

I. Serial Communications:

- A. This describes serial communications for the ES+ controller with versions V2.00 and later software.
- B. The RS-232 port is available for serial communications of compressor data to external monitoring systems at any time. If units are NOT connected in sequence, the RS-485 port may be used for multi-drop communications of compressor data to external monitoring systems. Data available include all pressures and temperatures, and a report of internal service data. This is accessible with a PC or PLC with an appropriate communications port. The following describes communications protocol for requesting and receiving data.

II. Communications Ports:

- A. One port is provided for data communications.
 - 1. This port is RS-232, with DB9F connector.
 - 2. The port is DCE mode.
 - a) Pin 5 is common.
 - b) RD data output is on pin 2.
 - c) TX data input is on pin 3.
 - d) CTS output is on pin 8.
 - e) All other pins are no connection.
 - 3. The RS-232 port is available for data communications in any operating mode.
- B. One port is provided for inter-controller communications for sequenced operations, but is available for data when units are not sequenced.
 - 1. This port is RS-485 with RJ12 six pin connectors.
 - a) The red & green wires are connected together and to RS-485 '-'.
 - b) The yellow & black wires are connected together and to RS-485 '+'.
 - c) The blue and white wires are connected together and are a common reference for all controller ports.
 - 2. Two jacks are provided for multi-drop connection. A terminating load and a pigtail lead is provided for a controller on the end of the RS-485 line.
 - 3. The RS-485 port is available for data communications in any mode other than SEQUENCE.
- C. COMM PORT UART parameters are as follows:
 - 1. baud is 1200 or 9600 (selected in controller adjustments).
 - 2. data bits: 7
 - 3. stop bit: 1
 - 4. no parity
 - 5. half duplex
- III. All data communications are initiated externally by requests for data.
 - A. All requests are four character, of the form "<stx>xx<etx>"
 - 1. <stx> is ascii 2

- 2. xx are identical text characters described below.
- 3. <etx> is ascii 3
- B. All responses follow a similar form "<stx>[data]<etx>
 - 1. <stx> is ascii 2
 - 2. data is a string of characters described below.
 - 3. <etx> is ascii 3
 - 4. Response is 100-500 mSecond following the request.
- C. Responses are affected by controller programming
 - 1. There is no response on the RS-485 port if the controller is operating in Sequence mode.
 - 2. If the controller is programmed for NUMBER OF UNITS > 1, the communications must be enabled as described below.
 - 3. If the controller is programmed for NUMBER OF UNITS = 1, the controller responds to all requests.
- IV. The following request enables and disables responses from units with NUMBER OF UNITS > 1:
 - A. **=Enable communications to any and all units
 - B. 11=Enable unit 1 communications only
 - C. 22=Enable unit 2 communications only
 - D. 33=Enable unit 3 communications only
 - E. 44=Enable unit 4 communications only
 - F. 55=Enable unit 5 communications only
 - G. 66=Enable unit 6 communications only
 - H. 77=Enable unit 7 communications only
 - I. 88=Enable unit 8 communications only
 - J. The controller response is "<stx><etx>"
- V. The controller provides service and maintenance data;
 - A. Send request <stx>BB<etx>
 - B. The controller responds with

- 1. aaaa = Advisories, four digit Hex, see bit values below
- 2. cc = Shutdown codes (most recent first), see codes below.
- 3. hhhhhh = Total runtime hourmeter @ shutdown
- 4. rrrrrr = Current total runtime hourmeter
- 5. IIIIII = Current loaded runtime hourmeter
- 6. tttttt = Current temp hourmeters [H1] through [H6] (lo temp 1^{st})
- 7. ssssss = Stored temp hourmeters [OH1] through [OH6] (lo temp 1st)
- 8. aaaaaa = Last maintenance A
- 9. bbbbbb = Last maintenance B
- 10. ooooooo = Oilage
- 11. All time values in ASCII Decimal (1/10-Hours)



- VI. The controller provides operating mode data.
 - A. Send request <stx>mm<etx>

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- B. Versions V2.00 & V2.01 respond with "<stx>m<etx>"
- C. Versions V2.10 and later respond with "<stx>mtff<etx>"
 - 1. m = Operating mode
 - a) 0=Stop/Ready
 - b) 1=Constant run
 - c) 2=Low Demand
 - d) 3=Automatic
 - e) 4=Sequence
 - f) 5=Shutdown
 - 2. \dot{t} = sequence number
 - 3. ff = unit operating state hex
 - a) 01=AUTO RESTART SEQUENCE
 - b) 02=SHUTDOWN
 - c) 03=READY
 - d) 04=COMP ENABLED
 - e) 05=AUTO ENABLED
 - f) 06=NOT BLOWNDOWN
 - g) 07=PRESTART
 - h) 08=START
 - i) 09=PAUSE
 - j) 0A=RUN
 - k) 0B=CLOSE BDV
 - I) 0C=FULL LOAD
 - m) 0D=MODULATING
 - n) 0E=NORMAL STOP
 - o) OF=REMOTE UNLOAD
 - p) 10=REMOTE HALT
 - q) 11=SHUTDOWN SEQUENCE
- The controller provides operating data;
 - A. Send request <stx>oo<etx>
 - B. The controller responds with "<stx>wwwxxxxyyyyzzzzaaa<etx>"
 - 1. wwww = System pressure in internal units
 - a) Pressure is in ASCII Hex 0-9,A-F
 - b) Divide by 16 for pressure in psig
 - 2. xxxx = Oil Reservoir pressure in internal units
 - a) Pressure is in ASCII Hex 0-9,A-F
 - b) Divide by 16 for pressure in psig
 - 3. yyyy = Discharge temperature in internal units
 - a) Temperature is in ASCII Hex 0-9,A-F
 - b) Divide by 16 for temperature in DegF.

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- 4. zzzz = Reservoir temperature in internal units
 - a) Temperature is in ASCII Hex 0-9,A-F
 - b) Divide by 16 for temperature in DegF.
- 5. aaa = Motor current in Amps
 - Current is in ASCII Hex 0-9,A-F
- VIII. Advisory Codes bit responses to carry multiple active advisories.
 - A. 0=Change separator

a)

- B. 1=Change air filter
- C. 2=Change oil filter
- D. 3=Change oil
- E. 4=Low ambient A (air end probe)
- F. 5=Low ambient B (separator probe)
- G. 6=High discharge temperature (air end probe)
- H. 7=High reservoir temperature (separator probe)
- I. 8=High motor amps
- J. 9=Check comm port
- K. 10=reserved
- L. 11=reserved
- M. 12=reserved
- N. 13=reserved
- O. 14=reserved
- P. 15=reserved
- IX. Shutdown Codes are numeric 2-digit values.
 - A. 00=No fault
 - B. 05=Fan overload
 - C. 06=Main overload
 - D. 07=High vibration
 - E. 08=Emergency stop
 - F. 09=Open system pressure transducer
 - G. 10=I/O Power (CN-8)
 - H. 11=High system pressure
 - I. 12=Shorted final discharge pressure transducer
 - J. 13=Open reservoir pressure transducer
 - K. 14=High reservoir pressure
 - L. 15=Shorted reservoir pressure transducer
 - M. 16=Open air end thermistor
 - N. 17=High separator temperature
 - O. 18=Shorted air end thermistor
 - P. 19=Open separator thermistor
 - Q. 20=High air end temperature
 - R. 21=Shorted separator thermistor
 - S. 23=Change separator
 - T. 24=Fan starter error

U. 25=Main starter error

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- V. 26=Low oil pressure
- W. 27=High separator temp rise
- X. 28=High air end temp rise
- Y. 29=Zero final discharge pressure transducer
- Z. 30=Zero reservoir pressure transducer
- AA. 31=Fan starter jammed
- BB. 32=Main starter jammed
- CC. 33=Open amp sensor
- DD. 34=Shorted amp sensor
- EE. 35=External device
- FF. 36=Phase relay
- GG. 37=Low voltage relay
- HH. 38=Water pressure switch
- II. 39=Motor overtemp switch
- JJ. 40=reserved
- KK. 41=reserved
- LL. 42=reserved
- MM. 43=reserved
- NN. 81=EEPROM checksum error
- OO. 82=Analog failure (CN-7)

NUMBER:



CHG. NO.	PART NO.	DESCRIPTION	VER.	DATE
1002175	305EAU1255	Released new instructions	00	07-24-98
1007027		Changed Sheet 3—Item VII, B, 2 – FROM: Filter	01	03-16-00
		pressure TO: Oil Reservoir pressure & changed		
		Sheet 5moved FROM: 81(LL) & 82 (MM)		
		TO: 81 (NN) & 82 (OO); added (LL) 42=reserved &		
		(MM) 43=reserved		