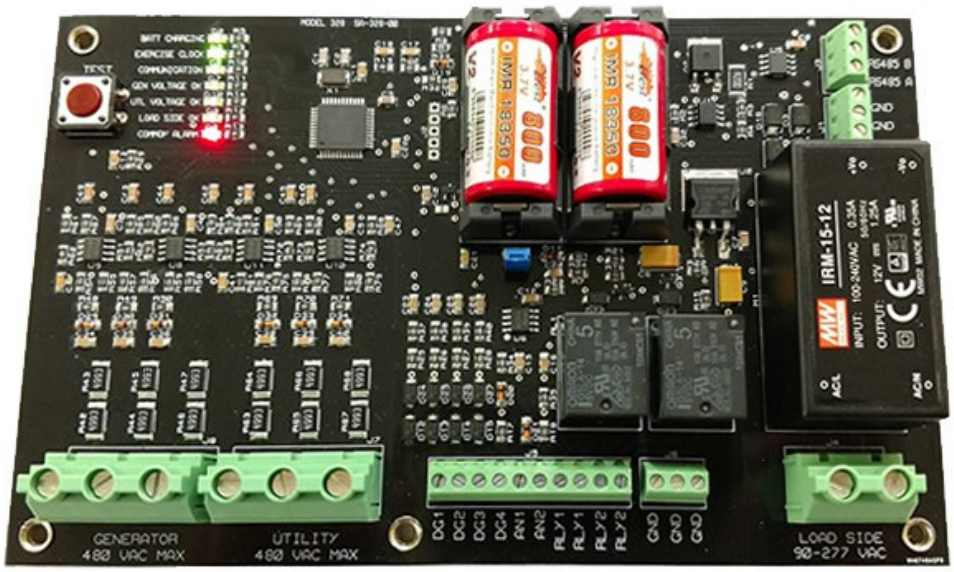
M328V2

Reference Manual

v1.0.0



Specifications			
Rating	**MIN**	**MAX**	**UNIT**
Load Side Power	90	277	Vac
Generator Sensing	50	480	Vac
Utility Sensing	50	480	Vac
Analog Inputs	0	50	Vdc
Digital Inputs	0	50	Vdc
Relay Contacts	-	5	Amps
Aux Power Output	-	8.4	Vdc
Aux Power Output	-	800	mAh
Aux Power Input	8	36	Vdc
RS485	4.5	12	Vdc

All digital inputs are switched to ground.

INSTALLATION

WARNING
Installation requires a qualified electrician. Dangerous voltages are present while the board is in operation. A minimum of #18 AWG wire is recommended for installation. Wire insulation should be rated for the voltage of your application.

The M328V2 should be mounted in or near the transfer switch. Disconnect mains power and disable the generator to prevent starting during the installation. Refer to the wiring diagrams at the end of this manual for your application.

1. Using 5 screws mount the M328V2 to the inside of the transfer switch.

2. Connect the generator output to the generator sensing connector. For single phase applications use terminals for phase A and phase B.

3. Connect the utility power to the utility sensing connector. Use terminals A and B for single phase applications.

4. From the load side of the transfer switch connect a single phase to the load side connector. Voltage should never exceed 277 VAC. In order to hardware reset the control a properly rated switch should be installed in series with the load side connection. A hardware reset requires removing the backup battery jumper and disconnecting power to the load side connection.

Programmable relay outputs, digital inputs, and analog inputs are all optional.

Relay Outputs - 5 Amps MAX
Analog inputs - 0-50 VDC MAX
Digital Inputs - Switched to ground (open or closed)

5. Connect communications cable to J3 connector. Observe modbus polarity. Terminal A must be connected to terminal A on the modem. Terminal B to terminal B. Terminal S or shield should only be connected at one end, either the modem or the M328V2.

6. Connect power for the modem to the AUX power connector J1. In the event of a power failure this will keep the M328V2 and the external modem powered.

7. Install jumper block in connector J9 for backup battery and restore mains power.

The Load Side LED indicator should be on and the Exercise Clock LED should be flashing. All other LEDs may or may not be on depending on your configuration. The attached modem should be powered on as well.

M328V2 SETUP

Download and install the M328V2 setup application from www.flightsystems.com. Connect to the device via a serial port w/RS232 to RS485 converter or if you purchased a M327V2 modem with your device you can connect directly thru the modem via the mini USB port or access the device via the online interface. Upon successful connection to the device the software will immediately download the M328V2 settings. Default settings are listed below with their descriptions.

Power Failure Delay - 10 minutes
Power Failure is not the same as Utility Failure. Power Failure only occurs when the Power Failure Delay expires and power has not been restored. This delay should be set for something greater than the time it takes for the generator to restore power.

Exercise Failed Delay - 172 hours
Exercise Failed occurs when the Time Elapsed register exceeds the Exercise Failed Delay. The Time Elapsed register is reset to 0 every time the generator produces voltage for the Minimum Exercise Time while Utility Voltage is present.

Minimum Exercise Time - 10 minutes
This should be set for something below the actual exercise time of the generator.

Maintenance Reminder - 500 hours
Activated when the Run Hours exceeds this threshold. Must be reset on site.

Generator / Utility High - 500 VAC
High voltage alarm for both generator and utility.

Generator / Utility Low - 100 VAC
Threshold for what is considered OK and activates both the Generator and Utility OK LEDs. Also used for Utility Power Failure Alarm.

Analog High/Low - 0 VDC
High and Low trip points for analog inputs

Alarm Bypass - 30 seconds
Delay before alarms are enabled used with both analog and digital inputs when the option "Running" is selected.

Calibration Settings
These settings adjust the displayed or corrected readings.
Generator Scaling – 174
Utility Scaling – 174
Analog Offset – 10
Analog Scaling – 147

OPERATION

Start by clearing any existing alarms. Press and hold the TEST button until all indicators turn off then release the TEST button.

Battery Charging may or may not be on.
Exercise Clock should be flashing.
Communication should be on if the modem is active.
GEN Voltage should be off.
UTL Voltage should be on.
Load Side should be on.
Common Alarm should be off.

STANDBY MODE

In standby mode both utility voltage and load side voltages are monitored. The device will remain in standby until either generator voltage is detected (exercise mode) or a loss of utility/load side voltage is detected (power failure). While in standby the device will continue to count the time elapsed since the last successful exercise cycle. If the time elapsed exceeds the exercise fail delay the fault register will be loaded with an exercised failed alarm. If the load side of the transfer switch loses power the controller will immediately switch to power failure mode. If the load side remains powered but a low voltage is detected on utility (brown out) the device will remain in standby but will load the fault register with a low utility voltage alarm.

EXERCISE MODE

The controller will remain in exercise mode while both generator and utility voltage is present. In this mode the controller will record the time that the generator has been exercising. Valid exercise time is any time that the generator voltage exceeds the low generator voltage setting while utility voltage is above the low utility voltage setting. The exercise cycle is consider valid after the exercise time has exceeded the minimum exercise time and the generator has shut down. The exercise OK alarm will be loaded upon returning to standby.

POWER FAILURE MODE

The controller will remain in power failure mode any time the load side of the transfer switch does not have power. If the controller remains in this mode longer than the power fail delay then the fault register will be loaded with a power failure alarm. If generator voltage is detected at the time of power failure the fault register will be loaded with a failure to transfer alarm instead. When power is restored the device will resume standby mode. If the power failure alarm was triggered then a power restored alarm will be loaded upon returning to standby mode.

COMMON ALARMS

Connecting the 3 voltage sensing inputs, generator, utility, and load will produce 6 common notifications. Exercise OK, Exercise Failed, Utility Voltage Low, Power Failure, Power Restored, and Failure to Transfer. All other alarms are optional and are monitored in all 3 modes of operation.

MODBUS COMMUNICATIONS

The RS485 communications port supports standard modbus RTU protocol format with a baud rate of 19200, 8 data bits, no parity. The M328V2 is a slave configuration with a fixed ID of 100. Below is a list of supported registers and their descriptions. The offset of 40000 is assumed.

READ ONLY		READ/WRITE	
3	GEN VAC A-B	1	FAULT REGISTER
4	GEN VAC B-C	2	STATUS REGISTER
5	GEN VAC C-A	20	RUN HOURS
6	GEN FREQUENCY	21	ACTIVE ALARMS 1
7	UTL VAC A-B	22	ACTIVE ALARMS 2
8	UTL VAC B-C	23	POWER FAILURE DELAY
9	UTL VAC C-A	24	EXERCISE FAILED DELAY
10	UTL FREQUENCY	25	MINIMUM EXERCISE TIME
11	LOAD SIDE PWR DC	26	MT HOURS
12	BATTERY PWR DC	27	ALARM BYPASS DELAY
13	ANALOG INPUT 1	28	ANALOG INPUT 1 HIGH
14	ANALOG INPUT 2	29	ANALOG INPUT 1 LOW
15	TIME ELAPSED	30	ANALOG INPUT 2 HIGH
16	SECONDS	31	ANALOG INPUT 2 LOW
17	MINUTES	32	GEN VAC HIGH
18	HOURS	33	GEN VAC LOW
19	MT DAYS	34	UTL VAC HIGH
44	GEN VAC RAW A-B	35	UTL VAC LOW
45	GEN VAC RAW B-C	36	UNDER FREQUENCY
46	GEN VAC RAW C-A	37	OVER FREQUENCY
47	UTL VAC RAW A-B	38	GEN VAC SCALING
48	UTL VAC RAW B-C	39	UTLITY VAC SCALING
49	UTL VAC RAW C-A	40	ANALOG INPUT 1 OFFSET
50	ANALOG INPUT 1 RAW	41	ANALOG INPUT 1 SCALING
51	ANALOG INPUT 2 RAW	42	ANALOG INPUT 2 OFFSET
52	FIRMWARE VERSION	43	ANALOG INPUT 2 SCALING

MODBUS COMMUNICATIONS Continued

The FAULT, STATUS, ACTIVE ALARMS1, and ACTIVE ALARMS2 register are in binary format.

ACTIVE ALARM REGISTER 1 (BINARY)

MSB LSB
DG1 | DG1 | DG2 | DG2 | DG3 | DG3 | DG4 | DG4 | X | X | AN1 | AN1 | X | X | AN2 | AN2

00 – DISABLED
01 – ALWAYS
10 - WHEN GENERATOR RUNNING

ACTIVE ALARM REGISTER 2 (BINARY)

MSB
DG1 | DG2 | DG3 | DG4 | GEN FREQ | UTL FREQ | 3 PHASE GEN | 3 PHASE UTL

0 - NORMALLY OPEN
1 - NORMALLY CLOSED

LSB
PWR FAIL | PWR RESTORED | EXER FAIL | EXER OK | REM | GEN ST | GEN SP | X

0 – DISABLED
1 – ENABLED

STATUS REGISTER (BINARY)

MSB
GEN VAC | GEN FREQ | UTL VAC | UTL FREQ | PWR | EXER | EXER PASS | PWR RES

LSB
RELAY 1 | RELAY 2 | GEN START | GEN STOP | DG1 | DG2 | DG3 | DG4

0 – CLEAR
1 – ACTIVE

FAULT REGISTER (BINARY)

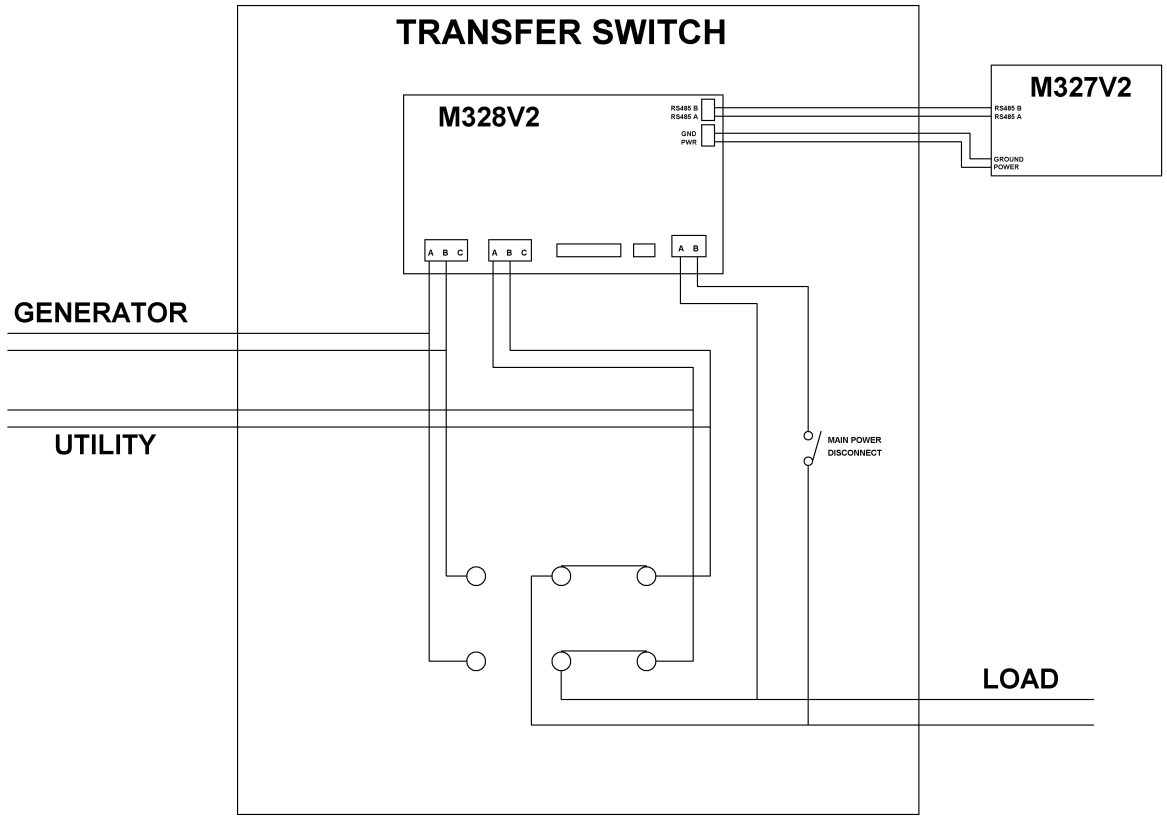
MSB
GEN VAC | GEN FREQ | UTL VAC | UTL FREQ | PWR FAIL | XFER | EXER | BATT FAIL

LSB
AN1 HIGH | AN1 LOW | AN2 HIGH | AN2 LOW | DG1 | DG2 | DG3 | DG4

0 – CLEAR
1 – ACTIVE

WIRING DIAGRAMS

SINGLE PHASE APPLICATION



3 PHASE APPLICATION