255)		1.48
34301	44301	Detonation level cyl 1		1.48
34302	44302	Detonation level cyl 2		1.48
34303	44303	Detonation level cyl 3		1.48
34304	44304	Detonation level cyl 4		1.48
34305	44305	Detonation level cyl 5		1.48
34306	44306	Detonation level cyl 6		1.48
34307	44307	Detonation level cyl 7		1.48
34308	44308	Detonation level cyl 8		1.48
34309	44309	Detonation level cyl 9		1.48
34310	44310	Detonation level cyl 10		1.48
34311	44311	Detonation level cyl 11		1.48
34312	44312	Detonation level cyl 12		1.48
34313	44313	Detonation level cyl 13		1.48
34314	44314	Detonation level cyl 14		1.48
34315	44315	Detonation level cyl 15		1.48
34316	44316	Detonation level cyl 16		1.48
		(Note: For detonation lvl cyls 17-20 see below at 44380)		
34317	44317	Actual Exhaust Oxygen	%	1.48
34318	44318	Desired Exhaust Oxygen	%	1.48
34319	44319	Actual AFR		1.48
34320	44320	Desired AFR		1.48
34321	44321	Desired Full Load Exhaust O2		1.48
34322	44322	Desired Nox	Ppm	1.48
34323	44323	Fuel Quality Setting		1.48
34324	44324	Engine Rated Speed		1.48
34325	44325	Cooldown Minutes Configuration		1.48
34326	44326	Low Idle Configuration		1.48
34327	44327	Max Hi Idle Configuration		1.48
34328	44328	Min Hi Idle Configuration		1.48
34329	44329	Fuel Position	%	1.48
34330	44330	Fuel Valve Position		1.48
34331	44331	Fuel Rate		1.48



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34332	44332	Air to Fuel Diff Pressure	KPa	1.48
34333	44333	Gas Fuel Flow	SCFM	1.48
34334	44334	Fuel Actuator Command Position		1.48
34335	44335	Wastegate Command Position		1.48
34336	44336	Choke Command Position		1.48
34337	44337	Turbo Bypass Command		1.48
34338	44338	Throttle Actuator Command Position		1.48
34339	44339	Throttle Valve Differential Pressure	KPa	1.48
34340	44340	Jacket Water to Oil Temp Differential	C	1.48
34341	44341	Desired Combustion Time		1.48
34342	44342	Actual Air Pressure	KPa	1.48
34343	44343	Desired Manifold Air Intake Pressure	KPa	1.48
34344	44344	Intake Manifold Air Flow		1.48
34345	44345	Specific Heat Ratio		1.48
34346	44346	Transformer Volts Cyl 1	V	1.48
34347	44347	Transformer Volts Cyl 2	V	1.48
34348	44348	Transformer Volts Cyl 3	V	1.48
34349	44349	Transformer Volts Cyl 4	V	1.48
34350	44350	Transformer Volts Cyl 5	V	1.48
34351	44351	Transformer Volts Cyl 6	V	1.48
34352	44352	Transformer Volts Cyl 7	V	1.48
34353	44353	Transformer Volts Cyl 8	V	1.48
34354	44354	Transformer Volts Cyl 9	V	1.48
34355	44355	Transformer Volts Cyl 10	V	1.48
34356	44356	Transformer Volts Cyl 11	V	1.48
34357	44357	Transformer Volts Cyl 12	V	1.48
34358	44358	Transformer Volts Cyl 13	V	1.48
34359	44359	Transformer Volts Cyl 14	V	1.48
34360	44360	Transformer Volts Cyl 15	V	1.48
34361	44361	Transformer Volts Cyl 16	V	1.48
34362	44362	Transformer Volts Cyl 17	V	1.63
34363	44363	Transformer Volts Cyl 18	V	1.63
34364	44364	Transformer Volts Cyl 19	V	1.63
34365	44365	Transformer Volts Cyl 20	V	1.63
34370	44370	Mass Fuel Flow	Kg/Hr	1.59
34380	44380	Detonation level cyl 17		1.63
34381	44381	Detonation level cyl 18		1.63
34382	44382	Detonation level cyl 19		1.63
34383	44383	Detonation level cyl 20		1.63



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34384	44384	Ignition Timing Cyl 13	Deg	1.63
34385	44385	Ignition Timing Cyl 14	Deg	1.63
34386	44386	Ignition Timing Cyl 15	Deg	1.63
34387	44387	Ignition Timing Cyl 16	Deg	1.63
34388	44388	Ignition Timing Cyl 17	Deg	1.63
34389	44389	Ignition Timing Cyl 18	Deg	1.63
34390	44390	Ignition Timing Cyl 19	Deg	1.63
34391	44391	Ignition Timing Cyl 20	Deg	1.63
34392	44392	Combustion Time Cyl 1	ms x 100	1.67.235
34393	44393	Combustion Time Cyl 2	ms x 100	1.67.235
34394	44394	Combustion Time Cyl 3	ms x 100	1.67.235
34395	44395	Combustion Time Cyl 4	ms x 100	1.67.235
34396	44396	Combustion Time Cyl 5	ms x 100	1.67.235
34397	44397	Combustion Time Cyl 6	ms x 100	1.67.235
34398	44398	Combustion Time Cyl 7	ms x 100	1.67.235
34399	44399	Combustion Time Cyl 8	ms x 100	1.67.235
34400	44400	Combustion Time Cyl 9	ms x 100	1.67.235
34401	44401	Combustion Time Cyl 10	ms x 100	1.67.235
34402	44402	Combustion Time Cyl 11	ms x 100	1.67.235
34403	44403	Combustion Time Cyl 12	ms x 100	1.67.235
34404	44404	Combustion Time Cyl 13	ms x 100	1.67.235
34405	44405	Combustion Time Cyl 14	ms x 100	1.67.235
34406	44406	Combustion Time Cyl 15	ms x 100	1.67.235
34407	44407	Combustion Time Cyl 16	ms x 100	1.67.235

\*The most significant bit of the CDL code reading signifies if it is an E type code (e.g. E267(1) ). If the bit is set, the code is E type. Otherwise it is a CID type code.

### EDT Comms Status, Register 44000



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This register is read as a bitmap, with the bits shown below

<b>Bit</b>	<b>Description</b>
<b>0</b>	Receiving any CAN data (1 = receiving)
<b>1</b>	Receiving good CAN data
<b>2</b>	Receiving good ESM data
<b>3</b>	Receiving good CDL data

Note: Some engines will only have CAN, some will have both CAN and CDL. For an ESM engine only the ESM bit should be set.



## Configuration Read and Write Registers

Writable registers can be written with function code 6 (Write single register). Writing multiple registers with function code 16 is also supported starting with version 1.43.

Holding Register	Description	Min SW Version
41200	(Brain) Send Flag 1 = Reset (and start for remote reset) 2 = Stop 99 = Go to remote lockout 100 = exit remote lockout	1.06
41202	PID 1 Setpoint	1.06
41203	PID 2 Setpoint	1.06
41204	PID 3 Setpoint	1.06
41205	PID 4 Setpoint	1.06
41206	PID 5 Setpoint	1.63.477
41207	Speed control setpoint, or low sensor value for linear ramp	1.26
41208	Speed control high sensor value for linear ramp, or deadband for SP/DB	1.34
41209	Speed control low auto range RPM	1.34
41210	Speed control high auto range RPM	1.34
41211	Speed control RPM at low output limit	1.34
41212	Speed control RPM at high output limit	1.34
41215	Flow control mode upstream suction setpoint	1.44
41216	Flow control mode upstream suction deadband	1.44
41217	Flow control mode discharge setpoint	1.44
41218	Flow control mode discharge deadband	1.44
41219	Proportional loop 1 setpoint	1.65.181
41220	Proportional loop 2 setpoint	1.65.181
41221	Proportional loop 3 setpoint	1.65.181
41222	Recycle loop low suction setpoint	1.67.224
41223	Recycle loop high discharge setpoint	1.67.224
41225	Override load control suction target (Any psi = new suction setpoint, 0 = clear override)	1.68
41227	Delay ___ minutes after shutdown before opening blowdown valve, if 'vent after fault' is used	1.69.122
41230 – 41249	Analog Input 1 Low Kill – Analog Input 20A Low Kill	1.57
41260 – 41279	Analog Input 1 High Kill – Analog Input 20A High Kill	1.57
41300 – 41323	Thermocouple 1 High Kill – Thermocouple 24 High Kill	1.57



## EMIT Vibration Sensor Registers

Input Register	Holding Register	Description	Unit	Min SW
33200	43200	Engine Vibration 1 Composite Level	IPS	1.58
33201	43201	Engine Vibration 2 Composite Level	IPS	1.58
33202	43202	Engine Vibration 3 Composite Level	IPS	1.58
33203	43203	Compressor Vibration 1 Composite Level	IPS	1.58
33204	43204	Compressor Vibration 2 Composite Level	IPS	1.58
33205	43205	Compressor Vibration 3 Composite Level	IPS	1.58
33206	43206	Cooler Vibration 1 Composite Level	IPS	1.58
33207	43207	Cooler Vibration 2 Composite Level	IPS	1.58
33208	43208	Cooler Vibration 3 Composite Level	IPS	1.58
33250	43250	Engine Vibration 1 Composite Acceleration	g/1000	1.65
33251	43251	Engine Vibration 2 Composite Acceleration	g/1000	1.65
33252	43252	Engine Vibration 3 Composite Acceleration	g/1000	1.65
33253	43253	Compressor Vibration 1 Composite Acceleration	g/1000	1.65
33254	43254	Compressor Vibration 2 Composite Acceleration	g/1000	1.65
33255	43255	Compressor Vibration 3 Composite Acceleration	g/1000	1.65
33256	43256	Cooler Vibration 1 Composite Acceleration	g/1000	1.65
33257	43257	Cooler Vibration 2 Composite Acceleration	g/1000	1.65
33258	43258	Cooler Vibration 3 Composite Acceleration	g/1000	1.65

Note: The sensors will need to use the default name options to show up in Modbus. If given a custom name, it won't be in the above list.

Note 2: The "Composite Level" is the vector length of the x,y,z direction vibration levels

Note 3: The acceleration values are high pass filtered so static gravity will not appear



## SCR Registers

Input Register	Holding Register	Description	Unit	Min SW
35200	45200	SCR state (see table below)		1.69.521
35201	45201	SCR first DTC*		1.69.521
35202	45202	SCR first FMI*		1.69.521
35203	45203	SCR in critical fault		1.69.521
35204	45204	Pre-SCR Temperature	F	1.69.521
35205	45205	Post-SCR Temperature	F	1.69.521
35206	45206	Reactant dose pressure	PSI	1.69.521
35207	45207	Air pressure	PSI	1.69.521
35208	45208	Day tank hydrostatic pressure	" WC	1.69.521
35209	45209	Air command	PSI	1.69.521
35210	45210	Pump command * 100	V / 100	1.69.521
35211	45211	Pump RPM	RPM	1.69.521

\*See SCR manual for DTC-FMI codes

### SCR State Table

State	Name
0	Off normal
1	Off critical error
2	Warmup injection off
3	Injecting open loop
4	Injecting closed loop
5	Error – running
6	Critical error purge
7	Purge
8	Manual line flush



## 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. Note that on the setup page, each port can have a different baud rate, so verify which port is connected
3. Verify that the ID is 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 DCT software version is high enough for the registers being requested. This is shown in the last column in each table
2. If using a 3xxxx register, note the scaling is special as noted in the General Information section. The 4xxxx registers should all be integer
3. If using the Data Translator (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.
4. If using an EDT on an A3 engine, make sure both CDL and CAN links are connected as shown in the panel drawing
5. 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
6. The offset of the two units may be different. Try changing the register number +/- 1 and see if the value appears correctly. If so then all register requests need to be offset by this amount.