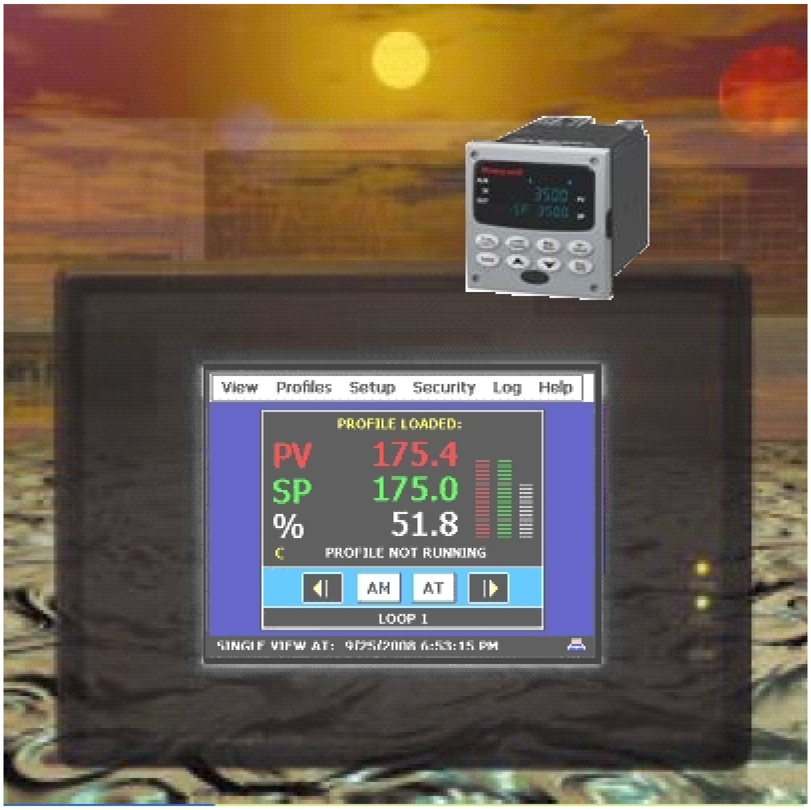
FUTUREDESIGN CONTROLS

Orion-M

Honeywell UDC3500 Controller System Guide


View
Profiles
Setup
Security
Log
Help
PROFILE LOADED:
PV 175.4
SP 175.0
% 51.8
PROFILE NOT RUNNING
AM
AT
LOOP 1
SINGLE VIEW AT:
3500
SP 3500

Orion-M Honeywell UDC3500 Series Controller System Guide Rev C
February 7, 2011
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Safety Information in this Manual

Notes, cautions and warnings appear throughout this book to draw your attention to important operational and safety information.

A “**NOTE**” marks a short message to alert you to an important detail.

A “**CAUTION**” safety alert appears with information that is important for protecting your equipment and performance.

A “**WARNING**” safety alert appears with information that is important for protecting you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.

⚠ This symbol (an exclamation point in a triangle) precedes a general CAUTION or WARNING statement.

⚠ This symbol (a lightning bolt in a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement.

Technical Assistance

If you encounter a problem with your Orion-M controller, review all of your configuration information to verify that your selections are consistent with your application: inputs; outputs; alarms; limits; etc. If the problem persists after checking the above, you can get technical assistance by dialing +1 (866) 342-5332 or by faxing your request to +1 (866) 332-8014, Monday thru Friday, 8:00 a.m. to 5:00 p.m. Eastern Standard Time. You can also email your request to support@futuredesigncontrols.com.

An applications engineer will discuss your application with you.

Please have the following information available:

- Complete Model #’s and/or Serial #’s for Component(s) in Question
- Complete Software Version #’s
- All Configuration Information
- All User Manuals

Warranty and return information is on the back cover of this manual.

Your Comments

Your comments or suggestions on this manual are welcome. Please send them to:
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1 What is the Orion-M?

The Orion-M is a multi-loop process control system combined with an embedded SCADA color touch interface. The Orion-M provides a configurable control platform for a variety of OEM applications requiring up to 15 separate loops of control. In addition to 15 loops of control, the Orion-M can also provide up to an additional 15 inputs for process monitoring, for a total of 30 process inputs.

The system is provided with eight 24Vdc digital inputs, two 24Vdc outputs and 6 relay outputs standard. The Orion-M can be expanded to a total of 16 digital inputs and 32 digital outputs. The Orion-M also provides the capability of accepting analog inputs for remote set point control and analog outputs capable of retransmitting system variables (PV, SP or %Out) to other devices such as a chart recorder. The 0-10Vdc or 4-20mA user selectable signals are provided through the addition of optional analog expander cards.

The Orion-M complements its versatile hardware platform by providing a host of standard features and configuration capabilities, all through its visual, touch interface. The touch screen interface is an embedded, industrial PC with all software included. No external PC software is required for setup or configuration of the Orion-M. All of the setup and configuration data is saved to the Orion-M's internal memory.

Individual process controllers, one for each loop in the system, provide reliable, consistent and accurate control by distributing the process control requirements of the system among multiple processors. Each loop controller provides full auto tune functionality with high resolution, universal process inputs. When coupled with the built in ramping profiler of the Orion-M, it allows for automatic, timed control of all processes and outputs of the system. No other control system on the market provides the flexibility, functionality and configurability of the Orion-M.

1.1 Features

The digital inputs of the Orion-M can be configured as alarm inputs with adjustable delay timers, as control inputs for controlling profile operation or for direct control of the system's digital outputs.

The digital outputs of the Orion-M can be used as direct outputs for controlling external equipment related to the application through software switches, called events, or be programmed to act as system alarm or status outputs. All outputs have adjustable delay times for on, off and cycle times.

The Orion-M can be operated in single set point or automatic profile control mode. Profile entry is made easy through the use of copy, paste and delete menu selections. Profiles can be copied to the external 'USB' memory stick and then imported to another Orion-M controller which eliminates the need to enter duplicate profiles into multiple Orion-M systems. When running in automatic profile mode, the operator can place the system into hold and change any control parameter without modifying the saved profile. This gives the operator maximum flexibility over the controlled process.

Data file analysis tools (auto-trend) make looking at historical data a simple task. Any control variable saved to the Orion-M flash memory can be plotted on the historical data trend, for any time frame within the data file's total time range. Full 'USB' print capabilities from the Orion-M interface to a standard HP inkjet printer Model 6540, 6940, 6980 (or compatible printer), eliminates the need for a PC, strip or circular chart-recording device. Graphics trends, historical and report print functions are standard.

The built in Ethernet functionality includes a 'Web Server' to provides access to all Orion-M data (view only), a VNC interface for remote control and monitoring and an NTS clock, all available via a local Intranet connection (wired or wireless), or the World Wide Web using standard software like Microsoft's Internet Explorer.

The Orion-M provides a rich set of tools for control interaction and data analysis. Views include system overviews, trends, alarms, profiles as well as historical data, alarm history and audit trail views. The menu driven interface eliminates screen 'clutter' by providing an easy to use 'Windows' interface for interaction between the user and the Orion-M system.

The Orion-M can store more than one year of data on its internal compact flash card. Data logging can be enabled manually or automatically during automatic profile run. Data backup is provided with the 'USB I-Stick' for plug and play transfer of files to any PC running Microsoft Windows XP operating systems.

The Orion-M security module provides full system security with three levels of access. Each of the three access levels allow for independent user rights. Up to 30 users can be entered into the system while the audit trail tracks all operator actions and records them.

The Orion-M control system includes the following interface features:

- Overview screen that displays all "runtime" information.
- Profile run and monitor views.
- Profile entry, open, save and download interface screens.
- Current alarm and alarm history views (alarm history for up to 1 year).
- Real time trends (with adjustable X,Y limits) for all inputs.
- System and application setup (control loops, monitors, inputs/outputs, alarms, etc.).
- Data logging interface screens include log point selection and historical viewing.
- 'Plug and Play' memory stick functionality for data transfer/backup.
- Full USB print capabilities and on-line help screens
- Web server for intranet/internet access (view only).
- VNC server for intranet/internet access (control/view).
- FTP data back-up for automatic data file transfer over intranet/internet.
- Integrated email server for alarm notification and file transfer.
- NTS clock with daylight savings time insures that the system is up to date.
- Full security with audit trail for tracking user actions.
- Maintenance counters for output cycles and on times.
- Helps screens are available for most screen views; configurable in English, Spanish and French
- Voice assisted help in English, Spanish and French (external speakers required – not included).

2 Getting Started

The Orion-M requires one Honeywell UDC3500 for every two control loops required in the system. Since the Orion-M is capable of interfacing to more than one brand of controller, refer to the Orion-M part number matrix for the operating system to be sure that the HWDL, CM application software has been provided. The Orion-M will not operate correctly if any other version of CM application software is used with a Honeywell UDC3500 controller.

2.1 Installing the UDC3500 Controller

For applications requiring several loops of control or more, proper planning and arrangement of the Honeywell UDC controllers prior to mounting is critical for optimum routing of the controller wiring. For applications requiring frequent access to the controllers, panel mounting provides direct access. For applications where operator access to the controllers is not required, or is desired to be kept at a minimum, the controllers can be mounted directly inside of an enclosure. This also reduces wiring concerns by eliminating the need to run the sensor, communication and control wiring for each controller to and from an enclosure door.

Refer to the Honeywell UDC3500 Controller Product Manual for dimensions, appropriate mounting and operating conditions, including proper electrical connections. Connect sensor and control wiring as required, paying close attention to all wiring precautions and guidelines as noted in the controller manual. It is recommended that all sensor and communication wiring, to and form the UDC controllers, be routed away from all high voltage and/or output control wiring. This will minimize the chances of electrical transients or spikes in the power/control wiring from causing communications or sensor reading errors.

2.1.1 Communications Wiring

Each UDC3500 control used in the Orion-M system is its own independent loop control. However, in order for the controllers to work as part of the system, they must communicate with the Orion-M control module using RS485 serial communications. Therefore, each UDC3500 used must be equipped with the RS485 Modbus RTU communications option or they will not operate as part of the Orion-M system:

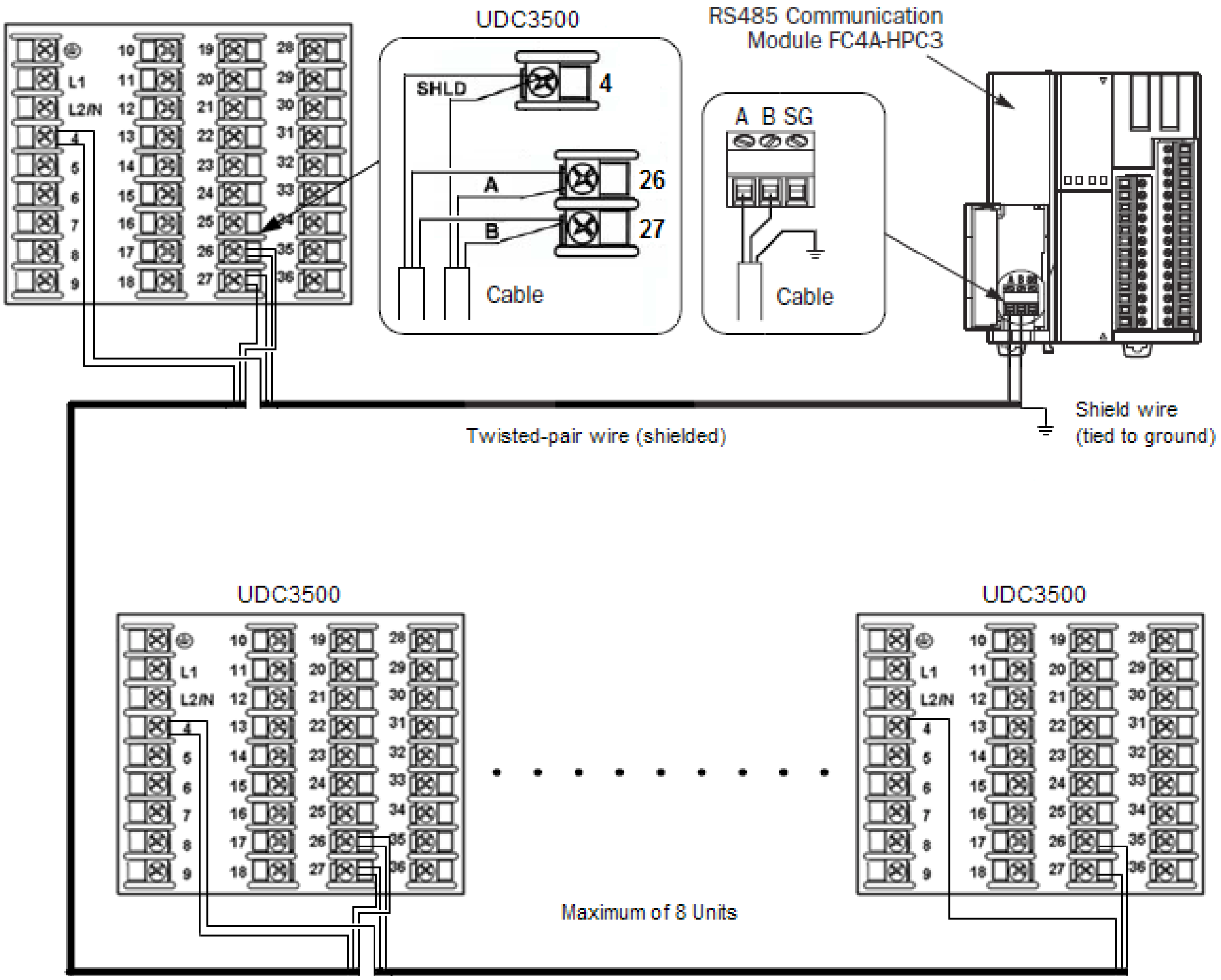
DC350X-XX-**2**XXX-XXX-XX000-XX-0

Order code **2** designates RS-485 Modbus serial communications
(see Honeywell UDC Product Manual for model number interpretation)

Communications wiring must be run using a minimum of 24 AWG twisted-pair, copper conductors. For short runs (< 50 feet total), non-shielded wiring can be used as long as proper separation from power/control conductors is maintained. For communications wiring where the total length will exceed 50 feet, up to the maximum allowed length of 650 feet, shielded twisted-pair must be used.

NOTE: *FDC recommends the use of shielded wire for all installations regardless of the total length in order to maintain optimum performance and minimize the possibility of communications errors.*

When using shielded twisted-pair, be sure to ground the shield at only one end, preferably at the Orion-M control module. Allowing any other portion of the cable shield to come in contact with ground, or grounding both ends, will allow ground loop currents to flow in that section of the cable shield which can disrupt communications.


UDC3500
RS485 Communication Module FC4A-HPC3
SHLD
4
A
26
B
27
Cable
A B SG
Cable
L1
L2/N
Twisted-pair wire (shielded)
Shield wire (tied to ground)
UDC3500
UDC3500
Maximum of 8 Units

NOTE: *Refer to the Honeywell UDC3500 Product Manual for all other connections including power, sensor and control wiring. Since no two applications are the same, it is up to the system designer to insure that the controllers are properly installed and wired to meet design specifications.*

3 Configuring the Honeywell UDC3500 Controller

The unique and inherently flexible design of the Orion-M system allows the OEM to tailor each component of the system to the application. By using independent loop controls, each one can be configured for various input and output types, control algorithms, etc., based on the requirements of the application. It also allows control loops to be added or replaced on the system at any time, simply by connecting the controller to the Orion-M's control module, RS-485 communication link.

If the application requirements change and a different input or output type is required, or if the controller were to fail, it can be replaced quickly, and at a lower cost as compared to having to repair or replace larger, integrated multi-loop controllers. The Orion-M only requires that the communications settings for each loop control be properly assigned, and that the input type of the controller is set in the Orion-M Configurator, so that the control loop input and set point can be displayed and set properly through the Orion-M interface.

3.1 Assigning the Proper Communications Settings

The Orion-M can support up to eight UDC3500 controls; however, the last UDC3500 will only be able to have its first control loop integrated into the Orion-M. The Orion-M only supports 15 loops and there are a total of 16 provided by eight UDC3500 dual loop controllers. However, the Orion-M does allow the last UDC3500 controller (the unit assigned to communication address 8) to be replaced with a UDC2500 or UDC3200 single loop controller to reduce installation costs since the second loop of the UDC3500 is not supported.

When assigning communications addresses, the allowable address range is 1 – 8. Loops are assigned in sequential order in the Orion-M, two per UDC3500, starting with address 1 up to address 8 which only has a single loop assigned to it. As control loops are enabled in the Orion-M Configurator, the Orion-M will automatically assign Loop Inputs 1 and 2 to the controller at address 1, loop inputs 3 and 4 to the controller at address 2, and so on up to Loop Input 15 which is assigned to the controller at address 8. If more than one UDC controller has the same address, or a loop input is enabled but a controller is not assigned to the corresponding address, the Orion-M will report a communications alarm for that loop input when the runtime application is started.

NOTE: *The order of the loop controls on the communication link is not important. The communications address for a controller can be assigned regardless of its position on the link.*

Required UDC3500 Communications Group Settings:

• Communications station address (ComADR):	1-8	*(based on system design)*
• Communications selection (ComSTATE):	MODBUS	
• Infrared communications (IRENAB):	DISABLE	*(recommended but not required)*
• Baud rate (BAUD):	9600	
• Transmit delay (TX DELAY):	1	
• Floating point data format (WS FLOAT):	FP_B	
• Shed enable (SHED ENAB):	ENABLE	
• Shed time (SHEDTIME) :	60	*(recommended – minimum of 30 secs)*
• Shed mode (SHEDMODE):	LAST	
• Shed set point (SHED SP):	TO CSP	
• UNITS:	ENG	
• Computer set point ratio (CSP(2) RATIO):	1	*(for loops 1 and 2)*
• Computer set point bias (CSP(2) BIAS):	0	*(for loops 1 and 2)*

***See section 3 Configuration, in the Honeywell UDC3500 Product Manual for instructions on accessing the control's configuration menus and setting the above parameters as required.**

3.2 Input Type Assignments

The Honeywell UDC3500 controller provides universal input types for inputs 1 and 2. The Loop Inputs for the corresponding controller in the Orion-M Configurator are set to match the selected input type for inputs 1 and 2 of the UDC control.

IMPORTANT: *The Orion-M is unable to detect sensor break or input failure conditions on the Honeywell UDC3500 controller. Therefore, a problem may exist with a controller input, but the Orion-M will be unable to report the alarm condition.*

If the failure of an input is a critical alarm condition that requires monitoring, the orion-M provides 30 alarms that can be configured to any loop or monitor input. A process alarm can be configured with alarm set points outside of the normal operating range for the input. A failure of the input on the UDC3500 would result in a high scale or low scale break, which could then be detected and reported by the alarm set in the Orion-M.

3.2.1 Input 1 and 2 Operation

When input 1 or 2 of the UDC3500 is a temperature input, i.e., RTD or thermocouple, the temperature units of the input on the UDC3500 must be set to match the selection in the Orion-M on the Degrees C/F screen. The Orion-M can not change the temperature units on the UDC controller. Thus, when you set up the UDC controller, its temperature units must match that of the selection in the Orion-M. If the selections do not match, the Orion-M may show units of degrees Centigrade while the actual value from the UDC control is in degrees Fahrenheit.

In addition, if %RH (wetbulb) is selected for a Loop Input in the Orion-M Configurator, the temperature units in the Orion-M must match the UDC controllers for the drybulb/wetbulb calculation to be performed correctly. If the temperature units do not match, the relative humidity reading on the Orion-M will not be correct.

NOTE: *It is recommended that the Degrees C/F selection screen be disabled in the Orion-M Configurator once the proper temperature units selection has been made to prevent it from being accessed. This will prevent the temperature units from being accidentally changed and causing operator confusion when the units do not match between the UDC control and the Orion-M. See section 3.6 Orion Functions/Startup View, in the Orion-M Configuration Manual for information on enabling and disabling this item.*

For either temperature or process (voltage/current/carbon) input types, the Orion-M will set the lower and upper set point limits for the input to match the settings in the Orion-M Configurator. The decimal point selection for the Loop Input in the Orion-M and the UDC controller do not have to be set to match; however, if the loop controls are visible to the operator, it is recommended that the decimal point resolution of the Orion-M and UDC controller match.

Loop Inputs set as temperature in the Orion-M Configurator allow a decimal point selection of 0 or 1. Process type loop inputs can be displayed on the Orion-M with a resolution of 0 to 3 decimal points. The Orion-M has a display range of -32768 to 32767, -3276.8 to 3276.7, -327.68 to 327.67 or -32.768 to 32.767 depending upon decimal point selection. When selecting the decimal point resolution for the Loop Input in the Orion-M Configurator, make sure that range of the UDC3500 does not exceed the range selected in the Orion-M or the value may not be displayed correctly.

IMPORTANT: *The lower and upper set point limits are set once, each time the Orion-M enters the runtime application. Do not alter the values in the UDC3500 control once they have been set or the Orion-M may not be able to set the correct set point to the controller.*

3.3 Control Output Assignments

The Orion-M uses a default resolution of 1 decimal point to display the percentage of output of all UDC controllers attached to the system. Therefore, regardless of the display resolution set on the UDC3500, the Orion-M will display a percentage of output of 0.0 – 100.0% for the output.

If the UDC controller is set for bimodal operation (heat/cool), a display value of 50.0% indicates that both heat and cool outputs are off. Values from 50.0 to 100.0% represent the percentage of heat output from off to full on and values from 50.0 to 0.0% represent the percentage of cool output from off to full on.

3.3.1 Auto-Tune and Auto/Manual Operation

The Orion-M provides the ability to switch each UDC3500 in the system between auto and manual output operation. This function is accessed from the Orion-M runtime, Single Loop View screen via the ‘AM’ control button.

The Orion-M cannot initiate the tune functions on the UDC3500 controller. Pressing the ‘AT’ button on the Single Loop View screen in the Orion-M runtime will provide the appearance that it will activate the auto-tune on the control, but once initiated, it will immediately turn off. Attempting to activate the auto-tune function will not cause any malfunction or system error; however, it should be noted that the function is inoperative when using the UDC3500 control.

3.4 Loop Permissions

The Orion-M iSeries configuration provides permissions which can be set to allow the control loop set point, auto/manual and auto tune operations to be performed at the loop control itself as well as through the Orion-M. These can allow an operator to make changes at the loop control in cases where the Orion-M interface is located in a remote location.

3.4.1 Set Point Permission Exception

If the control loop is configured to operate under cascade control or is configured as an RH wet bulb loop type, the set point for the loop is generated by logic within the Orion-M. The loop will not function as configured unless the se point is constantly set by the Orion-M. Thus, any change made at the loop control will be overridden by the Orion-M. If local adjustment at the loop control may be required for any reason, loop set point communications must be interrupted via a digital input to the Orion-M configured as ‘loop SP comms disable’.

In addition, the Honeywell controls will enter the computer set point mode (CSP) once they receive any set point command from the Orion-M. This will lock out adjustments from the keypad at the controller. The Orion-M is designed to send the ‘shed timer reset’ command to the UDC controller to take it out of computer set point control when the set point permission is enabled. This allows control via the keypad of the controller. However, during profile operation and after the profile completes, the UDC will remain under computer set point control. In order to deactivate CSP, a single set point must be sent from the Orion-M in order to unlock it. Triggering a digital input configured as ‘loop SP comms disable’ will also take the UDC controls out of computer set point control.

3.4.2 Auto/Manual Permission Requirement

The Honeywell controller provides the ability to initiate manual mode or ‘failure transfer mode’ through a digital input on the controller. If this function is used, the loop permission for auto/manual operation must be enabled. If this permission is not enabled, a communication error will occur at the Orion-M. This is due to the fact that without the permission enabled, the Orion-M will try and force the controller back to auto mode if it goes into manual operation via the digital input.

Since the digital input on the UDC controller is an override condition, it will deny the auto mode command from the Orion-M. The Orion-M then has to respond with a communication error, since the controller did not follow the command given. By enabling the auto/manual permission, the Orion-M will accept the manual mode force at the UDC controller.

Appendix

Software Usage Note:

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