AirNet
CAN Bus Implementation
Revision 8.07
7/6/2018

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1. CAN Implementation

The can data rate of 250K is to be used.

1.1 Message Arbitration (CAN ID)

Micro Air messages using the CAN protocol shall use 29-bit IDs as follows:

...p ppii iiii iiii ssss ssss dddd dddd (29-bit binary CAN ID) or

...p ppii iiii nnnn nnnn nnnn nnnn nnnn (29-bit binary CAN ID)

p = Priority Field (0..7)

i = Message Type Identifier (lower 8 bits used for destination address for point to point messages)

s = source address

d = $DD = Destination Address

n = unit serial number (see sections 16 and 12)

1.2 Priority Field

The default priority for all messages shall be five (ppp = 101).

1.3 Destination Address

The destination address is the unique 8-bit module address. A value of 0x00 is used to address all devices in the system.

2. Standard Data Types

This section defines standard data types. They are documented here so that each individual message need not re-define the types.

2.1 Bit Field Types

bits8, bits16, bits32

Note: Bit fields can be of any length, they are not required to be 8, 16, or 32 bits long.

2.2 Unsigned Integer Types

uint8, uint16, uint32

Note: Unsigned integers can be of any length, they are not required to be 8, 16, or 32 bits long.

2.3 Signed Integer Types

sint8, sint16, sint32

Note: Signed integers ARE required to be 8, 16, or 32 bits in length.

2.4 Enumerated Types

enum8, enum16, enum32

Note: Enumerated types can be of any length, they are not required to be 8, 16, or 32 bits long.

2.5 Boolean

bool

Note: The LSB of a Boolean field is the only significant bit. If a Boolean field is declared larger than one bit, all bits other than the LSB are considered "reserved".

3. HVAC Command 0x3F0 (1008.)

This message is used to send the HVAC unit a command.

Note: For all fields, a value of 0xFF for 8 bits indicates a supported field for which no information is available (ex faulted input).

3.1 Message Content

CAN ID	...p pp11 1111 0000 dddd dddd ssss ssss		
Data Size	4/5		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Operating Mode	enum8
Data[1]	XXXXXXXX	Fan Mode	enum8
Data[2]	XXXXXXXX	Fan Speed	enum8
Data[3]	XXXXXXXX	Setpoint Temperature	Uint8 °F
Data[4]	XXXXXXXX	Humidity Setpoint(Optional)	Uint8

3.1.1 Operating Mode

This enumeration contains the operating mode. It is defined as follows:

0 – no change
1 – Off
2 – Moisture/Dehumidify Mode
3 – Auto or Run[1] Mode
4 – Heat Only Mode
5 – Cool Only Mode
6 – Auto w/ Aux Heat[1]
7 – Aux Heat[1]

[1]Available for device IDs 0x505, 0x314, & 0x389 only (see section 16.1.4)

3.1.2 Fan Mode

This field enumerates the desired fan mode. It is defined as follows:

0 – no change
1 – Fan operating in Cycled Operation
2 – Fan operating in Continuous Operation

3.1.3 Fan Speed

This field indicates the desired fan speed. To determine the device ID, see section 16.1.4.

For device ID 0x314 & 0x389:

0 – No Change
1 - Auto or Off
2 – Manual Speed 1
3 – Manual Speed 2
4 – Manual Speed 3
5-0xFE = Manual Speed 3
0xFF = No Change

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For device ID 0x378 & 0x386:

6 Fan Speeds

0 = No Change

1 - Off or Auto

2 – Manual Speed 1

3 - Manual Speed 2

4 - Manual Speed 3

5 - Manual Speed 4

6 - Manual Speed 5

7 – Manual Speed 6

8-0xFE = Manual Speed 6

For device ID 0x505 and 0x560:

5 Fan Speeds

0 = No Change

1 - Off or Auto

2 – Manual Speed 1

3 - Manual Speed 2

4 - Manual Speed 3

5 - Manual Speed 4

6 - Manual Speed 5

7-0xFE = Manual Speed 5

0xFF = No Change

3 Fan Speeds

0 = No Change

1 - Off or Auto

2 – Manual Speed 1

3 - Manual Speed 2

4 – Manual Speed 3

5-0xFE = Manual Speed 3

0xFF = No Change

3.1.4 Setpoint Temperature

This is the desired temperature in degrees Fahrenheit. The value 0xFF is reserved for Don't Change. Any value outside of the allowed range will be ignored.

3.1.5 Humidity Setpoint [2]

This is the desired humidity in percent. This is an optional value. Valid range from 35 to 65, any value outside of the allowed range will be ignored.

[2]Not available for device ID 0x560 (see section 16.1.4)

4. HVAC Status 0x3E0 (992.)

The HVAC unit sends this message for two purposes. The first is for display information, and the second is to acknowledge an HVAC Command message. Therefore, it is broadcast in two ways: periodically at a rate not less than once every 10 seconds and asynchronously upon receipt of a HVAC Command message.

Note: For all fields, a value of 0xFF for 8 bits indicates a supported field for which no information is available (ex faulted input).

4.1 Message Content

CAN ID	...p pp11 1110 0000 ssss ssss dddd dddd		
Data Size	8		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Configuration/Mode	uint8
Data[1]	XXXXXXXX	Status	enum8
Data[2]	NNNMASSS	Fan Mode/ Fan Speed	enum8
Data[3]	XXXXXXXX	Setpoint Temperature	uint8
Data[4]	XXXXXXXX	Ambient Temperature	uint8
Data[5]	XXXXXXXX	Outdoor/Condenser Temperature	uint8
Data[6]	XXXXXXXX	Fault status	enum8
Data[7]	XXXXXXXX	Additional Sensor Temperatures	uint8

4.1.1 Configuration/Mode

This byte is divided into one bitmap one and one hex number.

The upper nibble is a bitmap and identifies the unit configuration as follows:

Bit 7: 1 - DX Truck[2]

Bit 6[1]: 0 – Cool Only mode disabled,
1 – Cool Only Mode enabled

Bit 5[1]: 0 – Aux heat disabled,
1 – Aux heat enabled

Bit 4: 0 – Air handler (CW/TW),
1 – Direct expansion (DX)

The lower nibble is defined as follows:

1 – Off
2 – Moisture/Dehumidify Mode
3 – Auto or Run[1] Mode
4 – Heat Only Mode
5 – Cool Only Mode
6 – Auto w/ Aux Heat[1]
7 – Aux Heat[1]

[1]Applies to device ID 0x505, 0x314, & 0x389 only (see section 16.1.4)

[2]Applies to device ID 0x560 only (see section 16.1.4)

4.1.2 Status

This field further specifies the operating mode. A display unit may use this message to determine whether or not the heater (bit 0) or chiller (bit 1) is actually operating at this time in the case of automatic operating mode.

7: Reserved

6: Condenser Fan[3]

5: Generator[3]

4: DX Aux Heater[1] On or Heater 2[3] On

3: Lockout. (Any fault flashing continuously) To remove the lock out and resume normal operation the fault must be corrected then the unit must be turned off and back on.

2: Fan On

1: Compressor or TW Electric Heater[1] On

0: Valve or DX/CW Electric Heater[2] On or Heater 1[3] On

[1]Applies to device ID 0x505, 0x314, & 0x389 only (see section 16.1.4)

[2]Applies to device ID 0x314 & 0x389 only (see section 16.1.4)

[3]Applies to device ID 0x560 only (see section 16.1.4)

4.1.3 Fan Mode / Fan Speed

This byte is divided into four sections containing cycled/continuous mode, maximum fan speeds, auto/manual/current speed.

The upper nibble is a bitmap and is defined as follows:

Bits 5-7[3]: Number of Available Fan Speeds

Bit 4[3]: 0=Cycled Operation, 1=Continuous Operation

[3]Applies to device ID 0x0314 with boot revision=B and code revision=13 or newer (see sections 16.1.4-16.1.6). For all previous revisions for this device ID, this upper nibble is defined in section 3.1.2.

The lower nibble is a hex value and indicates the fan speed defined as follows:

For device ID 0x314 & 0x389(Unity & PPIO):

0 - Auto or Off

1 - Manual Speed 1

2 - Manual Speed 2

3 - Manual Speed 3

For device ID 0x365 / 0x378 / 0x386 / 0x389(FX-2):

6 Fan Speeds	3 Fan Speeds
0 - Off	0 - Off
1 - Manual Speed 1	1 - Manual Speed 1
2 - Manual Speed 2	2 - Manual Speed 2
3 - Manual Speed 3	3 - Manual Speed 3
4 - Manual Speed 4	4 - n/a
5 - Manual Speed 5	5 - n/a
6 - Manual Speed 6	6 - n/a

7 - Auto Fan off	7 - Auto Fan off
8 - Auto Speed 1	8 - Auto Speed 1
9 - Auto Speed 2	9 - Auto Speed 2
10 - Auto Speed 3	10 - Auto Speed 3
11 - Auto Speed 4	11 – n/a
12 - Auto Speed 5	12 – n/a
13 – Auto Speed 6	13 – n/a

For device ID 0x505 or 0x560:

5 Fan Speeds	3 Fan Speeds
0 - Off	0 - Off
1 – Manual Speed 1	1 – Manual Speed 1
2 - Manual Speed 2	2 – Manual Speed 2
3 - Manual Speed 3	3 – Manual Speed 3
4 - Manual Speed 4	4 – Auto Fan off
5 - Manual Speed 5	5 – Auto Speed 1
6 - Auto Fan off	6 – Auto Speed 2
7 - Auto Speed 1	7 – Auto Speed 3
8 - Auto Speed 2	
9 - Auto Speed 3	
10 - Auto Speed 4	
11 - Auto Speed 5	

4.1.4 Setpoint Temperature

This is the current setpoint temperature in Fahrenheit.

4.1.5 Ambient Temperature

This is the measured ambient temperature in Fahrenheit.

4.1.6 Outdoor Temperature/Evaporator Temp[1]

This is the measured outdoor or evaporator temperature in Fahrenheit. This sensor is optional, so the value 0xFF is reserved to indicate that this sensor is not installed.

[1]Applies to device ID 0x560 only (see section 16.1.4)

4.1.7 Faults

This bit field indicates the current fault status. The three-letter pneumonic in parentheses is the corresponding fault shown on the control's display. See the control's operations manual for more details.

Bit	Fault Pneumonic Descriptions	Text dev ID 0x378 & 0x386	Text for dev ID 0x389	Pneumonic for dev ID 0x314	Pneumonic for dev ID 0x505	Pneumonic for dev ID 0x560	Text for dev ID 365
0	Ambient Temp Sensor failure	Air Sensor Trouble	Sensor Fault	ASF	IS/--	IS/--	Air Sensor Trouble
1	Low AC Voltage High AC Voltage[1]	Low AC Voltage	Low AC Fault	LAC n/a	AC/LO HI/AC	AC/LO HI/AC	
2	High Pres fault High Pres sensor fault[1]	High Freon Pressure	High Pres Fault	HPF n/a	HI/PS HP/--	HI/PS HP/--	High Freon Pressure
3	Low Pres fault Low Pres sensor fault[1] Low AC Freq[3]	Low Freon Pressure	Low Pres Fault	LPF n/a n/a	LO/PS LP/-- n/a	n/a n/a LO/FC	Low Freon Pressure
4	High Condenser Temp[2] Low Sea Water In Temp[1] High AC Freq[3]	Check Water Pump	Pump Fault	PLF n/a n/a	n/a LO/SE n/a	n/a n/a HI/FC	Check Water Pump
5	High Current Air Filter Reminder Condenser sensor fault[3]	System Over Current	Overcurr Fault	FIL n/a	Ar/FL n/a	n/a CS/--	Compressor not detected
6	Loop Water In Sensor[1] Low Evap temp fault[3] Evap sensor fault[3]		Lost AC Fault	n/a n/a n/a	IL/-- n/a n/a	n/a LO/ES ES/--	Freeze Warning
7	Low SW temp fault		EasyStrt Fault (w/ FX-2) (Low) SW Temp Fault (w/ Unity)	LSF			Bristol Drive Trouble

[1]Applies to device ID 0x505 only (see section 16.1.4)
[2]Applies to device IDs 0x314/378/386/389 (see section 16.1.4)
[3]Applies to device ID 0x560 only (see section 16.1.4)

4.1.8 Additional Sensor Temperatures

This byte is the measured temperature in Fahrenheit of the following sensors. The value 0xFF is reserved to indicate that this sensor is not installed.

	Configuration (see section 4.1.1, bit 4 and 7)	
Device ID	DX	CW/TW
0x378/0x386/ 0x314/0x389	Service (condenser)	Loop Water In
0x505	Sea Water In	Loop Water In
0x560	Condenser Temperature	

5. HVAC Supplemental Status 0x3FF 1023.)

5.1 Message Content

CAN ID	...p pp11 1111 1111 ssss ssss dddd dddd		
Data Size	7		
Data	Bits 76543210	Description	Scale / Format
Data[0]	0	Page	
Data[1]	XXXXXXXX	Voltage	uint8
Data[2]	XXXXXXXX	Current	uint8
Data[3]	XXXXXXXX	Fan A Duty Cycle	uint8
Data[4]	XXXXXXXX	Fan B Duty Cycle	uint8
Data[5]	XXXXXXXX	Fan C Duty Cycle	uint8
Data[6]	XXXXXXXX	Fan D Duty Cycle	uint8
Data[7]	XXXXXXXX	Triac simulation = 0x00, PWM = 0x55	uint8

5.1.1 Page

5.1.2 Voltage

The AC line voltage.

5.1.3 Current

The total unit AC current.

5.1.4 Fan A Duty Cycle

Speed value for fan A.

5.1.5 Fan B Duty Cycle

The duty cycle for Fan B.

5.1.6 Fan C Duty Cycle

The duty cycle for Fan C.

5.1.7 Fan D Duty Cycle

The duty cycle for Fan D.

5.2 Message Content

CAN ID	...p pp11 1111 1111 ssss ssss dddd dddd		
Data Size	7		
Data	Bits 76543210	Description	Scale / Format
Data[0]	1	Page	
Data[1]	XXXXXXXX	BTU request	int8
Data[2]	XXXXXXXX	Humidity (Supply)	uint8
Data[3]	XXXXXXXX	Humidity (outside)	uint8
Data[4]	XXXXXXXX	Humidity Setpoint	uint8
Data[5]	XXXXXXED	Daughterbrds installed	enum8
Data[6]	XXXXXXXX	EasyStart Peak Current	uint8
Data[7]	XXXXXXXX	EasyStart Run Current	uint8

5.2.1 Page

5.2.2 BTU Request

Signed BTU required in thousands of BTU.

5.2.3 Supply Humidity

Range 0 to 100.

5.2.4 Outside Humidity

Range 0 to 100.

5.2.5 Humidity Setpoint

Range 35 to 65.

5.2.6 Daughterboard Installed

D: 4x DC Blower Daughterboard (361) - 1=installed, 0=not installed

E: EasyStart Daughterboard (522) – 1=installed; 0=not installed

5.2.7 EasyStart Peak Current

Peak compressor current from last start-up (amps)

5.2.8 EasyStart Running Current

Live running current for compressor only (amps)

6. HVAC Fan Slave Status 0x3EF (1007.)

6.1 Message Content

CAN ID	...p pp11 1110 1111 0000 0000 dddd dddd		
Data Size	2		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Status	bit
Data[1]	XXXXXXXX	Fan A Duty Cycle	uint8

6.1.1 Status

Bit 0 = fan on

Bit 1 = Trouble

Bit 2 = Hot.

6.1.2 Fan A Duty Cycle

The duty cycle for Fan A.

7. Icemaker Command 0x3F1 (1009.)

7.1 Message Content

CAN ID	...p pp11 1111 0001 dddd dddd ssss ssss		
Data Size	1		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	State	enum8

7.1.1 State

The lower nibble is defined as follows:

0 – no change

1 – Off

2 – On

8. Icemaker Status 0x3E1 (993.)

8.1 Message Content

CAN ID	...p pp11 1110 0001 ssss ssss dddd dddd		
Data Size	6		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	State	bits8
Data[1]	XXXXXXXX	Hardware Status	enum8
Data[2]	XXXXXXXX	Faults	enum8
Data[3]	XXXXXXXX	Line Voltage	unit8
Data[4]	XXXXXXXX	Compressor Current	unit8
Data[5]	XXXXXXXX	Auger Current	unit8

8.1.1 State

The bits are defined as follows:

1 – Off=0 on=1

5 – Full

6 - Suspended

7 - Lockout

8.1.2 Hardware status

This field further specifies the operating mode.

7-4: Reserved

3: Lockout. (Any fault flashing continuously) To remove the lock out and resume normal operation the fault must be corrected then the unit must be turned off and back on.

2: Pump On

1: Compressor On

0: Auger On

8.1.3 Faults

This 8 bit enumerated field indicates the current fault status. The three letter pneumonic in parentheses is the corresponding fault shown on the control's display. See the control's operations manual for more details.

1: Under current auger (UCA)
2: Under current compressor (UCC)
3: Low water pressure (H20)
4: Low pressure fault (LPF)
5: High pressure fault (HPF)
6: Spout blockage (Spt)
7: Compressor over current (OCC)
8: Auger over current (OCA)
9: Low ac flag (LAC)

8.1.4 Line Voltage

8.1.5 Compressor Current

8.1.6 Auger Current

9. Hydromatic System Command 0x3F2 (1010)

9.1 Message Content

CAN ID	...p pp11 1111 0010 dddd dddd ssss ssss		
Data Size	2		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	State	byte
Data[1]	XXXXXXXX	Lockout override	bit

9.1.1 State

The lower nibble is defined as follows:

0 – no change

1 – Off

2 – Cool

3 – Heat

4 - Auto

9.1.2 Lockout override

Bit position when set will clear fault count and lockout at the slave.

10. Hydromatic System Status 0x3E2 (994.)

The Hydromatic sends this message for two purposes. The first is for display information, and the second is to acknowledge a Hydromatic Command message. Therefore, it is broadcast in two ways: periodically at a rate not less than once every 10 seconds and asynchronously upon receipt of a Hydromatic Command message.

Note: For all fields, a value of 0xFF for 8 bits indicates a supported field for which no information is available (ex faulted input).

10.1 Message Content

CAN ID	...p pp11 1110 0010 ssss ssss dddd dddd		
Data Size	7		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page	uint8
Data[1]	XXXXXXXX	Mode	enum8
Data[2]	XXXXXXXX	Compressor Status	bits8
Data[3]	XXXXXXXX	Valve Status	bits8
Data[4]	XXXXXXXX	Heater Status	bits8
Data[5]	XXXXXXXX	Return water temperature	uint8
Data[6]	XXXXXXXX	Supply Temperature	uint8

CAN ID	...p pp11 1110 0010 ssss ssss dddd dddd		
Data Size	7		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page	uint8
Data[1]	XXXXXXXX	Line Voltage	uint8
Data[2]	XXXXXXXX	Compressor Count	Uint8
Data[3]	XXXXXXXX	Enabled Slaves	bits8
Data[4]	XXXXXXXX	Stage Trouble	Bits8
Data[5]	XXXXXXXX	Compressors at Reduced speed	Bits8
Data[6]	XXXXXXXX	Compressor speed	uint8

10.1.1 Page

This byte identifies the page number.

10.1.2 Mode

Bit 0 – system mode B1:B0 =00 cool 01=heat 10=auto

Bit 1 – system mode

Bit 2 – Electric Heat mode

Bit 3 – Cycle in progress

Bit 4 – Pump Trouble

Bit 5 – Power

Bit 6 – Sea water pump on

Bit 7 - Chilled water pump on

10.1.3 Compressor Status

The bit is defined as follows:

Bit 0: stage 1 compressor on

Bit 1: stage 2 compressor on

Bit 2: stage 3 compressor on

Bit 3: stage 4 compressor on

Bit 4: stage 5 compressor on

Bit 5: stage 6 compressor on

Bit 6: stage 7 compressor on

Bit 7: stage 8 compressor on

10.1.4 Valve Status

The bit is defined as follows:

Bit 0: stage 1 valve on	Bit 4: stage 5 valve on
Bit 1: stage 2 valve on	Bit 5: stage 6 valve on
Bit 2: stage 3 valve on	Bit 6: stage 7 valve on
Bit 3: stage 4 valve on	Bit 7: stage 8 valve on

10.1.5 Heater Status

The bit is defined as follows:

Bit 0: stage 1 heater on	Bit 4: stage 5 heater on
Bit 1: stage 2 heater on	Bit 5: stage 6 heater on
Bit 2: stage 3 heater on	Bit 6: stage 7 heater on
Bit 3: stage 4 heater on	Bit 7: stage 8 heater on

10.1.6 Return water temperature

This is the temperature of the chilled water returning to the chiller input. A value of 0xff will be transmitted if not installed.

10.1.7 Supply Temperature

Circulating loop supply temperature in °F.

10.1.8 Line Voltage

Line voltage measured by master Hydromatic stage

10.1.9 Compressor Count

The number of compressors in system

10.1.10 Enabled Slaves

The bit is defined as follows:

Bit 0: stage 1 enabled	Bit 4: stage 5 enabled
Bit 1: stage 2 enabled	Bit 5: stage 6 enabled
Bit 2: stage 3 enabled	Bit 6: stage 7 enabled
Bit 3: stage 4 enabled	Bit 7: stage 8 enabled

10.1.11 Stage Trouble

Identifies slaves that currently have an active fault.

10.1.12 Compressors at reduced speed

Identifies slaves that are running at a reduced speed.

10.1.13 Compressor speed

Speed compressors identified by previous item are running at in 1/256ths of full speed.

11. Hydromatic Slave Status 0x3E3 (995)

11.1 Message Content

CAN ID	...p pp11 1110 0011 ssss ssss dddd dddd		
Data Size	8		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	0	uint8
Data[1]	XXXXXXXX	Freezestat temperature	uint8
Data[2]	XXXXXXXX	Return water temperature	Bits8
Data[3]	XXXXXXXX	High Limit temperature	uint8
Data[4]	XXXXXXXX	Faults bits 15-8	Bits16
Data[5]	XXXXXXXX	Faults bits 7-0	Bits16
Data[6]	XXXXXXXX	Fault Count	uint8
Data[7]	XXXXXXXX	Return Temperature fraction	uint8

CAN ID	...p pp11 1110 0011 ssss ssss dddd dddd		
Data Size	8		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	1	uint8
Data[1]	XXXXXXXX	Freon Suction Pressure	uint8
Data[2]	XXXXXXXX	Freon Discharge Pressure	uint8
Data[3]	XXXXXXXX	Hours high byte	uint8
Data[4]	XXXXXXXX	Hours middle byte	uint8
Data[5]	XXXXXXXX	Hours low byte	uint8
Data[6]	XXXXXXXX	Circulating Water Flow Rate	Uint8
Data[7]	XXXXXXXX	Current	uint8

11.1.1 Freezestat Temperature

This is the circulating water temperature at the compressor output in Fahrenheit.

11.1.2 Return water Temperature

This is the circulating water temperature at the heater output in Fahrenheit. This sensor is optional and should only be installed on the master stage. A value of 0xff will be transmitted if not installed.

11.1.3 High limit Temperature

This is the circulating water temperature at the heater output in Fahrenheit. This sensor is optional and should only be installed on stages with electric heaters. A value of 0xff will be transmitted if not installed.

11.1.4 Faults

0	sensor trouble flag
1	low ac flag
2	high pressure fault
3	low pressure fault
4	no water flow
5	high current
6	high limit
7	freeze
8	Missing Master Status report
9-15	Non-Reporting Slaves

11.1.5 Fault Count/Lockout Flag

Bits 0	General VFD Fault
Bits 1	Reverse Cycle Freeze Fault
Bits 2-4	unused
Bits 6-5	Count
Bit 7	Lockout

11.1.6 Fractional Return Temperature

This is the fraction of a degree of the return temperature measured by the slave.

11.1.7 Freon Suction Pressure

Multiply this number by 2 to get actual PSI. The value 255 indicates that the low pressure switch is open.

11.1.8 Freon discharge pressure

Multiply this number by 2 to get actual PSI. The value 255 indicates that the high pressure switch is open.

11.1.9 Hours

Three bytes HEX format indicating the total run time for the compressor. Example 0x01, 0x32, 0x94 should read as 78484 hours.

11.1.10 Circulating Water Flow Rate

Gallon per minute rate of flow for circulating water loop. Only available if optional flow sensor is installed.

11.1.11 Current

This is the total AC current for the slave. Only available if optional sensor is connected.

12. Generic Command 0x30n (768-783)

12.1 Message Content

CAN ID	...p pp11 0000 nnnn nnnn nnnn nnnn nnnn		
Data Size	8		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page	Bits8
Data[1]	XXXXXXXX	Device ID (high byte)	uint8
Data[2]	XXXXXXXX	Device ID (low byte)	uint8
Data[3]	XXXXXXXX	Message Source	uint8
Data[4]	XXXXXXXX	Device/Page defined byte 0	uint8
Data[5]	XXXXXXXX	Device/Page defined byte 1	uint8
Data[6]	XXXXXXXX	Device/Page defined byte 2	uint8
Data[7]	XXXXXXXX	Device/Page defined byte 3	uint8

12.1.1 nnnn nnnn nnnn nnnn nnnn

Lower six digits of the unit's serial number in hex.

12.1.2 Page

This byte identifies the page number. Page 0 is for configuration, page 1 is control operation. Page number is required in all transmissions on all pages.

12.1.3 Device ID (high byte)

This is the device type identification number in hex. Device ID is required in all transmissions on all pages. (See section 16.1.4)

12.1.4 Device ID (low byte)

This is the device type identification number in hex. Device ID is required in all transmissions on all pages. (See section 16.1.4)

12.1.5 Message Source

This identifies the source device of the message. Message source is required in all transmissions on all pages.

12.1.6 Device/page defined byte 0

On page 0 this is the Unit Id this device. On page 1 this is the first control byte. (See specific device type for further definition)

Device	Page 0	Page 1
251 (pump)	Transducer range	bit0=cir. Pump bit1=sea pump
360 (HVAC)	unit ID	bit5=comp bit6=valve bit7=pump
851 (QuietFan)	unit ID	

12.1.7 Device/page defined byte 1

On page 0 this value will be used by the unit to set its group Id. On page 1 this is the first control byte. (See specific device type for further definition)

Device	Page 0	Page 1
251 (pump)	Transducer offset	
360 (HVAC)	Undefined	fan speed
851 (QuietFan)	group ID	

12.1.8 Device/page defined byte 2

On page 0 this value will be used by the unit to set its group Id. On page 1 this is the first control byte. (See specific device type for further definition)

Device	Page 0	Page 1
251 (pump)	Transducer range	Undefined
360 (HVAC)	Undefined	Undefined
851 (QuietFan)	Fan Assignment	Undefined

12.1.9 Device/page defined byte 3

On page 0 this is undefined. On page 1 this is the third control byte. (See specific device type for further definition)

Device	Page 0	Page 1
251 (pump)	Transducer offset	Undefined
360 (HVAC)	Undefined	Undefined
851 (QuietFan)	Undefined	Undefined

13. Pump Status 0x3E4 (996)

13.1 Message Content

CAN ID	...p pp11 1110 0100 ssss ssss dddd dddd		
Data Size	n		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page	Uint8
Data[1]	XXXXXXXX	Data Byte 1	
Data[2]	XXXXXXXX	Data Byte 2	
Data[3]	XXXXXXXX	Data Byte 3	
Data[4]	XXXXXXXX	Data Byte 4	
Data[5]	XXXXXXXX	Data Byte 5	
Data[6]	XXXXXXXX	Data Byte 6	
Data[7]	XXXXXXXX	Data Byte 7	

13.1.1 Page 0

This byte identifies the page number. Page 0 only transmitted when configured as a pump station

13.1.1.1 Data Byte 1 (Status)

This is a bit defined field representing hardware status. Bit order is FXXXABSC. Where the bits are defined as follows:

Bit C: Circulating pump 1=on, 0=off

Bit S: Sea water Pump 1=on, 0=off

Bit B: Flow Switch 1 0=closed, 1= open

Bit A: Flow Switch 2 0=closed, 1= open

Bit F: Master control command not received

13.1.1.2 Data Byte 2/3 (Transducer A reading)

Pump Station = PSI

13.1.1.3 Data Byte 4/5 (Transducer B reading)

Pump Station = PSI

13.1.1.4 Data Byte 6 (Water Temperature)

This is typically used to monitor sea water temperature for automatic change between reverse cycle and electric heat. Value is 8 bits °F if present otherwise 0xff.

13.1.2 Page 1

This byte identifies the page number. Page 1 only transmitted when configured as a modulated compressor control.

13.1.2.1 Data Byte 1 (Status)

This is a bit defined field representing hardware status. Bit order is FTPMABSC. Where the bits are defined as follows:

Bit C: Compressor status 1=on, 0=off

Bit S: Sea water Pump 1=on, 0=off

Bit B: High freon 0=closed, 1= open

Bit A: Low freon 0=closed, 1= open

Bit M: Mode 0 = Cool, 1 = Heat

Bit P: Sea Water flow 0=closed, 1= open

Bit T: VStar Trouble

Bit F: no evaporator control messages received

13.1.2.2 Data Byte 2/3 (Compressor RPM)

Compressor speed in rpm. If not available will be 0xffff.

13.1.2.3 Data Byte 4 (BTU output)

BTU/1000 out signed value

13.1.2.4 Data Byte 5 (Water Temperature)

This is typically used to monitor sea water temperature for automatic change between reverse cycle and electric heat. Value is 8 bits °F if present otherwise 0xff.

13.1.2.5 Data Byte 6 (High Pressure Reading)

Pressure transducer reading divided by 5.

13.1.2.6 Data Byte 7 (Low Pressure Reading)

Pressure transducer reading divided by 5.

13.1.3 Page 2

This byte identifies the page number. Page 1 only transmitted when configured as a modulated compressor control.

13.1.3.1 Data Byte 1/2 (Compressor Current)

16 bit hex value of average current * 100.

14. Ping 0x200 (512.)

Used to determine presence of a device. When the global destination address of 00 is used all units in system will respond. Similarly group numbers can be used for units for the destination address. This will give an indication of addresses used by the units, which have power applied. Used in conjunction with Ping with serial number and address change it can also be used to resolve address conflicts.

14.1 Message Content

CAN ID	...p pp10 0000 0000 dddd dddd ssss ssss		
Data Size	0		
Data	Bits 76543210	Description	Scale / Format

14.1.1 Faults

15. Ping with serial number 0x210 (528.)

15.1 Message Content

CAN ID	...p pp10 0001 0000 dddd dddd ssss ssss		
Data Size	4		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Serial #	Byte
Data[1]	XXXXXXXX	Serial #	Byte
Data[2]	XXXXXXXX	Serial #	Byte
Data[3]	XXXXXXXX	Serial #	Byte

15.1.1 Serial

Only the lower 6 digits of the serial number are used in BCD format.

16. Ping response 0x22n (544 – 559)

16.1 Message Content

CAN ID	...p pp10 0010 nnnn nnnn nnnn nnnn nnnn		
Data Size	6		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Unit ID	Byte
Data[1]	XXXXXXXX	Group ID	Byte
Data[2]	XXXXXXXX	Device ID	Hex
Data[3]	XXXXXXXX	Device ID	Hex
Data[4]	XXXXXXXX	Boot Revision	ASCII
Data[5]	XXXXXXXX	Code Revision	Byte

16.1.1 nnnn nnnn nnnn nnnn nnnn

This is the lower six digits of the unit's serial number in hex.

16.1.2 Unit ID

Units ID.

16.1.3 Group ID

Group Unit belongs to.

16.1.4 Device ID

Two digit code for the type of device unit is:

- OLED joystick = 0x378
- OLED Touch = 0x386
- SmartTouch/EasyTouch = 0x389
- Pump Station = 0x251
- FXII control slave = 0x360
- Hydromatic II = 0x250
- Marine Air Systems Elite = 0x314
- Cruisair Q-Logic = 0x505
- Eskimo Ice Maker = 0x820
- Dometic Q-Truck Control = 0x560

16.1.5 Boot Revision

ASCII letter indicating the revision of the boot sector code.

16.1.6 Code Revision

Hex number indicating the revision of the main code.

17. Address change 0x230 (560.)

17.1 Message Content

CAN ID	...p pp10 0011 0000 dddd dddd ssss ssss		
Data Size	5 (6)		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	New address	Byte
Data[1]	XXXXXXXX	Serial #	Byte
Data[2]	XXXXXXXX	Serial #	Byte
Data[3]	XXXXXXXX	Serial #	Byte
Data[4]	XXXXXXXX	Serial #	Byte

The serial number must match the serial number of the unit the message is intended for. Because of the serial number requirement group and global destinations will not work.

17.1.1 New Address

New value to be used as the address of the unit.

17.1.2 Serial

Serial number of the unit to change its address. Only the lower 6 digits of the serial number are used in BCD format.

17.1.3 Optional Data byte 5

If a sixth byte is sent and its value is 0x5A and the new address matches the original address then the unit will interpret the command as a change serial number command.

18. Group address change 0x240 (576.)

18.1 Message Content

CAN ID	...p pp10 0100 0000 dddd dddd ssss ssss		
Data Size	1		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	New Group	Byte

This command will change the group the unit is assigned to.

18.1.1 New Group Assignment

New value to be used as the group address of the unit.

19. Address change response 0x250 (592.)

19.1 Message Content

CAN ID	...p pp10 0101 0000 ssss ssss dddd dddd		
Data Size	6		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Group address	Byte
Data[1]	XXXXXXXX	New Unit ID	Byte
Data[2]	XXXXXXXX	Serial #	Byte
Data[3]	XXXXXXXX	Serial #	Byte
Data[4]	XXXXXXXX	Serial #	Byte
Data[5]	XXXXXXXX	Serial #	Byte

19.1.1 Group Address

Group address unit belongs to.

19.1.2 New Unit ID

New unit ID.

19.1.3 Serial

Serial number of the unit to change it's address. Only the lower 6 digits of the serial number are used in BCD format. (i.e. 373001342 will use 001342)

20. Silent mode 0x260 (608.)

20.1 Message Content

CAN ID	...p pp10 0110 0000 dddd dddd ssss ssss		
Data Size	1		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	01/00	

20.1.1 Silent Mode Flag

0 – Normal mode. All communication messages allowed. Unit will report status once every 10 seconds.

1 – Only silent mode response message allowed. Unit will report its current state before switching to silent mode. Unit will respond to commands sent to it but periodic status messages will not be transmitted until commanded to exit silent mode or power for unit is interrupted.

21. Silent mode response 0x270 (624.)

21.1 Message Content

CAN ID	...p pp10 0111 0000 ssss ssss dddd dddd		
Data Size	1		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	State	

21.1.1 Silent Mode State

0 – Normal mode.

1 – Silent mode.

22. Read Memory 0x285 (645.)

22.1 Message Content

CAN ID	...p pp10 1000 0101 dddd dddd ssss ssss		
Data Size	3		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	High byte of starting address	Hex
Data[1]	XXXXXXXX	low byte of starting address	Hex
Data[2]	XXXXXXXX	Number of bytes	HEX

22.1.1 Starting address

First byte of data range requested.

22.1.2 Number of bytes

Number of bytes to read.

23. Read Memory Reply 0x286 (646.)

23.1 Message Content

CAN ID	...p pp10 1000 0110 ssss ssss dddd dddd		
Data Size	8		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	High byte of starting address	Byte
Data[1]	XXXXXXXX	High byte of starting address	Byte
Data[2]	XXXXXXXX	Data from memory	Byte
Data[3]	XXXXXXXX	Data from memory	Byte
Data[4]	XXXXXXXX	Data from memory	Byte
Data[5]	XXXXXXXX	Data from memory	Byte
Data[6]	XXXXXXXX	Data from memory	Byte
Data[7]	XXXXXXXX	Data from memory	Byte

23.1.1 Starting address

First byte of data range requested

23.1.2 Data from memory

Data byte from block requested. In the Eskimo Ice maker the range from 6E00H

to 6EFFH is reserved for operating parameters. Values in locations 6E0EH-6E0FH and 6E12H-6E13H must be doubled when read if the ice maker is operating on 110VAC and when modified to be written back to the ice maker must be halved. Location 6FF0H is a 4 byte checksum of the flash from 0 to 6FEFH.

24. EE Memory Reply 0x289 (649.)

24.1 Message Content

CAN ID	...p pp10 1000 1001 ssss ssss dddd dddd		
Data Size	8		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	High byte of starting address	Byte
Data[1]	XXXXXXXX	Low byte of starting address	Byte
Data[2]	XXXXXXXX	Data from memory	Byte
Data[3]	XXXXXXXX	Data from memory	Byte
Data[4]	XXXXXXXX	Data from memory	Byte
Data[5]	XXXXXXXX	Data from memory	Byte
Data[6]	XXXXXXXX	Data from memory	Byte
Data[7]	XXXXXXXX	Data from memory	Byte

24.1.1 Starting address

First byte of data range requested

24.1.2 Data from memory

Data byte from block requested.

25. Eeprom Write 0x287 (647.)

25.1 Message Content

CAN ID	...p pp10 1000 0111 dddd dddd ssss ssss		
Data Size	3		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	High byte of address	Hex
Data[1]	XXXXXXXX	low byte of address	Hex
Data[2]	XXXXXXXX	data	HEX

25.1.1 Address

Address of data to be written.

25.1.2 Data

Data.

26. Eeprom Read 0x288 (648.)

26.1 Message Content

CAN ID	...p pp10 1000 1000 dddd dddd ssss ssss		
Data Size	3		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	High byte of address	Hex
Data[1]	XXXXXXXX	low byte of address	Hex
Data[2]	00000000	Reply format	future

26.1.1 Address

First byte of data requested.

26.1.2 Reply Format

Format of the response message. 0 use message type 0x289. 1 use message type 0x28A.

27. Eeprom reply verbose 0x28A (650.)

27.1 Message Content

CAN ID	...p pp10 1000 1000 dddd dddd ssss ssss		
Data Size	n		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page 0 of 7	Hex
Data[1]	XXXXXXXX	Index	Hex
Data[2]	XXXXXXXX	Number of Parameters	Hex
Data[3]	XXXXXXXX	Length of Parameter	Hex
Data[4]	XXXXXXXX	Multiplier	Hex
Data[5]	XXXXXXXX	Default bits 23-16	Hex
Data[6]	XXXXXXXX	Default bits 15-8	Hex
Data[7]	XXXXXXXX	Default bits 7-0	Hex

CAN ID	...p pp10 1000 1000 dddd dddd ssss ssss		
Data Size	n		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page 1 of 7	Hex
Data[1]	XXXXXXXX	Value Step	Ascii
Data[2]	XXXXXXXX	Upper limit bits 23-16	Ascii
Data[3]	XXXXXXXX	Upper limit bits 15-8	Ascii
Data[4]	XXXXXXXX	Upper Limit bits 7-0	Ascii
Data[5]	XXXXXXXX	Lower limit bits 23-16	Ascii
Data[6]	XXXXXXXX	Lower limit bits 15-8	Ascii
Data[7]	XXXXXXXX	Lower limit bits 7-0	Ascii

CAN ID	...p pp10 1000 1000 dddd dddd ssss ssss		
Data Size	n		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page 2 of 7	Hex
Data[1]	XXXXXXXX	Item Description byte 1	Ascii
Data[2]	XXXXXXXX	Item Description byte 2	Ascii
Data[3]	XXXXXXXX	Item Description byte 3	Ascii
Data[4]	XXXXXXXX	Item Description byte 4	Ascii
Data[5]	XXXXXXXX	Item Description byte 5	Ascii
Data[6]	XXXXXXXX	Item Description byte 6	Ascii
Data[7]	XXXXXXXX	Item Description byte 7	Ascii

CAN ID	...p pp10 1000 1000 dddd dddd ssss ssss		
Data Size	n		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page 3 of 7	Hex
Data[1]	XXXXXXXX	Item Description byte 8	Ascii
Data[2]	XXXXXXXX	Item Description byte 9	Ascii
Data[3]	XXXXXXXX	Item Description byte 10	Ascii

Data[4]	XXXXXXXX	Item Description byte 11	Ascii
Data[5]	XXXXXXXX	Item Description byte 12	Ascii
Data[6]	XXXXXXXX	Item Description byte 13	Ascii
Data[7]	XXXXXXXX	Item Description byte 21	Ascii

CAN ID	...p pp10 1000 1000 dddd dddd ssss ssss		
Data Size	n		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page 4 of 7	Hex
Data[1]	XXXXXXXX	Item Description byte 14	Ascii
Data[2]	XXXXXXXX	Item Description byte 15	Ascii
Data[3]	XXXXXXXX	Item Description byte 16	Ascii
Data[4]	XXXXXXXX	Item Description byte 17	Ascii
Data[5]	XXXXXXXX	Item Description byte 18	Ascii
Data[6]	XXXXXXXX	Item Description byte 19	Ascii
Data[7]	XXXXXXXX	Item Description byte 20	Ascii

CAN ID	...p pp10 1000 1000 dddd dddd ssss ssss		
Data Size	n		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page 5 of 7	Hex
Data[1]	XXXXXXXX	Item Description byte 21	Ascii
Data[2]	XXXXXXXX	Item Description byte 22	Ascii
Data[3]	XXXXXXXX	Item Description byte 23	Ascii

Data[4]	XXXXXXXX	Item Description byte 24	Ascii
Data[5]	XXXXXXXX	Value Description byte 1	Ascii
Data[6]	XXXXXXXX	Value Description byte 2	Ascii
Data[7]	XXXXXXXX	Value Description byte 3	Ascii

CAN ID	...p pp10 1000 1000 dddd dddd ssss ssss		
Data Size	n		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page 6 of 7	Hex
Data[1]	XXXXXXXX	Value Description byte 4	Ascii
Data[2]	XXXXXXXX	Value Description byte 5	Ascii
Data[3]	XXXXXXXX	Value Description byte 6	Ascii
Data[4]	XXXXXXXX	Value Description byte 7	Ascii
Data[5]	XXXXXXXX	Value Description byte 8	Ascii
Data[6]	XXXXXXXX	Value Description byte 9	Ascii
Data[7]	XXXXXXXX	Value Description byte 10	Ascii

CAN ID	...p pp10 1000 1000 dddd dddd ssss ssss		
Data Size	n		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page 6 of 7	Hex
Data[1]	XXXXXXXX	Value Description byte 11	Ascii
Data[2]	XXXXXXXX	Value Description byte 12	Ascii

Data[3]	XXXXXXXX		Ascii
Data[4]	XXXXXXXX		Ascii
Data[5]	XXXXXXXX		Ascii
Data[6]	XXXXXXXX		Ascii
Data[7]	XXXXXXXX		Ascii

27.1.1 Page n of 7

Upper nibble is number of pages in reply. Lower nibble is page number.

27.1.2 Index

Index of parameter requested.

27.1.3 Number of parameters

Total number of parameters in product.

27.1.4 Length of parameter

Number of bits in parameter.

27.1.5 Multiplier

Used to increase value range.

27.1.6 Default Value

Parameter default value. Three bytes highest byte first.

27.1.7 Value Step

Minimum change.

27.1.8 Upper limit

Maximum parameter value. Three bytes highest byte first.

27.1.9 Lower limit

Minimum parameter value. Three bytes highest byte first.

27.1.10 Parameter Description

Parameter description 24 characters.

27.1.11 Parameter Value

Parameter value in ascii.

28. Download CAN firmware 0x1AA (426.)

This is a variable length multi page message.

28.1 Message Content

CAN ID	...p pp01 1010 1010 dddd dddd ssss ssss		
Data Size	8		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXXXXXX	Page n of n	
Data[1]	XXXXXXXX	Starting high address	
Data[2]	XXXXXXXX	Starting low address	
Data[3]	XXXXXXXX	String	
Data[4]	XXXXXXXX	String	
Data[5]	XXXXXXXX	String	
Data[6]	XXXXXXXX	String	
Data[7]	XXXXXXXX	String	

28.1.1 Page n of n

The upper nibble byte is total number of pages for message.
Lower nibble is current page number.

28.1.2 Starting address

The starting address for string being transmitted

28.1.3 String

Line from hex file

29. Transmission Error 0x0FF (255.)

This may be generated during downloading. If received during downloading the download should be aborted and retried from the beginning. Failure to do this will cause the unit to operate improperly.

29.1 Message Content

CAN ID	...p pp00 1111 1111 ssss ssss dddd dddd		
Data Size	2		
Data	Bits 76543210	Description	Scale / Format
Data[0]	XXXBSCFA	MOB ERRORS	Bits8
Data[1]	XXXXXXXX	DOWNLOAD Error number	Byte
Data[2]	XXXXXXXX	Flash Page Address	Byte

29.1.1 MOB Errors

B = Bit error
S = Stuff error
C = CRC error
F = Form Error
A = Acknowledge error.

29.1.2 Download Error Number

1 = Invalid page number
2 = page N address doesn't match string address
3 = page N address doesn't match string address
4 = End Of File message incorrect
5 = String checksum wrong

29.1.3 Flash Page Address

Address of first byte on page in flash

30. Flash Write Ready 0x1AB (427.)

This is generated during downloading at the end of each successful write.

30.1 Message Content

CAN ID	...p pp00 1111 1111 ssss ssss dddd dddd
Data Size	0

31. Wiring

Connect the CAN-H to the CH terminal and the CAN-L to the CL terminal, and ground (shield) to GND on each of CAN bus adaptor devices. Use twisted pair cable (CAN-H and CAN-L on one pair) with a shield for best results. Make sure that only the first and last adaptors on the CAN bus have the bus terminator jumper installed.