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USACE / NAVFAC / AFCEA / NASA UFGS-23 09 33.13 40 (August 2008)  
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Preparing Activity: NASA Superseding  
UFGS-23 09 33.13 40 (July 2007)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2008

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### SECTION 23 09 33.13 40

#### ELECTRIC CONTROL SYSTEM FOR HVAC 08/08

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NOTE: This specification covers the requirements for microprocessor interface requirements for control of air handling units from a central building control computer, referred to in the text as the Utility Control System (UCS).

The purpose of this section is to obtain detailed microprocessor communication protocol in order to interface an air handler microprocessor with a dissimilar building control system. Air handler microprocessor will typically communicate with a Remote Terminal Unit (RTU), which is a smart peripheral extension of the UCS.

This section should be used in conjunction with the following when applicable:

Section 42 22 13.00 40 CENTRIFUGAL PROCESS CHILLERS AND COOLERS.

Section 23 82 19 FAN COIL UNITS.

Section 23 34 16.00 20 AIR HANDLING UNITS.

Section 23 74 33.00 40 PACKAGED, OUTDOOR, HEATING AND COOLING MAKEUP AIR-CONDITIONERS

Section 23 81 23.00 20 COMPUTER ROOM AIR CONDITIONING UNITS

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments and suggestions on this guide specification are welcome and should be directed to the technical

proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

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## PART 1 GENERAL

### 1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this section to the extent referenced. The publications are referred to within the text by the basic designation only.

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

TIA/EIA 422-B

(1994; R 2005) Standard for Electrical Characteristics of Balanced Voltage Digital Interface Circuits

### 1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in

context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-01 Preconstruction Submittals

[Records of Existing Conditions](#) shall be submitted in accordance with paragraph entitled, "General Requirements," of this section.

#### SD-02 Shop Drawings

[Connection Diagrams](#) shall be submitted for air handling unit microprocessor interface in accordance with paragraph entitled, "General Requirements," of this section.

#### SD-03 Product Data

[Equipment and Performance Data](#) shall be submitted for air handling unit microprocessor interface in accordance with paragraph entitled, "General Requirements," of this section.

#### SD-07 Certificates

[Parts List](#) shall be submitted for air handling unit microprocessor interface in accordance with paragraph entitled, "General Requirements," of this section.

#### SD-08 Manufacturer's Instructions

[Operating Instructions](#) shall be submitted for air handling unit microprocessor interface in accordance with paragraph entitled, "General," of this section.

#### SD-10 Operation and Maintenance Data

[Operation and Maintenance Manuals](#) shall be submitted in accordance

with paragraph entitled, "Operation and Maintenance," of this section.

### 1.3 GENERAL REQUIREMENTS

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NOTE: If Section 23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS is not included in the project specification, applicable requirements therefrom should be inserted and the following paragraph deleted.  
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Section 23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS applies to work specified in this section.

Records of Existing Conditions shall be submitted consisting of the results of Contractor's survey of work area conditions and features of existing structures and facilities within and adjacent to the jobsite. Commencement of work shall constitute acceptance of existing conditions.

Connection Diagrams shall be submitted for air handling unit microprocessor interface indicating the relation and connection of devices and apparatus by showing the general physical layout of all controls, the interconnection of one system (or portion of system) with another, and internal tubing, wiring, and other devices.

Equipment and Performance Data shall be submitted for air handling unit microprocessor interface consisting of scan rates, and response times to direct commands.

Parts List shall be submitted for air handling unit microprocessor interface listing by manufacturer's name, part number, nomenclature, and stock level required for maintenance and repair necessary to ensure continued operation with minimal delay.

## PART 2 PRODUCTS

### 2.1 GENERAL

Air handling units which utilize a microprocessor-based control system for monitoring alarms, temperature and humidity and control chilled water flows, heating, and humidification, shall have the capability to communicate directly with a microprocessor-based remote terminal unit (RTU) for data acquisition, alarm monitoring, set point and alarm point adjustment.

Operating Instructions shall be submitted for air handling unit microprocessor interface consisting of standard operating procedures including startup, shutdown, and emergency operation.

### 2.2 COMMUNICATIONS

Communications port(s) shall be a standard interface in accordance with TIA/EIA 422-B. Standard baud rate shall be 9600, on which all performance specifications shall be based. Baud rate shall be switch selectable to [4800] [2400].

Each air handling unit microprocessor shall be available for and able to

communicate directly with the NASA Utility Control System (UCS) remote terminal unit (RTU).

### 2.3 DIAGNOSTICS

Microprocessor control shall include a diagnostic routine that can be performed by the user to check the operation of the microprocessor.

Diagnostic routines shall be fully tested by the manufacturer prior to delivery. Diagnostics shall provide two levels of testing.

#### 2.3.1 Automatic Diagnostics

Automatic diagnostics shall be executed upon system start-up and shall include a read/write check to memory for memory testing, minimal instruction execution check, buss and port checks.

#### 2.3.2 Comprehensive Diagnostics

Comprehensive diagnostics shall include:

Microprocessor instructions: All defined functions and their variations

Microprocessor memory testing: Memory testing shall include comprehensive memory test with memory execution characteristic printout. Limits on memory access time, all patterns run, run time, and number of successful executions in worst case pattern shall be included in this printout.

Power supply status

Buss and port checks

Capability to be initiated remotely (through the communication link)

Performance of the diagnostics shall meet the above requirements for final acceptance of the air handling unit.

### 2.4 ACQUISITION POINT REQUIREMENTS

Air handling unit microprocessor shall monitor and transmit the values of the following points to the remote terminal unit (RTU):

[Cooling temperature setpoint]

[Heating temperature setpoint]

[Humidification setpoint]

[Dehumidification setpoint]

[Return air temperature]

[Return air relative humidity]

[Air handler fan operation status (loss of airflow alarm)]

[Filter status (dirty filter alarm)]

[Water flow status (loss of chilled water flow alarm)]

[Return air smoke detector alarm]

[Humidifier failure alarm]

[Under floor water sensor alarm]

[Activation of manual override alarm]

[Activation of local alarm]

[Microprocessor failure (loss of communication is a valid indication of microprocessor failure)]

Acquisition values returned for a scan request shall be returned in no more than two (2) seconds.

Air handling unit microprocessor shall respond to a scan request in no more than five (5) seconds, total, for up to 16 scanned points.

## 2.5 CONTROL POINT REQUIREMENTS

Air handling unit microprocessor shall accept commands from the remote terminal unit (RTU) to control the following points:

[Unit (fan) start/stop]

[Cooling temperature setpoint]

[Heat temperature setpoint]

[Humidification setpoint]

[Dehumidification setpoint]

## PART 3 EXECUTION

### 3.1 INSTALLATION

Equipment shall be installed as indicated and in accordance with the manufacturer's recommendations.

### 3.2 OPERATION AND MAINTENANCE

Contractor shall submit [6] [\_\_\_\_\_] copies of the [Operation and Maintenance Manuals](#) 30 calendar days prior to testing the air handling unit microprocessor interface. Data shall be updated and resubmitted for final approval no later than 30 calendar days prior to contract completion.

-- End of Section --