Section 6: D.T.I. Data Transfer Interface

6.1 Data Transfer Interface Module

6.1.2 Overview of Data Transfer Interface Operation

By means of the Autoflame Data Transfer Interface (D.T.I.) module, all of the operational data, stored within each of up to ten M.M. modules, can be collected by the D.T.I. for transmission to a local terminal (PC), screen and printer, Building Management System (B.M.S.) or PLC. This facility can also be achieved remotely via modem/telecom link up. This cost effective system more than meets the requirements of today's E.M.S. and B.M.S. systems in providing all the necessary operational and alarm status and control of boiler plant to achieve its maximum energy efficient operation.

Up to a maximum of ten M.M. modules (one per burner) can be connected to one D.T.I. module by means of a series RS485 data link (daisy chain). The information gathered by the D.T.I. from each M.M. module is then available for transmission to the E.M.S. or B.M.S. via either an RS232 data link, an RS422 data link, an RS485 data link or modem/telecom data link. The RS232 and RS422 data links are used to send the data via the Autoflame software package for PC management or MODBUS communications for a Building Management System. The RS485 data link is used to send the data via Metasys communications.

Remote on/off control of the burners can also be achieved as well as adjustment of the temperature or pressure setpoints and selection of sequencing order. To accommodate the status information from other plant related equipment, the D.T.I. can handle upto 160 direct mains voltage inputs, 80 volt free outputs, 60 4-20mA inputs and 60 4-20mA outputs. Typical remote E.M.S., B.M.S. information and operational facilities that can be achieved are as follows, but are subject to the particular site and management system requirements that are to be accommodated.

The capability exists within the standard D.T.I. software for the end user to label any mains voltage signal input as an "Alarm" condition. When labelled as an "Alarm" condition the system can 'autodial' out onto the general telephone network to a remote office. It is also possible via a MODBUS to Ethernet converter to utilise this feature for data aquisition.

6.2 Information avaiable from the DTI

DTI Information:

MM Information:

Required boiler temperature (deg. C/F) or pressure (Bar/psi).
Actual boiler temperature (deg. C/F) or pressure (Bar/psi).
Burner on/off status.
Burner maximum firing rate.
Burner firing rate (%).
Fuel selected.
Control detector type (temperature/pressure).
Error conditions.
Low flame hold operation.
Hand operation.
Channel 1-Channel 4 positioning motor feedback signal
Channel 5-Channel 6 output and input signals to the VFD (inverter)
Maximum set point accepted from DTI.
Minimum set point accepted from DTI.
Lead boiler status.
Burner firing status (off, firing, purge, ignition).
Sequencing optioned.
Sequence status (on, stand-by, warm, off).
Enabled/disabled status.
Total hours run and number of start-ups per fuel.
Fuel type, instantaneous flow rates and totalised flows per fuel.
Online air and fuel pressure values.

EGA Information:

EGA operation optioned.
Flue gas oxygen present value.
Flue gas carbon dioxide present value.
Flue gas carbon monoxide (unburnt combustibles) present value.
Flue gas nitirc oxide present value.
Flue gas sulphur dioxide present value.
Flue gas exhaust temperature, ambient temperature and delta temperature present value.
Combustion efficiency present value.
Flue gas oxygen commission value.
Flue gas carbon dioxide commission value.
Flue gas carbon monoxide (unburnt combustibles) commission value.
Flue gas nitirc oxide commission value.
Flue gas sulphur dioxide commission value.
Flue gas exhaust temperature, ambient temperature and delta temperature commission value.
Combustion efficiency commission value.
Cooler condition.
Identification number.
Fuel selected.
EGA error conditions.

DTI Information:

DTI Input values:

Boiler enable/disable.
Change required set point.
Select lead boiler.
Shuffle sequencing.
Set Load Index.

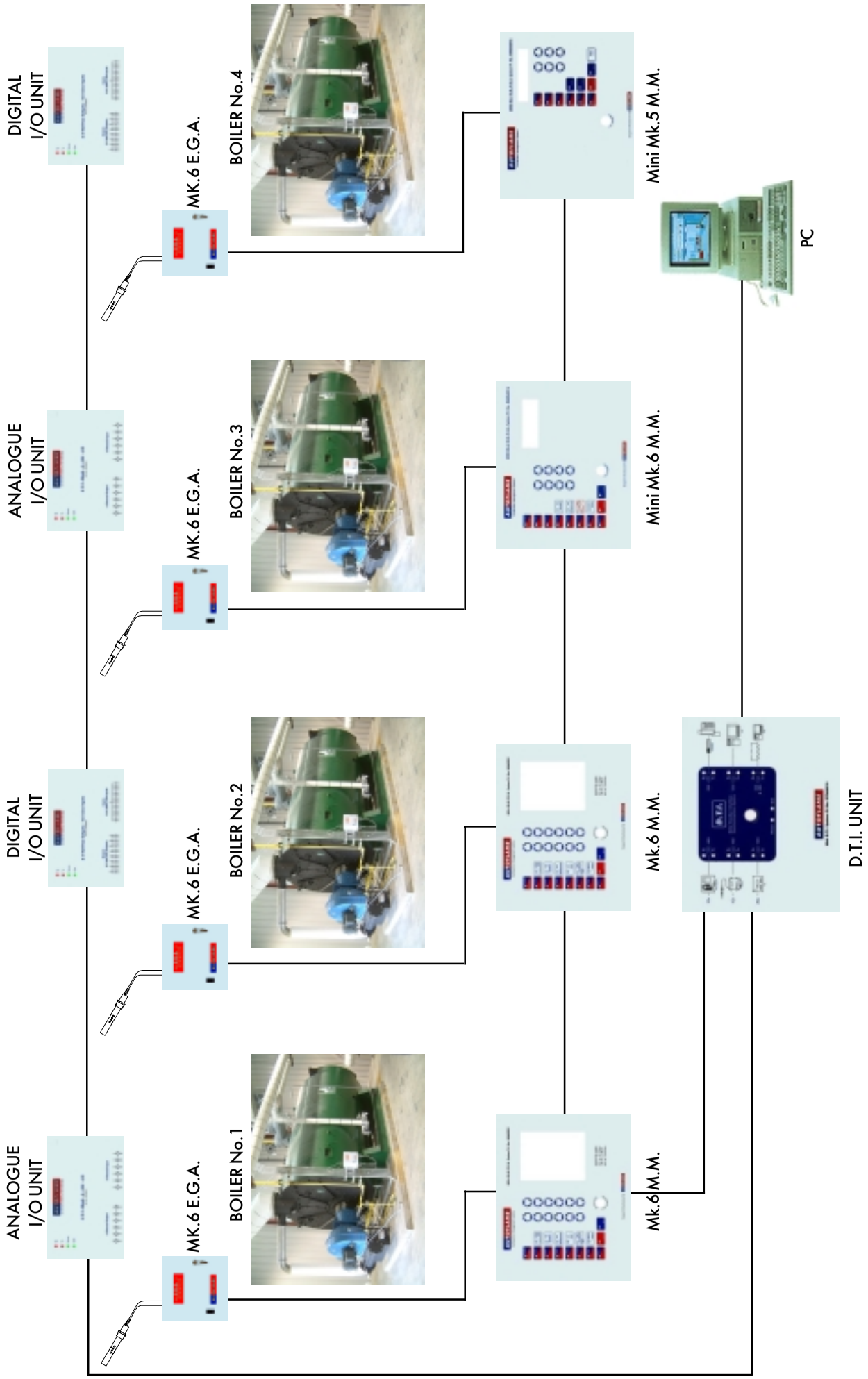
Water Level Information:

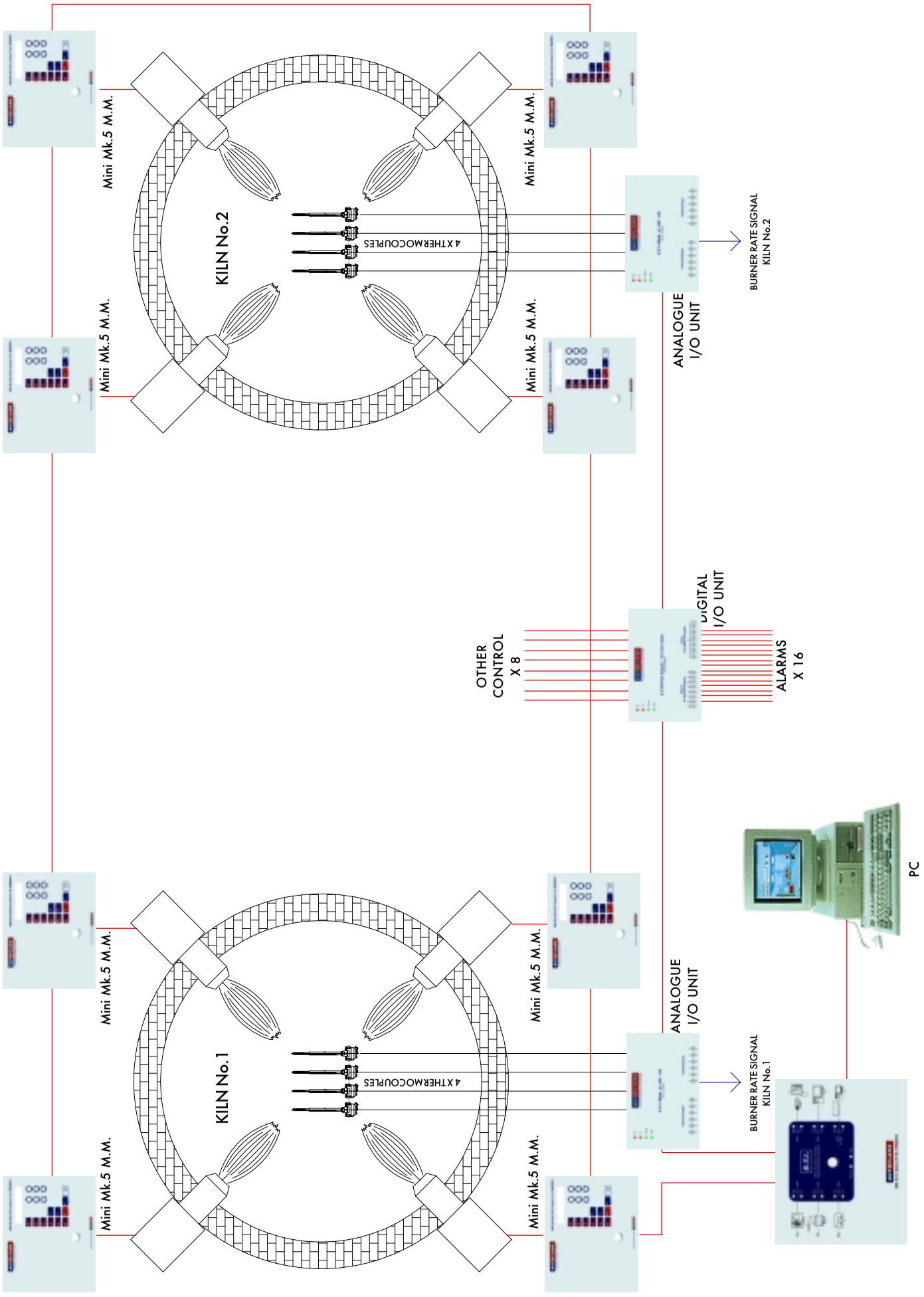
Actual Water Level
End of probe position
2nd low position
1st low position
1st low pre-alarm position
Control point position or pump on and pump off positions
High water pre-alarm position
High water position
15 First Out Annunciation inputs status
Instantaneous steam flow metering
Totalised steam flow metering
Feed water temperature
Steam temperature

Continuous Emissions Monitoring Software (CEMS):

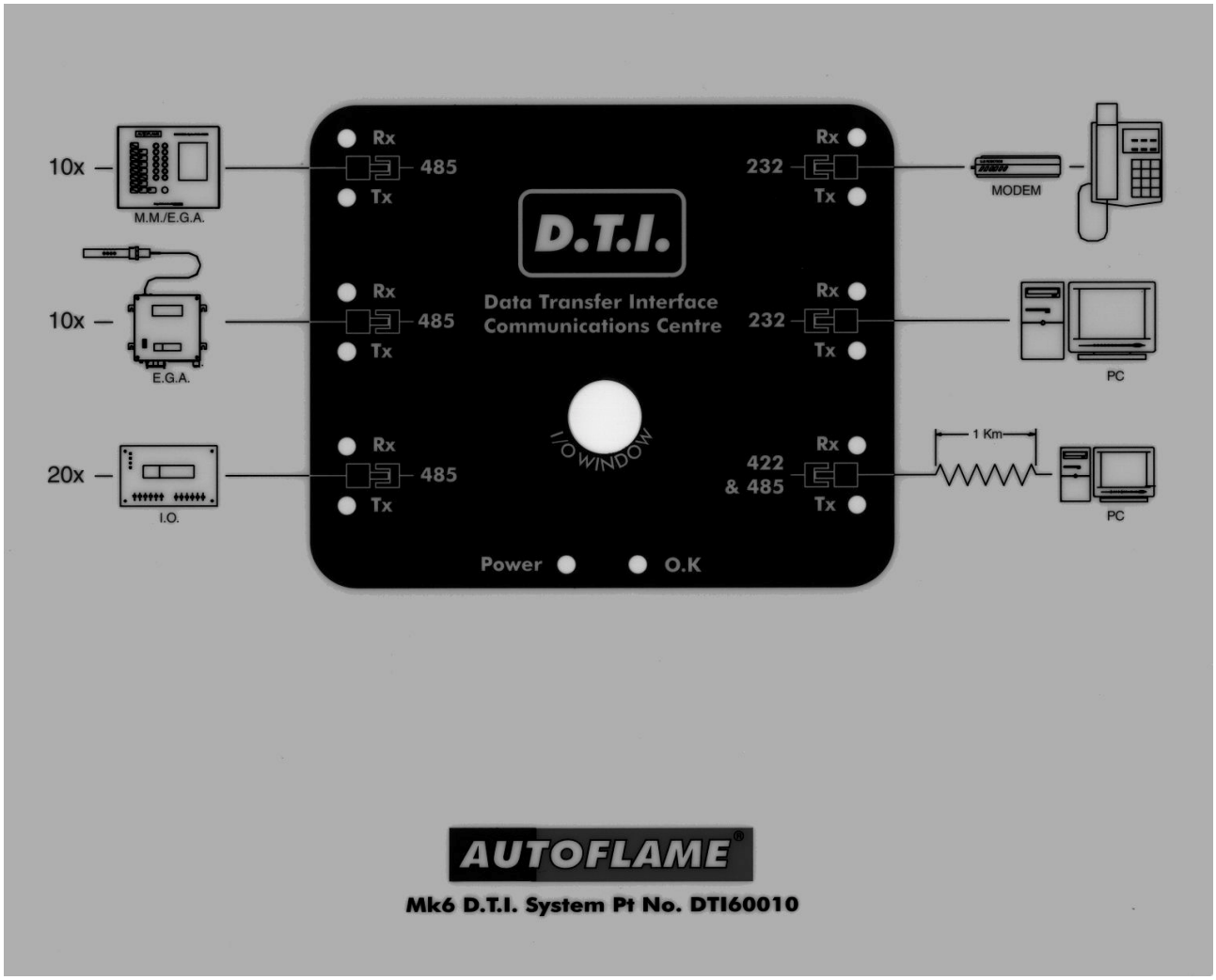
Current emissions by weight and volume (O_2, CO_2, CO, NO, SO_2, H_2O, N_2, Total)
Totalised emissions by weight (O_2, CO_2, CO, NO, SO_2, H_2O, N_2, Total)
Efficiency
Exhaust temperature
Boiler exit velocity
Total heat input into boiler
Net useful heat into boiler
Heat loss to stack
Fuel flow

Complete DTI Standard System Application Example

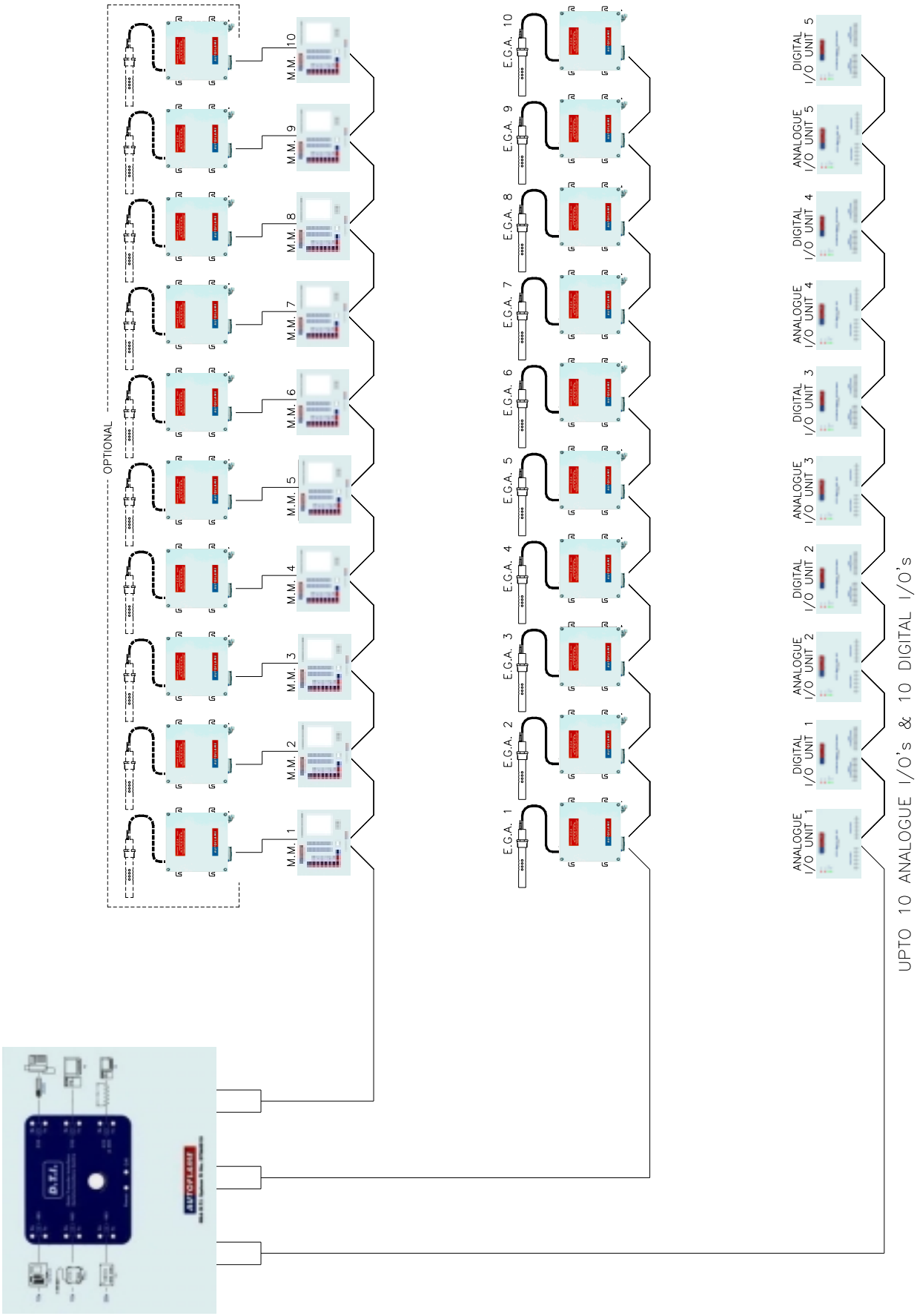



KILN No.2
4 X THERMOCOUPLES
Mini Mk.5 M.M.
Mini Mk.5 M.M.
Mini Mk.5 M.M.
Mini Mk.5 M.M.
ANALOGUE I/O UNIT
BURNER RATE SIGNAL KILN No.2
OTHER CONTROL X 8
I/O UNIT
ALARMS X 16
PC
KILN No.1
4 X THERMOCOUPLES
Mini Mk.5 M.M.
Mini Mk.5 M.M.
Mini Mk.5 M.M.
Mini Mk.5 M.M.
ANALOGUE I/O UNIT
BURNER RATE SIGNAL KILN No.1
DTI UNIT

6.5 Front Facia Layout



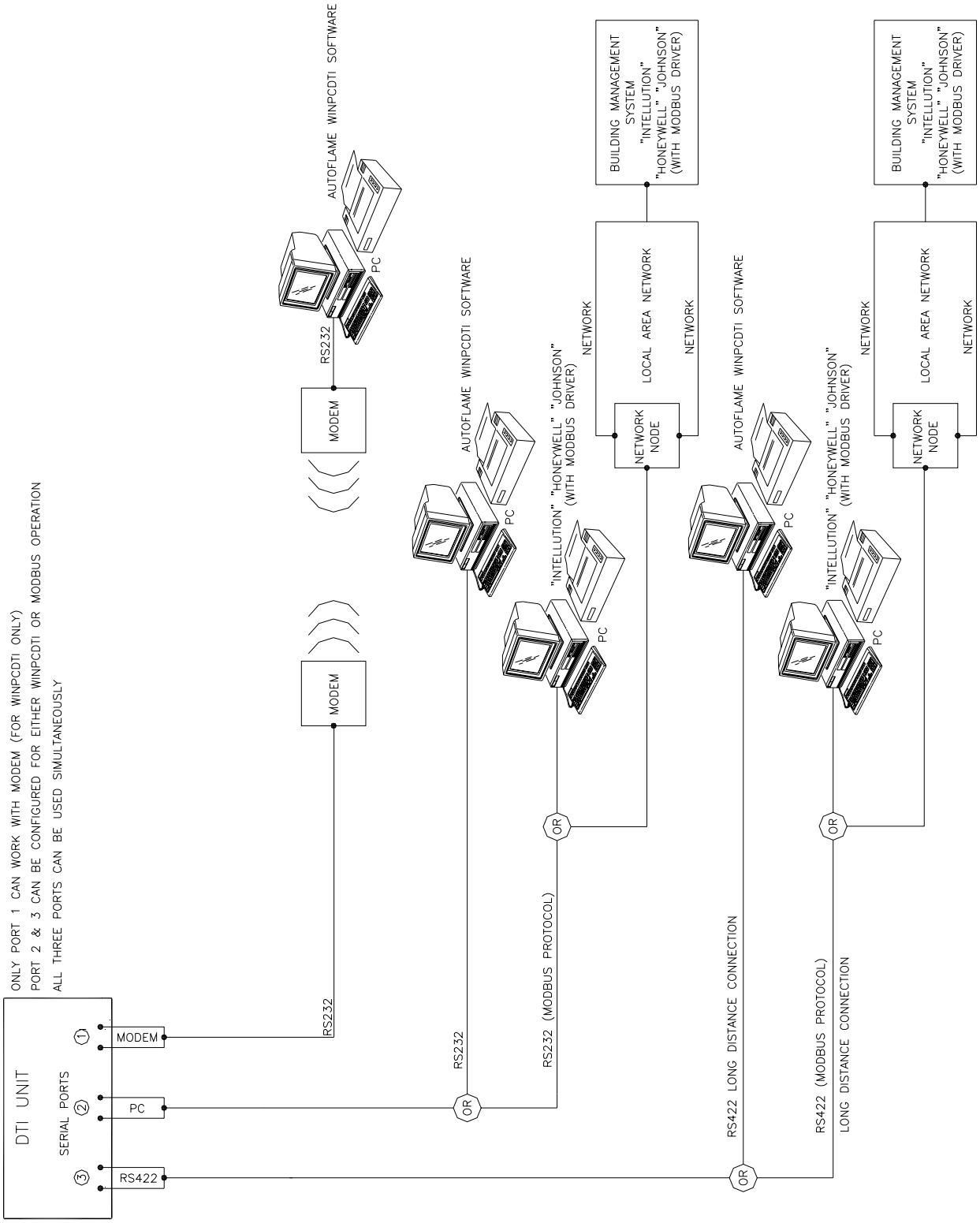
6.7 Input/Output System Capabilities



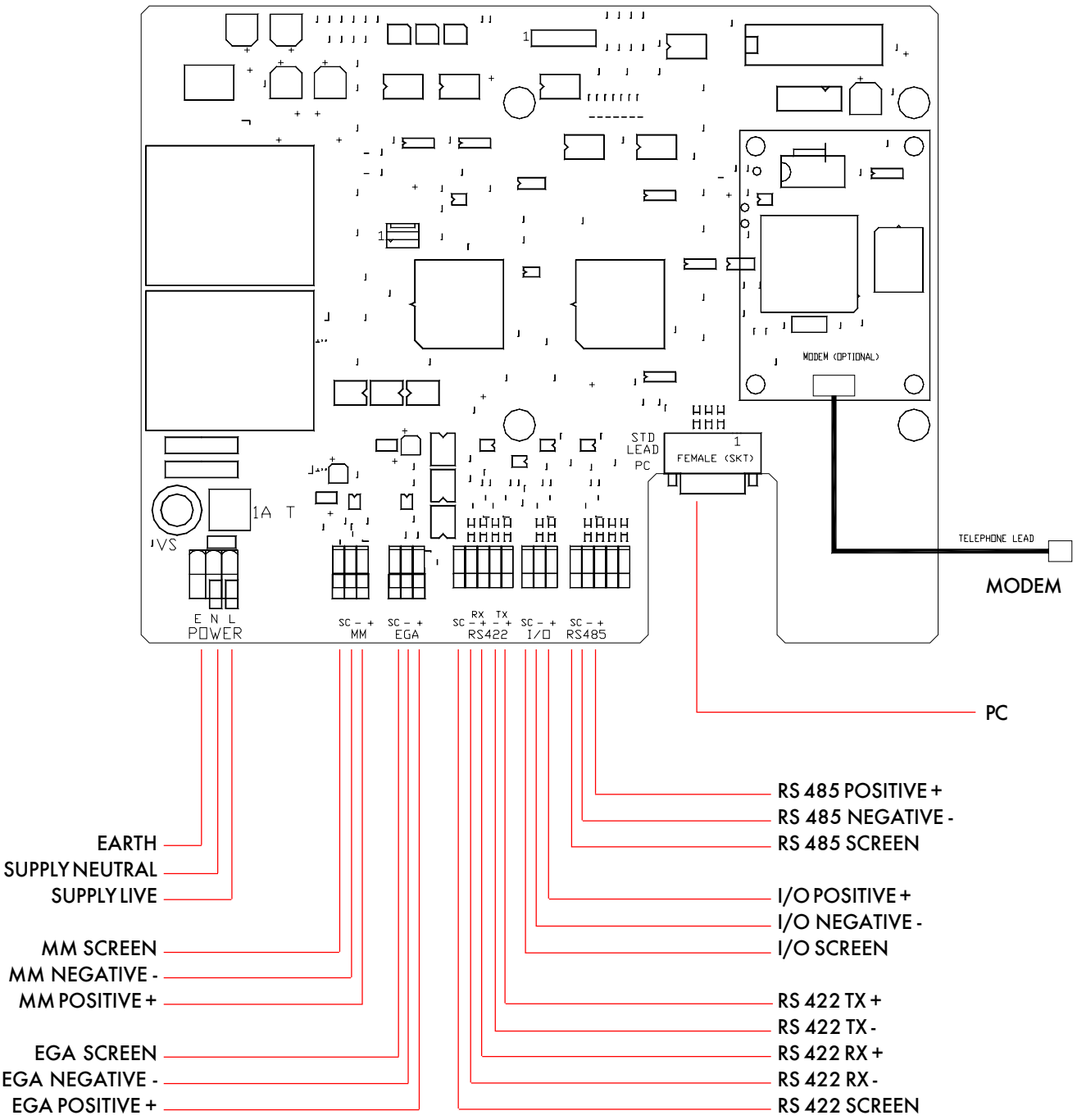
6.8 Communication Interface Schematic System Capabilities

The following communications ports are available on the DTI (contact Autoflame sales for other applications or other required protocols, i.e. BacNet, Ethernet, e.t.c.):

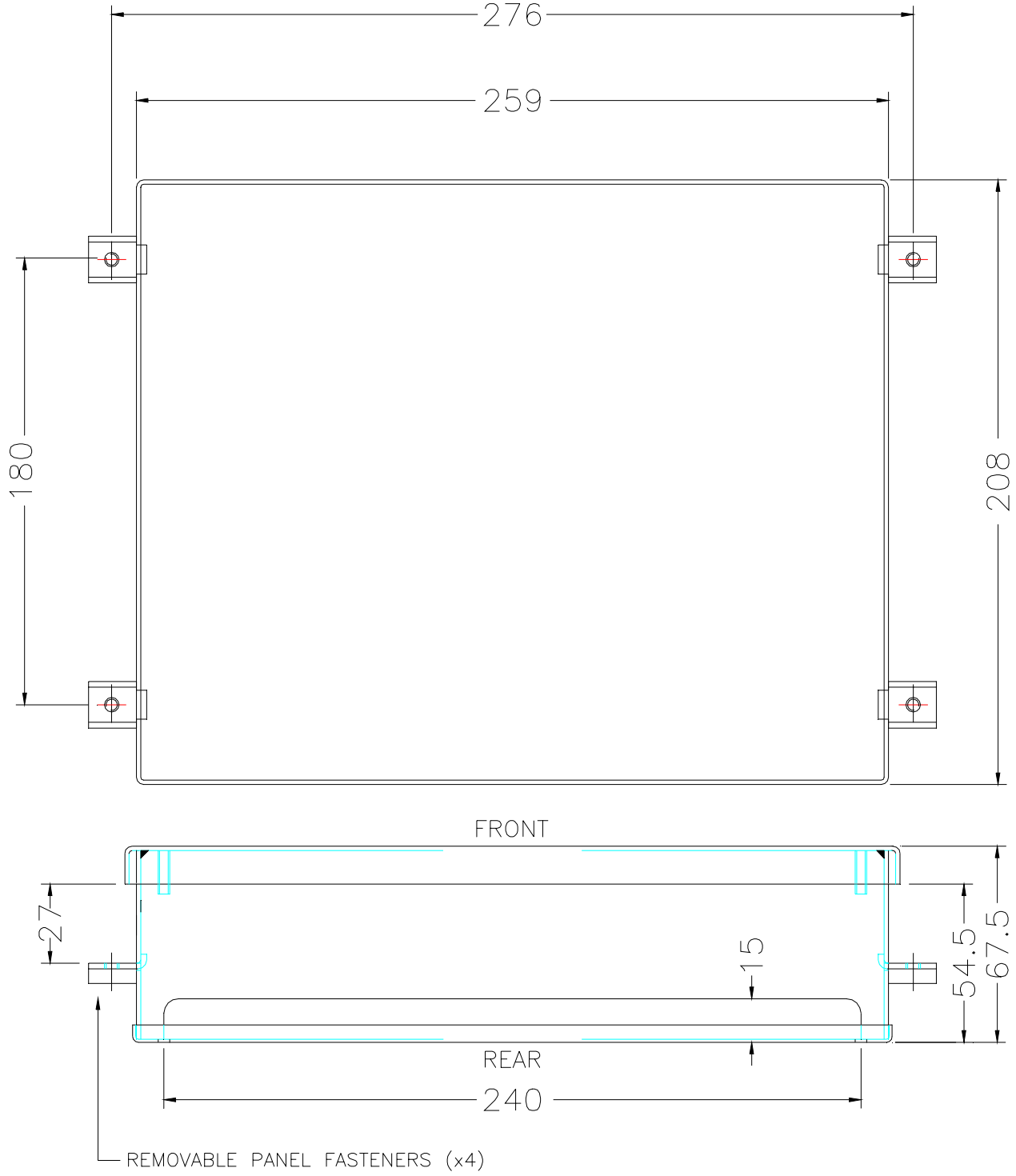
RS232 (serial port)- used for local PC's (less than 10m/40ft) using the Autoflame software or MODBUS
RS422 port- used for remote PC's (up to 1000m/4000ft) using the Autoflame software or MODBUS
RS485 port- used strictly for Metasys communications only
Modem port- used for telephone communications and the Autoflame software



6.9 Wiring Connection Terminals Diagram

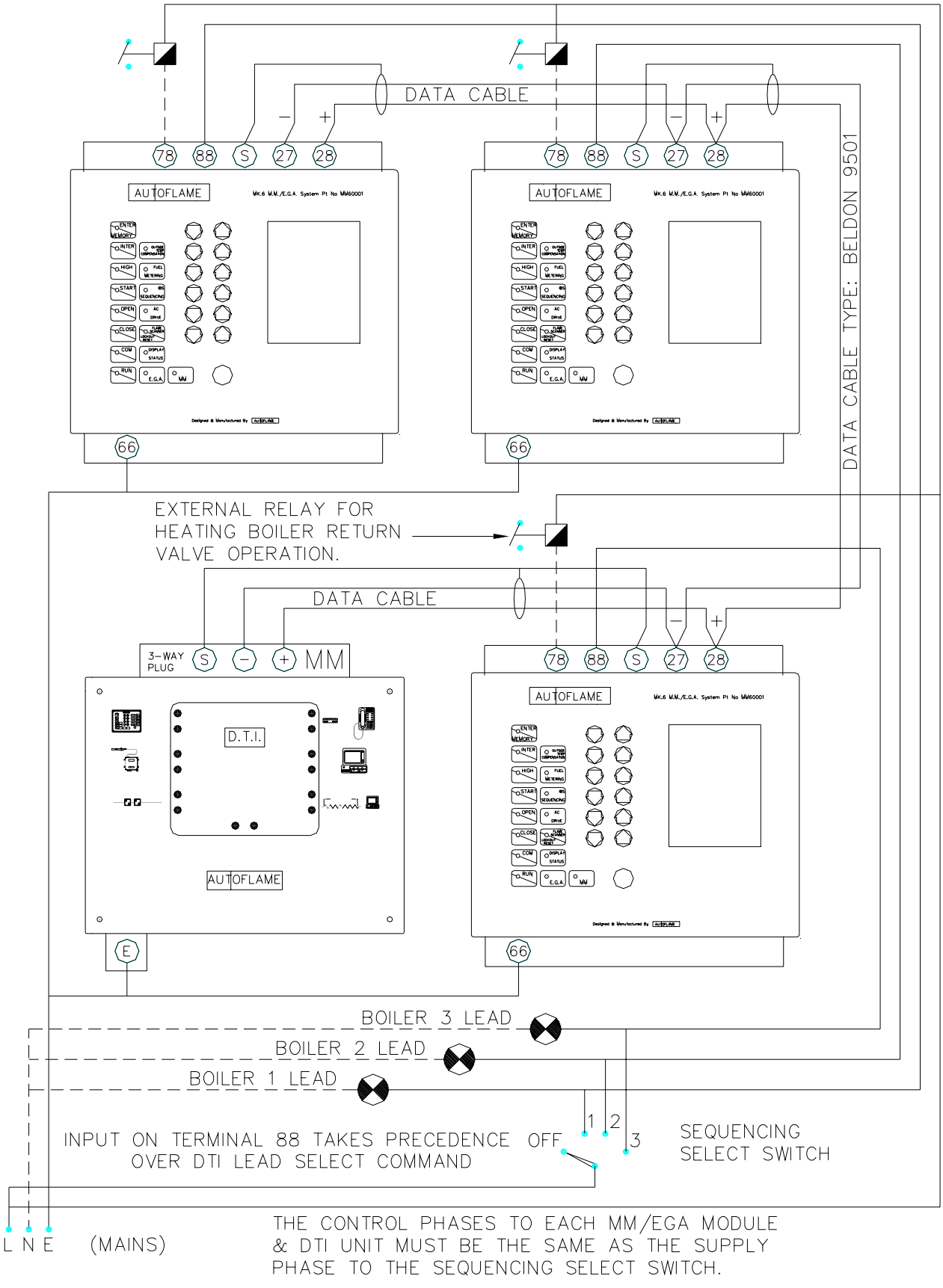


6.10 DTI Fixing Holes and Dimensions

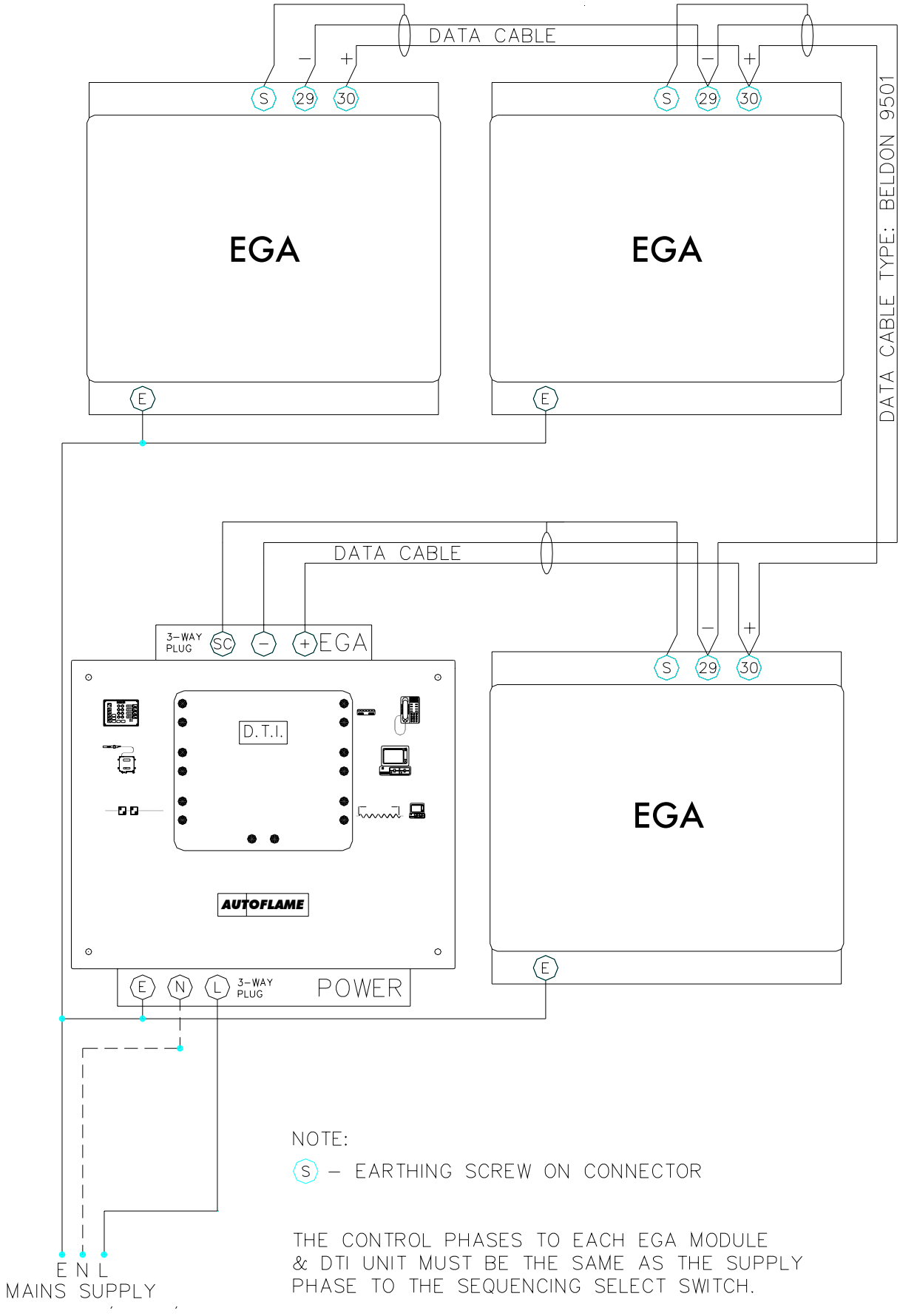


6.11 DTI Interconnections

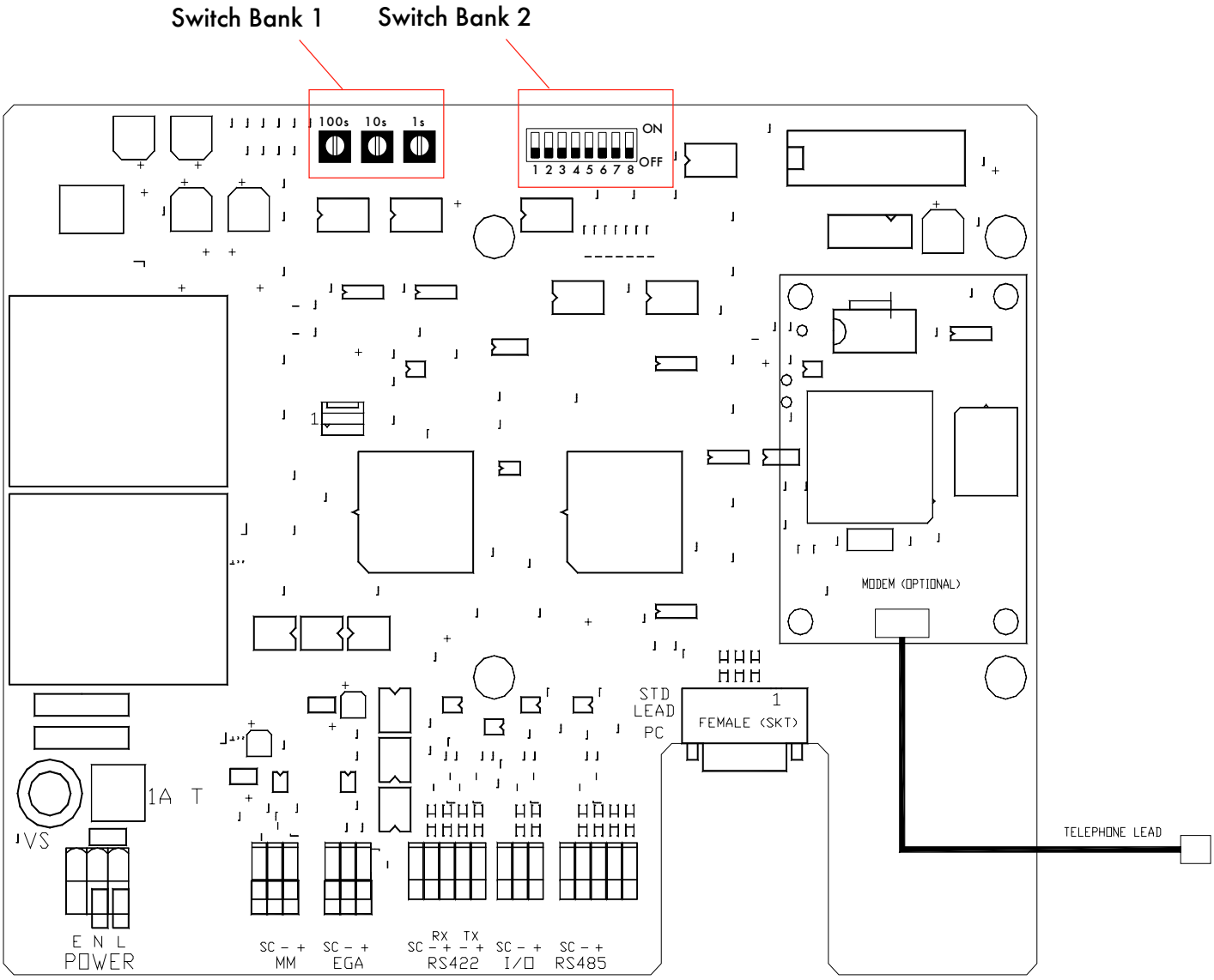
6.11.1 M.M. Modules (M.M./E.G.A.)



6.11.2 E.G.A. Modules (standalone E.G.A.)



6.12 PCB Switch Settings



Standard DTI - when used with WinPCDTI Software

Switch Bank 1 - not relevant, set to 001

Switch Bank 2 - ways 1 to 8 all set to off unless using the older Mk5 and mini Mk5 M.M. modules

Way 8 MM Port Baud Rate
off - 9600 (Mk6, Mini Mk6 and Mini Mk5 MMs)
on - 4800 (Older Mk5 and Mini MMs)*

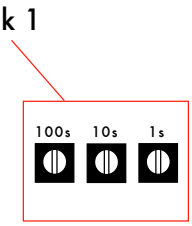
* Technical Memo: Data Communication Compatibility 3/9/1999

Settings for switch banks 1 & 2 may be different if the DTI is used for both WinPCDTI and Modbus/ Metasys operation. See sections 6.17.6.

6.12.1 To Restore Factory Settings

This procedure clears all congifuration data in the DTI and sets it back to default settings (configuration data includes, for example, alarm trigger conditions and labels).

Procedure



1. Power off the unit.

2. Set Switch Bank 1 address value to 789:
   100s = 7
   10s = 8
   1s = 9

   (Switch Bank 2 settings are irrelevant).

3. Power up.

4. Wait until the I/O transmit LED flashes (approx. 25 seconds)

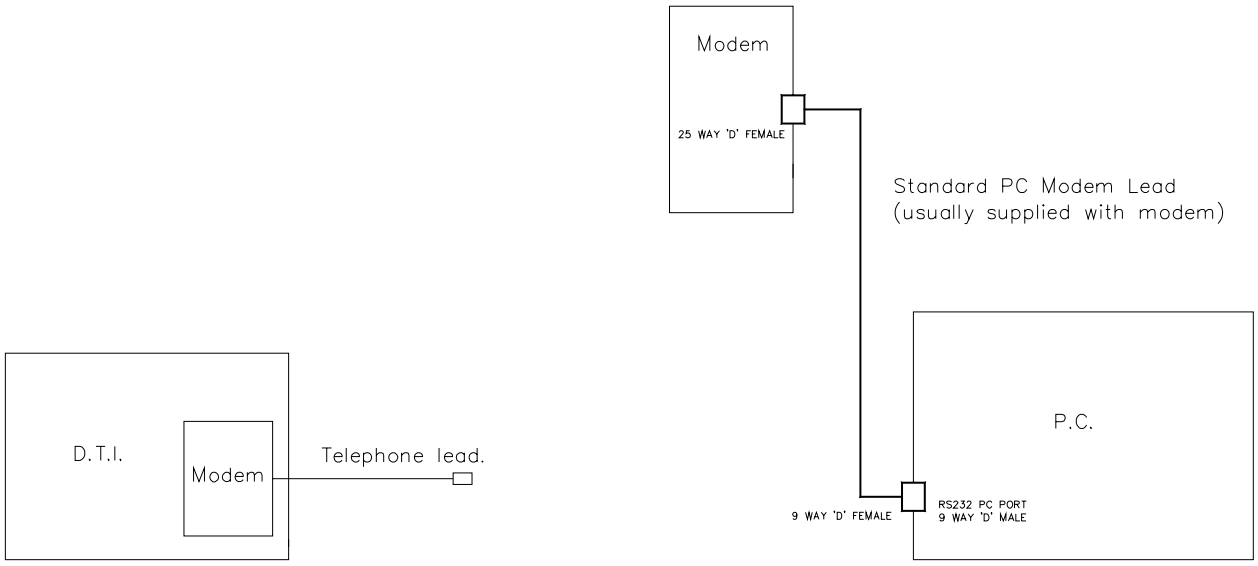
5. Power off.

6. Set switches back to the required operational settings.

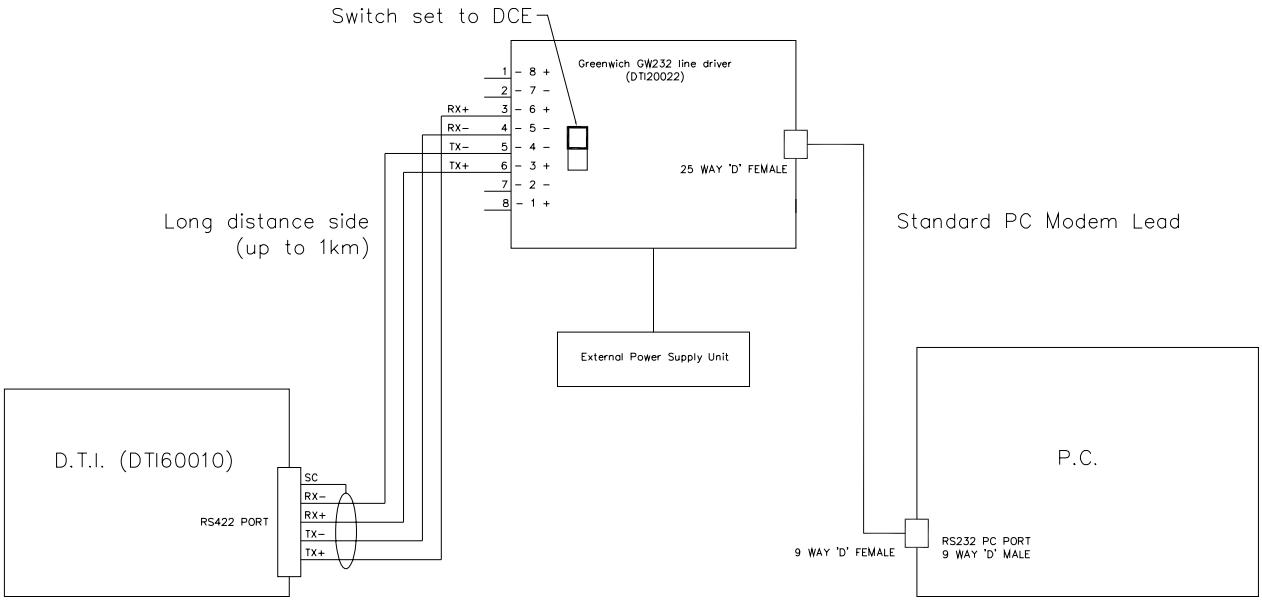
7. Power on unit.

6.13 DTI, PC and Modem Interconnections

Connection between PC and DTI MODEM

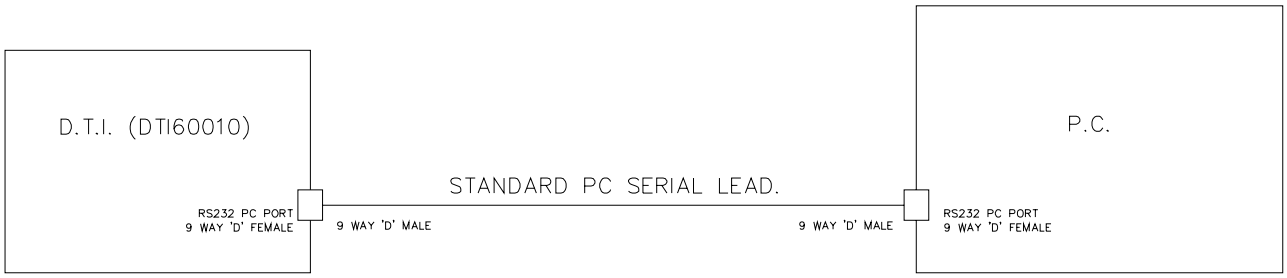


Connection between PC and DTI RS-422 port

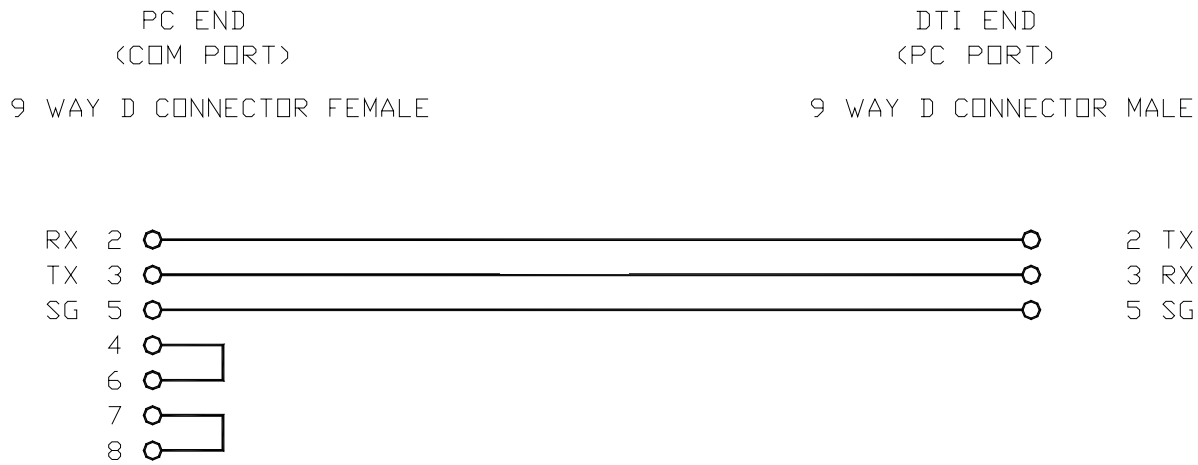


Example shown using line drive type GW232F made by Greenwich Instruments Limited.

Direct connection between PC and DTI RS-232 PC port



PC-DTI Cable (for older DTI units that do not use a standard PC serial lead)



Section 6.14: Analogue Input/Output Module Index

6.14.1 Introduction, Features and Benefits

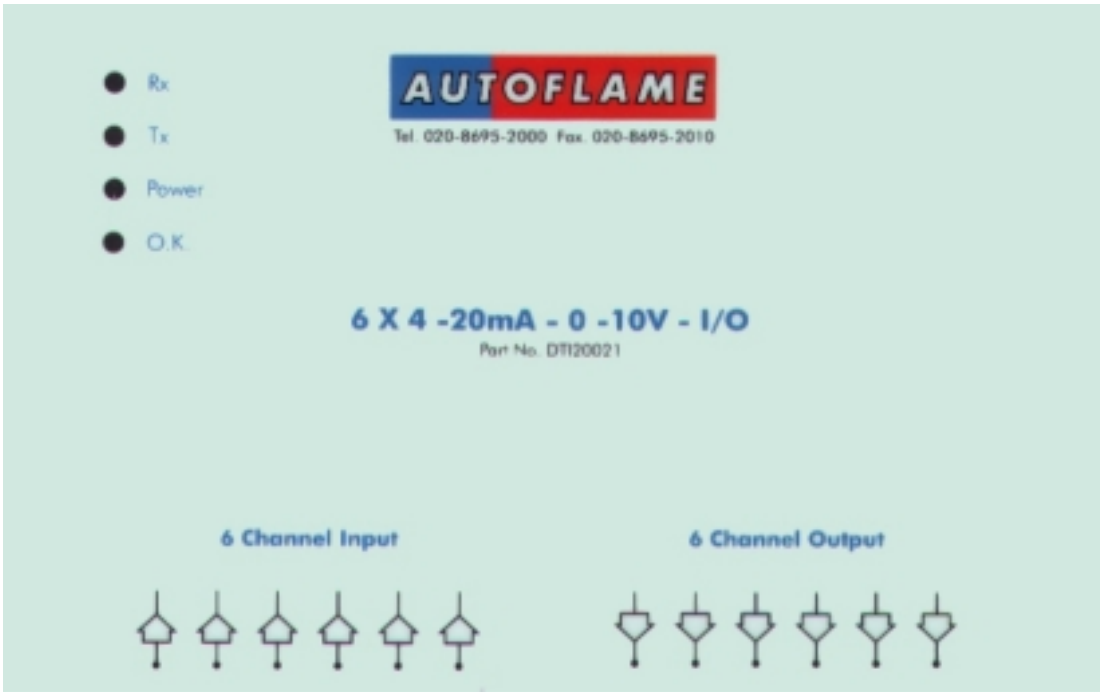
Each analogue I/O unit has 6 analogue inputs and 6 analogue outputs. Each analogue input can be individually configured for 0-10 V, 0-20 mA or 4-20 mA, and each analogue output can be individually configured for 0-10 V or 4-20 mA. The unit is primarily for use with a Data Transfer Interface (DTI) unit. However, it can also be used in conjunction with most M.M. units to convert M.M. items of data to analogue outputs. Before operation the unit must be setup for its particular modes of operation by means of a serial port and a personal computer (emulating a terminal, e.g. windows hyperterminal).

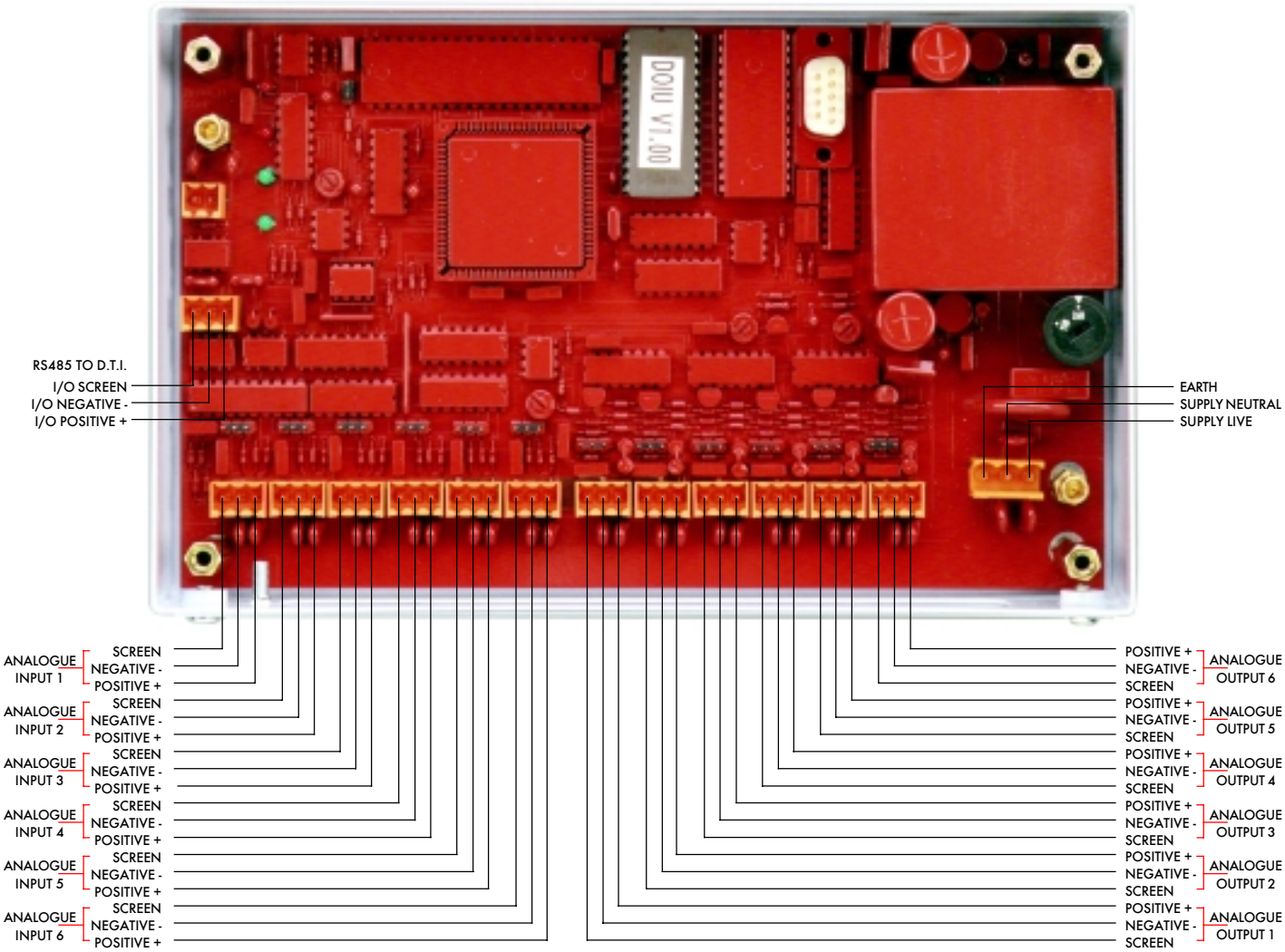
When used with a DTI, up to 10 analogue input/output units can be linked together. These are linked in series (daisy chain) using an RS485 2-core shielded data cable. As well as the actual analogue inputs and outputs being configurable, the data range for each input and output can also be individually set. Text labels can also be assigned to each input and output. The latter items (data range/text labels) can be of use when the DTI is being used for a building management system or programmable logic controller type interface. It is also possible to set each of the analogue inputs to simply monitor the required control signal or this can be set to alarm if the signal exceeds a user-defineable value or if the signal drops below a user-defineable value. These alarm settings are unique for each input and also carry a time delay setting until the alarm is actually recorded. This ensures that if the signal is fluctuating, annoyance alarms are avoided. The analogue inputs can also be set to totalise and so an instantaneous reading is recorded and displayed, but a totalising value is also stored in the background and is viewable. However, in the vast majority of cases, these setups can be left as supplied.

Notes:

An external PSU is not required for the analogue outputs.
The maximum permissable load on each analogue output is 250Ω.
All the negative terminals are common to each other.
The analogue outputs as a whole are isolated.
The analogue inputs are not powered internally by the analogue I/O module and so a 24V dc supply may be required for each input, depending on the controller.

6.14.2 Facia Layout and Internal Connections





N.B. All Negative connections are common to each other.

6.14.3 Setup Configuration for direct connection to M.M. unit

SETUP

To configure the unit connect a pc serial port to the setup port (use the Autoflame I/O setup lead). The pc must be running a terminal emulation program with the transmit and receive parameters set as follows:

Baud rate:	4800
Data bits	8
Parity	none
Stop bits	1

(Check the COM port is set to the one actually being used).

Pressing the <return> key should bring up the following opening message:

Analog I/O unit setup mode

Pressing the <ESC> key at any time during setup will cause exit from setup. If no keys are pressed for a period of approximately 5 minutes the unit will automatically exit from setup and revert to normal operation. During setup the unit will not carry out its normal functions. A test mode can be invoked during set up so the operation of the inputs and outputs can be checked. Every detail of the setup is not covered here as it is very repetitive. Experience can be quickly gained by working with an actual unit in setup mode (note that during normal operation if the PC is connected textual messages are displayed indicating communication between input/output units and the DTI).

If an existing setting is to be left unchanged then just press the <return> key.

The following shows samples of the various items that can be set. Text that is displayed on the screen is shown in bold.

Present input range for analog input 1 is A 0-10 volts

Ranges available
0 - 10 volts A
0 - 20 milliamps B
4 - 20 milliamps C

Make new selection or <return>
This can be set for all 6 inputs.

Present mode of operation is with DTI
Press M to set MM mode or <return to proceed>

If DTI mode is selected, by just pressing <return> in this example, the following items are displayed (if M.M. is selected please see later in this section):

Address is currently set to 1

Press <return> or enter new address(1-10) then <return>:

The address must be set in sequence for each analog I/O unit, e.g. if there are 3 analogue I/O units on the system the first should be set address 1, the second to address 2 and the third to address 3. Conflicts will occur if addresses are not set correctly and communications issues will occur.

Input number 1:-
Present label : Analog Input 1
Enter new label : Up to 30 alpha numeric characters can be used for a label

Present low range digital value : 0
Enter new low range value : This is the low data range value, it must be in the range 0-255

Present high range digital value : 255
Enter new high range value : This is the high data range value, it must be in the range 0-255

The label, low range and high range values can be set for all 6 inputs and all 6 outputs. After the ouput 6 high range value the setup mode is exited and the following appears on the screen:

SETUP TERMINATED !

Operation will revert to normal.

If the MM mode of operation is selected then the following items are displayed

Firing rate	**A**
Required value	**B**
Actual value	**C**
Channel 1 position	**D**
Channel 2 position	**E**
Channel 3 position	**F**
Channel 4 position	**G**
MM error	**H**
EGA error	**I**
O2 value	**J**
CO2 value	**K**
CO value	**L**
NO value	**M**
SO2 value	**N**
Exhaust Temperature	**O**
Efficiency	**P**

Present selection for analogue output 1 is : A - Firing rate
Present low range value : 0
Present high range value : 100

If the <return> key is pressed the screen refreshes with the same display but for analogue output 2. If a selection is made then a low range value and a high range value are subsequently requested. The low and high range values are values at which the output ranges itself from zero to span, i.e. 0-10V or 4-20 mA. After all 6 analogue outputs have been covered the setup mode is automatically exited and the screen displays:

SETUP TERMINATED !

It must be noted that the numeric values for the low and high range do not accept decimal points. If the value normally has a decimal point then the value should be entered without the decimal point, e.g. for the channel 2 position, if the output was set to give 0-10 volts over 10.0 to 80.0 degrees then the low and high range should be entered as 100 and 800 respectively.

Configuration of M.M. when used directly with an analogue I/O unit

If an analogue I/O unit is connected directly to an M.M. to provide analogue outputs, the first analogue input may be used to set the the required setpoint. Analogue input channels 2 to 6 are of no relevance when the unit is used with an M.M.

If the required setpoint is to be set by the channel 1 input then the following options/parameters should be set on the M.M. (see section 2.14.2.4)

Option#16 = 2
Option#30 = lowest required setpoint
Option#31 = highest required setpoint
Option#33 = 1 (identification number)
Parameter #49 = 1

The channel 1 input can be configured for voltage/current as described in the earlier sections of the setup procedure.

On later versions of the analogue I/O unit software (3.01 onwards) there is an additional set up to set the type of MM connected.

Example:

RS485 port baud rate is set at 9600 (Mk6, MiniMk6, MiniMk5)
Press 4 to set to 4800 <return> to proceed.

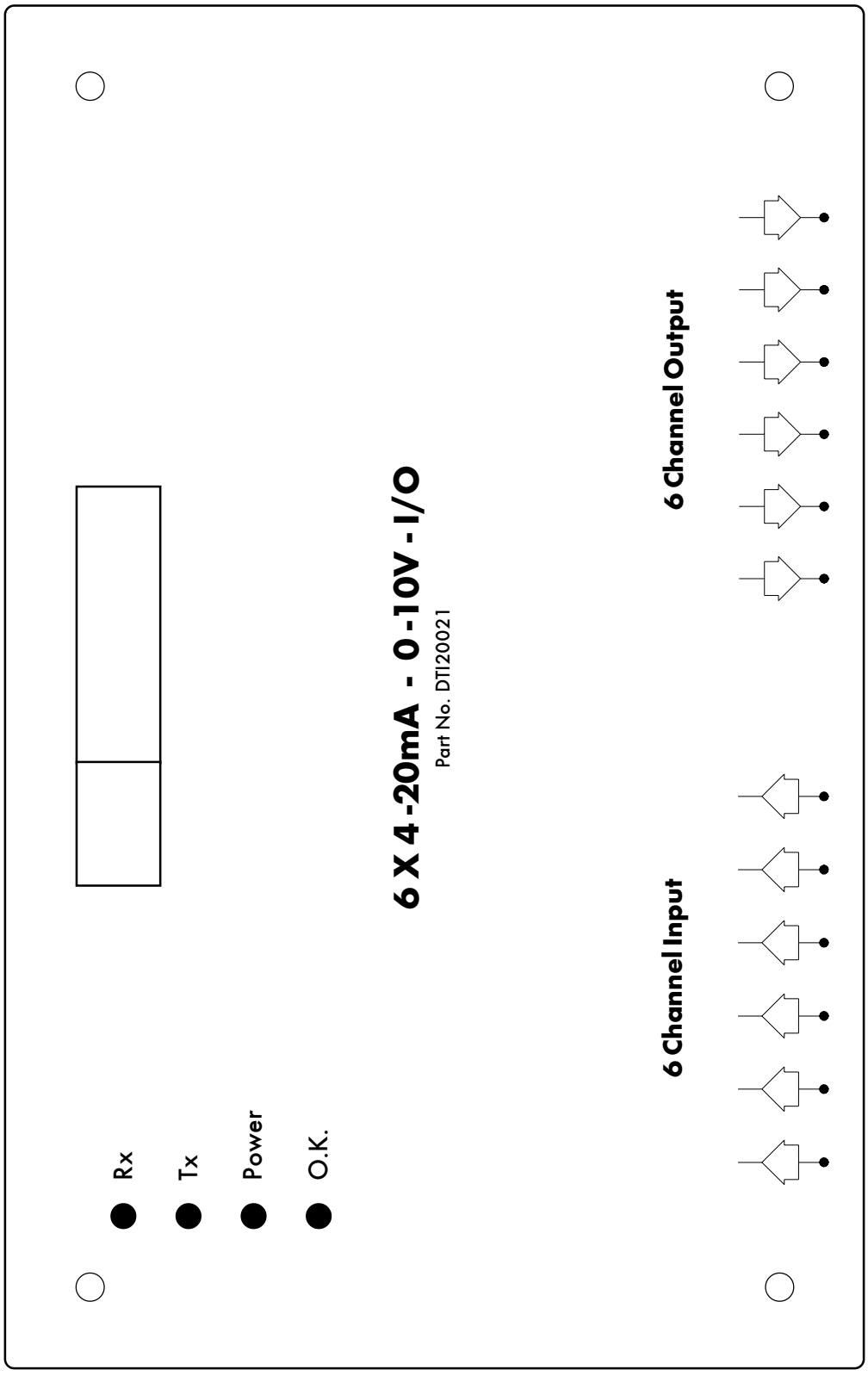
Also on the later versions the following text is displayed when not in set up mode.

MM comms = nnn required value = nnn

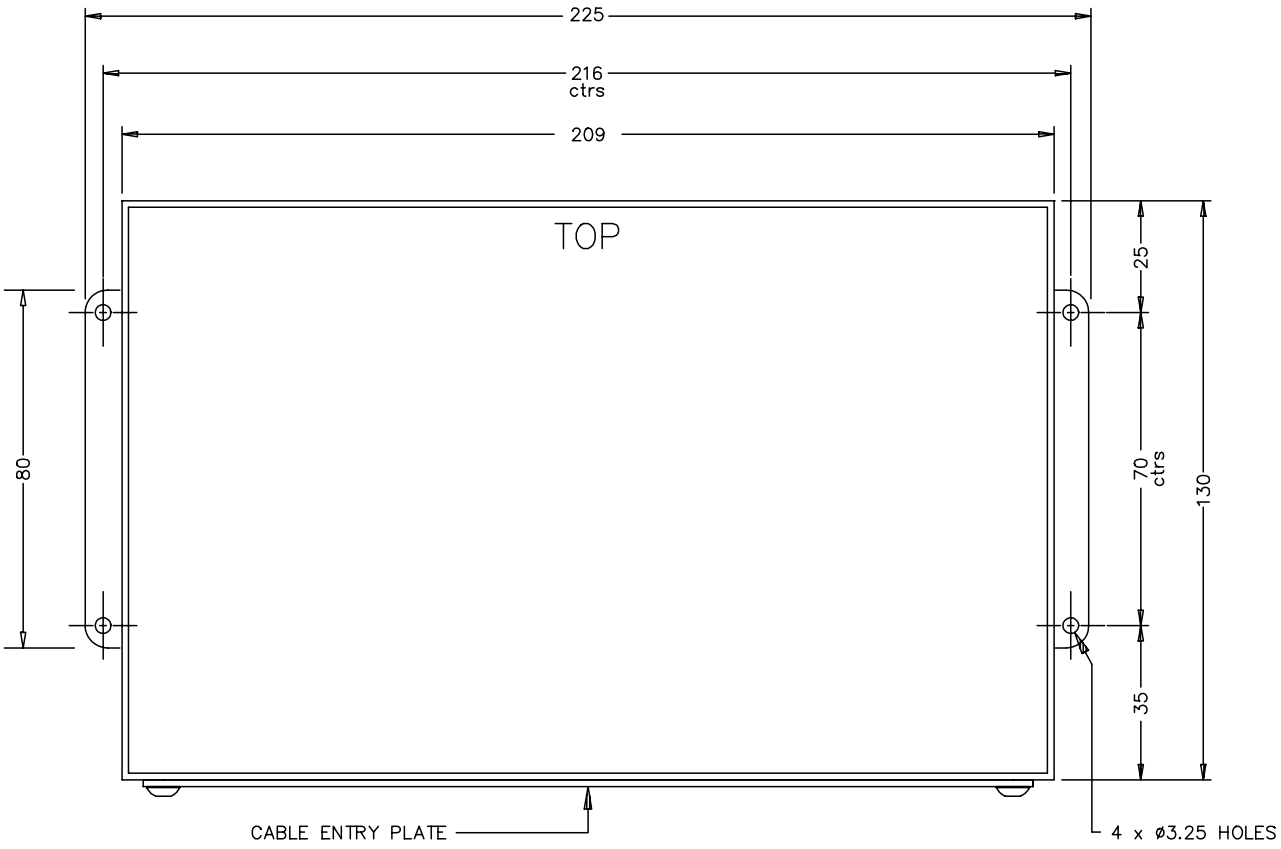
M.M. comms increments each time the analogue I/O unit receives data from the M.M. Required value is the value that has been calculated for transmission back to the M.M.

Note: Sequencing/D.T.I. and analogue I/O unit cannot be used at the same time if the analogue I/O module is to be used for setpoint changes on the M.M. If the analogue I/O module is used for monitoring and standard DTI operation then all of these features are available.

6.14.4 Front Facia Layout with LED Description



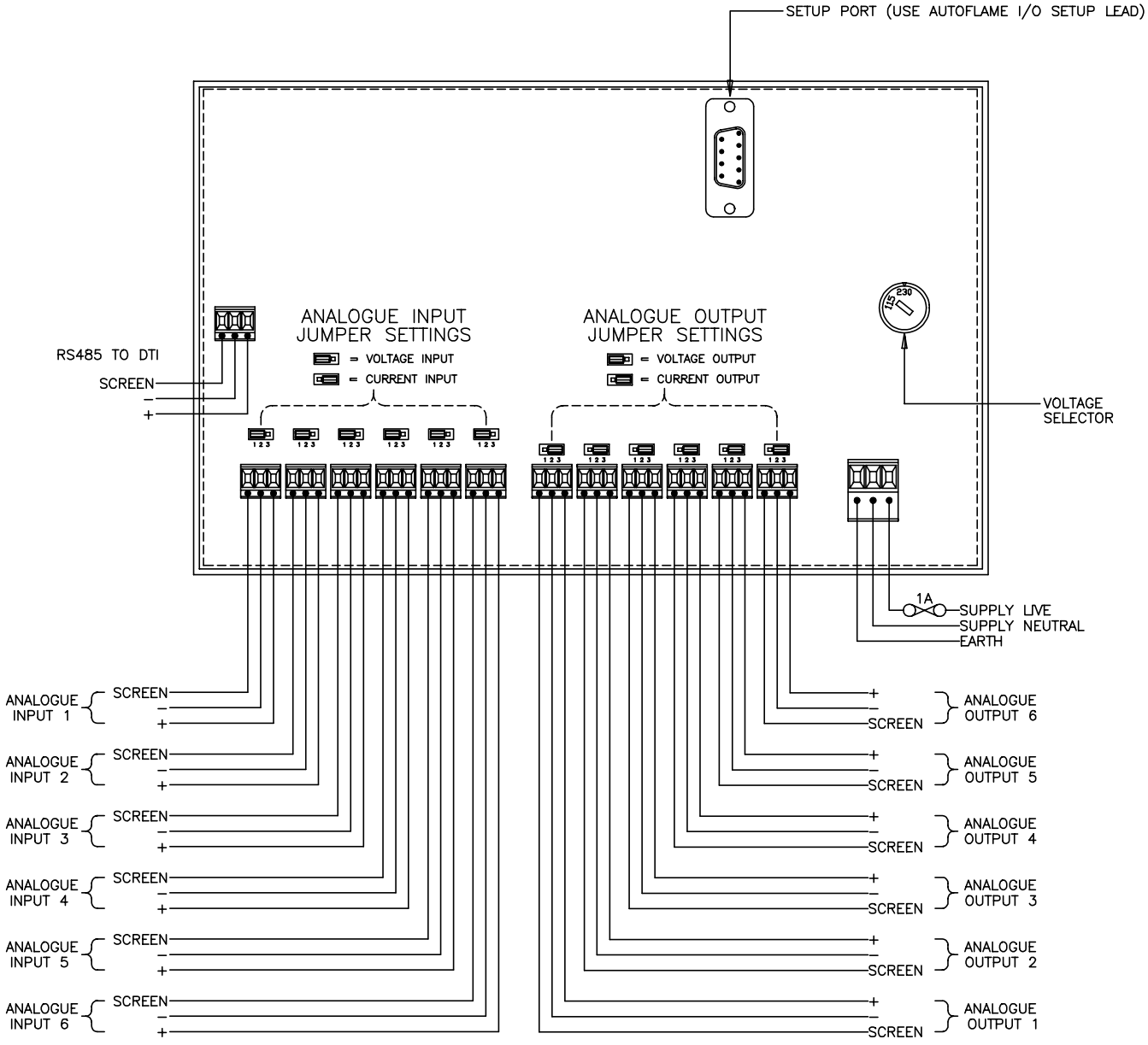
6.14.5 Fixing Holes & Dimensional Details



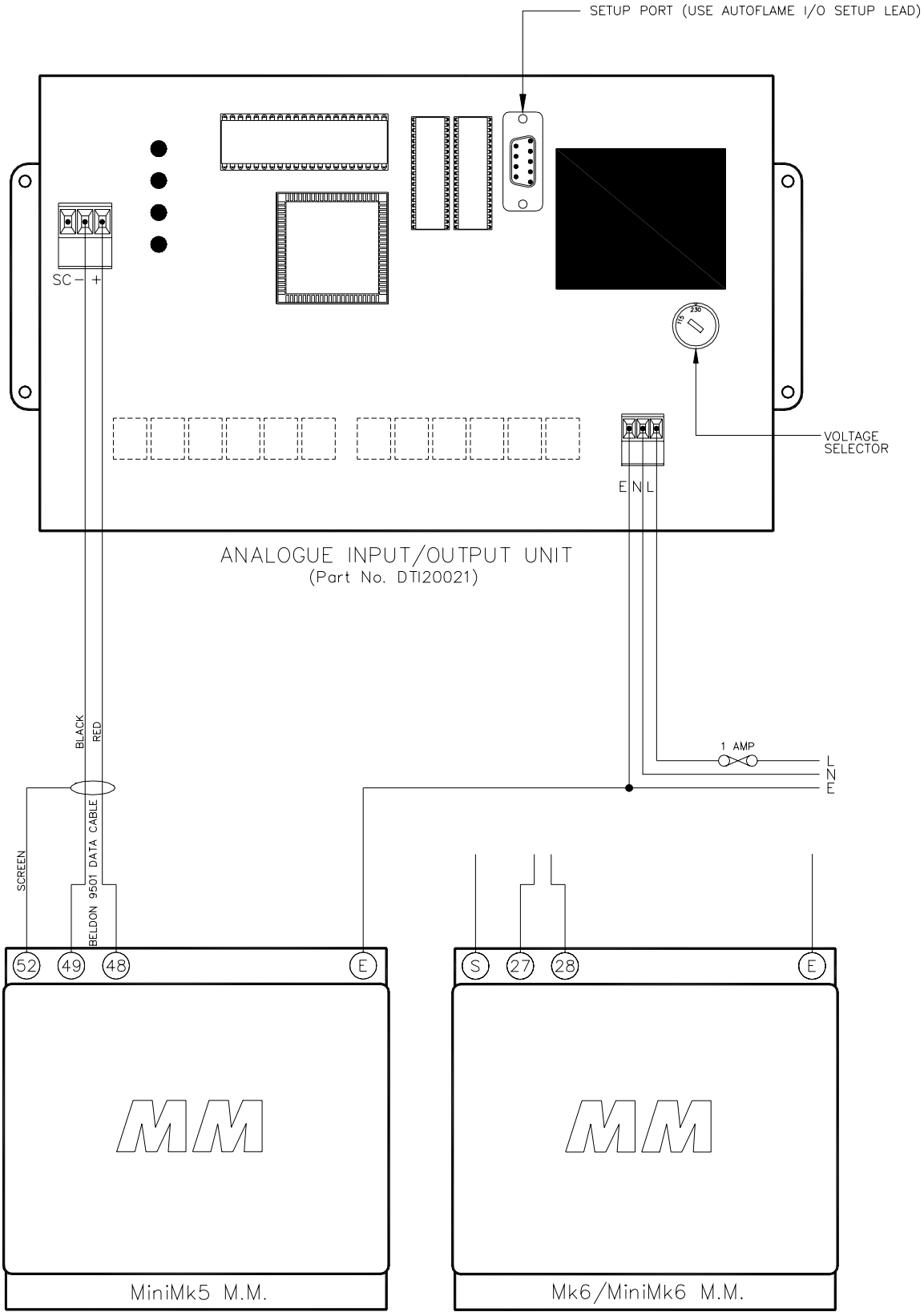
ALL DIMENSIONS IN MILLIMETRES

The depth of the unit is 38mm (1.5").
These units are back plate mounted not mounted on the front.

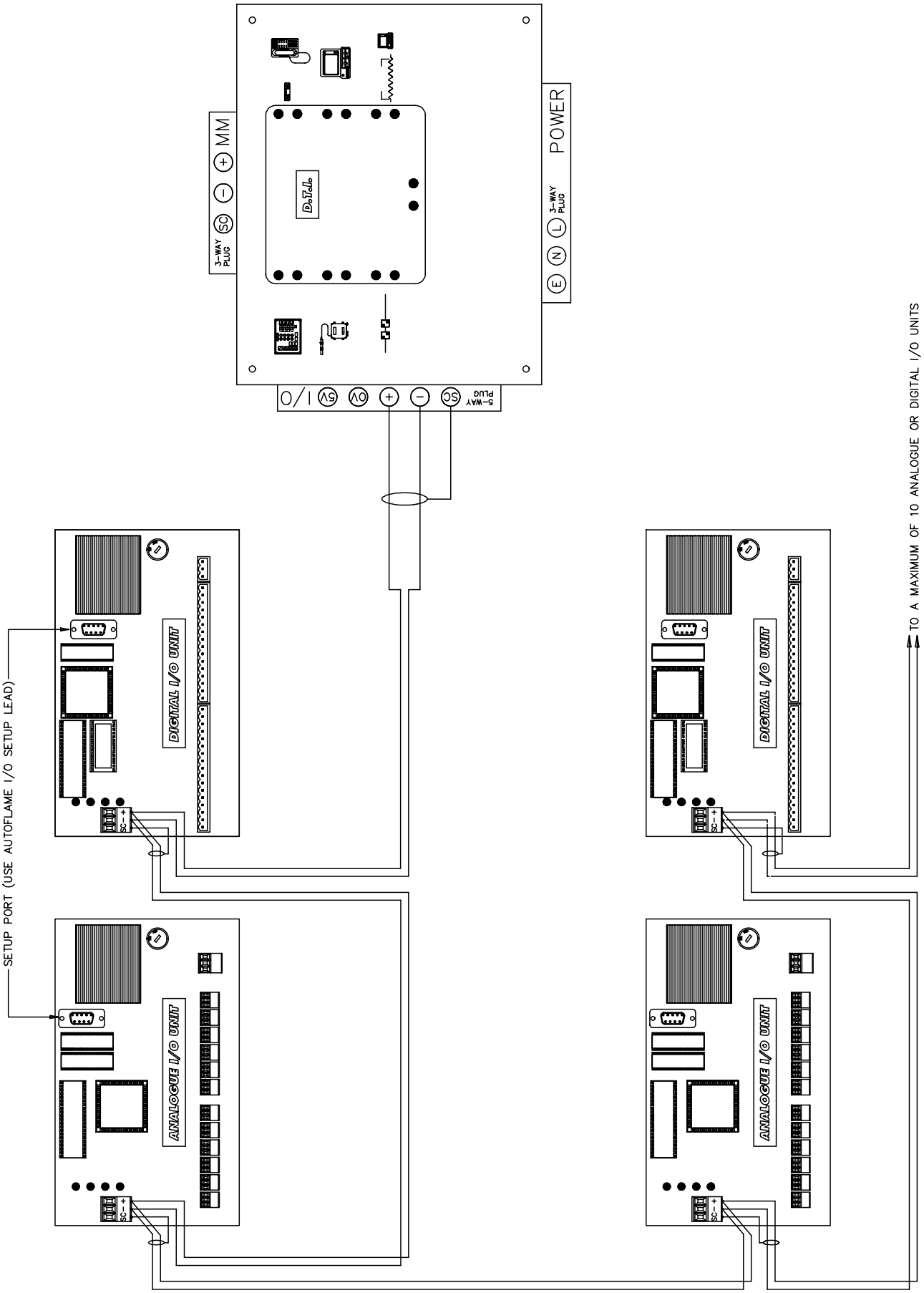
6.14.6 Wiring Connections Diagram



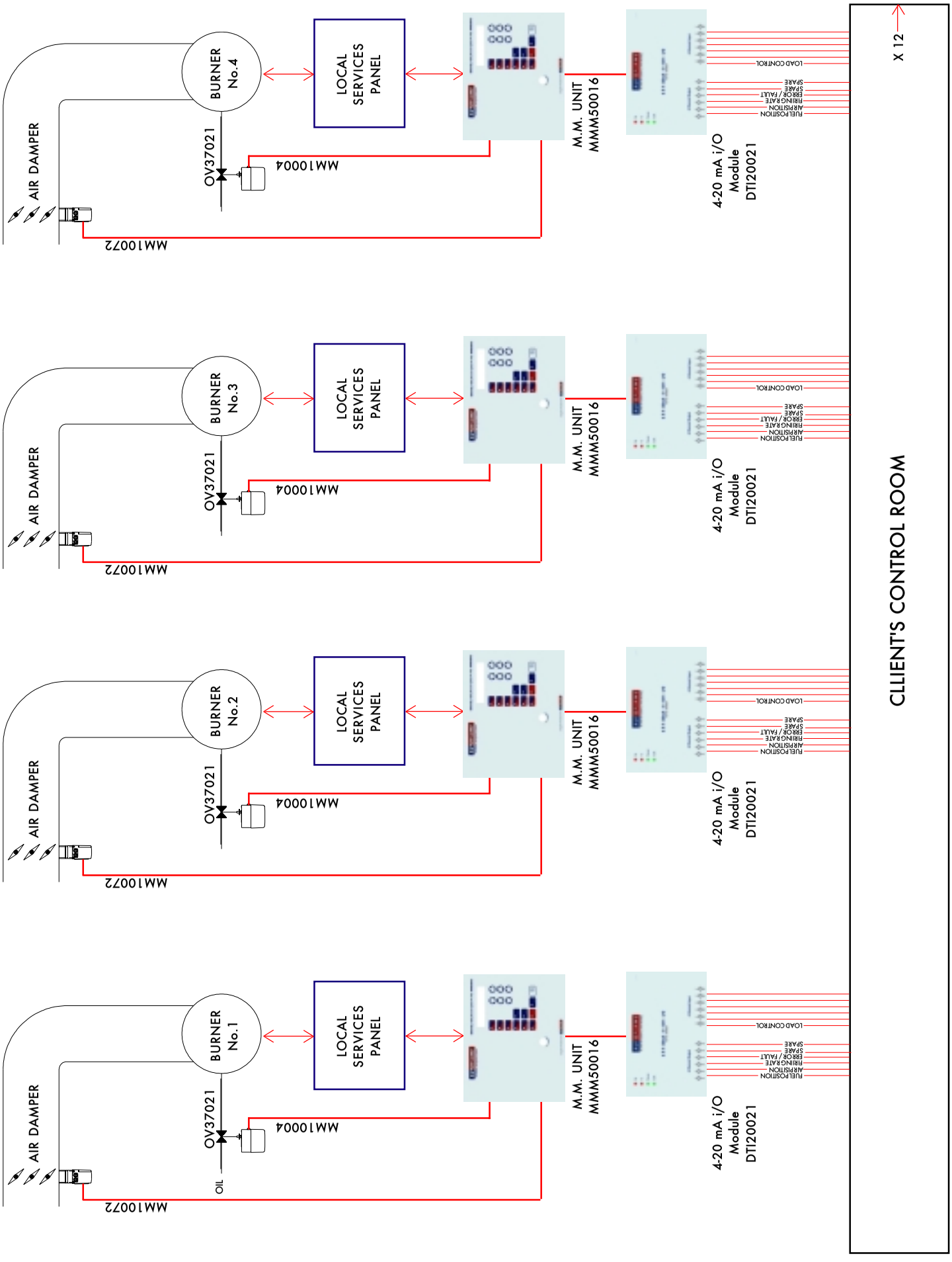
6.14.7 M.M. to Analogue Input/Output Unit Connection Diagram



6.14.8 DTI to Analogue Input/Output Unit Connection Diagram



6.14.9 Application Example: M.M. unit to Analogue Input/Output Unit Direct Connection

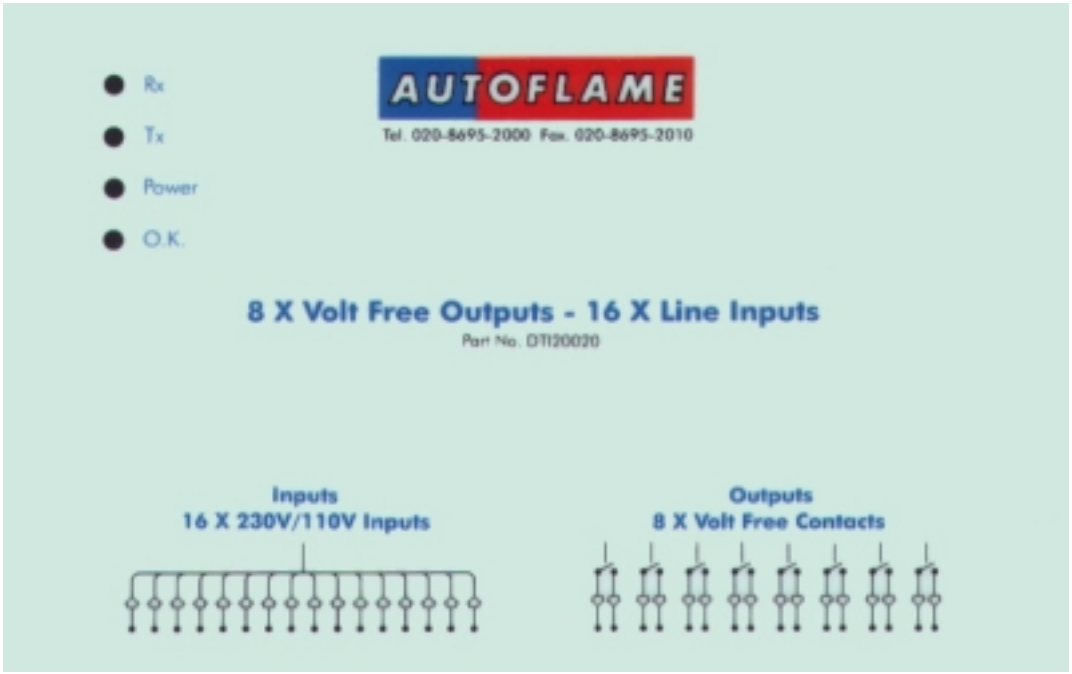


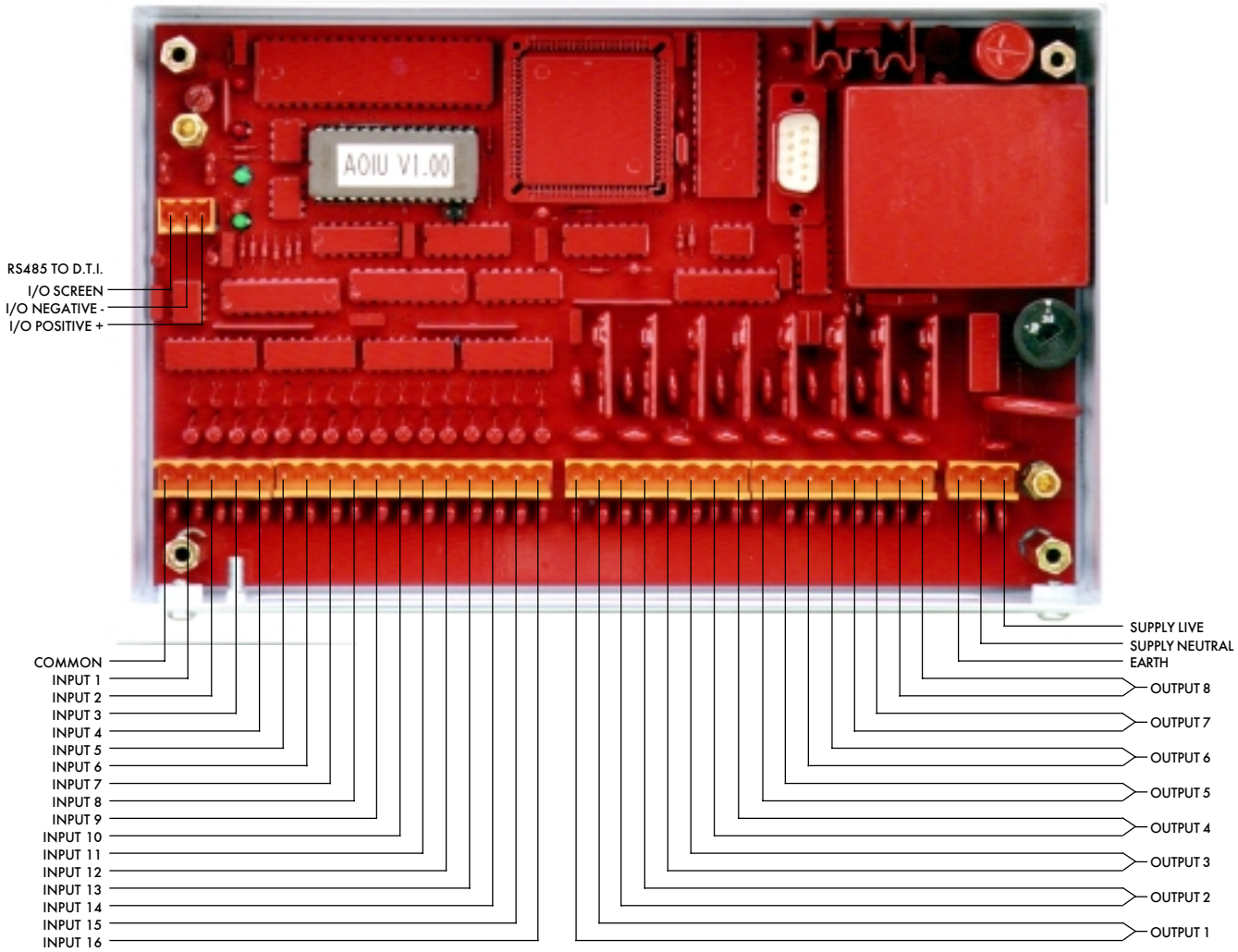
Section 6.15: Digital Input/Output Module Index

6.15.1 Introduction, Features and Benefits

Each digital I/O unit has 16 mains voltage inputs and 8 individual volt free mains voltage switches. The unit is used in conjunction with a Data Transfer Interface (DTI) unit. The mains voltage inputs can be used to wire in any alarms from the boiler house. The volt free mains voltage switches can be used to turn various components on/off. Before operation the unit must be setup for operation by means of a serial port and a personal computer (emulating a terminal). Up to 10 digital input/output units can be chained together. Text labels can also be assigned to each input and output. The latter items (data range / text labels) can be of use when the DTI is being used for a building management system or programmable logic controller type interface. It is also possible to set each of the digital inputs to simply monitor the required control signal or this can be set to alarm if the input signal is present ot not present, i.e. high or low. These alarm settings are unique for each input and also carry a time delay setting until the alarm is actually recorded. This ensures that if the signal is fluctuating, annoyance alarms are avoided.
Refer to DTI manual for interconnections between the digital I/O unit & the DTI.

6.15.2 Facia Layout and Internal Connections





6.15.3 Setup configuration for direct connection to D.T.I. unit

To configure the unit connect a pc serial port to the setup port (use the Autoflame I/O setup lead). The pc must be running a terminal emulation program with the transmit and receive parameters set as follows:

Baud rate:	4800
Data bits	8
Parity	none
Stop bits	1

(Check the COM port is set to the one actually being used).

Pressing the <return> key should bring up the following opening message:

Digital I/O unit setup mode

Pressing the <ESC> key at any time during setup will cause exit from setup. If no keys are pressed for a period of approximately 5 minutes the unit will automatically exit from setup and revert to normal operation. During setup the unit will not carry out its normal functions. A test mode can be invoked during set up so the operation of the inputs and outputs can be checked. Every detail of the setup is not covered here as it is very repetitive. Experience can be quickly gained by working with an actual unit in setup mode. Note that during normal operation if the PC is connected textual messages are displayed indicating communication between input/output units and the DTI.

If an existing setting is to be left unchanged then just press the <return> key.

The following shows samples of the various items that can be set. Text that is displayed on the screen is shown in bold.

Address is currently set to 1

Press <return> or enter new address(1-10) then <return>:

The address must be set in sequence for each digital I/O unit, e.g. if there are 3 digital I/O units on the system the first should be set to address 1, the second to address 2 and the third to address 3. Conflicts will occur if addresses are not set correctly.

Input number 1:-
Present label : Digital Input 1
Enter new label : Up to 30 alpha numeric characters can be used for the label

Present Monitor/Alarm status is : Monitor
Enter M/A or <return to proceed>

Present Active High/Low status is : High
Enter H/L or <return> to proceed

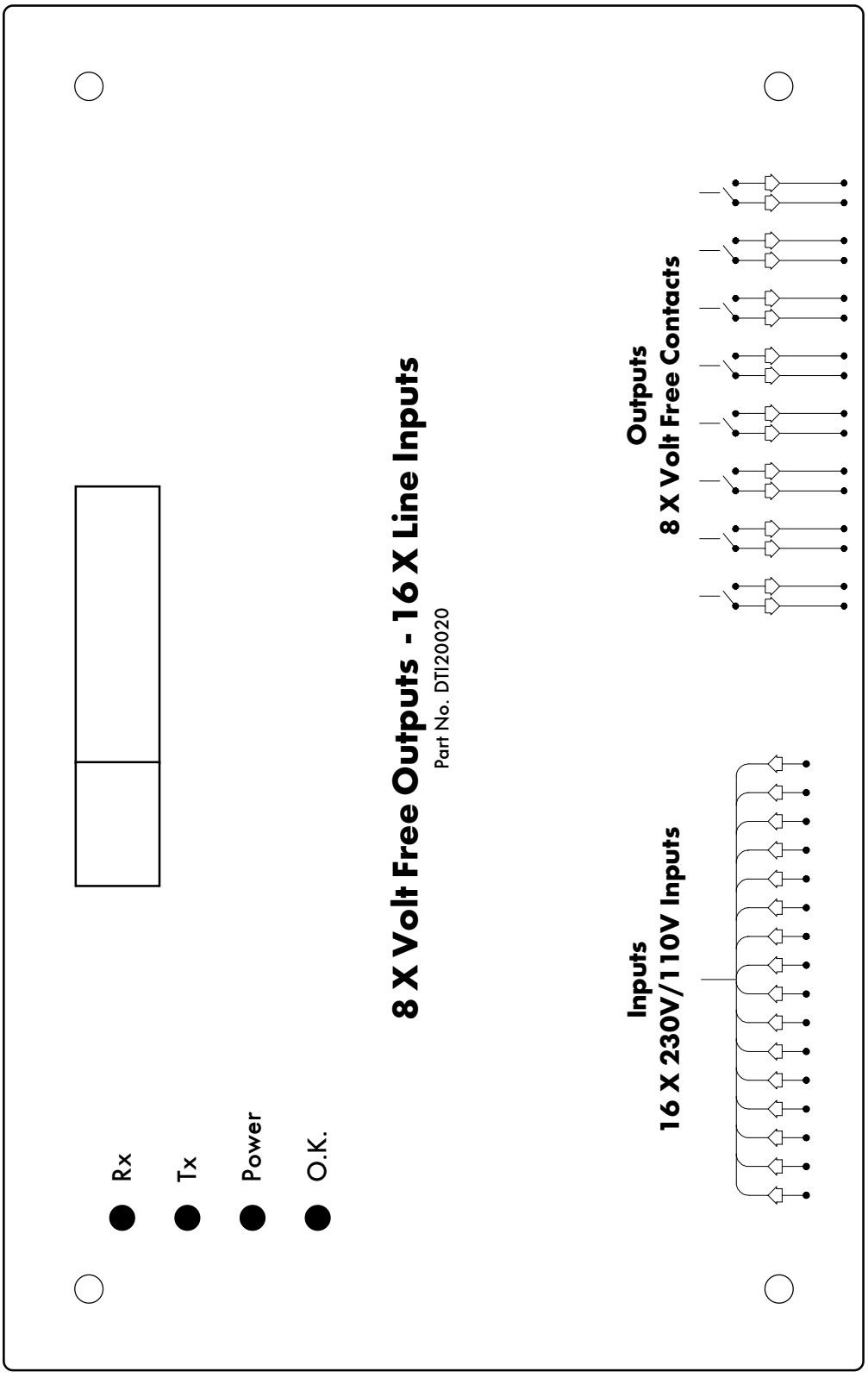
The label, M/A status and H/L status are repeated for all 16 inputs.

Output number 1:-
Present label : Digital Output 1
Enter new label : Up to 30 alpha numeric characters can be used for the label.

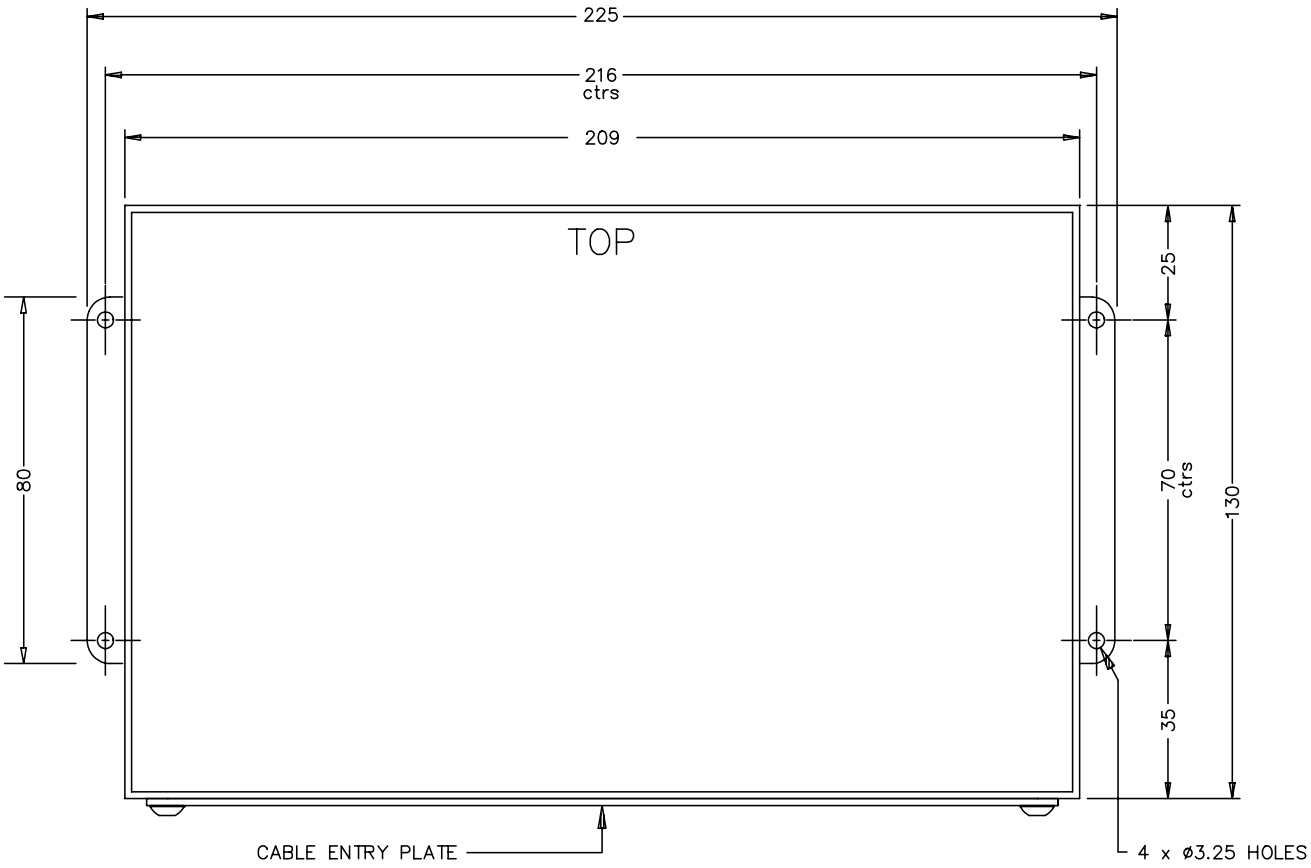
The label entry is repeated for all eight outputs. After all 8 digital outputs have been covered the setup mode is automatically exited and the screen displays

SETUP TERMINATED !

6.15.4 Front Facia Layout with LED Description



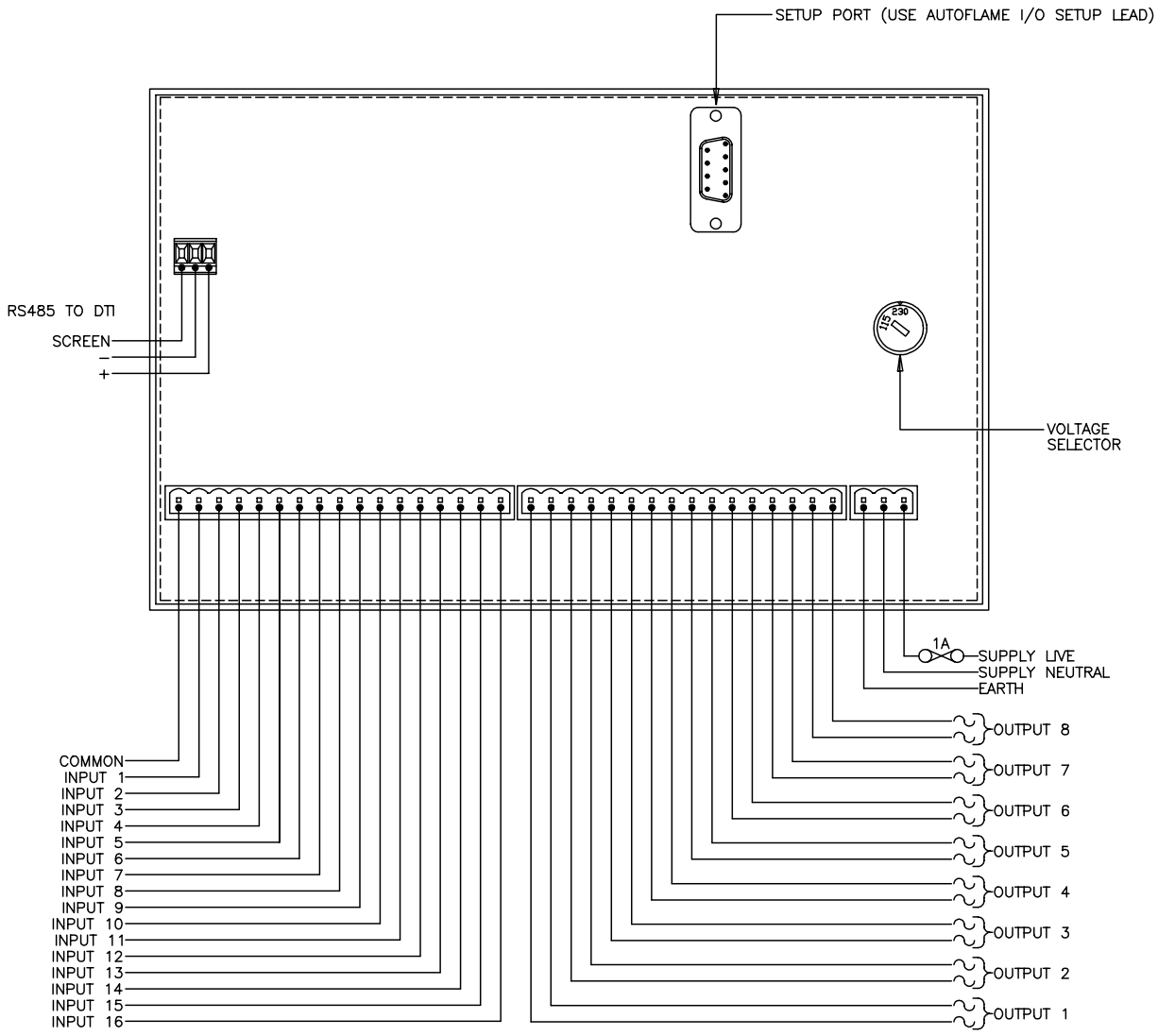
6.15.5 Fixing holes & Dimensional Details



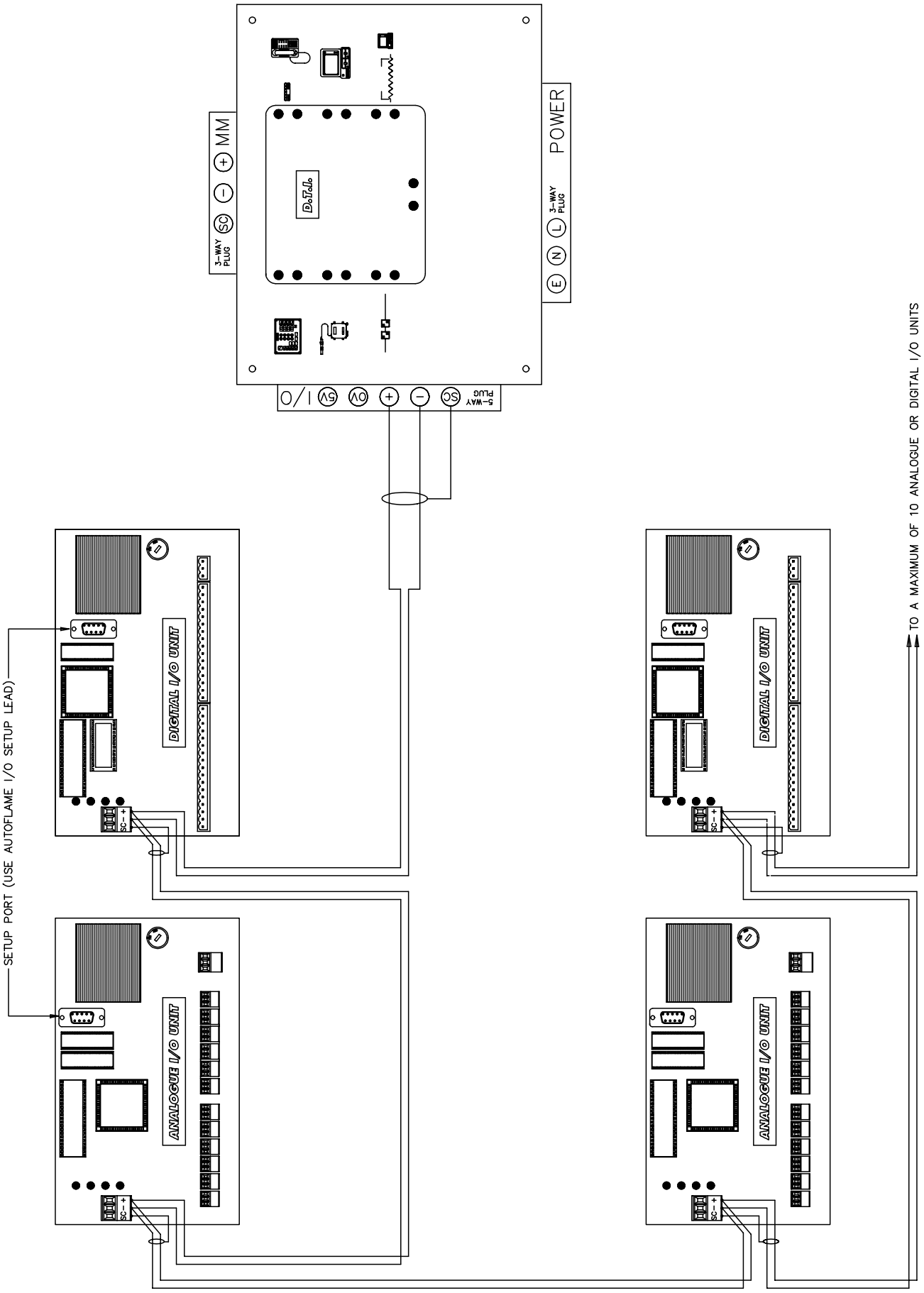
ALL DIMENSIONS IN MILLIMETRES

The depth of the unit is 38mm (1.5").
These units are back plate mounted not mounted on the front.

6.15.6 Wiring Connection Diagram



6.15.7 DTI to Digital Input/Output Unit Connection Diagram



Section 6.17: Modbus Interface Index

6.17.1 Overview

This manual details information regarding the Data Transfer Interface (DTI) 'Modbus' type interface. This interface allows the DTI to simultaneously communicate with the standard Autoflame Windows 95 PCDTI System.

Some knowledge of the Micro Modultion system is necessary to appreciate the meaning of the information contained within this manual.

6.17.2 0X Reference Addresses - Coils

6.17.2.1 Enable/Disable command for each MM

MM ID number		Reference Address
1		00001
2		00002
3		00003
4		00004
5		00005
6		00006
7		00007
8		00008
9		00009
10		00010

6.17.2.2 Digital I/O module output

Digital I/O Module Number		Output Number							
		1	2	3	4	5	6	7	8
1		00017	00018	00019	00020	00021	00022	00023	00024
2		00025	00026	00027	00028	00029	00030	00031	00032
3		00033	00034	00035	00036	00037	00038	00039	00040
4		00041	00042	00043	00044	00045	00046	00047	00048
5		00049	00050	00051	00052	00053	00054	00055	00056
6		00057	00058	00059	00060	00061	00062	00063	00064
7		00065	00066	00067	00068	00069	00070	00071	00072
8		00073	00074	00075	00076	00077	00078	00079	00080
9		00081	00082	00083	00084	00085	00086	00087	00088
10		00089	00090	00091	00092	00093	00094	00095	00096

6.17.3 1X Reference Addresses - Inputs

6.17.3.1 Digital Input

Digital I/O Module Number		Input Number 1	2	3	4	5	6	7	8
1		10001	10002	10003	10004	10005	10006	10007	10008
2		10017	10018	10019	10020	10021	10022	10023	10024
3		10033	10034	10035	10036	10037	10038	10039	10040
4		10049	10050	10051	10052	10053	10054	10055	10056
5		10065	10066	10067	10068	10069	10070	10071	10072
6		10081	10082	10083	10084	10085	10086	10087	10088
7		10097	10098	10099	10100	10101	10102	10103	10104
8		10113	10114	10115	10116	10117	10118	10119	10120
9		10129	10130	10131	10132	10133	10134	10135	10136
10		10145	10146	10147	10148	10149	10150	10151	10152

Digital I/O Module Number		Input Number 9	10	11	12	13	14	15	16
1		10009	10010	10011	10012	10013	10014	10015	10016
2		10025	10026	10027	10028	10029	10030	10031	10032
3		10041	10042	10043	10044	10045	10046	10047	10048
4		10057	10058	10059	10060	10061	10062	10063	10064
5		10073	10074	10075	10076	10077	10078	10079	10080
6		10089	10090	10091	10092	10093	10094	10095	10096
7		10105	10106	10107	10108	10109	10110	10111	10112
8		10121	10122	10123	10124	10125	10126	10127	10128
9		10137	10138	10139	10140	10141	10142	10143	10144
10		10153	10154	10155	10156	10157	10158	10159	10160

6.17.3.2 1X Reference Addresses - input

	MM Number				
	1	2	3	4	5
CR1 Relay Status	10193	10273	10353	10433	10513
	10194	10274	10354	10434	10514
	10195	10275	10355	10435	10515
	10196	10276	10356	10436	10516
	10197	10277	10357	10437	10517
	10198	10278	10358	10438	10518
	10199	10279	10359	10439	10519
	10200	10280	10360	10440	10520
Boiler Temp/Pressure	10201	10281	10361	10441	10521
	10202	10282	10362	10442	10522
	10203	10283	10363	10443	10523
	10204	10284	10364	10444	10524
	10205	10285	10365	10445	10525
	10206	10286	10366	10446	10526
	10207	10287	10367	10447	10527
	10208	10288	10368	10448	10528
	10209	10289	10369	10449	10529
Flow Metering On	10210	10290	10370	10450	10530
CO displayed on F2/F3	10211	10291	10371	10451	10531
	10212	10292	10372	10452	10532
C or F	10213	10293	10373	10453	10533
Bar or PSI	10214	10294	10374	10454	10534
External Voltage	10215	10295	10375	10455	10535
	10216	10296	10376	10456	10536
EGA Optioned	10217	10297	10377	10457	10537
Actual up to Trim Threshold	10218	10298	10378	10458	10538
Cooler Ready	10219	10299	10379	10459	10539
Ambient Temp OK	10220	10300	10380	10460	10540
NO optioned	10221	10301	10381	10461	10541
SO2 optioned	10222	10302	10382	10462	10542
Temp HI/LO	10223	10303	10383	10463	10543
OK to sample	10224	10304	10384	10464	10544
Sequencing optioned	10225	10305	10385	10465	10545
Setpoint/Enable Accepted	10226	10306	10386	10466	10546
	10227	10307	10387	10467	10547
	10228	10308	10388	10468	10548
	10229	10309	10389	10469	10549
	10230	10310	10390	10470	10550
	10231	10311	10391	10471	10551
	10232	10312	10392	10472	10552

Addresses with no detailed function are unused.

1X Reference Addressees - inputs

	MM Number				
	1	2	3	4	5
Hand Operation	10233	10313	10393	10473	10553
Low Flame Hold	10234	10314	10394	10474	10554
	10235	10315	10395	10475	10555
	10236	10316	10396	10476	10556
	10237	10317	10397	10477	10557
	10238	10318	10398	10478	10558
MM working COMMS	10239	10319	10399	10479	10559
Input 41 status	10240	10320	10400	10480	10560
Lead boiler status	10241	10321	10401	10481	10561
Disabled status	10242	10322	10402	10482	10562
	10243	10323	10403	10483	10563
	10244	10324	10404	10484	10564
	10245	10325	10405	10485	10565
	10246	10326	10406	10486	10566
	10247	10327	10407	10487	10567
	10248	10328	10408	10488	10568
Slave burner left/right	10249	10329	10409	10489	10569
	10250	10330	10410	10490	10570
	10251	10331	10411	10491	10571
	10252	10332	10412	10492	10572
	10253	10333	10413	10493	10573
	10254	10334	10414	10494	10574
	10255	10335	10415	10495	10575
	10256	10336	10416	10496	10576
	10257	10337	10417	10497	10577
	10258	10338	10418	10498	10578
	10259	10339	10419	10499	10579
	10260	10340	10420	10500	10580
	10261	10341	10421	10501	10581
	10262	10342	10422	10502	10582
	10263	10343	10423	10503	10583
	10264	10344	10424	10504	10584
	10265	10345	10425	10505	10585
	10266	10346	10426	10506	10586
	10267	10347	10427	10507	10587
	10268	10348	10428	10508	10588
	10269	10349	10429	10509	10589
	10270	10350	10430	10510	10590
	10271	10351	10431	10511	10591
	10272	10352	10432	10512	10592

Addresses with no detailed function are unused.

1X Reference Addresses - inputs

	MM Number				
	6	7	8	9	10
CR1 Relay Status	10593	10673	10753	10833	10913
	10594	10674	10754	10834	10914
	10595	10675	10755	10835	10915
	10596	10676	10756	10836	10916
	10597	10677	10757	10837	10917
	10598	10678	10758	10838	10918
	10599	10679	10759	10839	10919
	10600	10680	10760	10840	10920
Boiler Temp/Pressure	10601	10681	10761	10841	10921
	10602	10682	10762	10842	10922
	10603	10683	10763	10843	10923
	10604	10684	10764	10844	10924
	10605	10685	10765	10845	10925
	10606	10686	10766	10846	10926
	10607	10687	10767	10847	10927
	10608	10688	10768	10848	10928
	10609	10689	10769	10849	10929
Flow Metering On	10610	10690	10770	10850	10930
CO displayed on F2/F3	10611	10691	10771	10851	10931
	10612	10692	10772	10852	10932
C or F	10613	10693	10773	10853	10933
Bar or PSI	10614	10694	10774	10854	10934
External Voltage	10615	10695	10775	10855	10935
	10616	10696	10776	10856	10936
EGA Optioned	10617	10697	10777	10857	10937
Actual up to Trim Threshold	10618	10698	10778	10858	10938
Cooler Ready	10619	10699	10779	10859	10939
Ambient Temp OK	10620	10700	10780	10860	10940
NO optioned	10621	10701	10781	10861	10941
SO2 optioned	10622	10702	10782	10862	10942
Temp HI/LO	10623	10703	10783	10863	10943
OK to sample	10624	10704	10784	10864	10944
Sequencing optioned	10625	10705	10785	10865	10945
Setpoint/Enable Accepted	10626	10706	10786	10866	10946
	10627	10707	10787	10867	10947
	10628	10708	10788	10868	10948
	10629	10709	10789	10869	10949
	10630	10710	10790	10870	10950
	10631	10711	10791	10871	10951
	10632	10712	10792	10872	10952

Addresses with no detailed function are unused.

1X Reference Addresses - inputs

	MM Number				
	6	7	8	9	10
Hand Operation	10633	10713	10793	10873	10953
Low Flame Hold	10634	10714	10794	10874	10954
	10635	10715	10795	10875	10955
	10636	10716	10796	10876	10956
	10637	10717	10797	10877	10957
	10638	10718	10798	10878	10958
MM working COMMS	10639	10719	10799	10879	10959
Input 41 status	10640	10720	10800	10880	10960
Lead boiler status	10641	10721	10801	10881	10961
Disabled status	10642	10722	10802	10882	10962
	10643	10723	10803	10883	10963
	10644	10724	10804	10884	10964
	10645	10725	10805	10885	10965
	10646	10726	10806	10886	10966
	10647	10727	10807	10887	10967
	10648	10728	10808	10888	10968
Slave burner left/right	10649	10729	10809	10889	10969
	10650	10730	10810	10890	10970
	10651	10731	10811	10891	10971
	10652	10732	10812	10892	10972
	10653	10733	10813	10893	10973
	10654	10734	10814	10894	10974
	10655	10735	10815	10895	10975
	10656	10736	10816	10896	10976
	10657	10737	10817	10897	10977
	10658	10738	10818	10898	10978
	10659	10739	10819	10899	10979
	10660	10740	10820	10900	10980
	10661	10741	10821	10901	10981
	10662	10742	10822	10902	10982
	10663	10743	10823	10903	10983
	10664	10744	10824	10904	10984
	10665	10745	10825	10905	10985
	10666	10746	10826	10906	10986
	10667	10747	10827	10907	10987
	10668	10748	10828	10908	10988
	10669	10749	10829	10909	10989
	10670	10750	10830	10910	10990
	10671	10751	10831	10911	10991
	10672	10752	10832	10912	10992

Addresses with no detailed function are unused.

1X Reference Addresses - inputs

The information on this page is only relevant to standalone EGAs connected directly to the DTI via the EGA port

	EGA Number				
	1	2	3	4	5
Air Calibration in progress	10993	11009	11025	11041	11057
Gas Calibration in progress	10994	11010	11026	11042	11058
Cooler ready	10995	11011	11027	11043	11059
Ambient temperature OK	10996	11012	11028	11044	11060
Ambient temperature HIGH	10997	11013	11029	11045	11061
Ambient temperature LOW	10998	11014	11030	11046	11062
	10999	11015	11031	11047	11063
EGA ready	11000	11016	11032	11048	11064
CO optioned	11001	11017	11033	11049	11065
NO optioned	11002	11018	11034	11050	11066
SO2 optioned	11003	11019	11035	11051	11067
°C(0) or °F(1) optioned	11004	11020	11036	11052	11068
Sampling optioned	11005	11021	11037	11053	11069
2nd thermocouple optioned	11006	11022	11038	11054	11070
Voltage input optioned	11007	11023	11039	11055	11071
	11008	11024	11040	11056	11072

	EGA Number				
	6	7	8	9	10
Air Calibration in progress	11073	11089	11105	11121	11137
Gas Calibration in progress	11074	11090	11106	11122	11138
Cooler ready	11075	11091	11107	11123	11139
Ambient temperature OK	11076	11092	11108	11124	11140
Ambient temperature HIGH	11077	11093	11109	11125	11141
Ambient temperature LOW	11078	11094	11110	11126	11142
	11079	11095	11111	11127	11143
EGA ready	11080	11096	11112	11128	11144
CO optioned	11081	11097	11113	11129	11145
NO optioned	11082	11098	11114	11130	11146
SO2 optioned	11083	11099	11115	11131	11147
°C(0) or °F(1) optioned	11084	11100	11116	11132	11148
Sampling optioned	11085	11101	11117	11133	11149
2nd thermocouple optioned	11086	11102	11118	11134	11150
Voltage input optioned	11087	11103	11119	11135	11151
	11088	11104	11120	11136	11152

1X Reference Addresses - On line/Off line Status

In all cases, off line is indicated by 0, on line by 1.

MM No.	Reference Address
1	11793
2	11794
3	11795
4	11796
5	11797
6	11798
7	11799
8	11800
9	11801
10	11802

EGA No.	Reference Address
1	11809
2	11810
3	11811
4	11812
5	11813
6	11814
7	11815
8	11816
9	11817
10	11818

Digital I/O No.	Reference Address
1	11825
2	11826
3	11827
4	11828
5	11829
6	11830
7	11831
8	11832
9	11833
10	11834

Analogue I/O No.	Reference Address
1	11841
2	11842
3	11843
4	11844
5	11845
6	11846
7	11847
8	11848
9	11849
10	11850

1X Reference Addresses- Water Level

	MM Number				
	1	2	3	4	5
Water level optioned- no(0)/yes(1)	12001	12201	12401	12601	12801
Units- imperial(0)/metric(1)	12002	12202	12402	12602	12802
Feed water pump- off(0)/on(1)	12003	12203	12403	12603	12803
TDS units- ppm(0)/uSiemens(1)	12004	12204	12404	12604	12804
WL ready- no(0)/yes(1)	12005	12205	12405	12605	12805
TDS optioned- no(0)/yes(1)	12006	12206	12406	12606	12806
First out 1- normal(0)/fail(1)	12009	12209	12409	12609	12809
First out 2- normal(0)/fail(1)	12010	12210	12410	12610	12810
First out 3- normal(0)/fail(1)	12011	12211	12411	12611	12811
First out 4- normal(0)/fail(1)	12012	12212	12412	12612	12812
First out 5- normal(0)/fail(1)	12013	12213	12413	12613	12813
First out 6- normal(0)/fail(1)	12014	12214	12414	12614	12814
First out 7- normal(0)/fail(1)	12015	12215	12415	12615	12815
First out 8- normal(0)/fail(1)	12016	12216	12416	12616	12816
First out 9- normal(0)/fail(1)	12017	12217	12417	12617	12817
First out 10- normal(0)/fail(1)	12018	12218	12418	12618	12818
First out 11- normal(0)/fail(1)	12019	12219	12419	12619	12819
First out 12- normal(0)/fail(1)	12020	12220	12420	12620	12820
First out 13- normal(0)/fail(1)	12021	12221	12421	12621	12821
First out 14- normal(0)/fail(1)	12022	12222	12422	12622	12822
First out 15- normal(0)/fail(1)	12023	12223	12423	12623	12823

	MM Number				
	6	7	8	9	10
Water level optioned- no(0)/yes(1)	13001	13201	13401	13601	13801
Units- imperial(0)/metric(1)	13002	13202	13402	13602	13802
Feed water pump- off(0)/on(1)	13003	13203	13403	13603	13803
TDS units- ppm(0)/uSiemens(1)	13004	13204	13404	13604	13804
WL ready- no(0)/yes(1)	13005	13205	13405	13605	13805
TDS optioned- no(0)/yes(1)	13006	13206	13406	13606	13806
First out 1- normal(0)/fail(1)	13009	13209	13409	13609	13809
First out 2- normal(0)/fail(1)	13010	13210	13410	13610	13810
First out 3- normal(0)/fail(1)	13011	13211	13411	13611	13811
First out 4- normal(0)/fail(1)	13012	13212	13412	13612	13812
First out 5- normal(0)/fail(1)	13013	13213	13413	13613	13813
First out 6- normal(0)/fail(1)	13014	13214	13414	13614	13814
First out 7- normal(0)/fail(1)	13015	13215	13415	13615	13815
First out 8- normal(0)/fail(1)	13016	13216	13416	13616	13816
First out 9- normal(0)/fail(1)	13017	13217	13417	13617	13817
First out 10- normal(0)/fail(1)	13018	13218	13418	13618	13818
First out 11- normal(0)/fail(1)	13019	13219	13419	13619	13819
First out 12- normal(0)/fail(1)	13020	13220	13420	13620	13820
First out 13- normal(0)/fail(1)	13021	13221	13421	13621	13821
First out 14- normal(0)/fail(1)	13022	13222	13422	13622	13822
First out 15- normal(0)/fail(1)	13023	13223	13423	13623	13823

6.17.4 3X Reference Addresses - Input Registers

Analog Inputs

Analogue I/O Module Number		**Input Number**					
		1	2	3	4	5	6
1		30017	30018	30019	30020	30021	30022
2		30025	30026	30027	30028	30029	30030
3		30033	30034	30035	30036	30037	30038
4		30041	30042	30043	30044	30045	30046
5		30049	30050	30051	30052	30053	30054
6		30057	30058	30059	30060	30061	30062
7		30065	30066	30067	30068	30069	30070
8		30073	30074	30075	30076	30077	30078
9		30081	30082	30083	30084	30085	30086
10		30089	30090	30091	30092	30093	30094

Software Version

30097 Software Version Number
30098 Software Issue Number

3X Reference Addresses - Input Registers

	MM Number				
	1	2	3	4	5
Load index	30101	30151	30201	30251	30301
Startup/firing status	30102	30152	30202	30252	30302
Sequence status	30103	30153	30203	30253	30303
Burner rating	30104	30154	30204	30254	30304
Actual value	30105	30155	30205	30255	30305
Required value	30106	30156	30206	30256	30306
Fuel selected	30107	30157	30207	30257	30307
Number of channels	30108	30158	30208	30258	30308
Channel 1 position	30109	30159	30209	30259	30309
Channel 2 position	30110	30160	30210	30260	30310
Channel 3 position	30111	30161	30211	30261	30311
Channel 4 position	30112	30162	30212	30262	30312
MM error number	30113	30163	30213	30263	30313
Single/twin operation	30114	30164	30214	30264	30314
Run O2	30115	30165	30215	30265	30315
Run CO2	30116	30166	30216	30266	30316
Run CO	30117	30167	30217	30267	30317
Run exhaust temperature	30118	30168	30218	30268	30318
Run efficiency	30119	30169	30219	30269	30319
Run NO	30120	30170	30220	30270	30320
Run SO2	30121	30171	30221	30271	30321
Comm. O2	30122	30172	30222	30272	30322
Comm. CO2	30123	30173	30223	30273	30323
Comm. CO	30124	30174	30224	30274	30324
Comm. Exhaust temperature	30125	30175	30225	30275	30325
Comm. Efficiency	30126	30176	30226	30276	30326
Comm. NO	30127	30177	30227	30277	30327
Comm. SO2	30128	30178	30228	30278	30328
EGA error number	30129	30179	30229	30279	30329
Minimum required value	30130	30180	30230	30280	30330
Maximum required value	30131	30181	30231	30281	30331
Present flow units	30132	30182	30232	30282	30332
Present flow thousands	30133	30183	30233	30283	30333
Fuel 1 flow total units	30134	30184	30234	30284	30334
Fuel 1 flow total thousands	30135	30185	30235	30285	30335
Fuel 1 flow total millions	30136	30186	30236	30286	30336
Fuel 2 flow total units	30137	30187	30237	30287	30337
Fuel 2 flow total thousands	30138	30188	30238	30288	30338
Fuel 2 flow total millions	30139	30189	30239	30289	30339
Fuel 3 flow total units	30140	30190	30240	30290	30340
Fuel 3 flow total thousands	30141	30191	30241	30291	30341
Fuel 3 flow total millions	30142	30192	30242	30292	30342
Run ambient	30143	30193	30243	30293	30343
Run delta T	30144	30194	30244	30294	30344
COM ambient	30145	30195	30245	30295	30345
COM delta T	30146	30196	30246	30296	30346
Mk6/Mini6/Mini5 (0,4,5)	30147	30197	30247	30297	30347

3X Reference Addresses - Input Registers

	MM Number				
	6	7	8	9	10
Load index	30351	30401	30451	30501	30551
Startup/firing status	30352	30402	30452	30502	30552
Sequence status	30353	30403	30453	30503	30553
Boiler capacity	30354	30404	30454	30504	30554
Actual value	30355	30405	30455	30505	30555
Required value	30356	30406	30456	30506	30556
Fuel selected	30357	30407	30457	30507	30557
Number of channels	30358	30408	30458	30508	30558
Channel 1 position	30359	30409	30459	30509	30559
Channel 2 position	30360	30410	30460	30510	30560
Channel 3 position	30361	30411	30461	30511	30561
Channel 4 position	30362	30412	30462	30512	30562
MM error number	30363	30413	30463	30513	30563
Single/twin operation	30364	30414	30464	30514	30564
Run O2	30365	30415	30465	30515	30565
Run CO2	30366	30416	30466	30516	30566
Run CO	30367	30417	30467	30517	30567
Run exhaust temperature	30368	30418	30468	30518	30568
Run efficiency	30369	30419	30469	30519	30569
Run NO	30370	30420	30470	30520	30570
Run SO2	30371	30421	30471	30521	30571
Comm. O2	30372	30422	30472	30522	30572
Comm. CO2	30373	30423	30473	30523	30573
Comm. CO	30374	30424	30474	30524	30574
Comm. Exhaust temperature	30375	30425	30475	30525	30575
Comm. Efficiency	30376	30426	30476	30526	30576
Comm. NO	30377	30427	30477	30527	30577
Comm. SO2	30378	30428	30478	30528	30578
EGA error number	30379	30429	30479	30529	30579
Minimum required value	30380	30430	30480	30530	30580
Maximum required value	30381	30431	30481	30531	30581
Present flow units	30382	30432	30482	30532	30582
Present flow thousands	30383	30433	30483	30533	30583
Fuel 1 flow total units	30384	30434	30484	30534	30584
Fuel 1 flow total thousands	30385	30435	30485	30535	30585
Fuel 1 flow total millions	30386	30436	30486	30536	30586
Fuel 2 flow total units	30387	30437	30487	30537	30587
Fuel 2 flow total thousands	30388	30438	30488	30538	30588
Fuel 2 flow total millions	30389	30439	30489	30539	30589
Fuel 3 flow total units	30390	30440	30490	30540	30590
Fuel 3 flow total thousands	30391	30441	30491	30541	30591
Fuel 3 flow total millions	30392	30442	30492	30542	30592
Run ambient	30393	30443	30493	30543	30593
Run delta T	30394	30444	30494	30544	30594
COM ambient	30395	30445	30495	30545	30595
COM delta T	30396	30446	30496	30546	30596
Mk6/Mini6/Mini5 (0,4,5)	30397	30447	30497	30547	30597

3X Reference Addresses - Input Registers

	MM Number				
	1	2	3	4	5
Fuel 4 flow total units	30801	30851	30901	30951	31001
Fuel 4 flow total thousands	30802	30852	30902	30952	31002
Fuel 4 flow total millions	30803	30853	30903	30953	31003
Channel 5 output 0-255	30804	30854	30904	30954	31004
Channel 5 input 0-255	30805	30855	30905	30955	31005
Channel 6 output 0-255	30806	30856	30906	30956	31006
Channel 6 input 0-255	30807	30857	30907	30957	31007
Option 1	30808	30858	30908	30958	31008
Option 77	30809	30859	30909	30959	31009
Option 90	30810	30860	30910	30960	31010
Option 91	30811	30861	30911	30961	31011
Option 92	30812	30862	30912	30962	31012
Option 93	30813	30863	30913	30963	31013
Option 94	30814	30864	30914	30964	31014
Option 95	30815	30865	30915	30965	31015
Option 96	30816	30866	30916	30966	31016
Option 97	30817	30867	30917	30967	31017
Option 98	30818	30868	30918	30968	31018
Option 99	30819	30869	30919	30969	31019
Option 100	30820	30870	30920	30970	31020
Option 101	30821	30871	30921	30971	31021
Option 102	30822	30872	30922	30972	31022
Option 103	30823	30873	30923	30973	31023
Option 104	30824	30874	30924	30974	31024
Option 105	30825	30875	30925	30975	31025
Option 106	30826	30876	30926	30976	31026
Option 107	30827	30877	30927	30977	31027
Option 108	30828	30878	30928	30978	31028
Option 109	30829	30879	30929	30979	31029
Lockout code	30830	30880	30930	30980	31030
Option 71 fuel 1 type	30831	30881	30931	30981	31031
Option 72 fuel 2 type	30832	30882	30932	30982	31032
Option 73 fuel 3 type	30833	30883	30933	30983	31033
Option 74 fuel 4 type	30834	30884	30934	30984	31034
Option 61 flow units fuel 1	30835	30885	30935	30985	31035
Option 62 flow units fuel 2	30836	30886	30936	30986	31036
Option 63 flow units fuel 3	30837	30887	30937	30987	31037
Option 64 flow units fuel 4	30838	30888	30938	30988	31038
Fuel 1 hours run	30839	30889	30939	30989	31039
Fuel 2 hours run	30840	30890	30940	30990	31040
Fuel 3 hours run	30841	30891	30941	30991	31041
Fuel 4 hours run	30842	30892	30942	30992	31042
Fuel 1 start ups	30843	30893	30943	30993	31043
Fuel 2 start ups	30844	30894	30944	30994	31044
Fuel 3 start ups	30845	30895	30945	30995	31045
Fuel 4 start ups	30846	30896	30946	30996	31046
Air pressure	30847	30897	30947	30997	31047
Air pressure coding	30848	30898	30948	30998	31048
Gas pressure	30849	30899	30949	30999	31049
Gas pressure coding	30850	30900	30950	31000	31050

3X Reference Addresses - Input Registers

	MM Number				
	6	7	8	9	10
Fuel 4 flow total units	31051	31101	31151	31201	31251
Fuel 4 flow total thousands	31052	31102	31152	31202	31252
Fuel 4 flow total millions	31053	31103	31153	31203	31253
Channel 5 output 0-255	31054	31104	31154	31204	31254
Channel 5 input 0-255	31055	31105	31155	31205	31255
Channel 6 output 0-255	31056	31106	31156	31206	31256
Channel 6 input 0-255	31057	31107	31157	31207	31257
Option 1	31058	31108	31158	31208	31258
Option 77	31059	31109	31159	31209	31259
Option 90	31060	31110	31160	31210	31260
Option 91	31061	31111	31161	31211	31261
Option 92	31062	31112	31162	31212	31262
Option 93	31063	31113	31163	31213	31263
Option 94	31064	31114	31164	31214	31264
Option 95	31065	31115	31165	31215	31265
Option 96	31066	31116	31166	31216	31266
Option 97	31067	31117	31167	31217	31267
Option 98	31068	31118	31168	31218	31268
Option 99	31069	31119	31169	31219	31269
Option 100	31070	31120	31170	31220	31270
Option 101	31071	31121	31171	31221	31271
Option 102	31072	31122	31172	31222	31272
Option 103	31073	31123	31173	31223	31273
Option 104	31074	31124	31174	31224	31274
Option 105	31075	31125	31175	31225	31275
Option 106	31076	31126	31176	31226	31276
Option 107	31077	31127	31177	31227	31277
Option 108	31078	31128	31178	31228	31278
Option 109	31079	31129	31179	31229	31279
Lockout code	31080	31130	31180	31230	31280
Option 71 fuel 1 type	31081	31131	31181	31231	31281
Option 72 fuel 2 type	31082	31132	31182	31232	31282
Option 73 fuel 3 type	31083	31133	31183	31233	31283
Option 74 fuel 4 type	31084	31134	31184	31234	31284
Option 61 flow units fuel 1	31085	31135	31185	31235	31285
Option 62 flow units fuel 2	31086	31136	31186	31236	31286
Option 63 flow units fuel 3	31087	31137	31187	31237	31287
Option 64 flow units fuel 4	31088	31138	31188	31238	31288
Fuel 1 hours run	31089	31139	31189	31239	31289
Fuel 2 hours run	31090	31140	31190	31240	31290
Fuel 3 hours run	31091	31141	31191	31241	31291
Fuel 4 hours run	31092	31142	31192	31242	31292
Fuel 1 start ups	31093	31143	31193	31243	31293
Fuel 2 start ups	31094	31144	31194	31244	31294
Fuel 3 start ups	31095	31145	31195	31245	31295
Fuel 4 start ups	31096	31146	31196	31246	31296
Air pressure	31097	31147	31197	31247	31297
Air pressure coding	31098	31148	31198	31248	31298
Gas pressure	31099	31149	31199	31249	31299
Gas pressure coding	31100	31150	31200	31250	31300

3X Reference Addresses - Input Registers

The information on this page is only relevant to standalone EGAs connected directly to the DTI via the EGA port.

	EGA Number				
	1	2	3	4	5
Fuel selected	30601	30621	30641	30661	30681
% O2	30602	30622	30642	30662	30682
% CO2	30603	30623	30643	30663	30683
ppm CO	30604	30624	30644	30664	30684
ppm NO	30605	30625	30645	30665	30685
ppm SO2	30606	30626	30646	30666	30686
Exhaust temperature	30607	30627	30647	30667	30687
Efficiency	30608	30628	30648	30668	30688
Error number	30609	30629	30649	30669	30689
% voltage input	30610	30630	30650	30670	30690
Exhaust ? T	30611	30631	30651	30671	30691
Ambient	30612	30632	30652	30672	30692
Auxiliary temperature	30613	30633	30653	30673	30693
Service L.E.D.'s	30614	30634	30654	30674	30694

	EGA Number				
	6	7	8	9	10
Fuel selected	30701	30721	30741	30761	30781
% O2	30702	30722	30742	30762	30782
% CO2	30703	30723	30743	30763	30783
ppm CO	30704	30724	30744	30764	30784
ppm NO	30705	30725	30745	30765	30785
ppm SO2	30706	30726	30746	30766	30786
Exhaust temperature	30707	30727	30747	30767	30787
Efficiency	30708	30728	30748	30768	30788
Error number	30709	30729	30749	30769	30789
% voltage input	30710	30730	30750	30770	30790
Exhaust ? T	30711	30731	30751	30771	30791
Ambient	30712	30732	30752	30772	30792
Auxiliary temperature	30713	30733	30753	30773	30793
Service L.E.D.'s	30714	30734	30754	30774	30794

3X Reference Addresses - Input Registers

MM Number		
1	Error	31301
2	Error	31302
3	Error	31303
4	Error	31304
5	Error	31305
6	Error	31306
7	Error	31307
8	Error	31308
9	Error	31309
10	Error	31310

Please see section 6.17.8.4 for a list of the error codes that can be seen for each Modbus address.

MM Number		
1	Lockout	31311
2	Lockout	31312
3	Lockout	31313
4	Lockout	31314
5	Lockout	31315
6	Lockout	31316
7	Lockout	31317
8	Lockout	31318
9	Lockout	31319
10	Lockout	31320

Please see section 6.17.8.5 for a list of the lockout codes that can be seen for each Modbus address.

3X Reference Addresses - Analogue inputs- totalised values

Analogue I/O Module Number		**Channel Number** 1	2	3	4	5	6
1	byte 7/6	31324	31328	31332	31336	31340	31344
	byte 5/4	31323	31327	31331	31335	31339	31343
	byte 3/2	31322	31326	31330	31334	31338	31342
	byte 1/0	31321	31325	31329	31333	31337	31341
2	byte 7/6	31348	31352	31356	31360	31364	31368
	byte 5/4	31347	31351	31355	31359	31363	31367
	byte 3/2	31346	31350	31354	31358	31362	31366
	byte 1/0	31345	31349	31353	31357	31361	31365
3	byte 7/6	31372	31376	31380	31384	31388	31392
	byte 5/4	31371	31375	31379	31383	31387	31391
	byte 3/2	31370	31374	31378	31382	31386	31390
	byte 1/0	31369	31373	31377	31381	31385	31389
4	byte 7/6	31396	31400	31404	31408	31412	31416
	byte 5/4	31395	31399	31403	31407	31411	31415
	byte 3/2	31394	31398	31402	31406	31410	31414
	byte 1/0	31393	31397	31401	31405	31409	31413
5	byte 7/6	31420	31424	31428	31432	31436	31440
	byte 5/4	31419	31423	31427	31431	31435	31439
	byte 3/2	31418	31422	31426	31430	31434	31438
	byte 1/0	31417	31421	31425	31429	31433	31437
6	byte 7/6	31444	31448	31452	31456	31460	31464
	byte 5/4	31443	31447	31451	31455	31459	31463
	byte 3/2	31442	31446	31450	31454	31458	31462
	byte 1/0	31441	31445	31449	31453	31457	31461
7	byte 7/6	31468	31472	31476	31480	31484	31488
	byte 5/4	31467	31471	31475	31479	31483	31487
	byte 3/2	31466	31470	31474	31478	31482	31486
	byte 1/0	31465	31469	31473	31477	31481	31485
8	byte 7/6	31492	31496	31500	31504	31508	31512
	byte 5/4	31491	31495	31499	31503	31507	31511
	byte 3/2	31490	31494	31498	31502	31506	31510
	byte 1/0	31489	31493	31497	31501	31505	31509
9	byte 7/6	31516	31520	31524	31528	31532	31536
	byte 5/4	31515	31519	31523	31527	31531	31535
	byte 3/2	31514	31518	31522	31526	31530	31534
	byte 1/0	31513	31517	31521	31525	31529	31533
10	byte 7/6	31540	31544	31548	31552	31556	31560
	byte 5/4	31539	31543	31547	31551	31555	31559
	byte 3/2	31538	31542	31546	31550	31554	31558
	byte 1/0	31537	31541	31545	31549	31553	31557

3X Reference Addresses - Water Level Input Registers

	MM Number				
	1	2	3	4	5
Probe 1 signal	32001	32101	32201	32301	32401
Probe 1 reference	32002	32102	32202	32302	32402
	32003	32103	32203	32303	32403
Probe 1 Version/Issue (ms/ls byte)	32004	32104	32204	32304	32404
Probe 2 signal	32005	32105	32205	32305	32405
Probe 2 reference	32006	32106	32206	32306	32406
	32007	32107	32207	32307	32407
Probe 2 Version/Issue (ms/ls byte)	32008	32108	32208	32308	32408
Alarm status	32009	32109	32209	32309	32409
Level status	32010	32110	32210	32310	32410
WL version/Issue (ms/ls byte)	32011	32111	32211	32311	32411
Alarm code	32012	32112	32212	32312	32412
	32013	32113	32213	32313	32413
Steam temperature °C	32014	32114	32214	32314	32414
Feed water temperature °C	32015	32115	32215	32315	32415
Steam rate lb/hr	32016	32116	32216	32316	32416
Heat to steam Btus/lb	32017	32117	32217	32317	32417
Control element %	32018	32118	32218	32318	32418
	32019	32119	32219	32319	32419
Control point raised	32020	32120	32220	32320	32420
	32021	32121	32221	32321	32421
FO CRC	32022	32122	32222	32322	32422
Totalised steam lbs (ls word)	32023	32123	32223	32323	32423
Totalised steam lbs (ms word)	32024	32124	32224	32324	32424
Steam temperature F	32025	32125	32225	32325	32425
Feed water temperature F	32026	32126	32226	32326	32426
Steam rate Kgs/hr	32027	32127	32227	32327	32427
Heat to steam KJ/Kg	32028	32128	32228	32328	32428
Totalised steam Kgs (ls word)	32029	32129	32229	32329	32429
Totalised Steam Kgs (ms word)	32030	32130	32230	32330	32430
Probe 1 temperature °C	32031	32131	32231	32331	32431
Probe 2 temperature °C	32032	32132	32232	32332	32432
Probe 1 temperature °F	32033	32133	32233	32333	32433
Probe 2 temperature °F	32034	32134	32234	32334	32434
Max load index (%)	32035	32135	32235	32335	32435
Min load index (%)	32036	32136	32236	32336	32436
Cold start status- off(0)/on(1)	32037	32137	32237	32337	32437
Probe 1 corrected working	32038	32138	32238	32338	32438
Probe 2 corrected working	32039	32139	32239	32339	32439
TDS target	32040	32140	32240	32340	32440
TDS measured	32041	32141	32241	32341	32441
WL commdata CRC	32042	32142	32242	32342	32442
WL control type	32043	32143	32243	32343	32443

3X Reference Addresses - Water Level Input Registers

	MM Number				
	6	7	8	9	10
Probe 1 signal	32501	32601	32701	32801	32901
Probe 1 reference	32502	32602	32702	32802	32902
	32503	32603	32703	32803	32903
Probe 1 Version/Issue (ms/ls byte)	32504	32604	32704	32804	32904
Probe 2 signal	32505	32605	32705	32805	32905
Probe 2 reference	32506	32606	32706	32806	32906
	32507	32607	32707	32807	32907
Probe 2 Version/Issue (ms/ls byte)	32508	32608	32708	32808	32908
Alarm status	32509	32609	32709	32809	32909
Level status	32510	32610	32710	32810	32910
WL version/Issue (ms/ls byte)	32511	32611	32711	32811	32911
Alarm code	32512	32612	32712	32812	32912
	32513	32613	32713	32813	32913
Steam temperature °C	32514	32614	32714	32814	32914
Feed water temperature °C	32515	32615	32715	32815	32915
Steam rate lb/hr	32516	32616	32716	32816	32916
Heat to steam Btus/lb	32517	32617	32717	32817	32917
Control element %	32518	32618	32718	32818	32918
	32519	32619	32719	32819	32919
Control point raised	32520	32620	32720	32820	32920
	32521	32621	32721	32821	32921
FO CRC	32522	32622	32722	32822	32922
Totalised steam lbs (ls word)	32523	32623	32723	32823	32923
Totalised steam lbs (ms word)	32524	32624	32724	32824	32924
Steam temperature F	32525	32625	32725	32825	32925
Feed water temperature F	32526	32626	32726	32826	32926
Steam rate Kgs/hr	32527	32627	32727	32827	32927
Heat to steam KJ/Kg	32528	32628	32728	32828	32928
Totalised steam Kgs (ls word)	32529	32629	32729	32829	32929
Totalised Steam Kgs (ms word)	32530	32630	32730	32830	32930
Probe 1 temperature °C	32531	32631	32731	32831	32931
Probe 2 temperature °C	32532	32632	32732	32832	32932
Probe 1 temperature °F	32533	32633	32733	32833	32933
Probe 2 temperature °F	32534	32634	32734	32834	32934
Max load index (%)	32535	32635	32735	32835	32935
Min load index (%)	32536	32636	32736	32836	32936
Cold start status- off(0)/on(1)	32537	32637	32737	32837	32937
Probe 1 corrected working	32538	32638	32738	32838	32938
Probe 2 corrected working	32539	32639	32739	32839	32939
TDS target	32540	32640	32740	32840	32940
TDS measured	32541	32641	32741	32841	32941
WL commdata CRC	32542	32642	32742	32842	32942
WL control type	32543	32643	32743	32843	32943

6.17.5 4X Reference Addresses - Holding Registers

Individual Required value for each Micro Modulation unit

MM ID number		Reference Address
1		40001
2		40002
3		40003
4		40004
5		40005
6		40006
7		40007
8		40008
9		40009
10		40010

Global Required Value for all MMs

40011

Lead Boiler selection

40012

Reserved - DO NOT USE

40013 - 40016

Load Index commands- ability to change the firing rate remotely

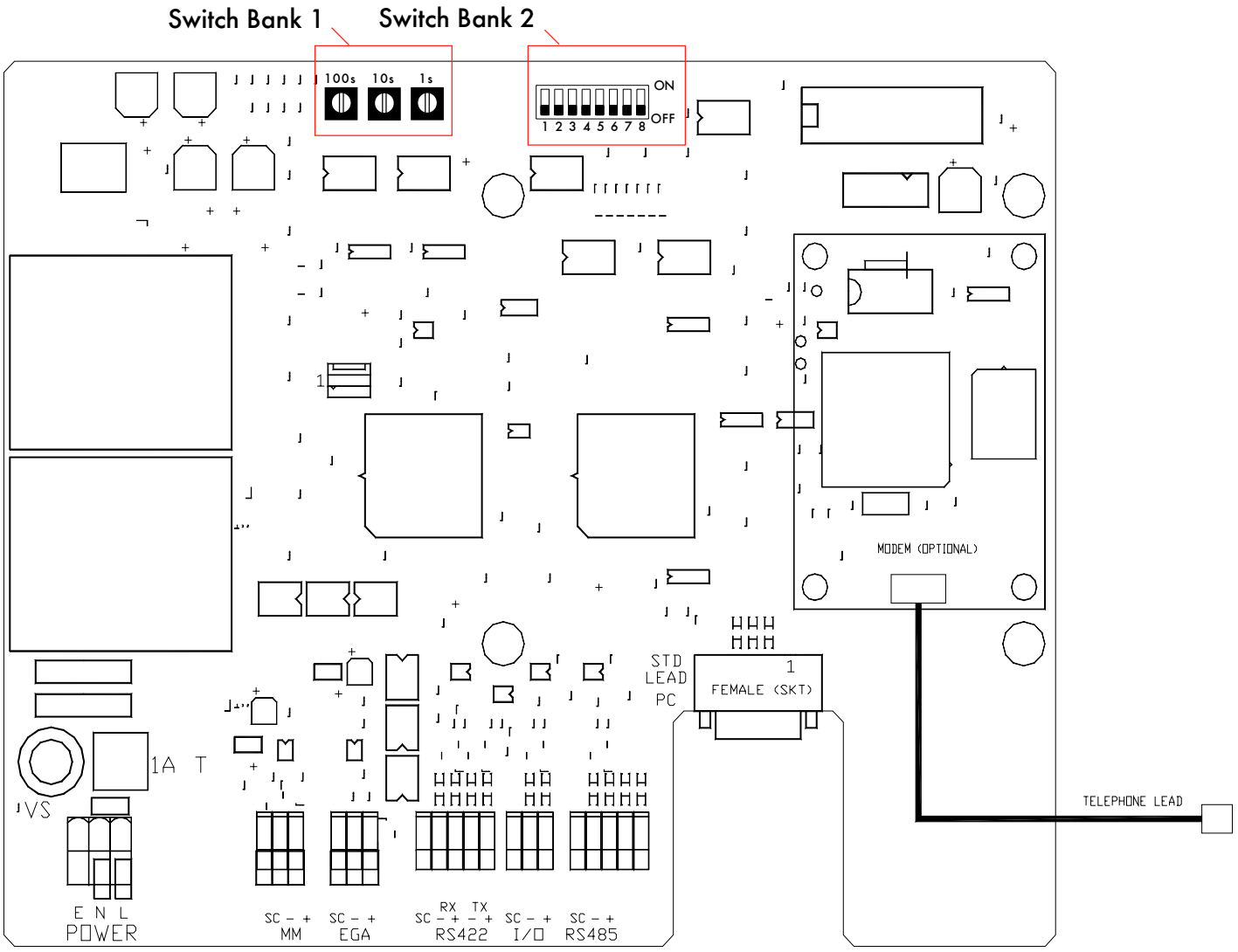
	MM Number				
	1	2	3	4	5
DTI load index value	40121	40122	40123	40124	40125
DTI load index command- off(0)/on(1)	40131	40132	40133	40134	40135

	MM Number				
	6	7	8	9	10
DTI load index value	40126	40127	40128	40129	40130
DTI load index command- off(0)/on(1)	40136	40137	40138	40139	40140

4X Reference Addresses - Holding Registers

Analogue I/O Module Number		**Output Number**					
		1	2	3	4	5	6
1		40017	40018	40019	40020	40021	40022
2		40025	40026	40027	40028	40029	40030
3		40033	40034	40035	40036	40037	40038
4		40041	40042	40043	40044	40045	40046
5		40049	40050	40051	40052	40053	40054
6		40057	40058	40059	40060	40061	40062
7		40065	40066	40067	40068	40069	40070
8		40073	40074	40075	40076	40077	40078
9		40081	40082	40083	40084	40085	40086
10		40089	40090	40091	40092	40093	40094

6.17.6 Switch Settings - Modbus Operation



Switch Bank 1

Set the Modbus address accordingly.

For example, to set address number 123:

100s	= 1
10s	= 2
1s	= 3

Switch Bank 2

1 off - Modbus 'ASCII' mode
on - Modbus 'RTU' mode

2 Transmission settings
off - 8 data bits, 1 stop bit, no parity.
on - 8 data bits, 1 stop bit, even parity.

3-5 no user function, must be set off

6 Windows PCDTI/MODBUS operation
off - 422 port set for Windows PCDTI
on - 422 port set for MODBUS

7 Windows PCDTI/MODBUS operation
off - PC port set for WinPCDTI
on - PC port set for MODBUS

8 MM Port Baud Rate
off - 9600 (Mk6, Mini Mk6 and Mini Mk5 MMs)
on - 4800 (Older Mk5 and Mini MMs)*

* Technical Memo: Data Communication Compatibility 3/9/1999

6.17.7 Other Information

Modbus Transmission Interface

There is no hardware or software flow control on any port.

Baud Rate 9600.

Supported MODBUS Commands

1	Read coil status
2	Read input status
3	Read holding registers
4	Read input registers
5	Force single coil
6	Preset single register
15	Force multiple coils
16	Preset multiple registers

6.17.7.3 Supported Exception Responses

Exception responses are not supported. No response is given to an unrecognised request.

6.17.7.4 Serial Port Connections

RS232 'PC' port - 9 Way Female D connector

PIN	Function
2	Data out
3	Data in
5	Signal ground

RS422 port - Screw terminal blocks

Receive and transmit connections are as identified on printed circuit board.

6.17.8 Relevance of MM/EGA data

Each MM/EGA can provide the following information. All values are instantaneous. Each MM/ EGA system updates the DTI approximately once every 20 seconds. Certain values and some values under certain conditions may require a decimal point. In these cases the user must add the decimal point accordingly (* only valid if EGA operational on system)

Digital Inputs (1x references)

Command status of M.M. 'CR Relay'	0- Off 1- On
Flow detector type	0- Temperature 1- Pressure
Optioned for flow metering	0- No 1- Yes
CO off/on on fuel 2 (fuel 1 CO always on)	0- Off 1- On
Temperature units	0- C 1- F
Pressure units	0- bar 1- psi
Optioned for voltage input modulation	0- No 1- Yes
Optioned for EGA	0- No 1- Yes
Boiler up to 'trimming' temperature	0- No 1- Yes
EGA cooler temperature ready	0- No 1- Yes
EGA ambient temperature OK	0- No 1- Yes
Optioned to display NO	0- No 1- Yes
Option to display SO_2	0- No 1- Yes
EGA ambient temperature low/high (relevant if bit 3 (ambient temperature) is 0)	0- LOW 1- HIGH
Optioned for sequencing	0- NO 1- YES
Setpoint/Disable commands accepted	0- NO 1- YES
Hand operation status	0- Modulating 1- Hand Operation
Low flame hold status	0- Modulating 1- Low Flame Hold
This MM controlling DTI bus communication	0- NO 1- YES
Input 88/41 set (lead boiler select)	0- NO 1- YES

Lead boiler status	0- not lead boiler 1- lead boiler
'Disabled' status	0- enabled 1- disabled
Slave burner indication status - test bit 0	0- master plus one 1- master minus one

Analogue Inputs (3x references)

0-100	Firing rate/load index - percentage	
0-250	Maximum firing rate- value number entered in option #34	
0-999 0.0-99.9	Actual value of boiler flow temperature/pressure- degrees C/F/psi Pressure- bar	
0-999 0.0-99.9	Required setpoint of boiler flow temperature/pressure- degrees C/F/psi Pressure- bar	
0-2	Present fuel selected	0- Fuel 1 (usually GAS) 1- Fuel 2 (usually OIL) 2- Fuel 3 (usually OIL)
1-7	Number of channels in operation (add one to this to get total number)	
-6.0-96.0 -6.0-96.0 -6.0-96.0 -6.0-96.0	CH1 positioning motor position degrees angular CH2 positioning motor position degrees angular CH3 positioning motor position degrees angular Ch4 positioning motor position degrees angular	
0-N	Fatal Error Code Value is as MM ERR display	0 - System is OK 1 - N system shut down
0-2	Single/twin burner operation 0 - single burner 1 - twin burner (both together only) 2 - twin burner (both together/one or the other)	
0-25.5 0-25.5 0-999 0-999 0-99.9 0-999 0-999	Present value percentage oxygen in flue gas Present value percentage carbon dioxide in flue gas Present value ppm carbon monoxide in flue gas Present value flue gas temperature Present value percentage combustion efficiency Present value NO Present value SO_2	

0-25.5	Commissioned value percentage oxygen in flue gas
0-25.5	Commissioned value percentage carbon dioxide in flue gas
0-999	Commissioned value ppm carbon monoxide in flue gas
0-999	Commissioned value flue gas temperature
0-99.9	Commissioned value percentage combustion efficiency
0-999	Commissioned value NO
0-999	Commissioned value SO_2
0-N	EGA error code normal- 0. Any other value indicates an error.
0-99.9	Minimum setpoint accepted(0-999, 0-99.9)
0-99.9	Minimum setpoint accepted(0-999, 0-99.9)
0-999	Flow value units
0-999	Flow value thousands (multiply thousands value by 1000 then add units value then divide by 100 to get flow value)
0-999	Fuel 1 totalised value units
0-999	Fuel 1 totalised value thousands
0-999	Fuel 1 totalised value millions
0-999	Fuel 2 totalised value units
0-999	Fuel 2 totalised value thousands
0-999	Fuel 2 totalised value millions
0-999	Fuel 3 totalised value units
0-999	Fuel 3 totalised value thousands
0-999	Fuel 3 totalised value millions
-6.0-96.0	Ch5 positioning motor position degrees angular
-6.0-96.0	Ch6 positioning motor position degrees angular
-6.0-96.0	Ch7 positioning motor position degrees angular
-6.0-96.0	Ch8 positioning motor position degrees angular

The following table lists the startup/firing status codes along with an explanation of what the codes mean. This is for Modbus addresses:

30102 MM ID #1
30152 MM ID #2
30202 MM ID #3
30252 MM ID #4
30302 MM ID #5
30352 MM ID #6
30402 MM ID #7
30452 MM ID #8
30502 MM ID #9
30552 MM ID #10

Code		Explanation
19		Waiting for stat circuit to complete
20		Waiting for command to drive air damper to purge position
21		Driving air damper to purge position
22		Purging: Waiting for command o drive valves to ignition position
23		Driving valves to ignition position
24		Ignition taking place
25		Burner firing and modulating
26		Post purge taking place

If 0, then the indicated transmission is direct from an E.G.A.

The following table lists the sequence status for each M.M. This is for Modbus addresses:

30103 MM ID #1
30153 MM ID #2
30203 MM ID #3
30253 MM ID #4
30303 MM ID #5
30353 MM ID #6
30403 MM ID #7
30453 MM ID #8
30503 MM ID #9
30553 MM ID #10

Code		Explanation
0		On
1		Standby
2		Warm
3		Off

The following table lists the error codes along with an explanation of what the codes mean. This is for Modbus addresses:

31301 MM ID #1
31302 MM ID #2
31303 MM ID #3
31304 MM ID #4
31305 MM ID #5
31306 MM ID #6
31307 MM ID #7
31308 MM ID #8
31309 MM ID #9
31310 MM ID #10

Code		**Error Message/Explanation**
1		CH1 positioning error
2		CH2 positioning error
3		load detector
4		Software error
5		PROM memory fault
6		Commisssion data fault
7		RAM memory fault
8		CH3 positioning error
9		CH4 positioning error
40		CR1 test failure
41		CH1 gain error
42		CH2 gain error
43		CH3 gain error
44		5 volt supply error
45		Watchdog- CR2 safety test failed
46		CH4 gain error
47		A/D converter
80		CH5 error
81		CH6 error
83		CH5 feedback signal error
84		CH6 feedbcak signal error
92		Air pressure outside limits
100		Twin burner communications failed

The following table lists the lockout codes along with an explanation of what the codes mean. This is for Modbus addresses:

31311 MM ID #1
31312 MM ID #2
31313 MM ID #3
31314 MM ID #4
31315 MM ID #5
31316 MM ID #6
31317 MM ID #7
31318 MM ID #8
31319 MM ID #9
31320 MM ID #10

Code		Lockout Message	Code		Lockout Message
1		CPI wrong state	27		Watchdog fail 2c
2		No air proving	28		Watchdog fail 2d
3		Ignition output fault	29		Input faulty
4		Motor output fault	30		Gas sensor error
5		Start gas output fault	31		Air sensor error
6		Main gas output 1 fault	32		Low gas pressure
7		Main gas output 2 fault	33		VPS air zeroing fail
8		Vent valve output fault	34		VPS gas pressure low
9		Fail safe relay fault	35		UV short circuit
10		Simulated flame	36		Oil pressure too low
11		VPS air proving fail	37		Oil pressure too high
12		VPS gas proving fail	38		CPU test failed
13		No flame signal	39		Freeze timeout
14		Shutter fault	40		Purge air pressure low
15		No cpi reset	41		Option 141 incorrect
16		Lockout permanently active	42		Terminal 86 inverse
17		Gas pressure too low	43		Terminal 85-86 fault
18		Gas pressure too high	44		Prove cct fail
19		RAM test failed	45		No prove cct set
20		PROM test failed	46		No prove cct reset
21		Watchdog fault 1a	198		BC input short
22		Watchdog fault 1b	199		Lockout 199
23		Watchdog fault 1c	200		
24		Watchdog fault 1d	201		Lockout 201
25		Watchdog fail 2a	202		EEPROM faulty
26		Watchdog fail 2b			

The following lists show the various codes for the water level Modbus addresses:

WL control type:

0- Modulating standard
1- On/off
2- Modulating high high
3- Modulating pre 1st low/pre high

Level status- the is the current level of the water:

0- Ok
1- High water
2- 1st low
3- 2nd low
4- High high water
5- Pre 1st low
6- Pre high water

Alarm code:

0- Ok
1- 2nd low
2- probe 1 comms
3- Probe 2 comms
4- Probe 1 short
5- Probe 2 short
6- Probe mismatch
7- Probe 1 TC
8- Probe 2 TC
9- Permanent reset
10- Permanent test
11- Keystuck reset
12- PU Eeprom
13- PU bogus EE state
14- Incompatible config
15- Probe 1 bogus comm data
16- Probe 2 bogus comm data
17- Config range check fail
18- 1st low
19- High water
20- Probe 1 still water
21- Probe 2 still water
22- Probes diverse
23- Pre 1st low
24- Pre high water

See section 5 for further explanation of the alarm codes.

6.17.9 Further Information

For more detailed information regarding the Modbus protocol, refer to the following publication:

Modicon Modbus Protocol Reference Guide,
PI-MBUS-300

Also visit the website: www.modicon.com

6.18 Autoflame winPCDTI Software

The Autoflame WinPCDTI software runs under Windows 95/98/NT4/XP and brings together our current range of products.

There are two modes of program operation:

Plant Supervisor for local control
Plant Manager for remote monitoring via modem for a number of sites

The software is presented in an intuitive graphical format where pictures and buttons are used to lead the operator through all the available functions.

Win PC DTI Operation (local PC connected directly)

The procedure detailed below indicates the set-up of the Autoflame winPCDTI software installed on a local PC connected directly to the DTI via a standard serial lead from the serial port on the back of the DTI to the serial port on the PC.

Components Checklist

1 x DTI*
1 x DTI to PC comms lead*
1 x DTI System CD-ROM*
1 x PC running Windows
* Included in the DTI System Package

Instructions

1. Wire all the MM and EGA modules, EGA units that are being used for standalone analysis and I/O modules to the DTI as shown in section 6.11.

2. On the back of the DTI, set the switches as shown in section 6.17.6 for winPCDTI operation. Usually, the rotary switches on switch bank 1 will be set to 001 and ways 1-8 on switch bank 2 will all be set to off.

3. Connect the DTI to the PC via a serial lead. One end will connect to the DTI's RS232 PC Port. The other will connect to the PC's serial port, usually COM1 or COM2.

4. Power up the DTI and the PC.

5. Insert the DTI system CD-ROM into the PC. Follow the instructions on the CD case to install the Autoflame winPCDTI software.

6. When the installation is complete, run winPCDTI. As this is the first time that the software has been run, it will prompt you to select Plant Manager/Plant Supervisor mode. Select Plant Supervisor.

If the DTI and other MM/EGA system modules are operational, they should appear on-line and be accessible from the PC.

6.18.1.2 Win PC DTI Operation (remote PC connected via modem)

The procedure detailed below indicates the set-up of the Autoflame winPCDTI software installed on a remote PC connected to the DTI via the modem on the DTI.

Components Checklist

1 x DTI* (this must be part number DTI60100/MD- DTI with internal modem)
2 x Modem and PC serial lead (one installed on the back of the DTI as supplied)
1 x DTI System CD-ROM*
1 x PC running Windows
* Included in the DTI System Package

Instructions

1. Wire all the MM and EGA modules, EGA units that are being used for standalone analysis and I/O modules to the DTI as shown in section 6.11.

2. On the back of the DTI, set the switches as shown in section 6.17.6 for winPCDTI operation. Usually, the rotary switches on switch bank 1 will be set to 001 and ways 1-8 on switch bank 2 will all be set to off.

3. Connect the modem on the DTI to the telephone socket.

4. Power up the DTI.

5. At the PC, connect the modem to the PC and the modem to the telephone socket.

6. Power up the modem and the PC.

7. Insert the DTI system CD-ROM into the PC. Follow the instructions on the CD case to install the Autoflame winPCDTI software.

8. When the installation is complete, run winPCDTI. As this is the first time that the software has been run, it will prompt you to select Plant Manager/Plant Supervisor mode. Select Plant Manager.

9. The site list will be empty to start of with. Click New Site to create a site entry in the data-base. Enter a name and telephone number for the site and save the changes.

10. Go back to the site list, click on your site and click Connect to dial into the remote DTI. If the other MM/EGA system modules are operational, they should appear on-line and be accessible from the PC.

6.18.1.3 Win PC DTI Operation (remote PC connected via a line driver)

The procedure detailed below indicates the set-up of the Autoflame winPCDTI software installed on a remote PC (up to 1km/4000ft) connected to the DTI via the RS422 port on the DTI to a line driver.

Components Checklist

1 x DTI*
1x Line driver and power supply
1x Standard PC modem lead
1 x DTI System CD-ROM*
1 x PC running Windows
* Included in the DTI System Package

Instructions

1. Wire all the MM and EGA modules, EGA units that are being used for standalone analysis and I/O modules to the DTI as shown in section 6.11.

2. On the back of the DTI, set the switches as shown in section 6.17.6 for winPCDTI operation. Usually, the rotary switches on switch bank 1 will be set to 001 and ways 1-8 on switch bank 2 will all be set to off.

3. Connect the long distance wiring to the RS422 port of the DTI as shown in section 6.13. At the PC end, connect the long distance wiring to the line driver. Set the switch on the line driver to DCE and plug the line driver to the PC using a standard PC Modem lead.

4. Power up the DTI, the PC and then the line driver (using its external power supply).

5. Insert the DTI system CD-ROM into the PC. Follow the instructions on the CD case to install the Autoflame winPCDTI software.

6. When the installation is complete, run winPCDTI. As this is the first time that the software has been run, it will prompt you to select Plant Manager/Plant Supervisor mode. Select Plant Supervisor.

If the DTI and other MM/EGA system modules are operational, they should appear on-line and be accessible from the PC.

Section 6.19: Johnson Metasys Interface Index

6.19.1 Overview

Autoflame's DTI unit interfaces with the Autoflame MM/EGA system. In doing so it provides a simple means of gathering information and presenting it to a bus or network. The DTI will interface with up to ten MM/EGA systems and up to ten analogue and/or digital units. This section details information regarding the Data Transfer Interface (DTI) 'Metasys' interface.

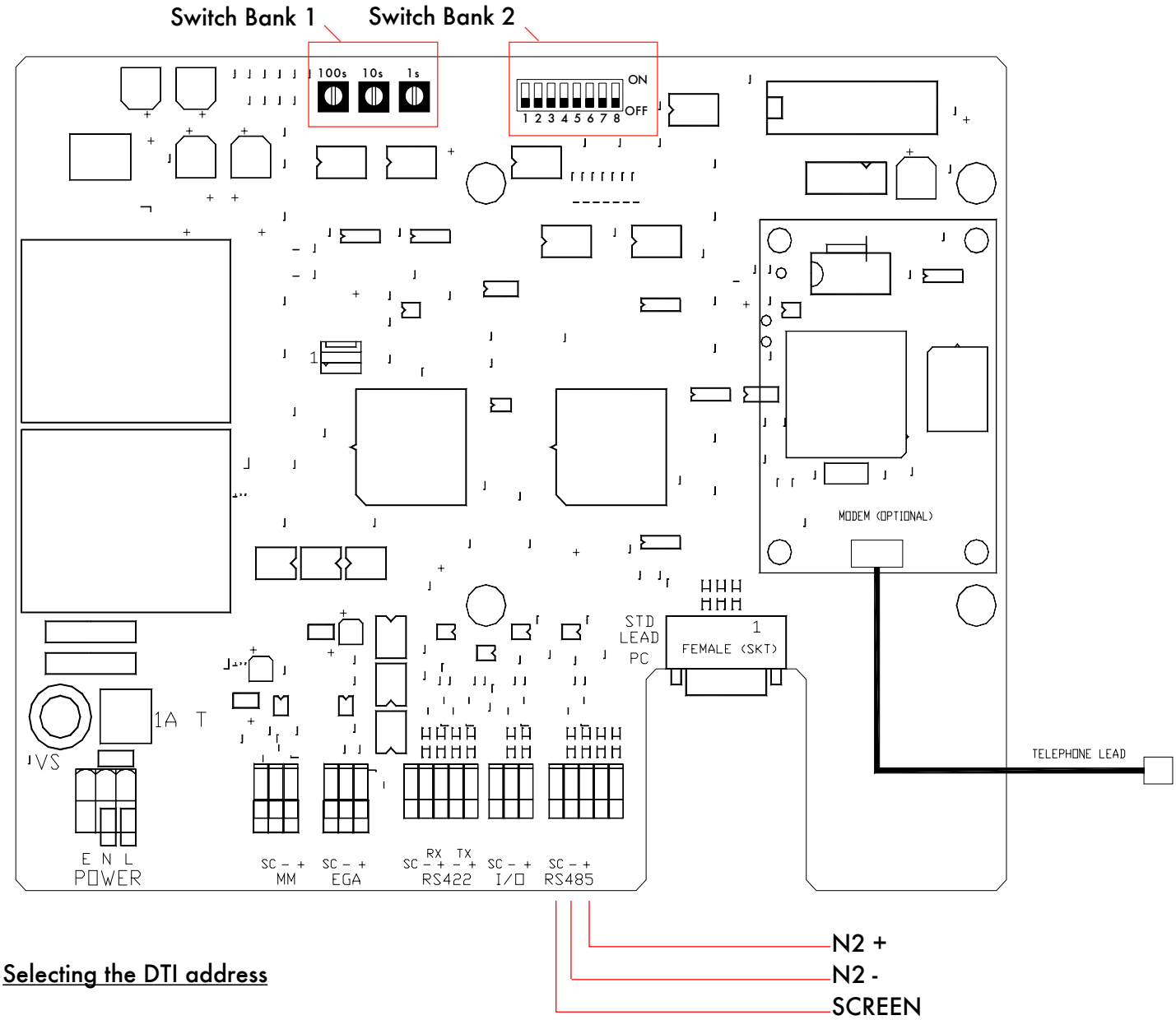
6.19.1.2 Requirements

Compatible software versions are:

DTI unit (DTI60100)	All serial numbers
DTI unit (DTI60100/MD)	All serial numbers
Mk6 unit	All serial numbers
Mini Mk6 unit	All serial numbers
Mini Mk5 evo	All serial numbers
Old DTI unit (DTI20010)	Serial number 095132 onwards
Old DTI EPROM	Metasys v1.02 onwards
MM Mk5 EPROM	300/0/15/4
mini Mk5 EPROM (2channel)	610/1/15/3
mini Mk5 EPROM (3channel)	620/1/15/3

6.19.2 Connecting the DTI to Metasys

The DTI has a port which provides direct access to the Metasys network. Connection is made via a screw terminal block labelled 'RS485+', 'RS485-' and 'RS485 screen'. Only the DTI address needs to be set by the installation engineer. The following diagram illustrates the connections required.



Selecting the DTI address

The DTI N2 address is selected by means of Switch Bank 1. Set the three rotary switches appropriately.
For example, to set address number 123: 100s = 1
10s = 2
1s = 3

The DTI can occupy any address on the Metasys network, however the DTI requires eleven free consecutive address, starting from and including the address selected using the switches. If the DTI is given address 30, 30 is selected on SW1. However addresses 31 to 40 must also be free on the network.

If Metasys operation is required alongside Modbus operation, the Metasys address and Modbus address will have to be the same.

If winPCDTI/Modbus/Metasys combinations are used, the required value and enable/disable commands can be implemented by any of these three means.

6.19.3 Network Point Table

The DTI occupies 11 (eleven) addresses on the network. The first 10 address are used to read data from the 10 MM/EGA systems and only the MM/EGa systems. The last (eleventh) address is used to read and write data to the analogue and digital units. This address is also used to read the status of MM/EGA systems and write values to them. All of the systems addresses implement internal integer and byte values only. A full network point table follows.

Technical Note

Please be aware that the Change of State feature is not implemented on the DTI/Metasys interface. Therefore, normal Metasys COS (alarm limits for analogue values and normal condition for binary) notification will be defeated. If COS notification is required, then it is necessary for the operator to:

- Map the specific object(s) requiring COS to a CS object
- Define a AD or BD object with the CS object of the required COS point
- Assign Alarm Limits to the AD
- The AD or BD point will only be scanned at a minimum of 30 seconds
- The normal state of the BO must be updated (written to) by GPL

Analogue/binary input points that are mapped in directly that do not support COS will never report a change of state condition. They will report the current value when read but no alarm notification will occur. A read will only occur if a focus window is open or a feature requires the current value.

Network point table for first 10 (ten) addresses (read values from MM/EGA systems).

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
AI	Not used	-	-	-	-
BI	Not used	-	-	-	-
AO	Not used	-	-	-	-
BO	Not used	-	-	-	-
NPT	**NPA**	**UNITS**	**DESCRIPTION**	**RANGE**	**NOTE**
ADF	01	%	Load index	0 to 100.0	
ADF	02		Startup/Firing status	19 - 28	19 = Waiting for stat. circuit to complete. 20 = Waiting for command to drive air damper to purge position. 21 = Driving air damper to purge position. 22 = Purging, waiting for command to drive values to ignition position. 23 = Driving valves to ignition position. 24 = Ignition taking place. 25 = Burner firing and modulating. 26 = Post purge taking place. 27 = Not used. 28 = Golden start.
ADF	03		Sequence status	1 to 10	
ADF	04		Boiler capacity		see option 34 on MM
ADF	05		Actual value		For units see Options 1, 51, and 52 on associated MM
ADF	06		Required value		For units see Options 1, 51, and 52 on associated MM
ADF	07		Fuel selected	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)
ADF	08		Number of channels	0 to 8	
ADF	09		Channel 1 position	-6.0 to 96.0	Displayed as –6.0 to 96.0
ADF	10		Channel 2 position	-6.0 to 96.0	Displayed as –6.0 to 96.0
ADF	11		Channel 3 position	-6.0 to 96.0	Displayed as –6.0 to 96.0
ADF	12		Channel 4 position	-6.0 to 96.0	Displayed as –6.0 to 96.0
ADF	13		MM error number	00 to 73	see section 2.3.1.2 of manual
ADF	14		Single/Twin operation	0 to 1	0 = single 1 = twin burner
ADF	15	%	Run O_2	0 to 20.9	Displayed as 0 to 20.9
ADF	16	%	Run CO_2	0 to 15	Displayed as 0 to 15.0
ADF	17	ppm	Run CO	0 to 999.0	
ADF	18		Run exhaust temperature	0 to 999.0	for units see option 51 on MM
ADF	19	%	Run efficiency	0 to 100.0	
ADF	20	ppm	Run NO	0 to 999.0	
ADF	21	ppm	Run SO_2	0 to 999.0	
ADF	22	%	Comm. O_2	0 to 20.9	Displayed as 0 to 20.9
ADF	23	%	Comm. CO_2	0 to 15.0	Displayed as 0 to 15.0
ADF	24	ppm	Comm. CO	0 to 999.0	
ADF	25		Comm. exhaust temp	0 to 999.0	for units see option 51 on MM
ADF	26	%	Comm. efficiency	0 to 100.0	

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADF	27	ppm	Comm. NO	0 to 999.0	
ADF	28	ppm	Comm. SO_2	0 to 999.0	
ADF	29		EGA error number	0 to 25	see section 3.4.1 of manual
ADF	30		Minimum required value		For units see Options 1, 51, and 52 on associated MM
ADF	31		Maximum required value		For units see Options 1, 51, and 52 on associated MM
ADF	32		Present flow units	0 to 999.0	
ADF	33		Present flow thousands	0 to 999.0	
ADF	34		Fuel 1 flow total units	0 to 999.0	
ADF	35		Fuel 1 flow total units	0 to 999.0	
ADF	36		Fuel 1 flow total thousands	0 to 999.0	
ADF	37		Fuel 1 flow total millions	0 to 999.0	
ADF	38		Fuel 2 flow total units	0 to 999.0	
ADF	39		Fuel 2 flow total thousands	0 to 999.0	
ADF	40		Fuel 2 flow total millions	0 to 999.0	
ADF	41		Fuel 3 flow total units	0 to 999.0	
ADF	42		Fuel 3 flow total thousands	0 to 999.0	
ADF	43		Fuel 3 flow total millions	0 to 999.0	
ADF	44		Channel 5 position	-6.0 to 96.0	Displayed as –6.0 to 96.0
ADF	45		Channel 6 position	-6.0 to 96.0	Displayed as –6.0 to 96.0
ADF	46		Channel 7 position	-6.0 to 90.0	Displayed as –6.0 to 96.0
ADF	47		Channel 8 position	-6.0 to 96.0	Displayed as –6.0 to 96.0
ADF	48		Not Used		
ADF	49		Not Used		
ADF	50		Not Used		
ADF	51		Fuel 4 flow total units	0 to 999.0	
ADF	52		Fuel 4 flow total thousands	0 to 999.0	
ADF	53		Fuel 4 flow total millions	0 to 999.0	
ADF	54		Channel 5 output	0 to 255.0	
ADF	55		Channel 5 input	0 to 255.0	
ADF	56		Channel 6 output	0 to 255.0	
ADF	57		Channel 6 input	0 to 255.0	
ADF	58		Option 1	3 to 8	See option table in manual
ADF	59		Option 77	0 to 5	See option table in manual
ADF	60		Option 90	0 to 1	See option table in manual
ADF	61		Option 91	0 to 2	See option table in manual
ADF	62		Option 92	1 to 200	See option table in manual
ADF	63		Option 93	1 to 200	See option table in manual
ADF	64		Option 94	0 to 2	See option table in manual
ADF	65		Option 95	0 to 1	See option table in manual
ADF	66		Option 96	0 to 200	See option table in manual
ADF	67		Option 97	0 to 200	See option table in manual
ADF	68		Not Used		
ADF	69		Not Used		
ADF	70		Option 100	0 to 1	See option table in manual
ADF	71		Option 101	0 to 2	See option table in manual
ADF	72		Option 102	1 to 200	See option table in manual
ADF	73		Option 103	1 to 200	See option table in manual
ADF	74		Option 104	0 to 2	See option table in manual

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADF	75		Option 105	0 to 1	See option table in manual
ADF	76		Option 106	0 to 200	See option table in manual
ADF	77		Option 107	0 to 200	See option table in manual
ADF	78		Not Used		
ADF	79		Not Used		
ADF	80		Lockout Code	0 to 255	See option table in manual
ADF	81		Option 71 Fuel 1 Type	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)
ADF	82		Option 72 Fuel 2 Type	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)
ADF	83		Option 73 Fuel 3 Type	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)
ADF	84		Option 74 Fuel 4 Type	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)
ADF	85		Option 61 Flow Units Fuel 1	0 to 4	0 = Cubic Feet 1 = Cubic Meters 2 = Kilograms 3 = Litres 4 = US Gallons
ADF	86		Option 62 Flow Units Fuel 2	0 to 4	0 = Cubic Feet 1 = Cubic Meters 2 = Kilograms 3 = Litres 4 = US Gallons
ADF	87		Option 63 Flow Units Fuel 3	0 to 4	0 = Cubic Feet 1 = Cubic Meters 2 = Kilograms 3 = Litres 4 = US Gallons
ADF	88		Option 64 Flow Units Fuel 4	0 to 4	0 = Cubic Feet 1 = Cubic Meters 2 = Kilograms 3 = Litres 4 = US Gallons
ADF	89		Fuel 1 Hours Run	0 to 9999.0	
ADF	90		Fuel 2 Hours Run	0 to 9999.0	
ADF	91		Fuel 3 Hours Run	0 to 9999.0	
ADF	92		Fuel 4 Hours Run	0 to 9999.0	
ADF	93		Fuel 1 Start ups	0 to 999.0	
ADF	94		Fuel 2 Start ups	0 to 999.0	
ADF	95		Fuel 3 Start ups	0 to 999.0	
ADF	96		Fuel 4 Start ups	0 to 999.0	
ADF	97		Air Pressure	0 to 999.0	Value is correctly scaled by DTI dependent on ADI 98

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADF	98		Air Pressure Coding	8 Bit Pattern	Bit_0 = 0 = off 1 = on Bit_1 = 0 = "WG 1 = mbar Bit_2 + Bit_3 =00 = 0 decimal places 01 = 1 decimal places 10 = 2 decimal places 11 = 3 decimal places Bit_4 = unused Bit_5 = unused Bit_6 = unused Bit_7 = unused
ADF	99		Gas Pressure	0 to 999.0	Value is correctly scaled by DTI dependent on ADI 100
ADF	100		Gas Pressure Coding	8 Bit Pattern	Bit_0 = 0 = off 1 = on Bit_1 + Bit_4 =00 = "WG 10 = mbar 01 = BAR 11 = PSI Bit_2 + Bit_3 =00 = 0 decimal places 01 = 1 decimal places 10 = 2 decimal places 11 = 3 decimal places Bit_5 = unused Bit_6 = unused Bit_7 = unused
ADF	101		Fuel Selected	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)
ADF	102	%	E.G.A. O_2	0 to 20.9	Displayed as 0 to 209
ADF	103	%	E.G.A. CO_2	0 to 15.0	Displayed as 0 to 15.0
ADF	104	ppm	E.G.A. CO	0 to 999.0	
ADF	105	ppm	E.G.A. NO	0 to 999.0	
ADF	106	ppm	E.G.A. SO_2	0 to 999.0	
ADF	107		E.G.A. Exhaust temp	0 to 999.0	
ADF	108	%	E.G.A. Efficiency	0 to 100.0	
ADF	109		E.G.A. Error Number	0 to 25.0	
ADF	110	%	E.G.A. Voltage Input	0 to 100.0	
ADF	111		E.G.A. Exhaust ΔT	0 to 999.0	
ADF	112		E.G.A. Ambient	0 to 50.0	
ADF	113		E.G.A. Auxiliary Temp	0 to 999.0	
ADF	114		Service LEDS	8 Bit Pattern	Bit_0 to Bit_5 = 000000 = EGA requires servicing 000001 = 2 Months to service 000011 = 4 Months 000111 = 6 Months 001111 = 8 Months 011111 = 10 Months 111111 = 1 Year Bit_6 = 1 = System Fault Bit_7 = 1 = O.K. – EGA can run
ADF	115		Not Used		
ADF	116		Not Used		
ADF	117		Not Used		
ADF	118		Not Used		
ADF	119		Not Used		

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADF	120		Not Used		
ADF	121	Hz	Probe 1 Signal		Frequency
ADF	122	Hz	Probe 1 Reference		Frequency
ADF	123		Not Used		
ADF	124		Probe 1Version/Issue		ms/ls byte
ADF	125	Hz	Probe 2 Signal		Frequency
ADF	126	Hz	Probe 2 Reference		Frequency
ADF	127		Not Used		
ADF	128		Probe 2 Version/Issue		ms/ls byte
ADF	129		Alarm Status		0 – OK 1 – High Water 2 – 1st Low 3 – 2nd Low
ADF	130		Level Status		As Alarm Status just above
ADF	131		WL Version/Issue		ms/ls byte
ADF	132		Alarm Code		0-OK 1-2nd Low 2-Probe 1 Comms 3-Probe 2 Comms 4-Probe 1 Short 5-Probe 2 Short 6-Probe Mismatch 7-Probe 1 TC 8-Probe 2TC 9-Permanent Reset 10-Permanent Test 11-Keystuck Reset 12-Power Up EEprom 13-Bogus EEprom State 14-Incompatible Config 15-Probe 1 Bogus Comm Data 16-Probe 2 Bogus Comm Data 17-Config Range Check Fail 18-1st Low 19-HighWater 20-Probe 1 Still Water 21-Probe 2 Still Water 22-Probes Diverse 255-OK/Reset
ADF	133		Not Used		
ADF	134	C	Steam Temp		
ADF	135	C	Feed Water Temp		
ADF	136	lb/hr	Steam Rate		
ADF	137	Btus/lb	Heat to Steam		
ADF	138	%	Control Element		
ADF	139		Not Used		
ADF	140	%	Control Point Raised		0-Normal 1 to 99 - % raised between 'Control Point' and 'High Water' positions
ADF	141		Not Used		
ADF	142		Not Used		
ADF	143	lbs	Totalised Steam		
ADF	144				
ADF	145	F	Steam Temp		
ADF	146	F	Feed Water Temp		
ADF	147	Kgs/hr	Steam Rate		

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADF	148	KJ/Kg	Heat to Steam		
ADF	149	Kgs	Totalised Steam		
ADF	150		Not Used		
ADF	151	C	Probe 1 Temperature		
ADF	152	C	Probe 2 Temperature		
ADF	153	F	Probe 1 Temperature		
ADF	154	F	Probe 2 Temperature		

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADI	01	%	Load index	0 to 100	
ADI	02		Startup/Firing status	19 – 28	19 = Waiting for stat. circuit to complete. 20 = Waiting for command to drive air damper to purge position. 21 = Driving air damper to purge position. 22 = Purging, waiting for command to drive values to ignition position. 23 = Driving valves to ignition position. 24 = Ignition taking place. 25 = Burner firing and modulating. 26 = Post purge taking place. 27 = Not used. 28 = Golden start.
ADI	03		Sequence status	1 to 10	
ADI	04		Boiler capacity		see option 34 on MM
ADI	05		Actual value		see option 1 on MM
ADI	06		Required value		see option 1 on MM
ADI	07		Fuel selected	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)
ADI	08		Number of channels	0 to 8	
ADI	09		Channel 1 position	-6.0 to 96.0	Displayed as -60 to 960
ADI	10		Channel 2 position	-6.0 to 96.0	Displayed as -60 to 960
ADI	11		Channel 3 position	-6.0 to 96.0	Displayed as -60 to 960
ADI	12		Channel 4 position	-6.0 to 96.0	Displayed as -60 to 960
ADI	13		MM error number	00 to 73	see section 2.3.1.2 of manual
ADI	14		Single/Twin operation	0 to 1	0 = single 1 = twin burner
ADI	15	%	Run O_2	0 to 20.9	Displayed as 0 to 209
ADI	16	%	Run CO_2	0 to 15	
ADI	17	ppm	Run CO	0 to 999	
ADI	18		Run exhaust temperature	0 to 999	for units see option 51 on MM
ADI	19	%	Run efficiency	0 to 100	
ADI	20	ppm	Run NO	0 to 999	
ADI	21	ppm	Run SO_2	0 to 999	
ADI	22	%	Comm. O_2	0 to 20.9	Displayed as 0 to 209
ADI	23	%	Comm. CO_2	0 to 15	
ADI	24	ppm	Comm. CO	0 to 999	
ADI	25		Comm. exhaust temp	0 to 999	for units see option 51 on MM
ADI	26	%	Comm. efficiency	0 to 100	
ADI	27	ppm	Comm. NO	0 to 999	
ADI	28	ppm	Comm. SO_2	0 to 999	
ADI	29		EGA error number	0 to 25	see section 3.4.1 of manual
ADI	30		Minimum required value		see option 30 on MM
ADI	31		Maximum required value		see option 31 on MM
ADI	32		Present flow units	0 to 999	
ADI	33		Present flow thousands	0 to 999	
ADI	34		Fuel 1 flow total units	0 to 999	
ADI	35		Fuel 1 flow total units	0 to 999	
ADI	36		Fuel 1 flow total thousands	0 to 999	
ADI	37		Fuel 1 flow total millions	0 to 999	

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADI	38		Fuel 2 flow total units	0 to 999	
ADI	39		Fuel 2 flow total thousands	0 to 999	
ADI	40		Fuel 2 flow total millions	0 to 999	
ADI	41		Fuel 3 flow total units	0 to 999	
ADI	42		Fuel 3 flow total thousands	0 to 999	
ADI	43		Fuel 3 flow total millions	0 to 999	
ADI	44		Channel 5 position	-6.0 to 96.0	Displayed as -60 to 960
ADI	45		Channel 6 position	-6.0 to 96.0	Displayed as -60 to 960
ADI	46		Channel 7 position	-6.0 to 90.0	Displayed as -60 to 960
ADI	47		Channel 8 position	-6.0 to 96.0	Displayed as -60 to 960
ADI	48		Not Used		
ADI	49		Not Used		
ADI	50		Not Used		
ADI	51		Fuel 4 flow total units	0 to 999	
ADI	52		Fuel 4 flow total thousands	0 to 999	
ADI	53		Fuel 4 flow total millions	0 to 999	
ADI	54		Channel 5 output	0 to 255	
ADI	55		Channel 5 input	0 to 255	
ADI	56		Channel 6 output	0 to 255	
ADI	57		Channel 6 input	0 to 255	
ADI	58		Option 1	3 to 8	See option table in manual
ADI	59		Option 77	0 to 5	See option table in manual
ADI	60		Option 90	0 to 1	See option table in manual
ADI	61		Option 91	0 to 2	See option table in manual
ADI	62		Option 92	1 to 200	See option table in manual
ADI	63		Option 93	1 to 200	See option table in manual
ADI	64		Option 94	0 to 2	See option table in manual
ADI	65		Option 95	0 to 1	See option table in manual
ADI	66		Option 96	0 to 200	See option table in manual
ADI	67		Option 97	0 to 200	See option table in manual
ADI	68		Not Used		
ADI	69		Not Used		
ADI	70		Option 100	0 to 1	See option table in manual
ADI	71		Option 101	0 to 2	See option table in manual
ADI	72		Option 102	1 to 200	See option table in manual
ADI	73		Option 103	1 to 200	See option table in manual
ADI	74		Option 104	0 to 2	See option table in manual
ADI	75		Option 105	0 to 1	See option table in manual
ADI	76		Option 106	0 to 200	See option table in manual
ADI	77		Option 107	0 to 200	See option table in manual
ADI	78		Not Used		
ADI	79		Not Used		
ADI	80		Lockout Code	0 to 255	See option table in manual
ADI	81		Option 71 Fuel 1 Type	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADI	82		Option 72 Fuel 2 Type	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)
ADI	83		Option 73 Fuel 3 Type	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)
ADI	84		Option 74 Fuel 4 Type	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)
ADI	85		Option 61 Flow Units Fuel 1	0 to 4	0 = Cubic Feet 1 = Cubic Meters 2 = Kilograms 3 = Litres 4 = US Gallons
ADI	86		Option 62 Flow Units Fuel 2	0 to 4	0 = Cubic Feet 1 = Cubic Meters 2 = Kilograms 3 = Litres 4 = US Gallons
ADI	87		Option 63 Flow Units Fuel 3	0 to 4	0 = Cubic Feet 1 = Cubic Meters 2 = Kilograms 3 = Litres 4 = US Gallons
ADI	88		Option 64 Flow Units Fuel 4	0 to 4	0 = Cubic Feet 1 = Cubic Meters 2 = Kilograms 3 = Litres 4 = US Gallons
ADI	89		Fuel 1 Hours Run	0 to 9999	
ADI	90		Fuel 2 Hours Run	0 to 9999	
ADI	91		Fuel 3 Hours Run	0 to 9999	
ADI	92		Fuel 4 Hours Run	0 to 9999	
ADI	93		Fuel 1 Start ups	0 to 999	
ADI	94		Fuel 2 Start ups	0 to 999	
ADI	95		Fuel 3 Start ups	0 to 999	
ADI	96		Fuel 4 Start ups	0 to 999	
ADI	97		Air Pressure	0 to 999	See point 98 for units
ADI	98		Air Pressure Coding	8 Bit Pattern	Bit_0 = 0 = off 1 = on Bit_1 = 0 = "WG 1 = mbar Bit_2 + Bit_3 = 00 = 0 decimal places 01 = 1 decimal places 10 = 2 decimal places 11 = 3 decimal places Bit_4 =unused Bit_5 =unused Bit_6 =unused Bit_7 =unused
ADI	99		Gas Pressure	0 to 999	See point 100 for units

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADI	100		Gas Pressure Coding	8 Bit Pattern	Bit_0= 0 = off 1 = on Bit_1 + Bit_4 = 00 = "WG 10 = mbar 01 = BAR 11 = PSI Bit_2 + Bit_3 =00 = 0 decimal places 01 = 1 decimal places 10 = 2 decimal places 11 = 3 decimal places Bit_5 =unused Bit_6 =unused Bit_7 =unused
ADI	101		Fuel Selected	0 to 3	0 = Fuel 1 (usually gas) 1 = Fuel 2 (usually oil) 2 = Fuel 3 (usually oil) 3 = Fuel 4 (Aux.)
ADI	102	%	E.G.A. O_2	0 to 20.9	Displayed as 0 to 209
ADI	103	%	E.G.A. CO_2	0 to 15	
ADI	104	ppm	E.G.A. CO	0 to 999	
ADI	105	ppm	E.G.A. NO	0 to 999	
ADI	106	ppm	E.G.A. SO_2	0 to 999	
ADI	107		E.G.A. Exhaust temp	0 to 999	
ADI	108	%	E.G.A. Efficiency	0 to 100	
ADI	109		E.G.A. Error Number	0 to 25	
ADI	110	%	E.G.A. Voltage Input	0 to 100	
ADI	111		E.G.A. Exhaust ΔT	0 to 999	
ADI	112		E.G.A. Ambient	0 to 50	
ADI	113		E.G.A. Auxiliary Temp	0 to 9999	
ADI	114		Service LEDS	8 Bit Pattern	Bit_0 to Bit_5 = 000000 = EGA requires servicing 000001 = 2 Months to service 000011 = 4 Months 000111 = 6 Months 001111 = 8 Months 011111 = 10 Months 111111 = 1 Year Bit_6 = 1 = System Fault Bit_7 = 1 = O.K. – EGA can run
ADI	115-120		Not Used		
ADI	121	Hz	Probe 1 Signal	U integer	Frequency
ADI	122	Hz	Probe 1 Reference	U integer	Frequency
ADI	123		Not Used		
ADI	124		Probe 1Version/Issue	U integer	ms/ls byte
ADI	125	Hz	Probe 2 Signal	U integer	Frequency
ADI	126	Hz	Probe 2 Reference	U integer	Frequency
ADI	127		Not Used		
ADI	128		Probe 2 Version/Issue	U integer	ms/ls byte
ADI	129		Alarm Status	U integer	0 – OK 1 – High Water 2 – 1st Low 3 – 2nd Low
ADI	130		Level Status	U integer	As Alarm Status just above
ADI	131		WL Version/Issue	U integer	ms/ls byte

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADI	132		Alarm Code	U integer	0-OK 1-2nd Low 2-Probe 1 Comms 3-Probe 2 Comms 4-Probe 1 Short 5-Probe 2 Short 6-Probe Mismatch 7-Probe 1 TC 8-Probe 2TC 9-Permanent Reset 10-Permanent Test 11-Keystuck Reset 12-Power Up EEprom 13-Bogus Eeprom State 14-Incompatible Config 15-Probe 1 Bogus Comm Data 16-Probe 2 Bogus Comm Data 17-Config Range Check Fail 18-1st Low 19-HighWater 20-Probe 1 Still Water 21-Probe 2 Still Water 22-Probes Diverse 255-OK/Reset
ADI	133		Not Used		
ADI	134	C	Steam Temp	U integer	
ADI	135	C	Feed Water Temp	U integer	
ADI	136	lb/hr	Steam Rate		USE ADF
ADI	137	Btus/lb	Heat to Steam		USE ADF
ADI	138	%	Control Element	U integer	Mod Valve close-open as percentage VSD min/max speed as percentage
ADI	139		Not Used		
ADI	140	%	Control Point Raised	U integer	0-Normal 1 to 99 - % raised between 'Control Point' and 'High Water' positions
ADI	141		Not Used		
ADI	142		Not Used		
ADI	143	lbs	Totalised Steam		USE ADF
ADI	144		Not Used		USE ADF
ADI	145	F	Steam Temp	U integer	
ADI	146	F	Feed Water Temp	U integer	
ADI	147	Kgs/hr	Steam Rate		USE ADF
ADI	148	KJ/Kg	Heat to Steam		USE ADF
ADI	149	Kgs	Totalised Steam		USE ADF
ADI	150		Not Used		
ADI	151	C	Probe 1 Temperature	U integer	
ADI	152	C	Probe 2 Temperature	U integer	
ADI	153	F	Probe 1 Temperature	U integer	
ADI	154	F	Probe 2 Temperature	U integer	

N.B. In the case of ADI/ADF points 101 through 114, values correspond to an EGA address not an MM address e.g. address 1 would correspond to E.G.A. #1 etc.

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
BD	01		CR Relay status	1 = burner run 0 = burner off	
BD	02		Not used		
BD	03		Not used		
BD	04		Not used		
BD	05		Not used		
BD	06		Not used		
BD	07		Not used		
BD	08		Not used		
BD	09		Temp./Pressure	0 = Temp. 1 = Press.	
BD	10		Not used		
BD	11		Not used		
BD	12		Not used		
BD	13		Not used		
BD	14		Not used		
BD	15		Not used		
BD	16		Not used		
BD	17		Not used		
BD	18		Flowmetering on	1 = yes 0 = no	
BD	19		CO displayed on F2/F3	1 = Displayed 0 = not displayed	
BD	20		Not used		
BD	21		^{O}C or ^{O}F	1 = F 0 = C	
BD	22		Bar or PSI	1 = PSI 0 = Bar	
BD	23		External Voltage	1 = yes 0 = no	
BD	24		Not used		
BD	25		EGA optioned	1 = yes 0 = no	
BD	26		Actual up to trim threshold	1 = yes 0 = no	
BD	27		E.G.A. cooler ready	1 = yes 0 = no	
BD	28		E.G.A ambient temp OK	1 = yes 0 = no	
BD	29		Optioned to display NO	1 = yes 0 = no	
BD	30		Optioned to display SO_2	1 = yes 0 = no	
BD	31		E.G.A. ambient temp. low/high	1 = Hi 0 = Lo	
BD	32		Not used		
BD	33		Sequencing optioned	1 = yes 0 = no	
BD	34		Setpoint/Enable commands accepted	1 = yes 0 = no	
BD	35		Not used		
BD	36		Not used		
BD	37		Not used		
BD	38		Not used		
BD	39		Not used		

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
BD	40		Not used		
BD	41		Hand operation status	1 = Hand operation 0 = Modulating	
BD	42		Low flame hold status	1 = Low flame hold 0 = Modulating	
BD	43		Not used		
BD	44		Not used		
BD	45		Not used		
BD	46		Not used		
BD	47		MM working comms	1 = yes 0 = no	
BD	48		Input 41 set (lead boiler select)	1 = yes 0 = no	
BD	49		Lead boiler status	1 = Lead boiler. 0 = Not lead boiler.	
BD	50		'Disabled' status	1 = Disabled 0 = Enabled	
BD	57		Slave burner left/right	1 = 0 =	
BD	58-80		Not Used		
BD	81		Water Level Enabled		
BD	82		Units imp(0)metric(1)		
BD	83		Feed Water Pump ON/OFF		
BD	84-88		Not Used		
BD	89		First Out 1		
BD	90		First Out 2		
BD	91		First Out 3		
BD	92		First Out 4		
BD	93		First Out 5		
BD	94		First Out 6		
BD	95		First Out 7		
BD	96		First Out 8		
BD	97		First Out 9		
BD	98		First Out 10		
BD	99		First Out 11		
BD	100		First Out 12		
BD	101		First Out 13		
BD	102		First Out 14		
BD	103		First Out 15		
BD	104-112		Not Used		

Network point table for last (eleventh) address (read/write values from/to analog and digital units also to MM/EGA).

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
AI	Not used	-	-	-	-
BI	Not used	-	-	-	-
AO	Not used	-	-	-	-
BO	Not used	-	-	-	-
NPT	**NPA**	**UNITS**	**DESCRIPTION**	**RANGE**	**NOTE**
ADF	01		MM 1 new required value	for range see option 30 and 31 on MM	for units see Options 1, 51, and 52 on associated MM write only – floating point representation.
ADF	02		MM 2 new required value	for range see option 30 and 31 on MM	for units see Options 1, 51, and 52 on associated MM write only – floating point representation.
ADF	03		MM 3 new required value	for range see option 30 and 31 on MM	for units see Options 1, 51, and 52 on associated MM write only – floating point representation.
ADF	04		MM 4 new required value	see option 30 and 31 on MM	for units see Options 1, 51, and 52 on associated MM write only – floating point representation.
ADF	05		MM 5 new required value	for range see option 30 and 31 on MM	for units see Options 1, 51, and 52 on associated MM write only – floating point representation.
ADF	06		MM 6 new required value	for range see option 30 and 31 on MM	for units see Options 1, 51, and 52 on associated MM write only – floating point representation.
ADF	07		MM 7 new required value	for range see option 30 and 31 on MM	for units see Options 1, 51, and 52 on associated MM write only – floating point representation.
ADF	08		MM 8 new required value	for range see option 30 and 31 on MM	for units see Options 1, 51, and 52 on associated MM write only – floating point representation.
ADF	09		MM 9 new required value	for range see option 30 and 31 on MM	for units see Options 1, 51, and 52 on associated MM write only – floating point representation.
ADF	10		MM 10 new required value	for range see option 30 and 31 on MM	for units see Options 1, 51, and 52 on associated MM write only – floating point representation.
ADF	11		Global required value		for units see Options 1, 51, and 52 on MM 1 write only – floating point representation.

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADI	01		MM 1 new required value	for range see option 30 and 31 on MM	write only
ADI	02		MM 2 new required value	for range see option 30 and 31 on MM	write only
ADI	03		MM 3 new required value	for range see option 30 and 31 on MM	write only
ADI	04		MM 4 new required value	see option 30 and 31 on MM	write only
ADI	05		MM 5 new required value	for range see option 30 and 31 on MM	write only
ADI	06		MM 6 new required value	for range see option 30 and 31 on MM	write only
ADI	07		MM 7 new required value	for range see option 30 and 31 on MM	write only
ADI	08		MM 8 new required value	for range see option 30 and 31 on MM	write only
ADI	09		MM 9 new required value	for range see option 30 and 31 on MM	write only
ADI	10		MM 10 new required value	for range see option 30 and 31 on MM	write only
ADI	11		Global required value		write only
ADI	12		Lead boiler select	1 to 10	write only
ADI	13		Number of MM's on system	1 to 10	write only
ADI	14		Not used		
ADI	15		Not used		
ADI	16		Not used		
ADI	17		Analog unit 1 output 1	0 to 255	read and write
ADI	18		Analog unit 1 output 2	0 to 255	read and write
ADI	19		Analog unit 1 output 3	0 to 255	read and write
ADI	20		Analog unit 1 output 4	0 to 255	read and write
ADI	21		Analog unit 1 output 5	0 to 255	read and write
ADI	22		Analog unit 1 output 6	0 to 255	read and write
ADI	23		Not used		
ADI	24		Not used		
ADI	25		Analog unit 2 output 1	0 to 255	read and write
ADI	26		Analog unit 2 output 2	0 to 255	read and write
ADI	27		Analog unit 2 output 3	0 to 255	read and write
ADI	28		Analog unit 2 output 4	0 to 255	read and write
ADI	29		Analog unit 2 output 5	0 to 255	read and write
ADI	30		Analog unit 2 output 6	0 to 255	read and write
ADI	31		Not used		
ADI	32		Not used		
ADI	33		Analog unit 3 output 1	0 to 255	read and write
ADI	34		Analog unit 3 output 2	0 to 255	read and write
ADI	35		Analog unit 3 output 3	0 to 255	read and write

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADI	36		Analog unit 3 output 4	0 to 255	read and write
ADI	37		Analog unit 3 output 5	0 to 255	read and write
ADI	38		Analog unit 3 output 6	0 to 255	read and write
ADI	39		Not used		
ADI	40		Not used		
ADI	41		Analog unit 4 output 1	0 to 255	read and write
ADI	42		Analog unit 4 output 2	0 to 255	read and write
ADI	43		Analog unit 4 output 3	0 to 255	read and write
ADI	44		Analog unit 4 output 4	0 to 255	read and write
ADI	45		Analog unit 4 output 5	0 to 255	read and write
ADI	46		Analog unit 4 output 6	0 to 255	read and write
ADI	47		Not used		
ADI	48		Not used		
ADI	49		Analog unit 5 output 1	0 to 255	read and write
ADI	50		Analog unit 5 output 2	0 to 255	read and write
ADI	51		Analog unit 5 output 3	0 to 255	read and write
ADI	52		Analog unit 5 output 4	0 to 255	read and write
ADI	53		Analog unit 5 output 5	0 to 255	read and write
ADI	54		Analog unit 5 output 6	0 to 255	read and write
ADI	55		Not used		
ADI	56		Not used		
ADI	57		Analog unit 6 output 1	0 to 255	read and write
ADI	58		Analog unit 6 output 2	0 to 255	read and write
ADI	59		Analog unit 6 output 3	0 to 255	read and write
ADI	60		Analog unit 6 output 4	0 to 255	read and write
ADI	61		Analog unit 6 output 5	0 to 255	read and write
ADI	62		Analog unit 6 output 6	0 to 255	read and write
ADI	63		Not used		
ADI	64		Not used		
ADI	65		Analog unit 7 output 1	0 to 255	read and write
ADI	66		Analog unit 7 output 2	0 to 255	read and write
ADI	67		Analog unit 7 output 3	0 to 255	read and write
ADI	68		Analog unit 7 output 4	0 to 255	read and write
ADI	69		Analog unit 7 output 5	0 to 255	read and write
ADI	70		Analog unit 7 output 6	0 to 255	read and write
ADI	71		Not used		
ADI	72		Not used		
ADI	73		Analog unit 8 output 1	0 to 255	read and write
ADI	74		Analog unit 8 output 2	0 to 255	read and write
ADI	75		Analog unit 8 output 3	0 to 255	read and write
ADI	76		Analog unit 8 output 4	0 to 255	read and write
ADI	77		Analog unit 8 output 5	0 to 255	read and write
ADI	78		Analog unit 8 output 6	0 to 255	read and write
ADI	79		Not used		
ADI	80		Not used		
ADI	81		Analog unit 9 output 1	0 to 255	read and write
ADI	82		Analog unit 9 output 2	0 to 255	read and write
ADI	83		Analog unit 9 output 3	0 to 255	read and write
ADI	84		Analog unit 9 output 4	0 to 255	read and write

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADI	85		Analog unit 9 output 5	0 to 255	read and write
ADI	86		Analog unit 9 output 6	0 to 255	read and write
ADI	87		Not used		
ADI	88		Not used		
ADI	89		Analog unit 10 output 1	0 to 255	read and write
ADI	90		Analog unit 10 output 2	0 to 255	read and write
ADI	91		Analog unit 10 output 3	0 to 255	read and write
ADI	92		Analog unit 10 output 4	0 to 255	read and write
ADI	93		Analog unit 10 output 5	0 to 255	read and write
ADI	94		Analog unit 10 output 6	0 to 255	read and write
ADI	95		Not used		
ADI	96		Not used		
ADI	97		Not used		
ADI	98		Not used		
ADI	99		Not used		
ADI	100		Not used		
ADI	101		Not used		
ADI	102		Not used		
ADI	103		Not used		
ADI	104		Not used		
ADI	105		Not used		
ADI	106		Not used		
ADI	107		Not used		
ADI	108		Not used		
ADI	109		Not used		
ADI	110		Not used		
ADI	111		Not used		
ADI	112		Analog unit 1 input 1	0 to 255	read only
ADI	113		Analog unit 1 input 2	0 to 255	read only
ADI	114		Analog unit 1 input 3	0 to 255	read only
ADI	115		Analog unit 1 input 4	0 to 255	read only
ADI	116		Analog unit 1 input 5	0 to 255	read only
ADI	117		Analog unit 1 input 6	0 to 255	read only
ADI	118		Not used		
ADI	119		Not used		
ADI	120		Analog unit 2 input 1	0 to 255	read only
ADI	121		Analog unit 2 input 2	0 to 255	read only
ADI	122		Analog unit 2 input 3	0 to 255	read only
ADI	123		Analog unit 2 input 4	0 to 255	read only
ADI	124		Analog unit 2 input 5	0 to 255	read only
ADI	125		Analog unit 2 input 6	0 to 255	read only
ADI	126		Not used		
ADI	127		Not used		
ADI	128		Analog unit 3 input 1	0 to 255	read only
ADI	129		Analog unit 3 input 2	0 to 255	read only
ADI	130		Analog unit 3 input 3	0 to 255	read only
ADI	131		Analog unit 3 input 4	0 to 255	read only
ADI	132		Analog unit 3 input 5	0 to 255	read only
ADI	133		Analog unit 3 input 6	0 to 255	read only

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADI	134		Not used		
ADI	135		Not used		
ADI	136		Analog unit 4 input 1	0 to 255	read only
ADI	137		Analog unit 4 input 2	0 to 255	read only
ADI	138		Analog unit 4 input 3	0 to 255	read only
ADI	139		Analog unit 4 input 4	0 to 255	read only
ADI	140		Analog unit 4 input 5	0 to 255	read only
ADI	141		Analog unit 4 input 6	0 to 255	read only
ADI	142		Not used		
ADI	143		Not used		
ADI	144		Analog unit 5 input 1	0 to 255	read only
ADI	145		Analog unit 5 input 2	0 to 255	read only
ADI	146		Analog unit 5 input 3	0 to 255	read only
ADI	147		Analog unit 5 input 4	0 to 255	read only
ADI	148		Analog unit 5 input 5	0 to 255	read only
ADI	149		Analog unit 5 input 6	0 to 255	read only
ADI	150		Not used		
ADI	151		Not used		
ADI	152		Analog unit 6 input 1	0 to 255	read only
ADI	153		Analog unit 6 input 2	0 to 255	read only
ADI	154		Analog unit 6 input 3	0 to 255	read only
ADI	155		Analog unit 6 input 4	0 to 255	read only
ADI	156		Analog unit 6 input 5	0 to 255	read only
ADI	157		Analog unit 6 input 6	0 to 255	read only
ADI	158		Not used		
ADI	159		Not used		
ADI	160		Analog unit 7 input 1	0 to 255	read only
ADI	161		Analog unit 7 input 2	0 to 255	read only
ADI	162		Analog unit 7 input 3	0 to 255	read only
ADI	163		Analog unit 7 input 4	0 to 255	read only
ADI	164		Analog unit 7 input 5	0 to 255	read only
ADI	165		Analog unit 7 input 6	0 to 255	read only
ADI	166		Not used		
ADI	167		Not used		
ADI	168		Analog unit 8 input 1	0 to 255	read only
ADI	169		Analog unit 8 input 2	0 to 255	read only
ADI	170		Analog unit 8 input 3	0 to 255	read only
ADI	171		Analog unit 8 input 4	0 to 255	read only
ADI	172		Analog unit 8 input 5	0 to 255	read only
ADI	173		Analog unit 8 input 6	0 to 255	read only
ADI	174		Not used		
ADI	175		Not used		
ADI	176		Analog unit 9 input 1	0 to 255	read only
ADI	177		Analog unit 9 input 2	0 to 255	read only
ADI	178		Analog unit 9 input 3	0 to 255	read only
ADI	179		Analog unit 9 input 4	0 to 255	read only
ADI	180		Analog unit 9 input 5	0 to 255	read only
ADI	181		Analog unit 9 input 6	0 to 255	read only
ADI	182		Not used		

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
ADI	183		Not used		
ADI	184		Analog unit 10 input 1	0 to 255	read only
ADI	185		Analog unit 10 input 2	0 to 255	read only
ADI	186		Analog unit 10 input 3	0 to 255	read only
ADI	187		Analog unit 10 input 4	0 to 255	read only
ADI	188		Analog unit 10 input 5	0 to 255	read only
ADI	189		Analog unit 10 input 6	0 to 255	read only

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
BD$_{READ}$	01		Digital unit 1 input 1	0 or 1	see digital unit setup
BD$_{READ}$	02		Digital unit 1 input 2	0 or 1	see digital unit setup
BD$_{READ}$	03		Digital unit 1 input 3	0 or 1	see digital unit setup
BD$_{READ}$	04		Digital unit 1 input 4	0 or 1	see digital unit setup
BD$_{READ}$	05		Digital unit 1 input 5	0 or 1	see digital unit setup
BD$_{READ}$	06		Digital unit 1 input 6	0 or 1	see digital unit setup
BD$_{READ}$	07		Digital unit 1 input 7	0 or 1	see digital unit setup
BD$_{READ}$	08		Digital unit 1 input 8	0 or 1	see digital unit setup
BD$_{READ}$	09		Digital unit 1 input 9	0 or 1	see digital unit setup
BD$_{READ}$	10		Digital unit 1 input 10	0 or 1	see digital unit setup
BD$_{READ}$	11		Digital unit 1 input 11	0 or 1	see digital unit setup
BD$_{READ}$	12		Digital unit 1 input 12	0 or 1	see digital unit setup
BD$_{READ}$	13		Digital unit 1 input 13	0 or 1	see digital unit setup
BD$_{READ}$	14		Digital unit 1 input 14	0 or 1	see digital unit setup
BD$_{READ}$	15		Digital unit 1 input 15	0 or 1	see digital unit setup
BD$_{READ}$	16		Digital unit 1 input 16	0 or 1	see digital unit setup
BD$_{READ}$	17		Digital unit 2 input 1	0 or 1	see digital unit setup
BD$_{READ}$	18		Digital unit 2 input 2	0 or 1	see digital unit setup
BD$_{READ}$	19		Digital unit 2 input 3	0 or 1	see digital unit setup
BD$_{READ}$	20		Digital unit 2 input 4	0 or 1	see digital unit setup
BD$_{READ}$	21		Digital unit 2 input 5	0 or 1	see digital unit setup
BD$_{READ}$	22		Digital unit 2 input 6	0 or 1	see digital unit setup
BD$_{READ}$	23		Digital unit 2 input 7	0 or 1	see digital unit setup
BD$_{READ}$	24		Digital unit 2 input 8	0 or 1	see digital unit setup
BD$_{READ}$	25		Digital unit 2 input 9	0 or 1	see digital unit setup
BD$_{READ}$	26		Digital unit 2 input 10	0 or 1	see digital unit setup
BD$_{READ}$	27		Digital unit 2 input 11	0 or 1	see digital unit setup
BD$_{READ}$	28		Digital unit 2 input 12	0 or 1	see digital unit setup
BD$_{READ}$	29		Digital unit 2 input 13	0 or 1	see digital unit setup
BD$_{READ}$	30		Digital unit 2 input 14	0 or 1	see digital unit setup
BD$_{READ}$	31		Digital unit 2 input 15	0 or 1	see digital unit setup
BD$_{READ}$	32		Digital unit 2 input 16	0 or 1	see digital unit setup
BD$_{READ}$	33		Digital unit 3 input 1	0 or 1	see digital unit setup
BD$_{READ}$	34		Digital unit 3 input 2	0 or 1	see digital unit setup
BD$_{READ}$	35		Digital unit 3 input 3	0 or 1	see digital unit setup
BD$_{READ}$	36		Digital unit 3 input 4	0 or 1	see digital unit setup
BD$_{READ}$	37		Digital unit 3 input 5	0 or 1	see digital unit setup
BD$_{READ}$	38		Digital unit 3 input 6	0 or 1	see digital unit setup
BD$_{READ}$	39		Digital unit 3 input 7	0 or 1	see digital unit setup
BD$_{READ}$	40		Digital unit 3 input 8	0 or 1	see digital unit setup
BD$_{READ}$	41		Digital unit 3 input 9	0 or 1	see digital unit setup
BD$_{READ}$	42		Digital unit 3 input 10	0 or 1	see digital unit setup
BD$_{READ}$	43		Digital unit 3 input 11	0 or 1	see digital unit setup
BD$_{READ}$	44		Digital unit 3 input 12	0 or 1	see digital unit setup
BD$_{READ}$	45		Digital unit 3 input 13	0 or 1	see digital unit setup
BD$_{READ}$	46		Digital unit 3 input 14	0 or 1	see digital unit setup
BD$_{READ}$	47		Digital unit 3 input 15	0 or 1	see digital unit setup
BD$_{READ}$	48		Digital unit 3 input 16	0 or 1	see digital unit setup
BD$_{READ}$	49		Digital unit 4 input 1	0 or 1	see digital unit setup
BD$_{READ}$	50		Digital unit 4 input 2	0 or 1	see digital unit setup
BD$_{READ}$	51		Digital unit 4 input 3	0 or 1	see digital unit setup
BD$_{READ}$	52		Digital unit 4 input 4	0 or 1	see digital unit setup
BD$_{READ}$	53		Digital unit 4 input 5	0 or 1	see digital unit setup

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
BDREAD	54		Digital unit 4 input 6	0 or 1	see digital unit setup
BDREAD	55		Digital unit 4 input 7	0 or 1	see digital unit setup
BDREAD	56		Digital unit 4 input 8	0 or 1	see digital unit setup
BDREAD	57		Digital unit 4 input 9	0 or 1	see digital unit setup
BDREAD	58		Digital unit 4 input 10	0 or 1	see digital unit setup
BDREAD	59		Digital unit 4 input 11	0 or 1	see digital unit setup
BDREAD	60		Digital unit 4 input 12	0 or 1	see digital unit setup
BDREAD	61		Digital unit 4 input 13	0 or 1	see digital unit setup
BDREAD	62		Digital unit 4 input 14	0 or 1	see digital unit setup
BDREAD	63		Digital unit 4 input 15	0 or 1	see digital unit setup
BDREAD	64		Digital unit 4 input 16	0 or 1	see digital unit setup
BDREAD	65		Digital unit 5 input 1	0 or 1	see digital unit setup
BDREAD	66		Digital unit 5 input 2	0 or 1	see digital unit setup
BDREAD	67		Digital unit 5 input 3	0 or 1	see digital unit setup
BDREAD	68		Digital unit 5 input 4	0 or 1	see digital unit setup
BDREAD	69		Digital unit 5 input 5	0 or 1	see digital unit setup
BDREAD	70		Digital unit 5 input 6	0 or 1	see digital unit setup
BDREAD	71		Digital unit 5 input 7	0 or 1	see digital unit setup
BDREAD	72		Digital unit 5 input 8	0 or 1	see digital unit setup
BDREAD	73		Digital unit 5 input 9	0 or 1	see digital unit setup
BDREAD	74		Digital unit 5 input 10	0 or 1	see digital unit setup
BDREAD	75		Digital unit 5 input 11	0 or 1	see digital unit setup
BDREAD	76		Digital unit 5 input 12	0 or 1	see digital unit setup
BDREAD	77		Digital unit 5 input 13	0 or 1	see digital unit setup
BDREAD	78		Digital unit 5 input 14	0 or 1	see digital unit setup
BDREAD	79		Digital unit 5 input 15	0 or 1	see digital unit setup
BDREAD	80		Digital unit 5 input 16	0 or 1	see digital unit setup
BDREAD	81		Digital unit 6 input 1	0 or 1	see digital unit setup
BDREAD	82		Digital unit 6 input 2	0 or 1	see digital unit setup
BDREAD	83		Digital unit 6 input 3	0 or 1	see digital unit setup
BDREAD	84		Digital unit 6 input 4	0 or 1	see digital unit setup
BDREAD	85		Digital unit 6 input 5	0 or 1	see digital unit setup
BDREAD	86		Digital unit 6 input 6	0 or 1	see digital unit setup
BDREAD	87		Digital unit 6 input 7	0 or 1	see digital unit setup
BDREAD	88		Digital unit 6 input 8	0 or 1	see digital unit setup
BDREAD	89		Digital unit 6 input 9	0 or 1	see digital unit setup
BDREAD	90		Digital unit 6 input 10	0 or 1	see digital unit setup
BDREAD	91		Digital unit 6 input 11	0 or 1	see digital unit setup
BDREAD	92		Digital unit 6 input 12	0 or 1	see digital unit setup
BDREAD	93		Digital unit 6 input 13	0 or 1	see digital unit setup
BDREAD	94		Digital unit 6 input 14	0 or 1	see digital unit setup
BDREAD	95		Digital unit 6 input 15	0 or 1	see digital unit setup
BDREAD	96		Digital unit 6 input 16	0 or 1	see digital unit setup
BDREAD	97		Digital unit 7 input 1	0 or 1	see digital unit setup
BDREAD	98		Digital unit 7 input 2	0 or 1	see digital unit setup
BDREAD	99		Digital unit 7 input 3	0 or 1	see digital unit setup
BDREAD	100		Digital unit 7 input 4	0 or 1	see digital unit setup
BDREAD	101		Digital unit 7 input 5	0 or 1	see digital unit setup
BDREAD	102		Digital unit 7 input 6	0 or 1	see digital unit setup
BDREAD	103		Digital unit 7 input 7	0 or 1	see digital unit setup
BDREAD	104		Digital unit 7 input 8	0 or 1	see digital unit setup
BDREAD	105		Digital unit 7 input 9	0 or 1	see digital unit setup
BDREAD	106		Digital unit 7 input 10	0 or 1	see digital unit setup
BDREAD	107		Digital unit 7 input 11	0 or 1	see digital unit setup

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
BD$_{READ}$	108		Digital unit 7 input 12	0 or 1	see digital unit setup
BD$_{READ}$	109		Digital unit 7 input 13	0 or 1	see digital unit setup
BD$_{READ}$	110		Digital unit 7 input 14	0 or 1	see digital unit setup
BD$_{READ}$	111		Digital unit 7 input 15	0 or 1	see digital unit setup
BD$_{READ}$	112		Digital unit 7 input 16	0 or 1	see digital unit setup
BD$_{READ}$	113		Digital unit 8 input 1	0 or 1	see digital unit setup
BD$_{READ}$	114		Digital unit 8 input 2	0 or 1	see digital unit setup
BD$_{READ}$	115		Digital unit 8 input 3	0 or 1	see digital unit setup
BD$_{READ}$	116		Digital unit 8 input 4	0 or 1	see digital unit setup
BD$_{READ}$	117		Digital unit 8 input 5	0 or 1	see digital unit setup
BD$_{READ}$	118		Digital unit 8 input 6	0 or 1	see digital unit setup
BD$_{READ}$	119		Digital unit 8 input 7	0 or 1	see digital unit setup
BD$_{READ}$	120		Digital unit 8 input 8	0 or 1	see digital unit setup
BD$_{READ}$	121		Digital unit 8 input 9	0 or 1	see digital unit setup
BD$_{READ}$	122		Digital unit 8 input 10	0 or 1	see digital unit setup
BD$_{READ}$	123		Digital unit 8 input 11	0 or 1	see digital unit setup
BD$_{READ}$	124		Digital unit 8 input 12	0 or 1	see digital unit setup
BD$_{READ}$	125		Digital unit 8 input 13	0 or 1	see digital unit setup
BD$_{READ}$	126		Digital unit 8 input 14	0 or 1	see digital unit setup
BD$_{READ}$	127		Digital unit 8 input 15	0 or 1	see digital unit setup
BD$_{READ}$	128		Digital unit 8 input 16	0 or 1	see digital unit setup
BD$_{READ}$	129		Digital unit 9 input 1	0 or 1	see digital unit setup
BD$_{READ}$	130		Digital unit 9 input 2	0 or 1	see digital unit setup
BD$_{READ}$	131		Digital unit 9 input 3	0 or 1	see digital unit setup
BD$_{READ}$	132		Digital unit 9 input 4	0 or 1	see digital unit setup
BD$_{READ}$	133		Digital unit 9 input 5	0 or 1	see digital unit setup
BD$_{READ}$	134		Digital unit 9 input 6	0 or 1	see digital unit setup
BD$_{READ}$	135		Digital unit 9 input 7	0 or 1	see digital unit setup
BD$_{READ}$	136		Digital unit 9 input 8	0 or 1	see digital unit setup
BD$_{READ}$	137		Digital unit 9 input 9	0 or 1	see digital unit setup
BD$_{READ}$	138		Digital unit 9 input 10	0 or 1	see digital unit setup
BD$_{READ}$	139		Digital unit 9 input 11	0 or 1	see digital unit setup
BD$_{READ}$	140		Digital unit 9 input 12	0 or 1	see digital unit setup
BD$_{READ}$	141		Digital unit 9 input 13	0 or 1	see digital unit setup
BD$_{READ}$	142		Digital unit 9 input 14	0 or 1	see digital unit setup
BD$_{READ}$	143		Digital unit 9 input 15	0 or 1	see digital unit setup
BD$_{READ}$	144		Digital unit 9 input 16	0 or 1	see digital unit setup
BD$_{READ}$	145		Digital unit 10 input 1	0 or 1	see digital unit setup
BD$_{READ}$	146		Digital unit 10 input 2	0 or 1	see digital unit setup
BD$_{READ}$	147		Digital unit 10 input 3	0 or 1	see digital unit setup
BD$_{READ}$	148		Digital unit 10 input 4	0 or 1	see digital unit setup
BD$_{READ}$	149		Digital unit 10 input 5	0 or 1	see digital unit setup
BD$_{READ}$	150		Digital unit 10 input 6	0 or 1	see digital unit setup
BD$_{READ}$	151		Digital unit 10 input 7	0 or 1	see digital unit setup
BD$_{READ}$	152		Digital unit 10 input 8	0 or 1	see digital unit setup
BD$_{READ}$	153		Digital unit 10 input 9	0 or 1	see digital unit setup
BD$_{READ}$	154		Digital unit 10 input 10	0 or 1	see digital unit setup
BD$_{READ}$	155		Digital unit 10 input 11	0 or 1	see digital unit setup
BD$_{READ}$	156		Digital unit 10 input 12	0 or 1	see digital unit setup
BD$_{READ}$	157		Digital unit 10 input 13	0 or 1	see digital unit setup
BD$_{READ}$	158		Digital unit 10 input 14	0 or 1	see digital unit setup
BD$_{READ}$	159		Digital unit 10 input 15	0 or 1	see digital unit setup
BD$_{READ}$	160		Digital unit 10 input 16	0 or 1	see digital unit setup

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
BDREAD	161		MM 1 on/off line status	0 = off line 1 = on line	
BDREAD	162		MM 2 on/off line status	0 = off line 1 = on line	
BDREAD	163		MM 3 on/off line status	0 = off line 1 = on line	
BDREAD	164		MM 4 on/off line status	0 = off line 1 = on line	
BDREAD	165		MM 5 on/off line status	0 = off line 1 = on line	
BDREAD	166		MM 6 on/off line status	0 = off line 1 = on line	
BDREAD	167		MM 7 on/off line status	0 = off line 1 = on line	
BDREAD	168		MM 8 on/off line status	0 = off line 1 = on line	
BDREAD	169		MM 9 on/off line status	0 = off line 1 = on line	
BDREAD	170		MM 10 on/off line status	0 = off line 1 = on line	
BDREAD	171-192		Not used		
BDREAD	193		Digital unit 1 on/off line status	0 = off line 1 = on line	read only
BDREAD	194		Digital unit 2 on/off line status	0 = off line 1 = on line	read only
BDREAD	195		Digital unit 3 on/off line status	0 = off line 1 = on line	read only
BDREAD	196		Digital unit 4 on/off line status	0 = off line 1 = on line	read only
BDREAD	197		Digital unit 5 on/off line status	0 = off line 1 = on line	read only
BDREAD	198		Digital unit 6 on/off line status	0 = off line 1 = on line	read only
BDREAD	199		Digital unit 7 on/off line status	0 = off line 1 = on line	read only
BDREAD	200		Digital unit 8 on/off line status	0 = off line 1 = on line	read only
BDREAD	201		Digital unit 9 on/off line status	0 = off line 1 = on line	read only
BDREAD	202		Digital unit 10 on/off line status	0 = off line 1 = on line	read only
BDREAD	203		Not used		
BDREAD	204		Not used		
BDREAD	205		Not used		
BDREAD	206		Not used		
BDREAD	207		Not used		
BDREAD	208		Not used		
BDREAD	209		Analog unit 1 on/off line status	0 = off line 1 = on line	read only
BDREAD	210		Analog unit 2 on/off line status	0 = off line 1 = on line	read only
BDREAD	211		Analog unit 3 on/off line status	0 = off line 1 = on line	read only
BDREAD	212		Analog unit 4 on/off line status	0 = off line 1 = on line	read only
BDREAD	213		Analog unit 5 on/off line status	0 = off line 1 = on line	read only
BDREAD	214		Anal4og unit 6 on/off line status	0 = off line 1 = on line	read only

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
BD$_{READ}$	215		Analog unit 7 on/off line status	0 = off line 1 = on line	read only
BD$_{READ}$	216		Analog unit 8 on/off line status	0 = off line 1 = on line	read only
BD$_{READ}$	217		Analog unit 9 on/off line status	0 = off line 1 = on line	read only
BD$_{READ}$	218		Analog unit 10 on/off line status	0 = off line 1 = on line	read only

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
BD$_{WRITE}$	1		MM 1 Enable/disable	1 = off line 0 = on line	write only
BD$_{WRITE}$	2		MM 2 Enable/disable	1 = off line 0 = on line	write only
BD$_{WRITE}$	3		MM 3 Enable/disable	1 = off line 0 = on line	write only
BD$_{WRITE}$	4		MM 4 Enable/disable	1 = off line 0 = on line	write only
BD$_{WRITE}$	5		MM 5 Enable/disable	1 = off line 0 = on line	write only
BD$_{WRITE}$	6		MM 6 Enable/disable	1 = off line 0 = on line	write only
BD$_{WRITE}$	7		MM 7 Enable/disable	1 = off line 0 = on line	writ only
BD$_{WRITE}$	8		MM 8 Enable/disable	1 = off line 0 = on line	write only
BD$_{WRITE}$	9		MM 9 Enable/disable	1 = off line 0 = on line	write only
BD$_{WRITE}$	10		MM 10 Enable/disable	1 = off line 0 = on line	write only
BD$_{WRITE}$	11		Not used		
BD$_{WRITE}$	12		Not used		
BD$_{WRITE}$	13		Not used		
BD$_{WRITE}$	14		Not used		
BD$_{WRITE}$	15		Not used		
BD$_{WRITE}$	16		Not used		
BD$_{WRITE}$	17		Digital unit 1 output 1	0 = off, 1 = on	write only
BD$_{WRITE}$	18		Digital unit 1 output 2	0 = off, 1 = on	write only
BD$_{WRITE}$	19		Digital unit 1 output 3	0 = off, 1 = on	write only
BD$_{WRITE}$	20		Digital unit 1 output 4	0 = off, 1 = on	write only
BD$_{WRITE}$	21		Digital unit 1 output 5	0 = off, 1 = on	write only
BD$_{WRITE}$	22		Digital unit 1 output 6	0 = off, 1 = on	write only
BD$_{WRITE}$	23		Digital unit 1 output 7	0 = off, 1 = on	write only
BD$_{WRITE}$	24		Digital unit 1 output 8	0 = off, 1 = on	write only
BD$_{WRITE}$	25		Digital unit 2 output 1	0 = off, 1 = on	write only
BD$_{WRITE}$	26		Digital unit 2 output 2	0 = off, 1 = on	write only
BD$_{WRITE}$	27		Digital unit 2 output 3	0 = off, 1 = on	write only
BD$_{WRITE}$	28		Digital unit 2 output 4	0 = off, 1 = on	write only
BD$_{WRITE}$	29		Digital unit 2 output 5	0 = off, 1 = on	write only
BD$_{WRITE}$	30		Digital unit 2 output 6	0 = off, 1 = on	write only
BD$_{WRITE}$	31		Digital unit 2 output 7	0 = off, 1 = on	write only
BD$_{WRITE}$	32		Digital unit 2 output 8	0 = off, 1 = on	write only
BD$_{WRITE}$	33		Digital unit 3 output 1	0 = off, 1 = on	write only
BD$_{WRITE}$	34		Digital unit 3 output 2	0 = off, 1 = on	write only
BD$_{WRITE}$	35		Digital unit 3 output 3	0 = off, 1 = on	write only
BD$_{WRITE}$	36		Digital unit 3 output 4	0 = off, 1 = on	write only
BD$_{WRITE}$	37		Digital unit 3 output 5	0 = off, 1 = on	write only
BD$_{WRITE}$	38		Digital unit 3 output 6	0 = off, 1 = on	write only
BD$_{WRITE}$	39		Digital unit 3 output 7	0 = off, 1 = on	write only
BD$_{WRITE}$	40		Digital unit 3 output 8	0 = off, 1 = on	write only
BD$_{WRITE}$	41		Digital unit 4 output 1	0 = off, 1 = on	write only
BD$_{WRITE}$	42		Digital unit 4 output 2	0 = off, 1 = on	write only
BD$_{WRITE}$	43		Digital unit 4 output 3	0 = off, 1 = on	write only
BD$_{WRITE}$	44		Digital unit 4 output 4	0 = off, 1 = on	write only
BD$_{WRITE}$	45		Digital unit 4 output 5	0 = off, 1 = on	write only

NPT	NPA	UNITS	DESCRIPTION	RANGE	NOTE
BD_{WRITE}	46		Digital unit 4 output 6	0 = off, 1 = on	write only
BD_{WRITE}	47		Digital unit 4 output 7	0 = off, 1 = on	write only
BD_{WRITE}	48		Digital unit 4 output 8	0 = off, 1 = on	write only
BD_{WRITE}	49		Digital unit 5 output 1	0 = off, 1 = on	write only
BD_{WRITE}	50		Digital unit 5 output 2	0 = off, 1 = on	write only
BD_{WRITE}	51		Digital unit 5 output 3	0 = off, 1 = on	write only
BD_{WRITE}	52		Digital unit 5 output 4	0 = off, 1 = on	write only
BD_{WRITE}	53		Digital unit 5 output 5	0 = off, 1 = on	write only
BD_{WRITE}	54		Digital unit 5 output 6	0 = off, 1 = on	write only
BD_{WRITE}	55		Digital unit 5 output 7	0 = off, 1 = on	write only
BD_{WRITE}	56		Digital unit 5 output 8	0 = off, 1 = on	write only
BD_{WRITE}	57		Digital unit 6 output 1	0 = off, 1 = on	write only
BD_{WRITE}	58		Digital unit 6 output 2	0 = off, 1 = on	write only
BD_{WRITE}	59		Digital unit 6 output 3	0 = off, 1 = on	write only
BD_{WRITE}	60		Digital unit 6 output 4	0 = off, 1 = on	write only
BD_{WRITE}	61		Digital unit 6 output 5	0 = off, 1 = on	write only
BD_{WRITE}	62		Digital unit 6 output 6	0 = off, 1 = on	write only
BD_{WRITE}	63		Digital unit 6 output 7	0 = off, 1 = on	write only
BD_{WRITE}	64		Digital unit 6 output 8	0 = off, 1 = on	write only
BD_{WRITE}	65		Digital unit 7 output 1	0 = off, 1 = on	write only
BD_{WRITE}	66		Digital unit 7 output 2	0 = off, 1 = on	write only
BD_{WRITE}	67		Digital unit 7 output 3	0 = off, 1 = on	write only
BD_{WRITE}	68		Digital unit 7 output 4	0 = off, 1 = on	write only
BD_{WRITE}	69		Digital unit 7 output 5	0 = off, 1 = on	write only
BD_{WRITE}	70		Digital unit 7 output 6	0 = off, 1 = on	write only
BD_{WRITE}	71		Digital unit 7 output 7	0 = off, 1 = on	write only
BD_{WRITE}	72		Digital unit 7 output 8	0 = off, 1 = on	write only
BD_{WRITE}	73		Digital unit 8 output 1	0 = off, 1 = on	write only
BD_{WRITE}	74		Digital unit 8 output 2	0 = off, 1 = on	write only
BD_{WRITE}	75		Digital unit 8 output 3	0 = off, 1 = on	write only
BD_{WRITE}	76		Digital unit 8 output 4	0 = off, 1 = on	write only
BD_{WRITE}	77		Digital unit 8 output 5	0 = off, 1 = on	write only
BD_{WRITE}	78		Digital unit 8 output 6	0 = off, 1 = on	write only
BD_{WRITE}	79		Digital unit 8 output 7	0 = off, 1 = on	write only
BD_{WRITE}	80		Digital unit 8 output 8	0 = off, 1 = on	write only
BD_{WRITE}	81		Digital unit 9 output 1	0 = off, 1 = on	write only
BD_{WRITE}	82		Digital unit 9 output 2	0 = off, 1 = on	write only
BD_{WRITE}	83		Digital unit 9 output 3	0 = off, 1 = on	write only
BD_{WRITE}	84		Digital unit 9 output 4	0 = off, 1 = on	write only
BD_{WRITE}	85		Digital unit 9 output 5	0 = off, 1 = on	write only
BD_{WRITE}	86		Digital unit 9 output 6	0 = off, 1 = on	write only
BD_{WRITE}	87		Digital unit 9 output 7	0 = off, 1 = on	write only
BD_{WRITE}	88		Digital unit 9 output 8	0 = off, 1 = on	write only
BD_{WRITE}	89		Digital unit 10 output 1	0 = off, 1 = on	write only
BD_{WRITE}	90		Digital unit 10 output 2	0 = off, 1 = on	write only
BD_{WRITE}	91		Digital unit 10 output 3	0 = off, 1 = on	write only
BD_{WRITE}	92		Digital unit 10 output 4	0 = off, 1 = on	write only
BD_{WRITE}	93		Digital unit 10 output 5	0 = off, 1 = on	write only
BD_{WRITE}	94		Digital unit 10 output 6	0 = off, 1 = on	write only
BD_{WRITE}	95		Digital unit 10 output 7	0 = off, 1 = on	write only
BD_{WRITE}	96		Digital unit 10 output 8	0 = off, 1 = on	write only

6.20 Other Information and Illustrations

6.20.1 Loop Back Test

A facility exists which enables the hardware connection to the RS232 PC port and the RS422 port to be checked.

On the dual inline switch (switch bank 2) set way 5 on and all other ways off.

Any character on the receive line is then echoed back immediately on the transmit line.

This facility is intended to be used in conjunction with a terminal emulator, such as Hyperterminal (hypertrm.exe) which is included with Windows.

The communications settings should be as follows:

Bits per second: 9600
Data bits: 8
Parity: none
Stop bits: 1
Flow control: None (i.e. no hardware or software flow control)

Full duplex.

6.20.2 Setting up the Hyperterminal for the DTI echo test

Connect the DTI to the PC via a serial lead.

Click on the Windows start button and choose Run.

Type hypertrm.exe in the Open box and press Enter.

Wait for the Connection Description box to appear.

In the name box type Autoflame DTI Echo Test and click OK.

Under Connect Using choose Direct to COM1.

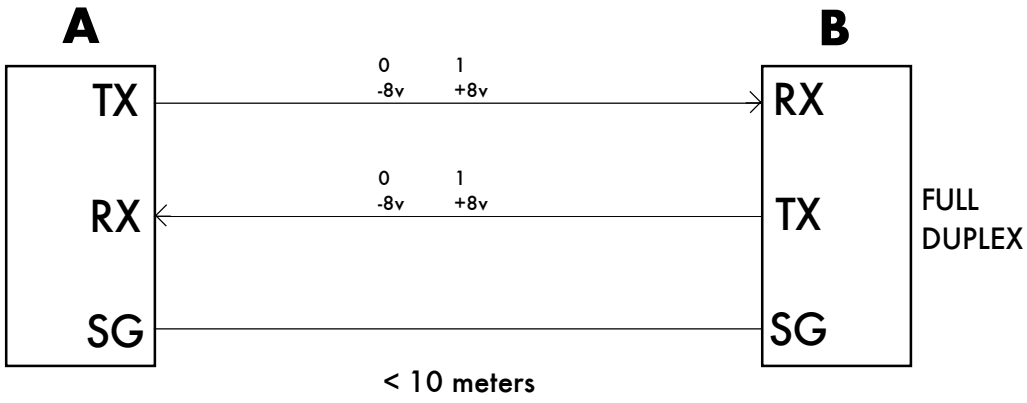
Use the following Port Settings for COM1 and choose OK:

Bits per second (baud rate): 9600
Data bits: 8
Parity: none
Stop bits: 1
Flow control: None (i.e. no hardware or software flow control)
(Full duplex if necessary)

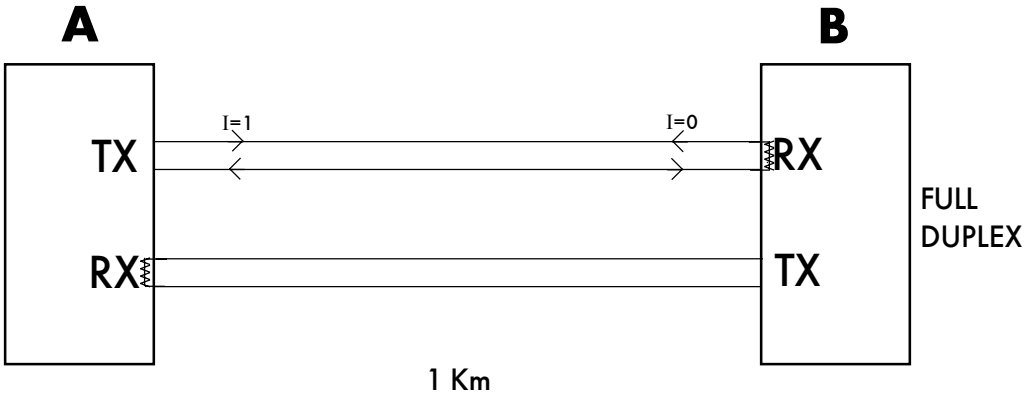
6.20.2 Communication Interfaces

This page is for information only.

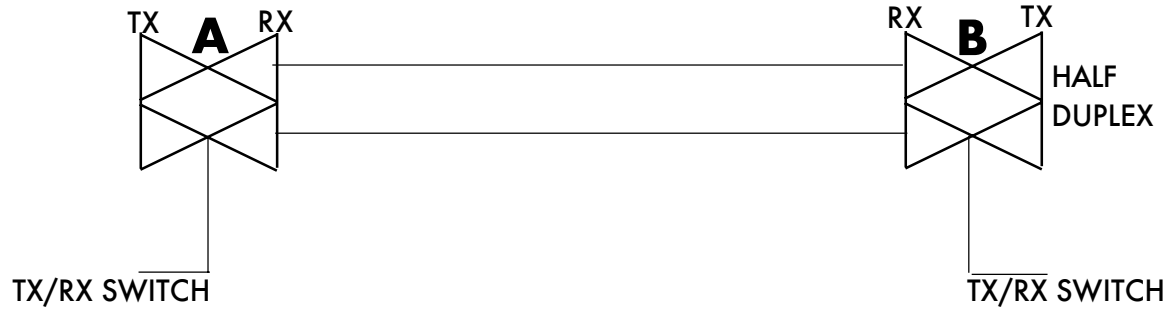
RS 232



RS 422



RS 485



Example of a network