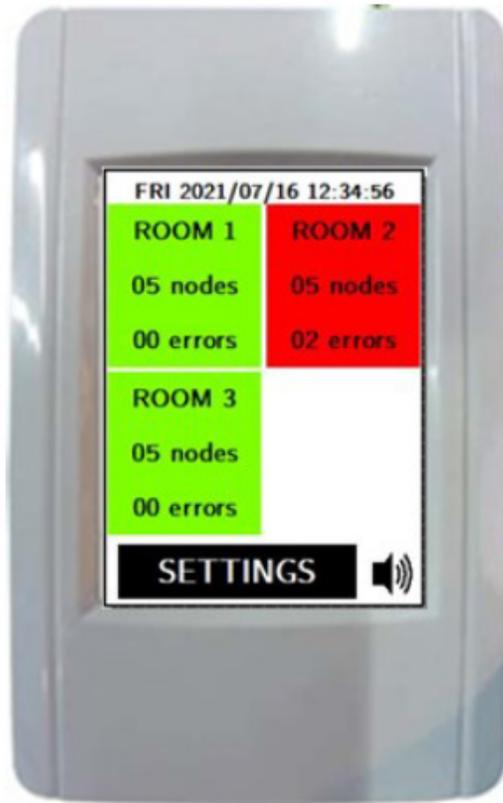


*****READ AND SAVE THESE INSTRUCTIONS*****



EOS-60

Fan Filter Unit Control

USER MANUAL

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User Manual

■ **Introduction**

This document will guide the user on how to operate the EOS-60 Console, firmware version 01.00. It will provide examples of all user interface displays of the EOS-60 and the associated functionalities.

■ **System Overview**

The EOS-1201 can control and monitor up to 4 rooms containing a total of 60 FFUs using the Modbus RTU protocol.

■ **Main Screen**

On startup the EOS-60 will display the Main screen, which displays all rooms being monitored and their status. For every room it will show the number of FFUs configured and if there are any FFUs with errors. If the room doesn't have any FFU assigned to it, it will not be shown on the screen.

The color coding is as follows:

Run	•Normal operating speed
Standby	•Setback operating speed
Auto	•Automatic operating speed, adjusts according to Clock/Calendar schedule
Stop	•Stops the FFU from operating
Offline	•Disables communication from the PLC to the FFU
Error	•Reports an error in the FFU

Red (Error) has the highest display priority, while Green (Run) has the lowest display priority.

Example: If there are 10 FFUs configured for a room and only 1 has an error and the remainder are fully functioning, the room will be shown in red (See Operating Modes). See figure 1 at right .

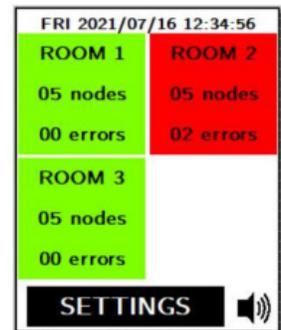


Figure 1: Main Screen

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Clicking on any room will show the status of the first configured FFU in the selected room. (See figure 10).

Touching the Settings button takes the user to the Systems Menu Screen.

If the audible alarm is enabled (See Alarm Setup pg. 31) and there is an alarm condition present, the speaker icon will be shown so that the user can temporarily mute the alarm.

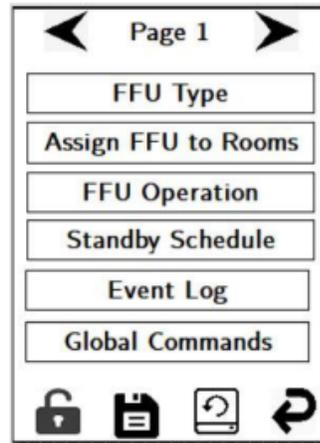


Figure 2: System Menu 1

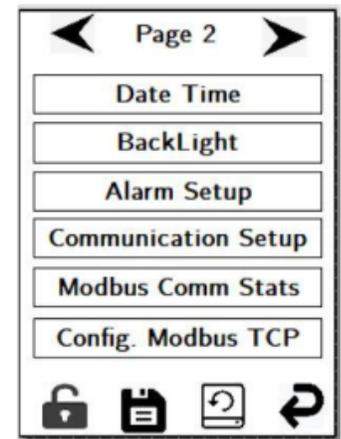


Figure 3: System Menu 2

■ Operating Modes

The following are operational modes for all FFUs monitored and controlled by the EOS-60:

Run: In this mode the FFUs operates at the established Run Setpoint. The EOS-60 will continuously monitor the FFU Run Setpoint value. If there is any deviation from the value of the FFU; the correct value will be written to the FFU from the EOS-60. An additional function in this mode is RPM monitoring. If the RPM is outside the upper or lower limits, the EOS-60 will log the error. Note: The Standby schedules will not apply to FFUs in RUN mode.

Standby: In this mode, the FFUs operates at the established Standby Setpoint, the EOS-60 will continuously monitor the FFU Standby Setpoint value and if the value being read from the FFU is different to the set value in the EOS-60, the correct value will be written to the FFU. In this mode the RPM is also being monitored against the high and low limits. If the RPM is outside the limits the EOS-60 will mark the error. The Standby schedules will not apply for the FFUs in this mode.

Auto: In this mode the FFUs will follow the Standby Schedule. If the day/time complies with any of the standby schedules the FFU will operate in Standby mode, if not, it will operate in the Run mode. The Setpoint and RPM values are being monitored.

Stop: In this mode, the FFUs operates at the established Stop Setpoint, the EOS-60 will continuously monitor the FFU Setpoint value and if the value being read from the FFU is different to the set value in the EOS-60, the correct value will be written to the FFU. In this mode the RPM is not being monitored against the high and low limits. The Standby schedules will not apply for the FFUs in this mode.

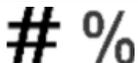
Offline: In this mode, there is no communication between FFU and EOS-60. The FFU operates at its latest setting and there is no limit checking. The EOS-60 will not display the value of the Setpoint or RPM.

By default, the EOS-60 is shipped with AUTO mode enabled. This default setting allows all FFUs connected to the EOS-60 to be configured to AUTO mode immediately.

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■ **Icons**

The following table has an overview of all the icons used in the EOS-60

Icon	Description/Function
	By clicking this icon, the user will either be logged out or prompted to login at the Log In Screen (Figure 5 pg.14). While logged out the icon is a locked padlock; limiting the user to view only. While logged in the icon is an unlocked padlock; the user may alter all settings freely.
	Shortcut to the Systems Menu Screen (Figure 2 pg. 8).
	When there is an active alarm (Example includes: values out of bound or communication error), this icon can mute/unmute the alarm. If the audio alarm is disabled, this icon is hidden.
	This icon indicates the status of communication with the N34 Gateway. Black is normal operation, while white is a communication error. If the logging feature is disabled, this icon will be hidden.
	Navigation arrows. Depending on the screen present, the arrows will either navigate between rooms or menus.
	Page indicators on the event log screen. Transitions one page down and up of the event log respectively.
	Page indicators on the event log screen. Transitions to the last page and the first page of the event log respectively.
	Back arrow to previous screen or main screen.
	Force Modbus poll (See pg. 19 FFU Operation for more details).
	Switch navigation mode (See FFU Operation pg. 19).
	Switch event log memory between Flash and RAM (See the Event Log pg. 23).
	Shortcut to the Modbus RTU Communication Statistics (See pg. 32).
	Switch error count mode (See Modbus RTU Communication Statistics pg. 32)
	After configuring parameters of the EOS-60, by selecting the first icon will make the changes permanent by saving to Flash memory. Otherwise, the changes will be lost on a power cycle (reset) of the EOS-1201. When the save is successful, the EOS-60 will emit a short beep and change temporarily to the second icon for 2 seconds.
	Reset parameters to default values (See Restore and Reset pg. 33).
	Cycle power supply to EOS-60 (power off / power on) (see Restore and Reset pg.33).
	On first selection the user will be prompted to change the password (See New Password pg. 16). After the new password is configured, this icon will become a shortcut to System Menu pg. 13.
	By selecting the trash bin icon, the configuration on the current display screen will be cleared.

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■ Keypad

When the user needs to enter numerical data, the EOS-60 will show the numerical keypad. Depending on the type of data that will be entered it will limit the number of digits or change the presentation on the screen. For example, in the user needs to enter the password, the keypad will allow for 6 digits and because it is a password, it shows “*” instead of the actual digits.

The user can enter integer or floating-point numbers; however, if the required data is an integer and the user enters a floating-point number, the program will only interpret the integer part of the number entered. Example: 123.45 will become 123. If a negative number is required, the minus sign must be entered as the first digit. The clear button will clear the number entered and stay on the keypad to enter a new value. The cancel button will cancel the operation and return to the previous screen without any value changes.

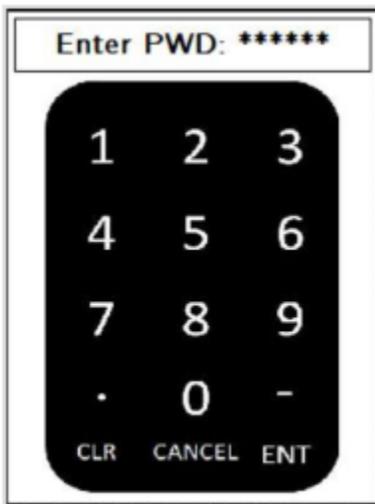


Figure 4: Keypad

■ System Menu Screen

On the System Menu Screen (see figure 2 and 3) the user has access to the following functions (see the following sections):

- Select FFU Type
- Assign FFU to Rooms
- FFU Operation
- Standby Schedule
- Event Log
- Global Commands
- Date Time
- Backlight
- Alarm Setup
- Communication Setup Screen
- Modbus Comm Stats
- Config. Modbus TCP

■ Login Screen

If the password is not changed the factory default password is “000000”. While in factory default mode the padlock will always show as unlocked, allowing full access to all functions of the EOS-60.

Touching the locked padlock icon will bring the user to the new password screen (See figure 6). The user can touch the “LOG IN” message to enter the password, to access protected functions. If the correct password is entered the message is changed to “LOGGED IN!” (See figure 5 below) and the padlock icon at the bottom of the screen will show as unlocked.



Figure 5: Log In

The password can be changed by the user by clicking the icon next to the “LOGGED IN!” message (See figure 3 below).

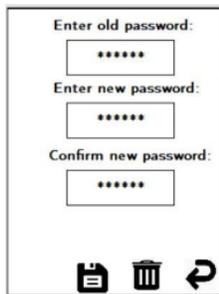


Figure 6: New Password

On any screen of the EOS-60, the user can touch the unlocked padlock icon to logout. The EOS-60 will also check the time of the last interaction of the user with the screen, if 3 minutes has passed, it will automatically log out and return to the Main screen. This screen in addition will present the information of the EOS-60; such as the software version and compilation date.

■ New Password

To change the password, the user must enter the previous password and the new password twice to confirm the new password is correct. After entering the passwords, the user must touch the save icon to store the new password to Flash memory.

The bin icon will clear the fields so that the user can enter the passwords again. Note: The save icon will save the new password along with all the configurable parameters to Flash; therefore, the user must ensure all parameters are correct.

■ Select FFU Type

The user can select the FFU type on this screen (See figure 7); when no FFU type is selected the EOS-60 will not send out any Modbus queries to the network. The 2 available selections are AC Motors (ACM) and EC Motors (ECM). While ACM is selected an additional selection is available if the system contains a pressure switch. Another option select is added if a pressure switch is selected to determine switch type; options include normally open N.O. or normally closed N.C

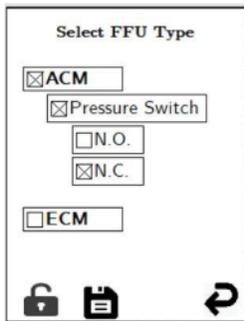


Figure 7: Select FFU Type

■ Total FFUs per Room

This screen shows the number of FFUs assigned to each room (See figure 8). Clicking on the gear icon will go to the screen to select the FFUs for every room (See figure 18).

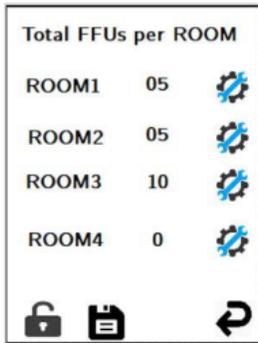


Figure 8: Total FFUs per Room

■ Assigning FFUs To Rooms

The top arrows cycle through the configured rooms, while the second set of arrows will cycle up to 6 pages to see all 60 FFU's in a maximum sized configuration. When an FFU is assigned to a room, it can only be unassigned when on the same room again. Example: FFU 05 is assigned to Room 1 and then requires reassignment to Room 2, first it must be unassigned from Room 1, then it will be available for assignment to Room 2.

FFU color coding is as follows:

Blue	FFU's are assigned to the current room.
Red	FFU's are in a different room.
Green	FFU's that have not been assigned to any room.

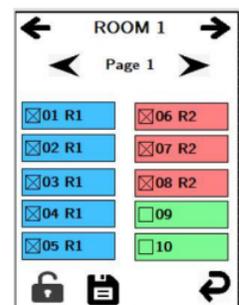


Figure 9: Assign FFU to Room

■ FFU Operation

The user will be able to navigate through the rooms or the FFUs of the room (See figures 10-15 for examples). From this screen (See figure 10) the user can change the setpoint, high and low rpm limit of the FFU. The RPM and Setpoint value are always the values being read from the FFU. The high and low limits are the values written to the EOS-60 memory. When the user changes the room or FFU (using the arrow keys), the EOS-60 will read the values saved in memory and display them on screen.

The setpoint is always written to the FFU and the EOS-60 memory (permanent change) unless the Temporary checkbox is checked (temporary change).

The reload icon at the bottom is to force the program to query the Modbus data for this FFU, so that the screen can display updated values instead of waiting for the program to go through the scan of the other FFUs.

The fourth icon from the left at the bottom is a fan, selecting this icon will switch navigation modes. While a fan is present when the second set of arrows are selected the next or previous configured FFU will be presented; regardless of condition.

When navigation mode is changed the fan icon will become a warning sign. In this mode when selecting an FFU to view only FFU's with errors will be shown.

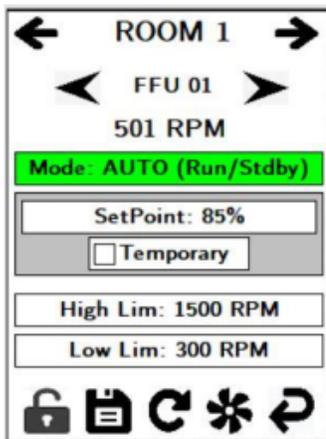


Figure 10: AUTO / Run

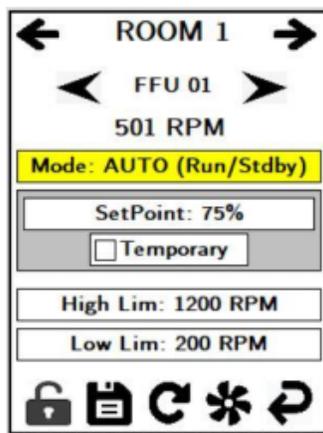


Figure 11: AUTO / Stdby

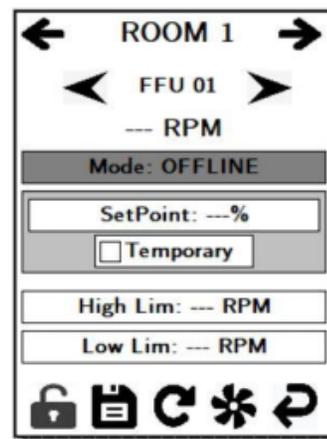


Figure 12: OFFLINE

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While an error is displayed, the EOS-60 will show the error message instead of the mode (See figure 13 and 14 below). If there are no FFUs with errors in the room, a message “No Errors to report” will be displayed (See figure 15 below).

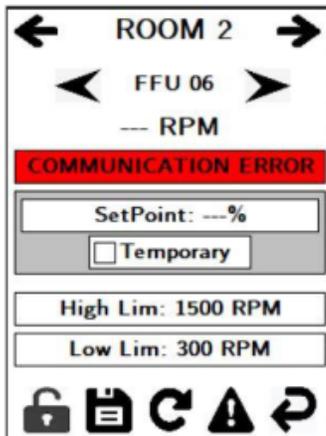


Figure 13: Comm Error

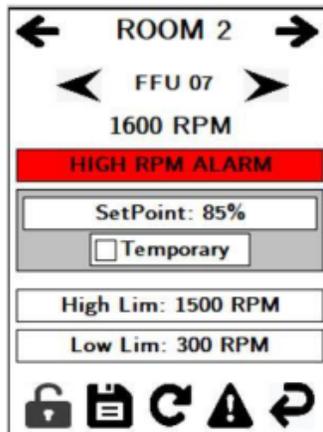


Figure 14: Hi Lim Error



Figure 15: No Errors

The previous examples were for ECM FFUs, as they had information about the RPM. Below are examples for ACM FFUs with a pressure switch, configured as normally closed (See figures 16 and 17).

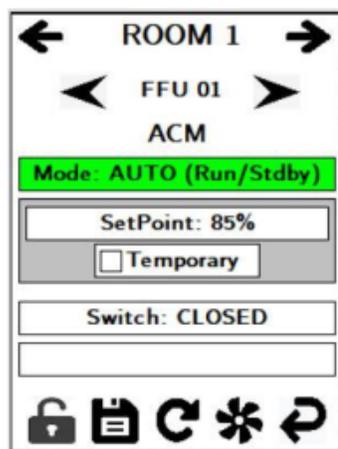


Figure 16: ACM / N.C.

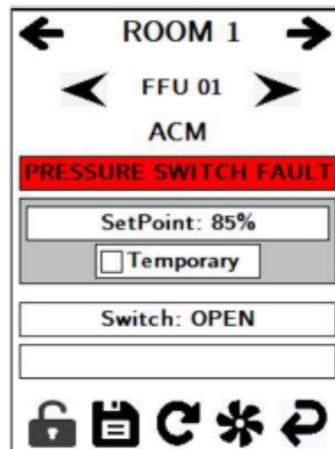


Figure 17: PSW Fault

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■ **Simplified FFU Operation**

In regular (day to day) operation of the EOS-60 the user will mostly need to see and configure the setpoint and mode of the FFUs. The Simplified FFU Operation screen shows a subset of the information, while also having larger buttons for ease of use (See figure 18 and 19).

When saving parameters on this screen will be permanent as the changes are being saved to the FFUs and the EOS-60 Flash memory.

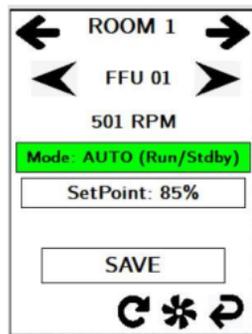


Figure 18: Simplified FFU ECM

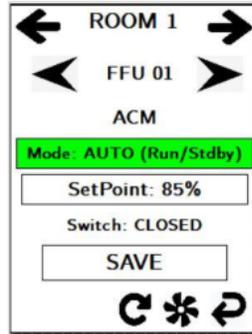


Figure 19: Simplified FFU ACM

■ **Standby Schedule**

To configure the start and finish of the standby period, the user can touch the left or right side of any of the periods. This will open the screen to enter an hour and minute and to select the day.

If the user only configures the start or finish, the system will ignore that period and mark it in red to inform the user configuration is not complete. Periods spanning more than 3 days will be marked yellow; however, it is still a valid selection. Below are the screens for the 24HR



Figure 20: Standby Schedule 24HR

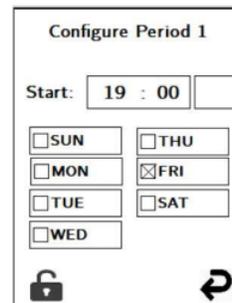


Figure 21: Configure Period 24HR



Figure 22: Standby Schedule 12HR

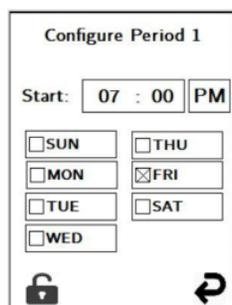


Figure 23: Configure Period 12HR

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■ Event Log

The EOS-60 logs the events to the Flash memory (permanent storage) and RAM (volatile storage). The Flash can store up to 2560 events; when the capacity is reached the program will delete oldest events to continue storing the newer events. The events stored in Flash will not be deleted if the EOS-60 is powered down. The events stored in RAM are lost when the EOS-60 is powered down. The log in RAM is a cyclic buffer of the last 120 events. When the icon is an F, the events shown are from the Flash memory and the R icon shows the events logged to the RAM.

When the time format is set to 12HR, the time shows A for AM and P for PM.

To differentiate the global commands in the log, when the command is for all the rooms/FFUs, the FFU 00 is used. When the command is for any of the room, the FFU will be 60+Room Number. For example, Room 1 will be 61 (60 being the max number of FFUs possible in the system).

Logged Events	
CommError	The FFU has not responded after a configured number of queries.
CommOK	The FFU has responded for the configured number of queries after it had a CommError.
Enter Standby / Exit Standby	A scheduled standby period has started or ended.
FFU Type	Change of FFU type, 1 ACM, 2 ECM.
Hi Alarm / Lo Alarm	Hi/Lo alarm condition for a FFU.
Mode	Changing the mode of the FFU (1 Auto, 2 Run, 3 Standby, 4 Stop, 5 Offline).
PSW Config	Pressure Switch, 0 Disabled, 1 Enabled.
PSW Fault	Pressure Switch Faulty, a N.O. is closed or a N.C. is open.
PSW OK	Pressure Switch returns to OK after fault.
PSW Type	Pressure Switch, 1 N.O., 2 N.C.
Reset Log	A user has deleted the log.
SetPoint	Change the setpoint
Save Parameters	The user has saved the current parameters to Flash.
Startup	When the EOS-60 is powered on
Timer Log Out	The system is logged out after 3 minutes of inactivity
User Log In / User Log Out	A user has logged in/out

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When the user is viewing the events logged to Flash, by touching the page indicator, up or down will change the page of events displayed one at a time (See figure 24). Figure 25 shows an example of the event log stored to RAM. Additional page indicators marked with lines or , are to be used to move to the last and first page of the event log respectively with out having to scroll through every page.

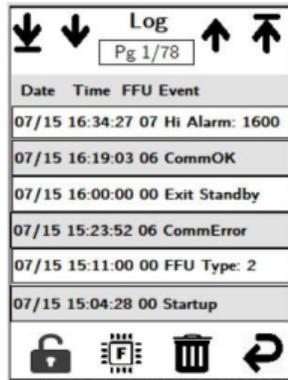


Figure 24: Log, FLASH, 24HR

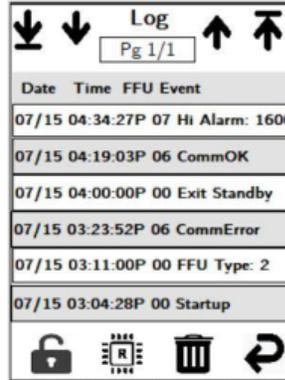


Figure 25: Log, RAM, 12HR

By touching an event, the Event Details screen is presented to the user (See figure 26). On this screen detailed information regarding the event will be present, with the ability to navigate through events with the arrow keys at the top of the screen.

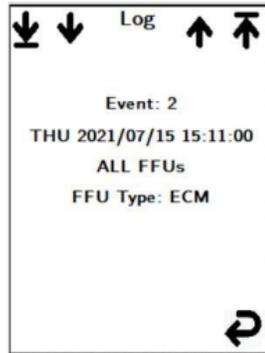


Figure26: Event Details

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■ **Global Commands**

The Global Commands screen allows configuration of all FFUs at once or configuration of all FFUs assigned to a specific room. Such as changing the mode and adjusting operation parameters. For AC motors the user can only change the setpoint; while with ECM's it is also possible to change the high and low RPM limits.

When the Global Commands screen is loaded, the EOS-60 scans all the FFUs for the current screen (either all rooms or the specified room) to determine if all the FFUs have a common configuration.

For example, all FFUs are configured with the same mode or have the same parameters. On this screen only if all FFU's are in the same mode or have exact equal parameters will that common information be displayed. As an example, in , all the FFUs (ACM type) of all the rooms are configured in AUTO mode and with the setpoint at 85%.

The user then navigates to Room 3 and change the mode for that room to standby. As the standby mode for that room has a setpoint of 75% the FFUs will have a different setpoint than the rest of the FFUs of the other rooms when the user touches the save icon ().

After saving the changes the user navigates back to the All Rooms screens, where the AUTO mode now is not selected (Rooms 1,2 and 4 have AUTO mode but Room 3 has Standby mode). The setpoint value is also not shown as the FFUs have different values for that parameter. Note that in this case, there is no mode selected or a parameter with a value to set, so the user needs to either select a mode for all the FFUs or enter a value for a parameter to be able to save a configuration for All Rooms.



Figure 27: Global All Rooms

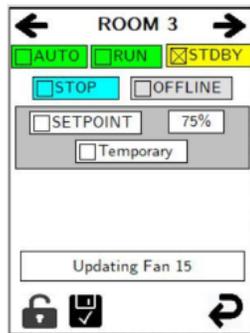


Figure 28: Global Room 3

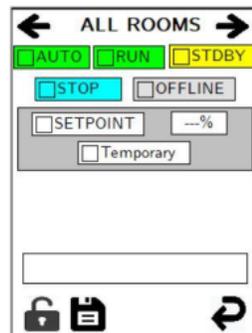


Figure 29: Global No Save

Note: When Offline mode is selected, the setpoint and high/low RPM (for ECM type FFUs) parameters are not considered; therefore, they will not be shown (See figure 30).

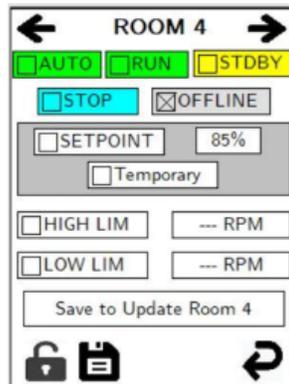


Figure 30: Room 4 Offline

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■ **Global Commands**

The date is in month/day/year format. The time can be displayed as 12HR or 24HR format. If the 12HR format is selected the AM/PM toggle is enabled (See figures 31 and 32 below).

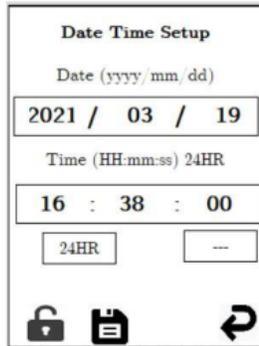


Figure 31: Date Time 24HR

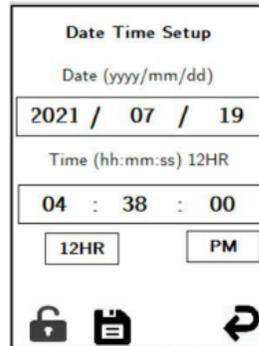


Figure 32: Date Time 12HR

■ **Backlight Setup**

The active brightness is the brightness when the user is using the screen, the standby brightness is when the controller is not being used. When the standby brightness is 5% or lower the screen will be unreadable, touching the screen will bring the brightness back to active brightness.

The inactivity timeout is only checked on the Main screen. The timeout can be 1 minute or greater; but must be less than 99 minutes. The inactivity can be disabled altogether in this case the screen will always be turned on. Make sure to use this option with caution, as the screen has a life expectancy of 20,000 hours.

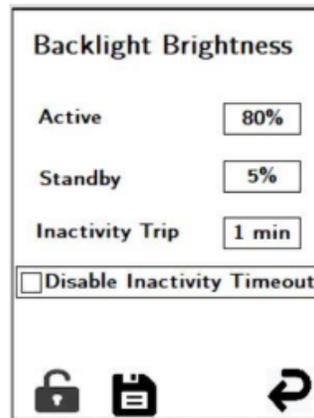


Figure 33: Backlight Setup

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■ **Alarm Setup**

On this screen the user can enable/disable the audible (beeps) and backlight (screen flashing) alarm (See figure 34). When there is an alarm condition the EOS-60 will wait for the time configured in the trip delay before the alarm goes off. If the trip delay is 0 min the alarm will activate the moment the EOS-60 receives the alarm condition. The upper limit for the trip delay is 30 minutes.



Figure 34: Alarm Setup

■ **Communication Setup Screen**

The poll rate defines how frequently a Modbus query is sent to the network of FFUs, in figure 35 shown below it is 250 ms. The time out is the time the EOS-60 will wait for a reply from the FFU. The number of timeouts is the number of consecutive timeouts the EOS-60 will count for a FFU before marking it as a communication error please contact ENVIRCO if you would like to make adjustments to these values.

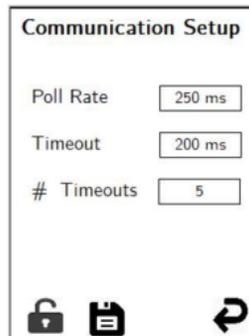


Figure 35: Communication Setup

■ **Modbus RTU Communication Statistics**

This screen will show the Modbus RTU communication statistics since the last power up or reset of the EOS-60. The trash icon will delete the current statistics and reset the start time notification.

The # icon will show the total count of errors (See figure 36), whereas the % icon will show the percentage of errors (See figure 37).

Since: FRI 2021/07/16 15:36:07		Last: FRI 2021/07/16 19:02:21	
Total Polls	27289		
Total Errors	61		
Page 1/13			
	POLLS	ERRORS	
ROOM1	9159	44	
ROOM2	9092	17	
ROOM3	9038	0	
ROOM4	0	0	
Logger	0	0	

Figure 36: Modbus Comm Stats

Since: FRI 2021/07/16 15:36:07		Last: FRI 2021/07/16 19:02:34	
Total Polls	272312		
Total Errors	0.23%		
Page 1/13			
	POLLS	ERRORS	
ROOM1	9169	0.49%	
ROOM2	9097	0.19%	
ROOM3	9046	0.00%	
ROOM4	0	0.00%	
Logger	0	0%	

Figure 37: Modbus Comm %

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■ Restore and Reset

The Flash writes gives an estimate of times data has been written to the Flash memory. The Restore to Default option sets the EOS-60 back to factory default mode.

The reset EOS-60 option power cycles the EOS-60. In both cases the user must check the corresponding checkbox to confirm the action, before touching the corresponding icon to execute the action (See figure 38).

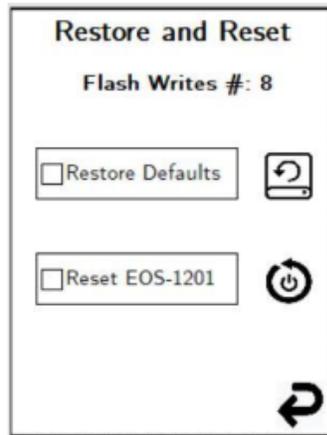


Figure 38: Restore and Reset

■ Configure Modbus TCP

The EOS-60 can act as a Modbus TCP slave device. The TCP/IP properties and the Net ID (slave ID) can be configured on the EOS-60 (See figure 39). The IP address is static, and the user must ensure the address, mask, and gateway are correctly configured.

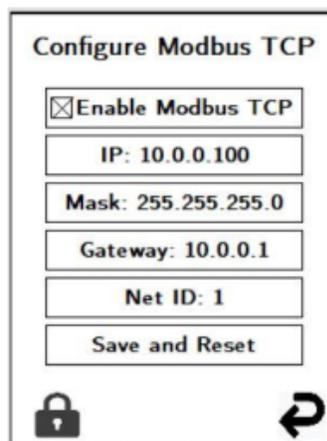


Figure 39: Configure Modbus TCP

The EOS-60 has 32 holding registers; while all are R/W (Read and Write), as writing to any of the registers will not throw an exception, but the registers with an asterisk * will always be overwritten by data of the EOS-60. The other registers can be used to configure the EOS-60 from the master

User Manual

Modbus Registers	
Register	Parameter
40001*	Model number (0x1201)
40002*	SW Version (0x0100)
40003-40005*	Compilation Year-Month-Day
40006-40011	Current Date/Time
40012	Time format: 0-24HR 1-12HR
40013	if 12HR: 1-AM 2-PM
40014	FFU Type: 0-none 1-ACM 2-ECM
40018	Pressure switch 0-disabled 1-enabled
40019	PSW type 1-N.O. 2-N.C.
40020-40023*	Number off FFUs per room 1-4
40024-40027*	Number of errors per room 1-4
40025	FFU index, 0: disabled, 1-60: put FFU information in the following registers
40026-4053	FFU information (mode, status, configurations, etc)

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