UPR/ATC MODBUS Address List

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1 Introduction

1.1 Scope

This document describes the layout of the Modbus addresses for parameters supported by the Dynisco controller.

Advisory notes and comments are placed as footnotes within the document. They do not form essential requirements of the product.

1.2 Precedence

This document has been compiled from the best available information at the time of writing. Errors should be reported in the first instance to the author who will then update the document. Additions or changes to the requirements stated shall be submitted to the Project Leader at West Instruments Ltd for incorporation into this document. Changes submitted too late for incorporation into the plan of work may not be incorporated.

Some requirements refer to National & International Standards; the current versions of these standards shall always take precedence over the information contained in this document. Other documents that may take precedence are referred to in the text.

1.3 Audience

This document will be used anyone that needs to know the modbus parameters supported by the ATC and UPR controllers.

2 Serial Communications

2.1 Supported Protocols

The unit supports two communication interfaces Modbus RTU and Modbus TCP. Modbus RTU is supported through the RS485 interface and Modbus TCP is supported through the optional Ethernet Module.

For a complete description of the Modbus protocol refer to the description provided at http://www.modbus.org/

2.2 RS485 Configuration

The RS485 address, bit rate and character format are configured via the front panel from the Comms Configuration menu.

Physical layer configuration settings possible are:

Data rate:	4800, 9600, 19200, 38400, 57600 or 115200 bps
Parity:	None (default), Even, Odd
Character format:	Always 8 bits per character.
Device Address:	*See below*.

2.3 RS485 Device Addressing

The instrument must be assigned a unique device address in the range 1 to 255. This address is used to recognise Modbus Queries intended for this instrument. With the exception of globally addressed broadcast messages, the instrument ignores Modbus Queries that do not match the address that has been assigned to it.

The instrument will accept broadcast messages (global queries) using device address 0 no matter what device address is assigned. No response messages are returned for globally addressed Queries.

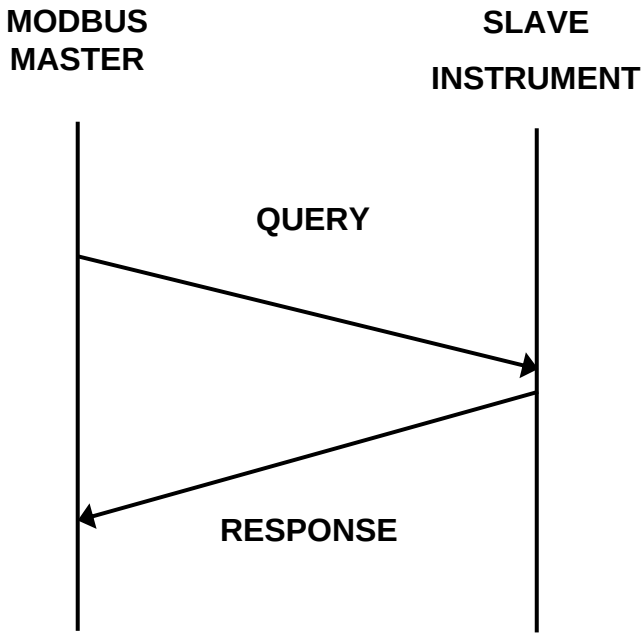
2.4 Ethernet Configuration

For Modbus TCP communications (Modbus over Ethernet), the IP address can either be assigned by a Dynamic Host Configuration Protocol (DHCP), BootP or AutoIP server on the network, or manually assigned using the IP address allocation software tool.
The supported data rates 10/100BASE-T (10 or 100 Mbps) are automatically detected.

2.5 Link Layer

A Query (or command) is transmitted from the Modbus Master to the Modbus Slave. The slave instrument assembles the reply to the master.

Figure 1. Modbus Link Layer



A message for either a QUERY or RESPONSE is made up of an inter-message gap followed by a sequence of data characters. The inter-message gap is at least 3.5 data character times - the transmitter must not start transmission until 3 character times have elapsed since reception of the last character in a message, and must release the transmission line within 3 character times of the last character in a message.

Note:

Three character times is approximately 0.25ms at 115200 bps, 0.51ms at 57600 bps, 0.75ms at 38400 bps, 1.5ms at 19200 bps, 3ms at 9600 bps and 6ms at 4800bps.

Data is encoded for each character as binary data, transmitted LSB first.

For a QUERY the address field contains the address of the slave destination. The slave address is given together with the Function and Data fields by the Application layer. The CRC is generated from the given address, function and data characters.

For a RESPONSE the address field contains the address of the responding slave. The Function and Data fields are generated by the slave application. The CRC is generated from the address, function and data characters.

The standard MODBUS RTU CRC-16 calculation employing the polynomial $2^{16}+2^{15}+2^{2}+1$ is used.

Inter-message gap	Address 1 character	Function 1 character	Data *n* characters	CRC Check 2 characters

2.6 Supported Modbus Functions

Modbus defines several function types. The following types are supported by this instrument:

Function Code (decimal)	Modbus Meaning	Description
03 / 04	Read Holding/Input registers	Read current binary value of specified number of parameters at given address. Up to 64 parameters can be accessed with one Query.
06	Write Single Register	Writes two bytes to a specified word address.
08	Diagnostics	Used for loopback test only.
16 (0x10 hex)	Write Multiple Registers	Writes up to 253 bytes of data to the specified address range.
23 (0x17 hex)	Read/Write Multiple Registers	Reads and Writes 253 bytes of data to the specified address ranges.

2.7 Function Descriptions

The following is interpreted from the Modbus Protocol Description obtainable from http://www.modbus.org/. Refer to that document if clarification is required.

In the function descriptions below, the preceding device address value is assumed, as is the correctly formed two-byte CRC value at the end of the QUERY and RESPONSE frames.

Function 03 / 04 - Read Holding/Input Registers

Reads current binary value of data at the specified word addresses.

QUERY

Function	Address of 1st Word		Number of Words	
03 / 04	HI	LO	HI	LO

RESPONSE

Function	Number of Bytes	First Word		Last Word	
03 / 04		HI	LO	HI	LO

In the response the “Number of Bytes” indicates the number of data bytes read from the instrument. E.g. if 5 words are read, the count will be 10 (A hex). The maximum number of words that can be read is 64. If a parameter does not exist at one of the addresses read, then a value of 0000h is returned for that word.

Function 06 - Write Single Register

Writes two bytes to a specified word address.

QUERY

Function	Address of Word		Value to write	
06	HI	LO	HI	LO

RESPONSE

Function	Address of Word		Value written	
06	HI	LO	HI	LO

Note:
The Response normally returns the same data as the Query.

Function 08 - Loopback Diagnostic Test

QUERY

Function	Diagnostic Code		Value	
08	HI =00	LO=00	HI	LO

RESPONSE

Function	Sub-function		Value	
08	HI=00	LO=00	HI	LO

Note:
The Response normally returns the same data as the loopback Query. Other Diagnostic Codes are not supported.

Function 16 - Write Multiple Registers (*0x10 Hex*)

Writes consecutive word (two-byte) values starting at the specified address.

QUERY

Function	1st Write Address		Number of Words to Write		Number of Query Bytes	1st Query Byte	2nd Query Byte	*etc*	Last Query Byte
10	HI	LO	HI	LO				→	

RESPONSE

Function	1st Word Address		Number of Words	
10	HI	LO	HI	LO

Note:
The number of data bytes that can be written in one message is 253 bytes.

Function 23 Hex - Read / Write Multiple Registers (*0x17 hex*)

Reads and writes the requested number of consecutive words (two-bytes) starting at the specified addresses.

QUERY

Function	1st Read Address		Number of Words to Read		1st Write Address		Number of Words to Write		Values to Write						
									1st Word		2nd Word		*etc*	Last Word	
17	HI	LO	HI	LO	HI	LO	HI	LO	HI	LO	HI	LO	→	HI	LO

RESPONSE

Function	Number of Bytes	Read Data						
		1st Word		2nd Word		*etc*	Last Word	
17		HI	LO	HI	LO	→	HI	LO

Note:
The number of data bytes that can be read and written in one message is 253 bytes.

Exception Responses

When a QUERY is sent that the instrument cannot interpret, an Exception RESPONSE is returned. Possible exception responses are:

Exception Code	Error Condition	Interpretation
00	Unused	None.
01	Illegal function	Function number out of range.
02	Illegal Data Address	Write functions: Parameter number out of range or not supported. (for write functions only). Read Functions: Start parameter does not exist or end parameter greater than 65536.
03	Illegal Data Value	Attempt to write invalid data / required action not executed.

The format of an exception response is:

RESPONSE

Function	Exception Code
Original Function code with its Most Significant Bit (MSB) set.	*as detailed above*

Note:
In the case of multiple exception codes for a single QUERY the Exception code returned is the one corresponding to the first parameter in error.

The Modbus parameter register addresses are detailed in the following sections.
The Access column indicates if a parameter is read only (RO) or if it can also be written to (R/W).

Note:
Some parameters that do not apply for a particular configuration will accept reads and writes. Read only parameters will return an exception if an attempt is made to write values to them.

2.8 Data Formats

Data can be read or written in three formats: Integer Only, Integer with 1 Decimal Place and Floating Point Number.

The Modbus Address column shows the register address for each parameter in integer format. Other formats can be calculated from the Integer Only address.

When working in Hexadecimal, the format calculations are:

Address for Integer with 1 Decimal Place = Integer address plus 0x4000
Address for Floating Point = Integer address multiplied by 2, plus 0x8000

When working in Decimal, the format calculations are:

Address for Integer with 1 Decimal Place = Integer address plus 16384
Address for Floating Point = Integer address multiplied by 2, plus 32768

Example Register Address Calculations

Calculating Parameter Register Addresses				
		Integer Only	***Integer+1***	***Floating Point***
Register Address Calculation	**(*hex*)**	**Address**	**Address + 0x4000**	**Address x 2 + 0x8000**
	(*dec*)	**Address**	**Address + 16384**	**Address x 2 + 32768**
Address Example: (*For Process Variable*)	**(*hex*)**	**0x0407**	**0x4407**	**0x880E**
	(*dec*)	**1031**	**17415**	**34830**
Data Value Returned: If actual Value = 23.9 decimal	*(hex)*	*0x00, 0x17*	*0x00, 0xEF*	*0x41, 0xBF, 0x33, 0x33*
	(dec)	*23*	*239*	*23.9 as floating decimal*
Address Example: (*For Selected Setpoint*)	**(*hex*)**	**0x101F**	**0x501F**	**0xA03E**
	(*dec*)	**4127**	**20511**	**41022**
Data Value Returned: If Value = 1 (Alternative SP)	*(hex)*	*0x00, 0x01*	*0x00, 0x0A*	*0x3F, 0x80, 0x00, 0x00*
	(dec)	*1*	*10*	*1.0 as floating decimal*

3 Input parameters

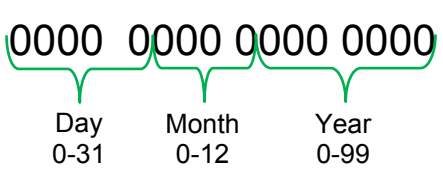
3.1 Input 1 parameters

<table>
<tr><th>Parameter Name</th><th>Modbus Address (Dec)</th><th>Modbus Address (Hex)</th><th>Access R/W</th><th>Notes</th><th>Default</th></tr>
<tr><td>Input Range</td><td>1024</td><td>0x0400</td><td>R/W</td><td><table><tr><th>Value</th><th>Range</th></tr><tr><td>0</td><td>B TC</td></tr><tr><td>2</td><td>C TC</td></tr><tr><td>4</td><td>D TC</td></tr><tr><td>6</td><td>E TC</td></tr><tr><td>8</td><td>J TC</td></tr><tr><td>10</td><td>K TC</td></tr><tr><td>12</td><td>L TC</td></tr><tr><td>14</td><td>N TC</td></tr><tr><td>16</td><td>R TC</td></tr><tr><td>18</td><td>S TC</td></tr><tr><td>20</td><td>T TC</td></tr><tr><td>22</td><td>P24</td></tr><tr><td>24</td><td>Pt100</td></tr><tr><td>26</td><td>NI120</td></tr><tr><td>28</td><td>0_20mA</td></tr><tr><td>29</td><td>4_20mA</td></tr><tr><td>30</td><td>0_50mV</td></tr><tr><td>31</td><td>10_50mV</td></tr><tr><td>32</td><td>0_5V</td></tr><tr><td>33</td><td>1_5V</td></tr><tr><td>34</td><td>0_10V</td></tr><tr><td>35</td><td>2_10V</td></tr><tr><td>36</td><td>Potentiometer</td></tr><tr><td>37</td><td>Strain gauge</td></tr></table></td><td>37</td></tr>
<tr><td>Engineering units</td><td>1025</td><td>0x0401</td><td>R/W</td><td>0 = None
1 = Degrees C
2 = Degrees F
3 = Degrees K
4 = Bar
5 = pH
6 = Percent
7 = Percent RH
8 = PSI
9 = MPa
10 = KGcm</td><td>8</td></tr>
<tr><td>Decimal Place</td><td>1026</td><td>0x0402</td><td>R/W</td><td>0 = 1234
1 = 123.4
2 = 12.34
3 = 1.234</td><td>0</td></tr>
</table>

Process Input Range Minimum	1027	0x0403	R/W		0
Process Input Range Maximum	1028	0x0404	R/W		10000
Process Input Process variable offset	1029	0x0405	R/W	Span of the input range	0
Process Input Filter time constant	1030	0x0406	R/W	Any value between 0.0 and 512.0	1
Process Input Process Variable	1031	0x0407	R		
Process Input Sensor Break Flag	1032	0x0408	R	0 = Inactive 1 = Active	
Process Input Under Range Flag	1033	0x0409	R	0 = Inactive 1 = Active	
Process Input Over Range Flag	1034	0x040A	R	0 = Inactive 1 = Active	
Process Input CJC Enable	1035	0x040B	R/W	0 = Enable 1 = Disabled	0
Multi-point scaling enable	1053	0x041D	R/W	0 = Disabled 1 = Enabled (Can only be set to enable if the input type is linear)	0
Scale point 1	1054	0x041E	R/W	0.1 to 100.0%	100
Display point 1	1055	0x041F	R/W	Span of the input range	1000
Scale point 2	1056	0x0420	R/W	Scale point 1 to 100.0% can only be set when Scale point 1 is not equal to 100.0%	100
Display point 2	1057	0x0421	R/W	Span of the input range	1000
Scale point 3	1058	0x0422	R/W	Scale point 2 to 100.0% can only be set when Scale point 2 is not equal to 100.0%	100
Display point 3	1059	0x0423	R/W	Span of the input range	1000
Scale point 4	1060	0x0424	R/W	Scale point 3 to 100.0% can only be set when Scale point 3 is not equal to 100.0%	100

Display point 4	1061	0x0425	R/W	Span of the input range	1000
Scale point 5	1062	0x0426	R/W	Scale point 4 to 100.0% can only be set when Scale point 4 is not equal to 100.0%	100
Display point 5	1063	0x0427	R/W	Span of the input range	1000
Scale point 6	1064	0x0428	R/W	Scale point 5 to 100.0% can only be set when Scale point 5 is not equal to 100.0%	100
Display point 6	1065	0x0429	R/W	Span of the input range	1000
Scale point 7	1066	0x042A	R/W	Scale point 6 to 100.0% can only be set when Scale point 6 is not equal to 100.0%	100
Display point 7	1067	0x042B	R/W	Span of the input range	1000
Scale point 8	1068	0x042C	R/W	Scale point 7 to 100.0% can only be set when Scale point 7 is not equal to 100.0%	100
Display point 8	1069	0x042D	R/W	Span of the input range	1000
Scale point 9	1070	0x042E	R/W	Scale point 8 to 100.0% can only be set when Scale point 8 is not equal to 100.0%	100
Display point 9	1071	0x042F	R/W	Span of the input range	1000
Scale point 10	1072	0x0430	R/W	Scale point 9 to 100.0% can only be set when Scale point 9 is not equal to 100.0%	100
Display point 10	1073	0x0431	R/W	Span of the input range	1000
Scale point 11	1074	0x0432	R/W	Scale point 10 to 100.0% can only be set when Scale point 10 is not equal to 100.0%	100
Display point 11	1075	0x0433	R/W	Span of the input range	1000
Scale point 12	1076	0x0434	R/W	Scale point 11 to 100.0% can only be set when Scale point 11 is not equal to 100.0%	100
Display point 12	1077	0x0435	R/W	Span of the input range	1000
Scale point 13	1078	0x0436	R/W	Scale point 12 to 100.0% can only be set when Scale point 12 is not equal to 100.0%	100
Display point 13	1079	0x0437	R/W	Span of the input range	1000
Scale point 14	1080	0x0438	R/W	Scale point 13 to 100.0% can only be set when Scale point 13 is not equal to 100.0%	100
Display point 14	1081	0x0439	R/W	Span of the input range	1000
Scale point 15	1082	0x043A	R/W	Scale point 14 to 100.0% can only be set when Scale point 14 is not equal to 100.0%	100
Display point 15	1083	0x043B	R/W	Span of the input range	1000
Input failure Mode	1096	0x0448	R/W	0 = Fail High 1 = Fail Low	0

Input Peak Detection	1097	0x0449	R/W	0 = Disabled 1 = Maximum Peak 2 = Minimum Peak	0
Peak Value	1101	0x044D	R/W		
Input 1 User Calibration (non Strain Gauge Types)					
Process Input User Calibration Type	1085	0x043D	R/W	0 = No User Calibration 1 = Single Point Calibration 2 = Two Point Calibration	0
Process Input Low Temperature Calibration Point	1086	0x043E	R/W		0
Process Input Low Calibration Offset	1087	0x043F	R/W		0
Process Input High Temperature Calibration Point	1088	0x0440	R/W		2192.5
Process Input High Calibration Offset	1089	0x0441	R/W		0
Input 1 Strain Gauge User Calibration					
Shunt Resistor	1090	0x0442	R/W	0 = Disabled 1 = Enabled	1
Calibration Resistor	1091	0x0443	R/W	40 – 100% of transducer full scale	80
Calibration start	1092	0x0444	R/W	Write 51966 (0xCAFE) to begin the selected calibration attempt	0
Calibration Status	1093	0x0445	R	Returns latest calibration status for Input 1: 0 = None 1 = Busy 2 = Wait Lo 3 = Wait Hi 4 = Complete 5 = CNT Fail 6 = RCAL Fail	0
Calibration mode	1094	0x0446	R/W	Write 1 to Select Input 1 Low Calibration Write 2 to Select Input 1 High Calibration	NA
Each calibration stage requires two Modbus writes. The first tells the unit which input you want to calibrate and if this is to be the Low or High calibration. The second is a password that tells the unit to execute the calibration attempt. <u>To perform Strain Gauge Calibration on Input 1</u> 1. Write “1” to register 1094 *Selects Low Calibration*					

<table>
<tr><td colspan="6">2. Write “51966” to register 1092 Calibration is attempted
3. Write “2” to register 1094 Selects High Calibration
4. Write “51966” to register 1092 Calibration is attempted
It is advisable to read the status between the low and high calibration stages to ensure low cal has completed successfully before performing the high cal</td></tr>
<tr><td colspan="5">Calibration Reminder</td><td></td></tr>
<tr><td>Calibration Reminder Enable</td><td>1048</td><td>0x0418</td><td>R/W</td><td></td><td>0</td></tr>
<tr><td>Calibration Reminder Date</td><td>1049</td><td>0x0419</td><td>R/W</td><td>Binary coded decimal (BCD)
16 bits that represent the date as follows:
XXXX XXXX XXXX XXXX
 

So an example of setting the date to 31/07/2012
Day = 31 = 11111
Month = 7 = 0111
Year = 12 = 0001100
This would give the total BCD of: 11111 0111 0001100 or 64396.
However reading this back out afterwards would return 195468 as the calculated day of week would be automatically added on the end (3msd).</td><td>2176</td></tr>
</table>

3.2 Input 2 parameters

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Input Range	1110	0x0456	R/W	Value / Range: 0 B TC 2 C TC 4 D TC 6 E TC 8 J TC 10 K TC 12 L TC 14 N TC 16 R TC 18 S TC 20 T TC 22 P24 24 Pt100	37

				26 NI120 28 0_20mA 29 4_20mA 30 0_50mV 31 10_50mV 32 0_5V 33 1_5V 34 0_10V 35 2_10V 36 Potentiometer 37 Strain gauge	
Engineering units	1111	0x0457	R/W	0 = None 1 = Degrees C 2 = Degrees F	8
Decimal Place	1112	0x0458	R/W	0 = 1234 1 = 123.4 2 = 12.34 3 = 1.234	0
Process Input Range Minimum	1113	0x0459	R/W		0
Process Input Range Maximum	1114	0x045A	R/W		10000
Process Input Process variable offset	1115	0x045B	R/W	Span of the input range	0
Process Input Filter time constant	1116	0x045C	R/W	Any value between 0.0 and 512.0	1
Process Input Process Variable	1117	0x045D	R		
Process Input Sensor Break Flag	1118	0x045E	R	0 = Inactive 1 = Active	
Process Input Under Range Flag	1119	0x045F	R	0 = Inactive 1 = Active	
Process Input Over Range Flag	1120	0x0460	R	0 = Inactive 1 = Active	
Process Input CJC Enable	1121	0x0461	R/W	0 = Enable 1 = Disabled	0
Multi-point scaling enable	1139	0x0473	R/W	0 = Disabled 1 = Enabled (Can only be set to enable if the input type is linear)	0

Scale point 1	1140	0x0474	R/W	0.1 to 100.0%	100
Display point 1	1141	0x0475	R/W	Span of the input range	1000
Scale point 2	1142	0x0476	R/W	Scale point 1 to 100.0% can only be set when Scale point 1 is not equal to 100.0%	100
Display point 2	1143	0x0477	R/W	Span of the input range	1000
Scale point 3	1144	0x0478	R/W	Scale point 2 to 100.0% can only be set when Scale point 2 is not equal to 100.0%	100
Display point 3	1145	0x0479	R/W	Span of the input range	1000
Scale point 4	1146	0x047A	R/W	Scale point 3 to 100.0% can only be set when Scale point 3 is not equal to 100.0%	100
Display point 4	1147	0x047B	R/W	Span of the input range	1000
Scale point 5	1148	0x047C	R/W	Scale point 4 to 100.0% can only be set when Scale point 4 is not equal to 100.0%	100
Display point 5	1149	0x047D	R/W	Span of the input range	1000
Scale point 6	1150	0x047E	R/W	Scale point 5 to 100.0% can only be set when Scale point 5 is not equal to 100.0%	100
Display point 6	1151	0x047F	R/W	Span of the input range	1000
Scale point 7	1152	0x0480	R/W	Scale point 6 to 100.0% can only be set when Scale point 6 is not equal to 100.0%	100
Display point 7	1153	0x0481	R/W	Span of the input range	1000
Scale point 8	1154	0x0482	R/W	Scale point 7 to 100.0% can only be set when Scale point 7 is not equal to 100.0%	100
Display point 8	1155	0x0483	R/W	Span of the input range	1000
Scale point 9	1156	0x0484	R/W	Scale point 8 to 100.0% can only be set when Scale point 8 is not equal to 100.0%	100
Display point 9	1157	0x0485	R/W	Span of the input range	1000
Scale point 10	1158	0x0486	R/W	Scale point 9 to 100.0% can only be set when Scale point 9 is not equal to 100.0%	100
Display point 10	1159	0x0487	R/W	Span of the input range	1000
Scale point 11	1160	0x0488	R/W	Scale point 10 to 100.0% can only be set when Scale point 10 is not equal to 100.0%	100
Display point 11	1161	0x0489	R/W	Span of the input range	1000
Scale point 12	1162	0x048A	R/W	Scale point 11 to 100.0% can only be set when Scale point 11 is not equal to 100.0%	100
Display point 12	1163	0x048B	R/W	Span of the input range	1000

Scale point 13	1164	0x048C	R/W	Scale point 12 to 100.0% can only be set when Scale point 12 is not equal to 100.0%	100
Display point 13	1165	0x048D	R/W	Span of the input range	1000
Scale point 14	1166	0x048E	R/W	Scale point 13 to 100.0% can only be set when Scale point 13 is not equal to 100.0%	100
Display point 14	1167	0x048F	R/W	Span of the input range	1000
Scale point 15	1168	0x0490	R/W	Scale point 14 to 100.0% can only be set when Scale point 14 is not equal to 100.0%	100
Display point 15	1169	0x0491	R/W	Span of the input range	1000
Input failure Mode	1182	0x049E	R/W	0 = Fail High 1 = Fail Low	0
Input Peak Detection	1183	0x049F	R/W	0 = Disabled 1 = Maximum Peak 2 = Minimum Peak	0
Input 2 User Calibration (non Strain Gauge Types)					
Process Input User Calibration Type	1171	0x0493	R/W	0 = No User Calibration 1 = Single Point Calibration 2 = Two Point Calibration	0
Process Input Low Temperature Calibration Point	1172	0x0494	R/W		0
Process Input Low Calibration Offset	1173	0x0495	R/W		0
Process Input High Temperature Calibration Point	1174	0x0496	R/W		2192.5
Process Input High Calibration Offset	1175	0x0497	R/W		0
Input 2 Strain Gauge User Calibration					
Shunt Resistor	1176	0x0498	R/W	0 = Disabled 1 = Enabled	1
Calibration Resistor	1177	0x0499	R/W	40 – 100% of transducer full scale	80
Calibration start	1178	0x049A	R/W	Write 51966 (0xCAFE) to begin the selected calibration attempt	0

Calibration Status	1179	0x049B	R	Returns latest calibration status for Input 2: 0 = None 1 = Busy 2 = Wait Lo 3 = Wait Hi 4 = Complete 5 = CNT Fail 6 = RCAL Fail	0
Calibration mode	1180	0x049C	R/W	Write 1 to Select Input 2 Low Calibration Write 2 to Select Input 2 High Calibration	NA

Each calibration stage requires two Modbus writes. The first tells the unit which input you want to calibrate and if this is to be the Low or High calibration. The second is a password that tells the unit to execute the calibration attempt.

To perform Strain Gauge Calibration on Input 2

1. Write "1" to register 1180 *Selects Low Calibration*
2. Write "51966" to register 1178 *Calibration is attempted*
3. Write "2" to register 1180 *Selects High Calibration*
4. Write "51966" to register 1178 *Calibration is attempted*

It is advisable to read the status between the low and high calibration stages to ensure low cal has completed successfully before performing the high cal

3.3 Digital inputs

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Digital Input A Function Selection	7880	0x1EC8	R/W	Value / Function 0 None 1 Input 1 Peak Reset 2 Input 2 Peak Reset 3 Input 1/2 Peak Reset 4 Alarm Reset 5 Input 1 Peak And Alarm Reset 6 Input 2 Peak And Alarm Reset 7 Input 1/2 Peak And Alarm Reset 8 Input 1 Zero Calibration 9 Input 2 Zero Calibration 10 Input 1/2 Zero Calibration 11 Input 1 Zero Cal, Alarm and Peak reset 12 Input 2 Zero Cal, Alarm and Peak reset 13 Input 1/2 Zero Cal, Alarm and Peak reset 14 Start Data Recorder 15 Setpoint Selection 16 Auto Manual Control 17 PID Control Outputs 18 Run Pretune 19 Run Selftune	0

				20 Control Loop Input select 21 Up Key Selection mimic 22 Down Key Selection mimic 23 Back Key Selection mimic 24 Right Key Selection mimic 25 Increment Control Output 26 Decrement Control Output	
Digital Input 1 Function Selection	7881	0x1EC9	R/W	As Digital Input A	0
Digital Input 2 Function Selection	7882	0x1ECA	R/W	As Digital Input A	0
Digital Input 3 Function Selection	7883	0x1ECB	R/W	As Digital Input A	0
Digital Input 4 Function Selection	7884	0x1ECC	R/W	As Digital Input A	0

4 Output parameters

4.1 Option Slot 1 parameters

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Output type	2130	0x0852	R/W	0 = No option fitted 1 = Relay255 = Illegal/Invalid	1
Digital Output state	2132	0x0854	R	0 = Inactive 1 = Active	
Output function selection	2146	0x0862	R/W	0 = Disabled 1 = Primary output power 2 = Secondary output power 3 = Alarm 1 Direct Acting 4 = Alarm 1 Reverse Acting 5 = Alarm 2 Direct Acting 6 = Alarm 2 Reverse Acting 7 = Alarm 3 Direct Acting 8 = Alarm 3 Reverse Acting 9 = Alarm 1 Or Alarm 2 Direct Acting 10 = Alarm 1 Or Alarm 2 Reverse Acting 11 = Alarm 1 Or Alarm 2 Or Alarm 3 Direct Acting 12 = Alarm 1 Or Alarm 2 Or Alarm 3 Reverse Acting	0
Output Latching	2135	0x0857	R/W	0 = Disabled 1 = Enabled	0
Output latch Reset	2136	0x0858	R/W	0 = Do Nothing 1 = Clear Latch	
Output Latch State	2137	0x0859	R	0 = Clear 1 = Latched	

4.2 Option Slot 2 parameters

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Output type	2160	0x0870	R/W	0 = No option fitted 1 = Relay 9 = Duel Relay 255 = Illegal/Invalid	1
Output A state	2162	0x0872	R	0 = Inactive 1 = Active	
Output A function selection	2176	0x0880	R/W	0 = Disabled 1 = Primary output power 2 = Secondary output power 3 = Alarm 1 Direct Acting	0

				4 = Alarm 1 Reverse Acting 5 = Alarm 2 Direct Acting 6 = Alarm 2 Reverse Acting 7 = Alarm 3 Direct Acting 8 = Alarm 3 Reverse Acting 9 = Alarm 1 Or Alarm 2 Direct Acting 10 = Alarm 1 Or Alarm 2 Reverse Acting 11 = Alarm 1 Or Alarm 2 Or Alarm 3 Direct Acting 12 = Alarm 1 Or Alarm 2 Or Alarm 3 Reverse Acting	
Output A Latching	2165	0x0875	R/W	0 = Disabled 1 = Enabled	0
Output A latch Reset	2166	0x0876	R/W	0 = Do Nothing 1 = Clear Latch	
Output A Latch State	2167	0x0877	R	0 = Clear 1 = Latched	
Output B state	2163	0x0873	R	0 = Inactive 1 = Active	
Output B function selection	2177	0x0881	R/W	0 = Disabled 1 = Primary output power 2 = Secondary output power 3 = Alarm 1 Direct Acting 4 = Alarm 1 Reverse Acting 5 = Alarm 2 Direct Acting 6 = Alarm 2 Reverse Acting 7 = Alarm 3 Direct Acting 8 = Alarm 3 Reverse Acting 9 = Alarm 1 Or Alarm 2 Direct Acting 10 = Alarm 1 Or Alarm 2 Reverse Acting 11 = Alarm 1 Or Alarm 2 Or Alarm 3 Direct Acting 12 = Alarm 1 Or Alarm 2 Or Alarm 3 Reverse Acting	0
Output B Latching	2168	0x0878	R/W	0 = Disabled 1 = Enabled	0
Output B latch Reset	2169	0x0879	R/W	0 = Do Nothing 1 = Clear Latch	
Output B Latch State	2170	0x087A	R	0 = Clear 1 = Latched	

4.3 Option Slot 3 parameters

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Output type	2192	0x0890	R/W	0 = No option fitted 1 = Relay 9 = Duel Relay 11 = TX PSU 255 = Illegal/Invalid	0

Output A state	2194	0x0892	R	0 = Inactive 1 = Active	
Output A function selection	2205	0x089D	R/W	0 = Disabled 1 = Primary output power 2 = Secondary output power 3 = Alarm 1 Direct Acting 4 = Alarm 1 Reverse Acting 5 = Alarm 2 Direct Acting 6 = Alarm 2 Reverse Acting 7 = Alarm 3 Direct Acting 8 = Alarm 3 Reverse Acting 9 = Alarm 1 Or Alarm 2 Direct Acting 10 = Alarm 1 Or Alarm 2 Reverse Acting 11 = Alarm 1 Or Alarm 2 Or Alarm 3 Direct Acting 12 = Alarm 1 Or Alarm 2 Or Alarm 3 Reverse Acting	0
Output A Latching	2197	0x0895	R/W	0 = Disabled 1 = Enabled	0
Output A latch Reset	2198	0x0896	R/W	0 = Do Nothing 1 = Clear Latch	
Output A Latch State	2199	0x0897	R	0 = Clear 1 = Latched	
Output B state	2195	0x0893	R	0 = Inactive 1 = Active	
Output B function selection	2206	0x089E	R/W	0 = Disabled 1 = Primary output power 2 = Secondary output power 3 = Alarm 1 Direct Acting 4 = Alarm 1 Reverse Acting 5 = Alarm 2 Direct Acting 6 = Alarm 2 Reverse Acting 7 = Alarm 3 Direct Acting 8 = Alarm 3 Reverse Acting 9 = Alarm 1 Or Alarm 2 Direct Acting 10 = Alarm 1 Or Alarm 2 Reverse Acting 11 = Alarm 1 Or Alarm 2 Or Alarm 3 Direct Acting 12 = Alarm 1 Or Alarm 2 Or Alarm 3 Reverse Acting	0
Output B Latching	2200	0x0898	R/W	0 = Disabled 1 = Enabled	0
Output B latch Reset	2201	0x0899	R/W	0 = Do Nothing 1 = Clear Latch	
Output B Latch State	2202	0x089A	R	0 = Clear 1 = Latched	

4.4 Linear Output A parameters

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Linear output range	3011	0x0BC3	R/W	**Value** / **Range**: 0 – 5V; 1 – 0 – 10V; 2 – 2 – 10V; 3 – 0 – 20mA; 4 – 4 – 20mA; 5 – 0 – 10V DC Supply	**1**
Linear Output Usage	2144	0x0860	R/W	**Value** / **Usage**: 0 None; 1 Primary Control Power; 2 Secondary Control Power; 3 Retransmit SP; 4 Retransmit Input 1PV; 5 Retransmit Input 2PV; 6 Retransmit Differential	**1**
0 – 10V DC Supply	3014	0x0BC6	R/W	0 to 10V as a percentage between 0 - 100	0
Input 1 Retransmit Minimum	2152	0x0868	R/W		0
Input 1 Retransmit Maximum	2153	0x0869	R/W		10000
Input 2 Retransmit Minimum	2400	0x0960	R/W		0
Input 2 Retransmit Maximum	2401	0x0961	R/W		10000

4.5 Linear Output B parameters

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Linear output range	3021	0x0BCD	R/W	**Value** / **Range**: 0 – 5V; 1 – 0 – 10V; 2 – 2 – 10V; 3 – 0 – 20mA; 4 – 4 – 20mA; 5 – 0 – 10V DC Supply	**1**
Linear Output Usage	2174	0x087E	R/W	**Value** / **Usage**: 0 None	**1**

				1 Primary Control Power 2 Secondary Control Power 3 Retransmit SP 4 Retransmit Input 1PV 5 Retransmit Input 2PV 6 Retransmit Differential	
0 – 10V DC Supply	3024	0x0BD0	R/W	0 to 10V as a percentage between 0 - 100	0
Input 1 Retransmit Minimum	2182	0x0886	R/W		0
Input 1 Retransmit Maximum	2183	0x0887	R/W		10000
Input 2 Retransmit Minimum	2430	0x097E	R/W		0
Input 2 Retransmit Maximum	2431	0x097F	R/W		10000

5 Setpoint parameters (ATC Only)

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Setpoint Minimum	3944	0x0F68	R/W	Limited by input range maximum/minimum	0
Setpoint Maximum	3945	0x0F69	R/W	Limited by input range maximum/minimum	10000
Setpoint 1A Value	3960	0x0F78	R/W	Limited by Setpoint maximum/minimum	0
Setpoint 1A Offset	3961	0x0F79	R/W	Local offset	0
Setpoint 1B Value	3962	0x0F7A	R/W	Limited by Setpoint maximum/minimum	0
Setpoint BA Offset	3963	0x0F7B	R/W	Local offset	0
Setpoint Selection	4122	0x101A	R/W	0 = Local Setpoint 1 1 = Local Setpoint 2	0
Ramp rate in Operator Mode	4126	0x101E	R/W	0 = Disable 1 = Enable	0
Setpoint Ramp Rate	4123	0x101B	R/W		0

6 Control parameters (ATC Only)

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Primary Cycle Time	4301	0x10CD	R/W	0.5 to 512.0	32
Secondary Cycle Time	4302	0x10CE	R/W	0.5 to 512.0	32
Auto/Manual Control	4308	0x10D4	R/W	0 = Automatic 1 = Manual	1
Control Enable/Disable	4309	0x10D5	R/W	0 = Enable 1 = Disable	0
Control Type	4310	0x10D6	R/W	0 = Single (Heat Only) 1 = Dual (Heat/Cool) 2 = Pressure	2
Control Action	4311	0x10D7	R/W	0 = Reverse 1 = Direct	0
Proportional Band 1	4312	0x10D8	R/W	0.0 to 9999.9	100
Secondary (Cool) Proportional Band	4313	0x10D9	R/W	0.0 to 9999.9 (Only available on Heat Cool Variant)	100
Integral/Reset	4314	0x10DA	R/W	0.0 to 6000.0	5
Derivative/Rate	4315	0x10DB	R/W	0.0 to 5999	0
Bias	4316	0x10DC	R/W	For single control 0 to 100, for Duel control -100 to 100	25
Overlap/DeadBand	4317	0x10DD	R/W	+/-20% of the proportional band (As a percentage) (Only available on Heat Cool Variant)	0
Primary On/Off Diff	4318	0x10DE	R/W	0.1 to 10.0	0.5
Secondary On/Off Diff	4319	0x1DDF	R/W	0.1 to 10.0	0.5
On/Off Differential	4320	0x10E0	R/W	0.0 to 300.0	27
Heat/Primary Power Upper limit	4321	0x10E1	R/W	10 to 100% Cannot be made smaller than Heat/Primary Lower limit + 10	100
Heat/Primary Power Lower limit	4322	0x10E2	R/W	0 to 90% Cannot be made larger than Heat/Primary Upper limit – 10	0
Cool/Secondary Power Upper limit	4323	0x10E3	R/W	10 to 100% Cannot be made smaller than Cool/Secondary Lower limit + 10	100
Cool/Secondary Power Lower limit	4324	0x10E4	R/W	0 to 90% Cannot be made larger than Cool/Secondary Upper limit – 10	0
Pretune Enable	4325	0x10E5	R/W	0 = Disabled 1 = Enabled	0
Self tune Enable	4326	0x10E6	R/W	0 = Disabled 1 = Enabled	0

Loop Alarm Type	4327	0x10E7	R/W	0 = Off 1 = Time 2 = Auto	2
Loop Alarm time	4328	0x10E8	R/W	1 to 5999	1
Primary Power	4329	0x10E9	R	0 to 100%	
Secondary Power	4330	0x10EA	R	0 to 100%	
Combined Power	4331	0x10EB	R/W	-100 to 100%	
Pretune Status	4332	0x10EC	R	0 = Inactive 1 = Active	
Self tune Status	4333	0x10ED	R	0 = Inactive 1 = Active	
Loop Alarm status	4334	0x10EE	R	0 = Inactive 1 = Active	
Preset Power	4335	0x10EF	R/W	-100% to 100%	0
Auto Pre-tune	4336	0x10F0	R/W	0 = Disabled 1 = Enabled	0
Scaled Power	4345	0x10F9	R/W	0 = Disabled 1 = Enabled	0
Scaled RPM Value for 0 % Power	4346	0x10FA	R/W		0
Scaled RPM Value for 100 % Power	4347	0x10FB	R/W		100
Scaled Power Value	4348	0x10FC	R		
Startup Control	4349	0x10FD	R/W	0 = Automatic 1 = Manual	1
Tuning Settings					
Auto/Manual Transfer	4128	0x1020	R/W	0 = Bumpless Mode 1 = Setpoint Mode	0
Output Pulse	4350	0x10FE	R/W	-25 to 25	10
Standby Threshold	4355	0x1103	R/W	0 to 1500	0
Standby Recovery Time	4356	0x1104	R/W	0 to 60	30
Standby Active Limit	4358	0x1106	R/W	0 to 100	20

7 Alarm parameters

7.1 Alarm 1

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Alarm Type	6143	0x17FF	R/W	0 = Unused 1 = High Alarm 2 = Low Alarm 3 = Deviation Alarm 4 = Band Alarm 5 = Input Rate of change 6 = Sensor Break Alarm 7 = Control Loop 10 = % Memory Used 11 = High Power 12 = Low Power	0
Alarm Input Source	6144	0x1800	R/W	0 = Universal Input 1 1 = Universal Input 2 2 = Differential 3 = Aux A Input 4 = Control Pri Power 5 = Control Sec Power	0
Alarm Value	6145	0x1801	R/W	Limited by the input range maximum and minimum for Alarm types 0 and 1. Limited by the span of the input range for alarm types 2 and 3. Not used for alarms 4 and 5.	0
Alarm Hysteresis	6146	0x1802	R/W	Limited by the span of the input range	10
Alarm inhibit	6147	0x1803	R/W	0 = Disabled 1 = Enabled	0
Alarm status	6148	0x1804	R	0 = Inactive 1 = Active 2 = Unused	
Alarm inhibit status	6149	0x1805	R	0 = Not inhibited 1 = Inhibited	
Rate Minimum Time Alarm Value	6150	0x1806	R/W	1.0 to 9999.0	1
Alarm Label	6151	0x1807	R/W	Label for the Alarm (Max 16 chars)	Alarm 1
Alternate Language Alarm Label	6152	0x1808	R/W	Label for the Alarm alternate language (Max 16 chars	
Alarm Filter Time	6153	0x1809	R/W	Time in seconds 0.5 to 100.0	0.5
Alarm Failure Mode	6154	0x180A	R/W	0 = Normal Mode 1 = Input Fail Mode	0

7.2 Alarm 2

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Alarm Type	6159	0x180F	R/W	0 = Unused 1 = High Alarm 2 = Low Alarm 3 = Deviation Alarm 4 = Band Alarm 5 = Input Rate of change 6 = Sensor Break Alarm 7 = Control Loop 10 = % Memory Used 11 = High Power 12 = Low Power	0
Alarm Input Source	6160	0x1810	R/W	0 = Universal Input 1 1 = Universal Input 2	0
Alarm Value	6161	0x1811	R/W	Limited by the input range maximum and minimum for Alarm types 0 and 1. Limited by the span of the input range for alarm types 2 and 3. Not used for alarms 4 and 5.	0
Alarm Hysteresis	6162	0x1812	R/W	Limited by the span of the input range	10
Alarm inhibit	6163	0x1813	R/W	0 = Disabled 1 = Enabled	0
Alarm status	6164	0x1814	R	0 = Inactive 1 = Active	
Alarm inhibit status	6165	0x1815	R	0 = Not inhibited 1 = Inhibited	
Rate Minimum Time Alarm Value	6166	0x1816	R/W		1
Alarm Label	6167	0x1817	R/W	Label for the Alarm	Alarm 2
Alternate Language Alarm Label	6152	0x1808	R/W	Label for the Alarm alternate language (Max 16 chars	
Alarm Filter Time	6169	0x1819	R/W	Time in seconds 0.5 to 100.0	0.5
Alarm Failure Mode	6154	0x180A	R/W	0 = Normal Mode 1 = Input Fail Mode	0

7.3 Alarm 3

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Alarm Type	6175	0x181F	R/W	0 = Unused 1 = High Alarm 2 = Low Alarm 3 = Deviation Alarm 4 = Band Alarm 5 = Input Rate of change 6 = Sensor Break Alarm 7 = Control Loop 10 = % Memory Used 11 = High Power 12 = Low Power	0
Alarm Input Source	6176	0x1820	R/W	0 = Universal Input 1 1 = Universal Input 2	0
Alarm Value	6177	0x1821	R/W	Limited by the input range maximum and minimum for Alarm types 0 and 1. Limited by the span of the input range for alarm types 2 and 3. Not used for alarms 4 and 5.	0
Alarm Hysteresis	6178	0x1822	R/W	Limited by the span of the input range	10
Alarm inhibit	6179	0x1823	R/W	0 = Disabled 1 = Enabled	0
Alarm status	6180	0x1824	R	0 = Inactive 1 = Active	
Alarm inhibit status	6181	0x1825	R	0 = Not inhibited 1 = Inhibited	
Rate Minimum Time Alarm Value	6182	0x1826	R/W		1
Alarm Label	6183	0x1827	R/W	Label for the Alarm	Alarm 3
Alternate Language Alarm Label	6152	0x1808	R/W	Label for the Alarm alternate language (Max 16 chars	
Alarm Filter Time	6185	0x1829	R/W	Time in seconds 0.5 to 100.0	0.5
Alarm Failure Mode	6154	0x180A	R/W	0 = Normal Mode 1 = Input Fail Mode	0

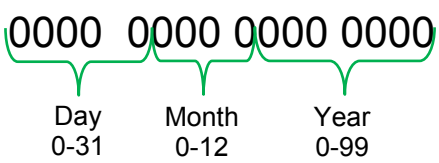
8 Logger parameters (Data Logger)

8.1 Data Recorder

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Log Interval	7550	0x1D7E	R/W	0 = Every second 1 = Every 2 seconds 2 = Every 5 seconds 3 = Every 10 seconds 4 = Every 15 seconds 5 = Every 30 seconds 6 = Every Minute 7 = Every 2 Minutes 8 = Every 5 Minutes 9 = Every 10 Minutes 10 = Every 15 Minutes 11 = Every 30 Minutes	3
Log Mode	7551	0x1D7F	R/W	0 = Record until memory used 1 = Continues FIFO	0
Start/Stop Recorder	7552	0x1D80	R/W	0 = Stop 1 = Start	0
Recorder Fitted	7553	0x1D81	R	0 = Not Fitted 1 = Fitted	1
Memory Remaining	7554	0x1D82	R	In Bytes	
Time Remaining	7555	0x1D83	R	In seconds	
Recorder Trigger	7563	0x1D8B	R/W	0 = Operator Start Stop 1 = Recorder Menu Start/Stop 2 = From Alarm 3 = Digital Input 4 = Record while profile running	1
Trigger on Alarm 1	7584	0x1DA0	R/W	0 = Off 1 = Trigger	0
Trigger on Alarm 2	7585	0x1DA1	R/W	0 = Off 1 = Trigger	0
Trigger on Alarm 3	7586	0x1DA2	R/W	0 = Off 1 = Trigger	0
Force Record Abort	7589	0x1DA5	R/W	0 = Nothing – Does not abort 1 = Abort	
Recorder Status	7591	0x1DA7	R	0 = Not Recording 1 = Recording	
Record Input 1 PV	7572	0x1D94	R/W	0 = Off 1 = Record	0
Record Input 1 PV Max	7573	0x1D95	R/W	0 = Off 1 = Record	0
Record Input	7574	0x1D96	R/W	0 = Off	0

1 PV Min				1 = Record	
Record Input 2 PV	7607	0x1DB7	R/W	0 = Off 1 = Record	0
Record Input 2 PV Max	7608	0x1DB8	R/W	0 = Off 1 = Record	0
Record Input 2 PV Min	7609	0x1DB9	R/W	0 = Off 1 = Record	0
Record Local Setpoint	7575	0x1D97	R/W	0 = Off 1 = Record	0
Record Primary Power	7576	0x1D98	R/W	0 = Off 1 = Record	0
Record Secondary Power	7577	0x1D99	R/W	0 = Off 1 = Record	0
Record Alarm 1 Status	7578	0x1D9A	R/W	0 = Off 1 = Record	0
Record Alarm 2 Status	7579	0x1D9B	R/W	0 = Off 1 = Record	0
Record Alarm 3 Status	7580	0x1D9C	R/W	0 = Off 1 = Record	0
Record Power On/Off	7583	0x1D9F	R/W	0 = Off 1 = Record	0

8.2 Real time clock

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Date format	7868	0x1EBC	R	0 = dd/mm/yyyy (European Default) 1 = mm/dd/yyyy (USA Default)	0
Time	7869	0x1EBD	R/W	In seconds from midnight	
Date	7870	0x1EBE	R/W	Binary coded decimal (BCD) 16 bits that represent the date as follows: XXXX XXXX XXXX XXXX  So an example of setting the date to 31/07/2012 Day = 31 = 11111 Month = 7 = 0111 Year = 12 = 0001100 This would give the total BCD of: 11111 0111 0001100 or 64396. However reading this back out afterwards would return 195468 as the calculated day of week would be automatically added on the end (3msd).	
Day of the week	7872	0x1EC0	R	1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday 7 = Sunday	
RTC Fitted	7871	0x1EBF	R	0 = Not Fitted 1 = Fitted	

9 Display parameters

9.1 Keys

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Key State	7669	0x1DF5	R	Current state of the keys	

9.2 LEDs

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
LED 1 Label	7656	0x1DE8	R/W	Max 6 charaters	STBY
LED 2 Label	7657	0x1DE9	R/W	Max 6 charaters	ALM1
LED 3 Label	7658	0x1DEA	R/W	Max 6 charaters	ALM2
LED 4 Label	7659	0x1DEB	R/W	Max 6 charaters	TUNE
LED 1 Alternate Language Label	7660	0x1DEC	R/W	Max 6 charaters	
LED 2 Alternate Language Label	7661	0x1DED	R/W	Max 6 charaters	
LED 3 Alternate Language Label	7662	0x1DEE	R/W	Max 6 charaters	
LED 4 Alternate Language Label	7663	0x1DEF	R/W	Max 6 charaters	
Backlight Colour	7668	0x1DF4	R/W	0 = Green to Red on Alarm 1 = Red to Green on Alarm 2 = Green 3 = Red	0

9.3 HMI

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Language	7675	0x1DFB	R/W	0 = Downloaded Language 1 = English	0
LCD Contrast	7676	0x1DFC	R/W	0 to 100	50
Invert LCD	7677	0x1DFD	R/W	0 = Normal 1 = Inverted	0
Setup Lock Code	7678	0x1DFE	R/W	Default 10	10
Configuration Lock Code	7679	0x1DFF	R/W	Default 10	10
Tune Lock Code	7680	0x1E00	R/W	Default 10	10
Supervisor Lock Code	7681	0x1E01	R/W	Default 10	10
USB Lock Code	7683	0x1E03	R/W	Default 10	10
Recorder Lock Code	7684	0x1E04	R/W	Default 10	10
Input 1 Trend View Mode	9001	0x2329	R/W	0 = None 1 = PV 2 = PV and Setpoint 3 = PV Max/Min	2
Input 1 Trend View Interval	9000	0x2328	R/W	0 = Every second 1 = Every 2 seconds 2 = Every 5 seconds 3 = Every 10 seconds 4 = Every 15 seconds 5 = Every 30 seconds 6 = Every Minute 7 = Every 2 Minutes 8 = Every 5 Minutes 9 = Every 10 Minutes 10 = Every 15 Minutes 11 = Every 30 Minutes	0
Input 2 Trend View Mode	9011	0x2334	R/W	0 = None 1 = PV 3 = PV Max/Min	2
Input 2 Trend View Interval	9010	0x2332	R/W	0 = Every second 1 = Every 2 seconds 2 = Every 5 seconds 3 = Every 10 seconds 4 = Every 15 seconds 5 = Every 30 seconds 6 = Every Minute 7 = Every 2 Minutes 8 = Every 5 Minutes 9 = Every 10 Minutes 10 = Every 15 Minutes 11 = Every 30 Minutes	0

10 Contact Details

Parameter Name	Modbus Address (Dec)	Modbus Address (Hex)	Access R/W	Notes	Default
Contact Details line 1	400	0x0190	R/W	26 characters of text	Dynisco LLC
Contact Details line 2	401	0x0191	R/W	26 characters of text	38 Forge Parkway
Contact Details line 3	402	0x0192	R/W	26 characters of text	Franklin, MA, 02038
Contact Details line 4	403	0x0193	R/W	26 characters of text	USA
Contact Details line 5	404	0x0194	R/W	26 characters of text	Tel: +1 508 541 9400
Contact Details line 6	405	0x0195	R/W	26 characters of text	Fax: +1 508 541 6206
Contact Details line 7	406	0x0196	R/W	26 characters of text	