REVISIONS				
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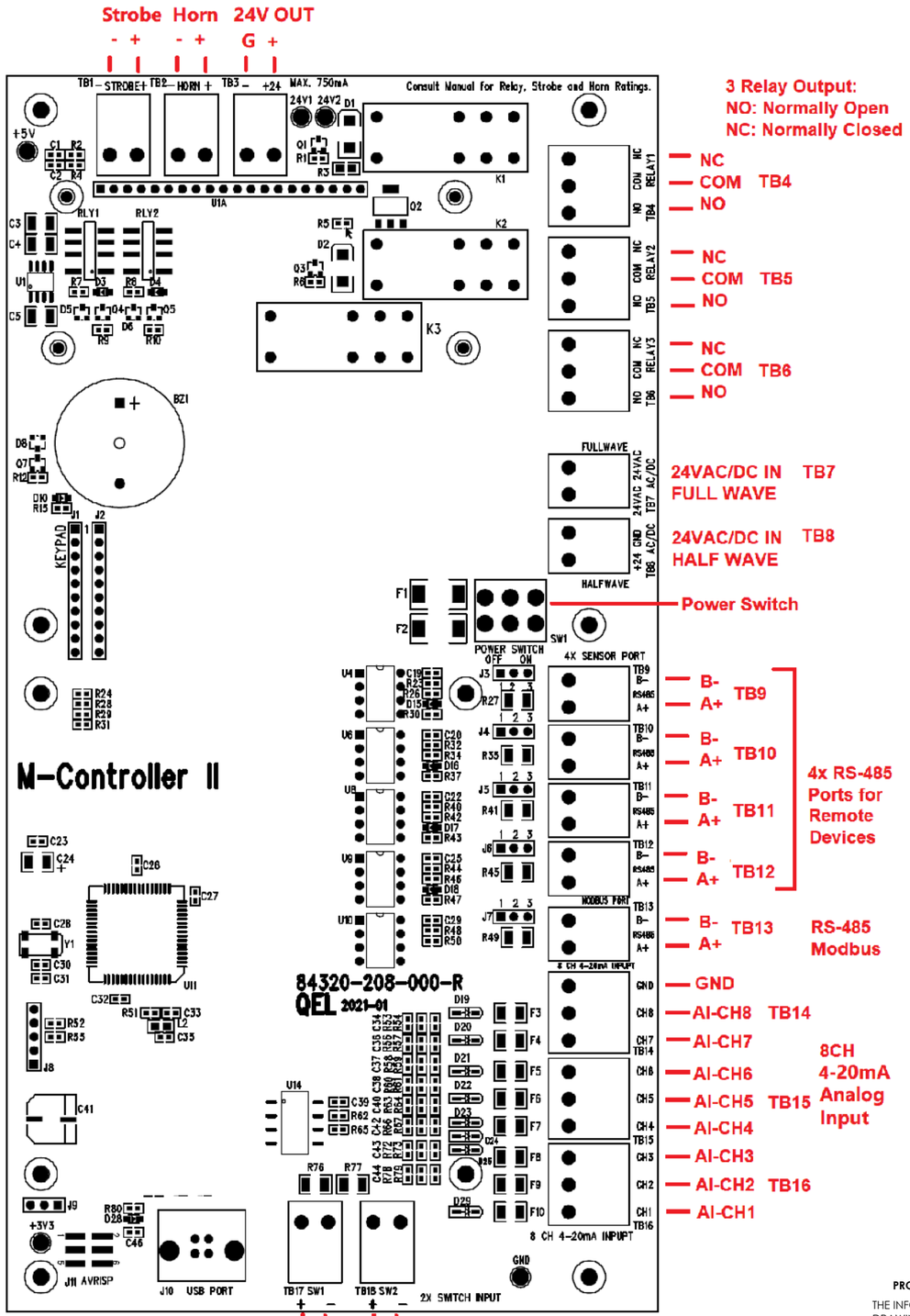

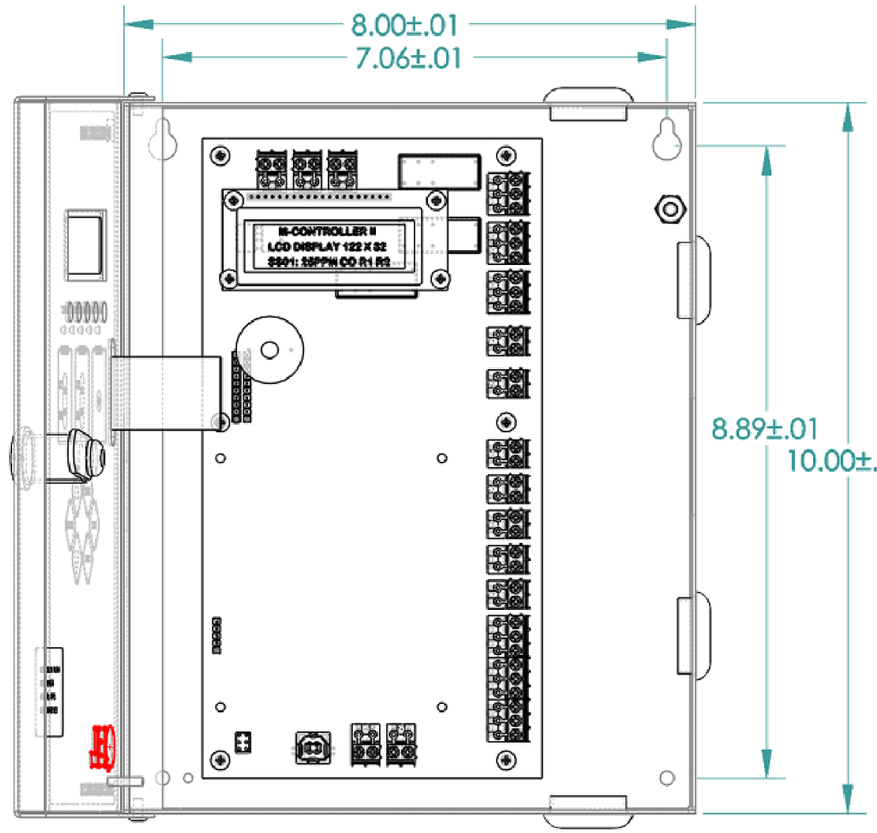

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		MATERIAL	COMMENTS:		
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Greystone Energy Systems Inc.

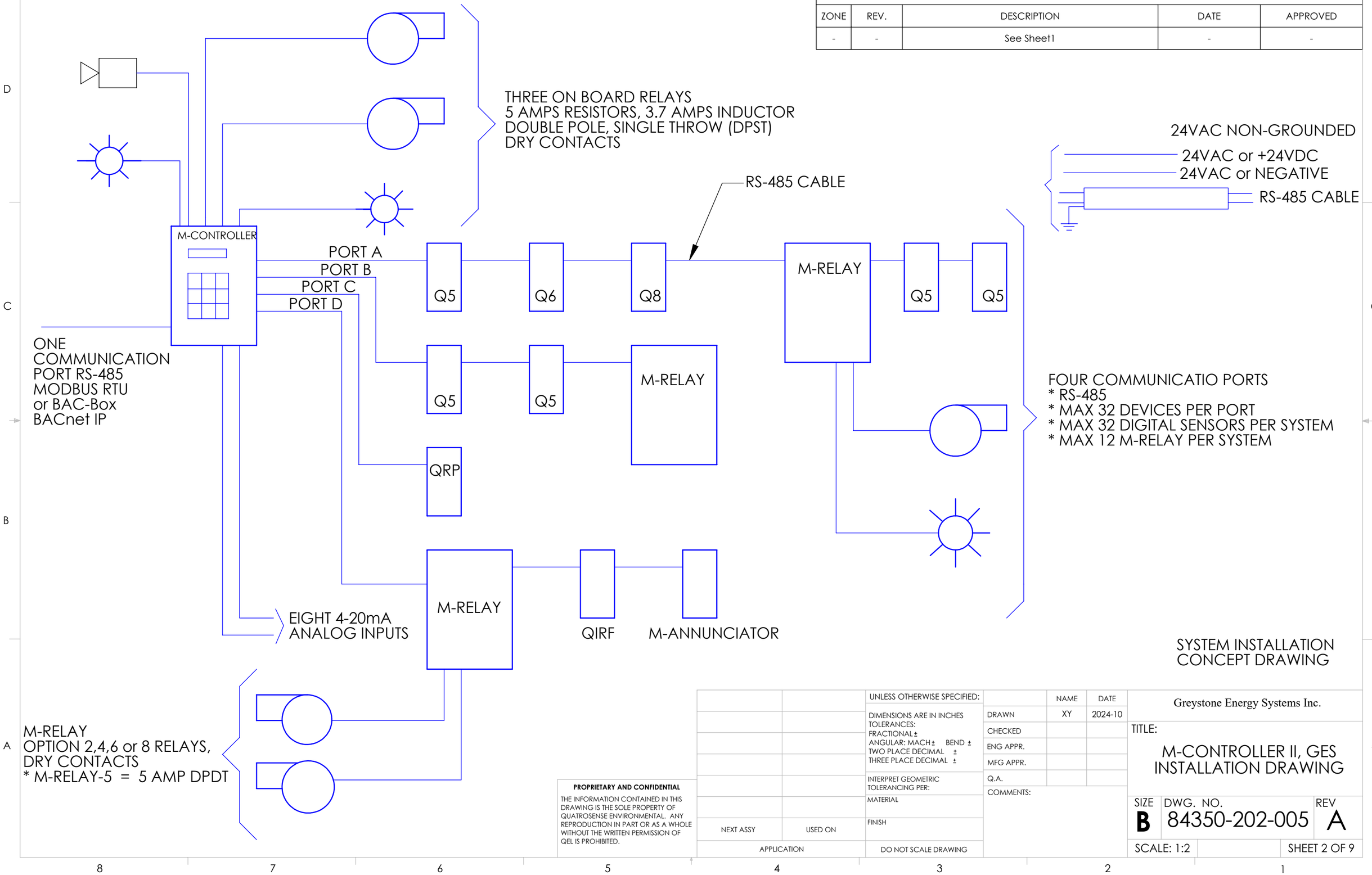
TITLE:

M-CONTROLLER II, GES INSTALLATION DRAWING

SIZE	DWG. NO.	REV
B	84350-202-005	A

SCALE: 1:2	WEIGHT:	SHEET 1 OF 9

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-



SYSTEM INSTALLATION
CONCEPT DRAWING

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Greystone Energy Systems Inc.

TITLE:

M-CONTROLLER II, GES
INSTALLATION DRAWING

SIZE	DWG. NO.	REV
B	84350-202-005	A

SCALE: 1:2 SHEET 2 OF 9

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-

Specification:	
Power Supply	Voltage: 24VDC nominal, range 18 to 30VDC 24VAC nominal, range 15 to 24VAC 50/60HZ **Note: M-Controller II has full-wave rectifier and half-wave rectifier circuit on board for flexibility. You will damage devices if you mix half wave and full wave rectifiers on the same AC source. Use extreme caution when sharing a common AC source. Sharing a common DC source is less problematic.** Current: M-Controller: max. 1.0 A (fuse protected) Total actual power is dependent on the system design. The power may be supplied to sensors and modules or each may have separate power supplies. Each type of sensor varies in its power requirements. **Note: No external overcurrent protection is required. Over-current protection is provided by means of fuses F1 and F2. See fuse specification below.**
Fuse	F1, F2 on Main Board: Polyswitch 750mA Polyswitch device resets after the fault is cleared and power to the circuit is removed.
Power Switch	Slide switch on circuit card (SW1). This switch disconnects power to the main circuit cards and LCD display. NOTICE: A switch or circuit breaker must be provided in the installation, which can remove power from the M-Controller in case of emergency or any other related requirement. Since the M-Controller enclosure can be locked to prevent unwanted tampering, the internal power switch is not guaranteed to be accessible. Feeding the M-Controller power from a rack main switch or from a switch in a distribution box is adequate.
Enclosure	NEMA 1, Steel, Epoxy painted black

Environmental conditions	Location: Indoor use only Altitude: Up to 2 000 m Temperature: -10 °C to 50 °C Relative Humidity: 0 to 95% RH (non-condensing) Pollution Degree: 2, in accordance with IEC 664. Installation Categories (Overvoltage Categories) II
Display & Keypad	LCD display c/w backlight 6x tactile & audible keypad
Panel Indicators	10 Status LEDs Power Status RS-485 port TX/RX Status for Sensor Network RS-485 port TX/RX Status for Modbus LED1-LED5: RELAY1, RELAY2, RELAY3, HUSH, FAULT
On-Board Relays	3 Relays SPDT, Dry contacts, Relay1 to Relay3 Resistive load: 5.0A at 250VAC 5.0A at 30VDC Inductive load: 3.7A at 250VAC 3.7A at 30VDC
On-Board Switch Inputs: (BI)	2 channel switch inputs or binary inputs (BI-1 and BI-2) The switch can be Q-Switch or any ON-OFF switch
Analog Input	8 channel 4-20mA Analog Inputs AI-CH1 to AI-CH8

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Greystone Energy Systems Inc.

TITLE:
M-CONTROLLER II, GES INSTALLATION DRAWING

SIZE	DWG. NO.	REV
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SCALE: 1:2 WEIGHT: SHEET 3 OF 9

General Guideline:

- Old M-Controller uses full-wave rectifier only, if the M-Controller II is supposed to replace the old M-Controller, use TB7 for input power
- Q5 and Q8 both have full-wave and half-wave rectifier
- Old M-Relay, old M-Annunciator and QRP have a full-wave rectifier only
- M-Relay SMT version and M-Annunciator SMT version have full-wave and half-wave rectifier
- It is okay to connect multiple devices to the same AC transformer and share signal commons if
  - Every device uses a same style rectifier
  - And the same AC lead on every device is used for common
- If the power supply is 24VAC and half-wave rectifier circuit is selected, no matter it is GROUNDED (one side of AC is connected to ground), or FLOATING (neither side of AC is connected to ground), the polarization is important, make sure the Neutral or the same AC lead is connected to the GND of TB8. Make sure the same AC lead is connected to ground in all devices that share the AC source. Treat AC like DC for purposes of watching polarity in this case.
  - For Q5, the TB5 of Q5 can only be connected to the same AC source
  - For Q8, the TB6 of Q8 can only be connected to the same AC source
  - For other devices, only the device with half-wave rectifier can be connected to the same AC source. If it does not have, or any doubt exists, provide a dedicated isolated transformer to the device
- If the power supply is 24VDC, all the devices can be powered by the same DC source.
- Whenever you have different devices from different manufacturers, be careful to separate those devices that utilize a Full-wave rectifier from those using a Half-wave rectifier. When any doubt exists, provide a separate transformer. The small expense of an additional transformer or two will more than make up for all of the time and money spent on troubleshooting
- Please refer to M-Controller Installation Drawing for power & RS-485 Connection
- It is necessary to bear in mind the actual installation when sizing the transformer. The installation requirements can run theoretically from only 15 VA to over 200 VA.
- It is always best to allow some safety margin in designing power supplies, and 25% to 50% allowance for startup surges and future requirements is recommended.
- M-Controller Common/Power Supply Negative is not connected to Chassis Safety Ground. AI Common is connected to M-Controller Common. Therefore, the power supplies for remote devices should be powered carefully to prevent ground loops. Remote Relay Module Negative is not connected to Chassis Safety Ground.
- All metal chassis are supplied with a safety ground to the case.

GES supplies one standard transformer (Optional, not included)

M-Transformer 120 to 24 VAC 200 VA

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-

On-Board Buzzer	Used for internal warning and alarm, 3700 Hz Continuous It's not used for Alarm-Sounding Appliance. For external Alarm-Sounding Appliance, they can be connected to the below Horn/Strobe terminal blocks, the Alarm-Sounding Appliance sound-pressure level should be at least 85dB at 10 feet according standard UL2017 Audibility Test
Horn & Strobe	Two relay dry contact are for Horn and Strobe Dedicated 24VDC terminals are supplied for connection to standard strobe and horn set. Maximum of 750mA on the 24VDC power supply
Remote Devices	4x RS-485 Ports with QEL Controller Protocol - Available QEL digital transmitters, such as Q5C - Available I/O box: M-Relay, M-Annunciator, QRP
Modbus Slave Port	RS-485 port Responds as a Modbus Slave using RTU protocol. M-Controller supplies read status information only
Analog Output	Optional added circuit card to support 8 channels of 4-20 milliamps. The output signals and ground are isolated from the M-Controller.
Grounding	A protective conductor (earth wire) must be connected from the M-Controller grounding terminal to the electrical earth of the installation. A grounding point is provided inside the unit in the top right corner of the base of the enclosure. The protective conductor terminal is marked with the following symbol: ⏚
Certification	Standard UL 2017 2nd Edition 2008

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TITLE:

M-CONTROLLER II, GES INSTALLATION DRAWING

SIZE	DWG. NO.	REV
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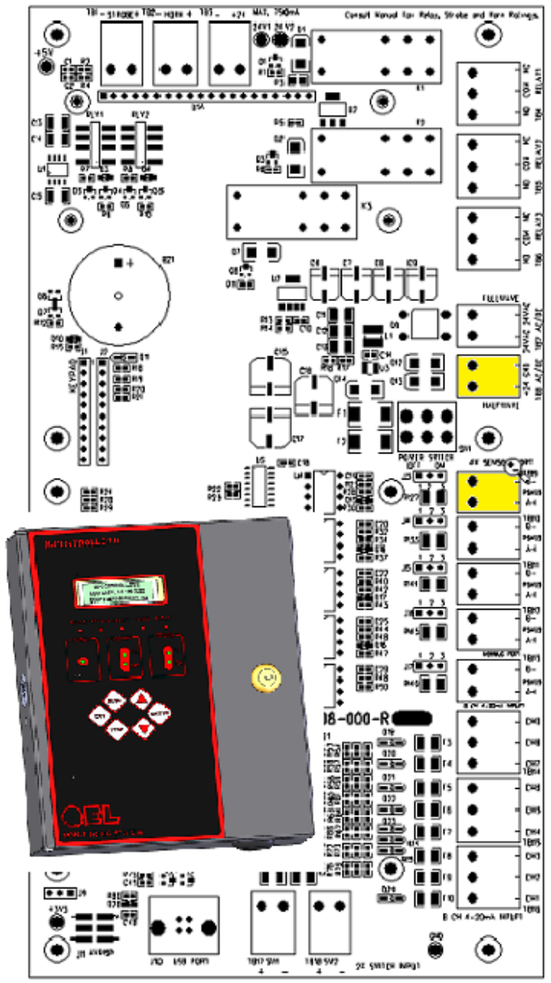
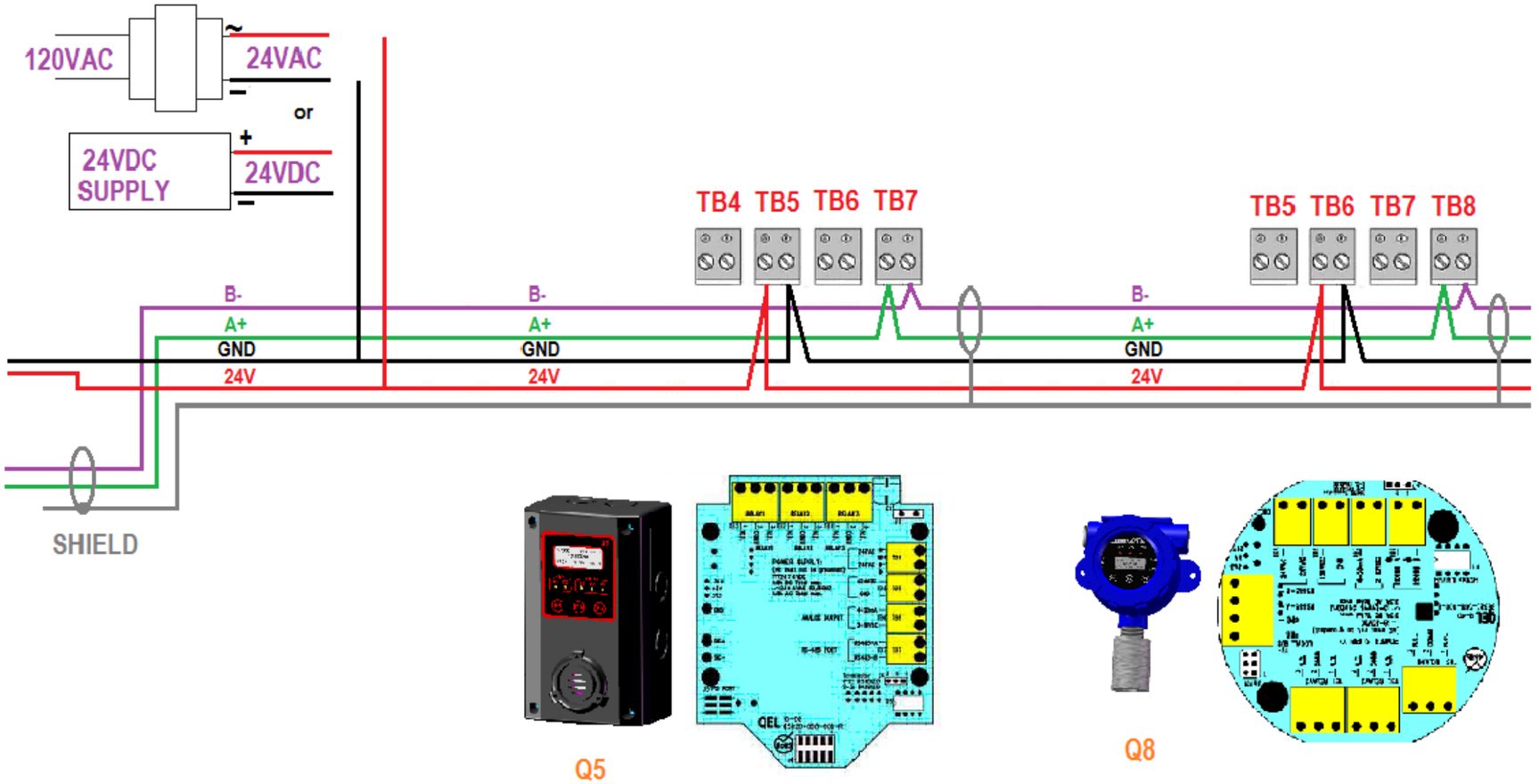
SCALE: 1:2 | WEIGHT: | SHEET 4 OF 9

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-

24VAC/DC Power to all Half-wave rectifier circuit TB (Can be Grounded or Floating Ground)





Q5

Q8

WARNING:

WHEN PROGRAMMING THE M-CONTROLLER WITH A LAPTOP ENSURE THAT THE LAPTOP IS NOT CONNECTED TO ANY POWER SOURCE. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT WITH DAMAGES TO THE CONTROLLER AND OTHER DEVICES CONNECTED TO IT.

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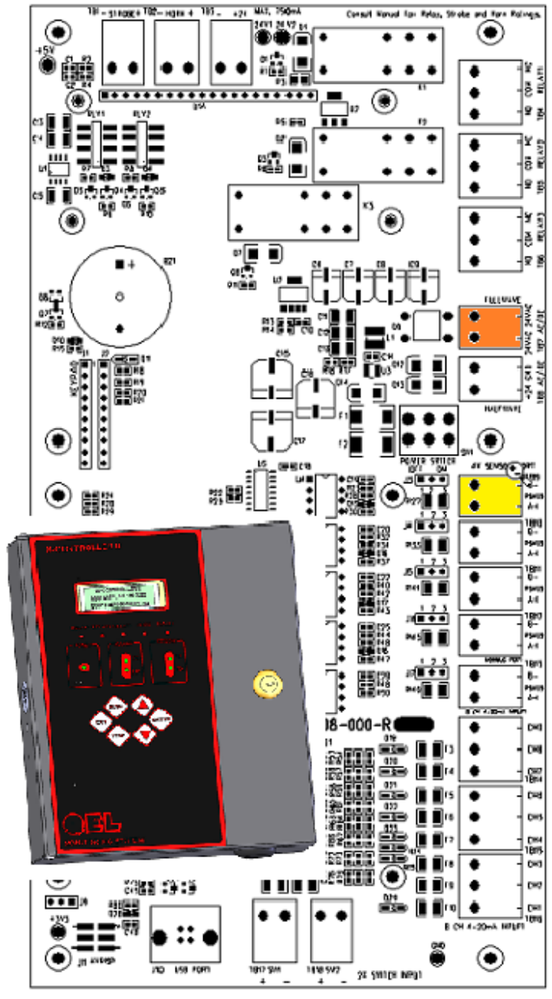
M-CONTROLLER II, GES INSTALLATION DRAWING

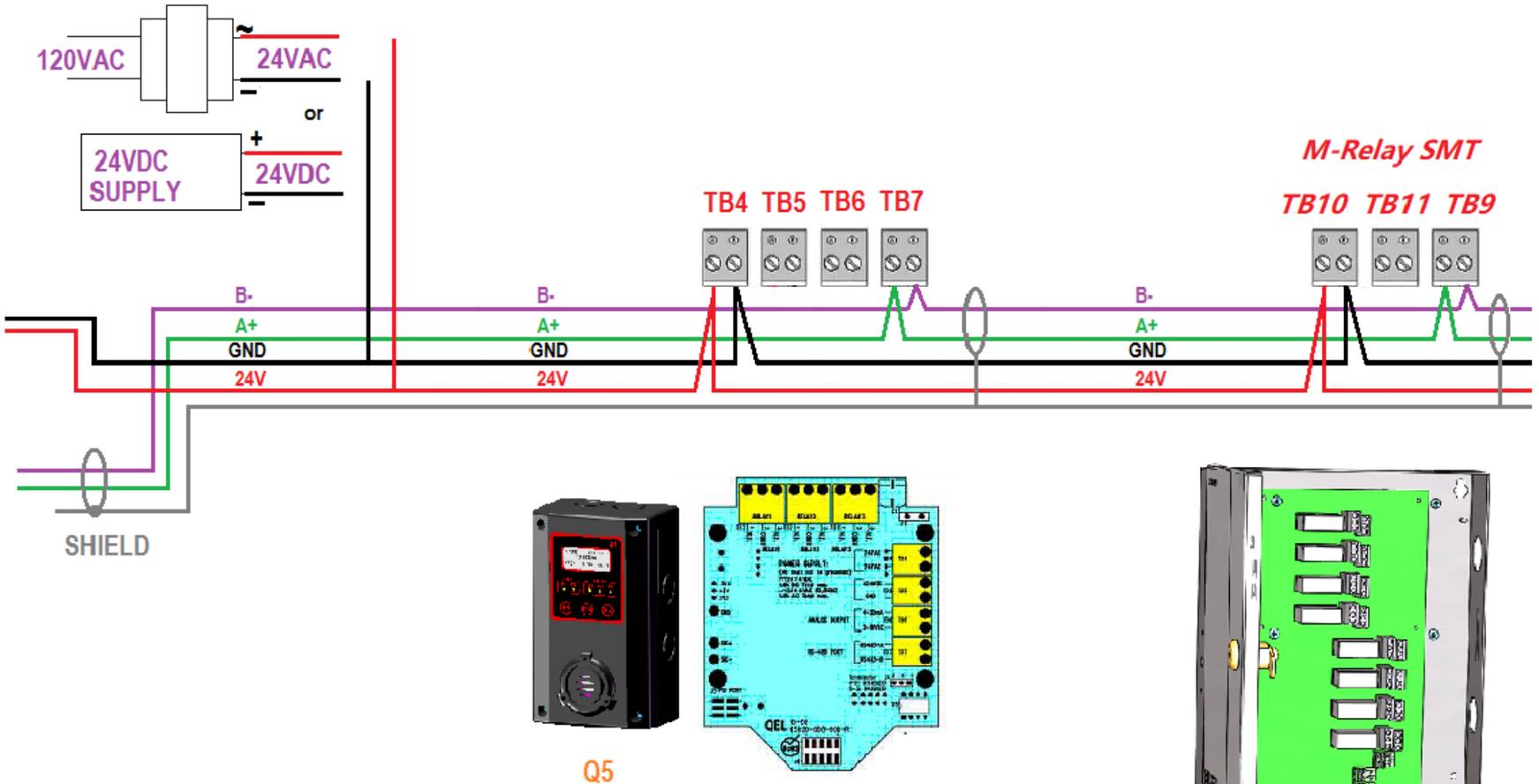
SIZE	DWG. NO.	REV
B	84350-202-005	A

SCALE: 1:2 | WEIGHT: | SHEET 5 OF 9

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	-	See Sheet1	-	-

24VAC/DC Power to all Full-wave rectifier circuit TB (Floating Ground is recommended)





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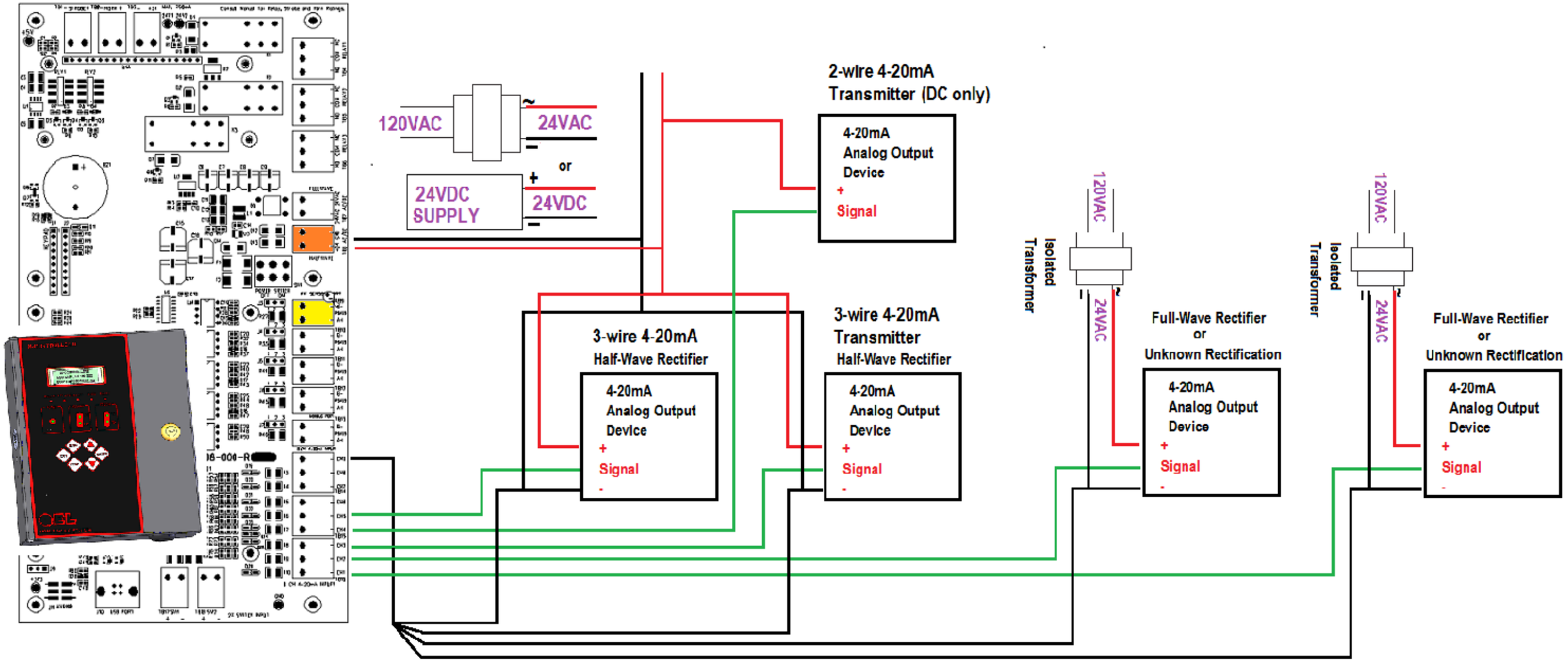
M-Controller Analog Inputs:



NOTE for AI:
M-Controller 8x Analog Inputs are non-isolated 4-20mA input receiver. The AI common ground is internal connected to the GND of the half-wave TB8. Therefore, to prevent equipment damage, multiple devices that are powered by a common 24VAC transformer must use common device power connections (e.g.24VAC input power to other device power inputs, and ground to other device grounds), or dedicated isolated transformers must be provided for each non-isolated device.

- If it is known that the connected analog device is half-wave rectified, it can share the same AC power supply with the M-Controller II half-wave termianl TB8.
- If it is known that the connected analog device is full-wave rectified or mixed half-wave and full-wave, DC power supply is recommended.
- If the rectification of the other device is unknown, it is recommended that a separate transformer is used to power other device.

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TITLE:
M-Controller II, GES Installation Drawing

SIZE	DWG. NO.	REV
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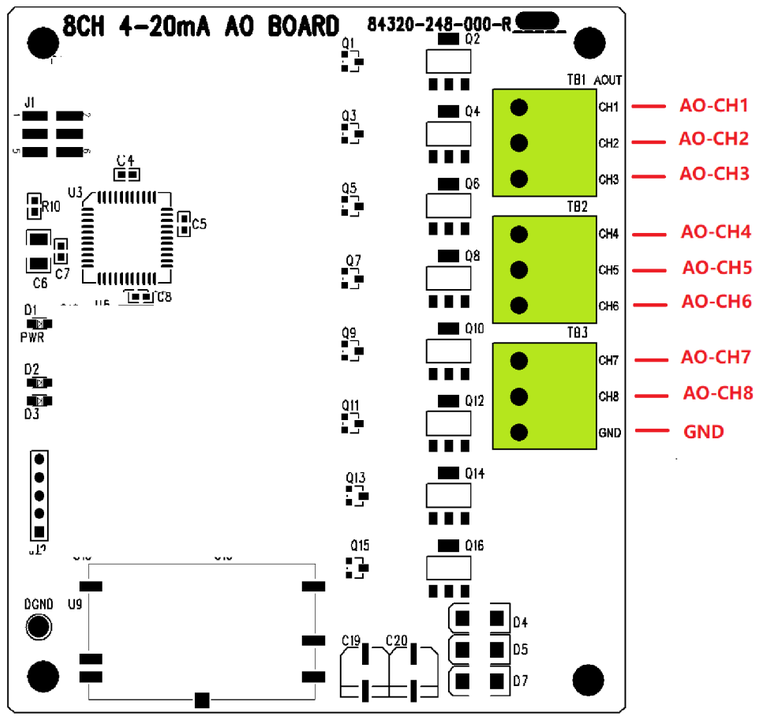
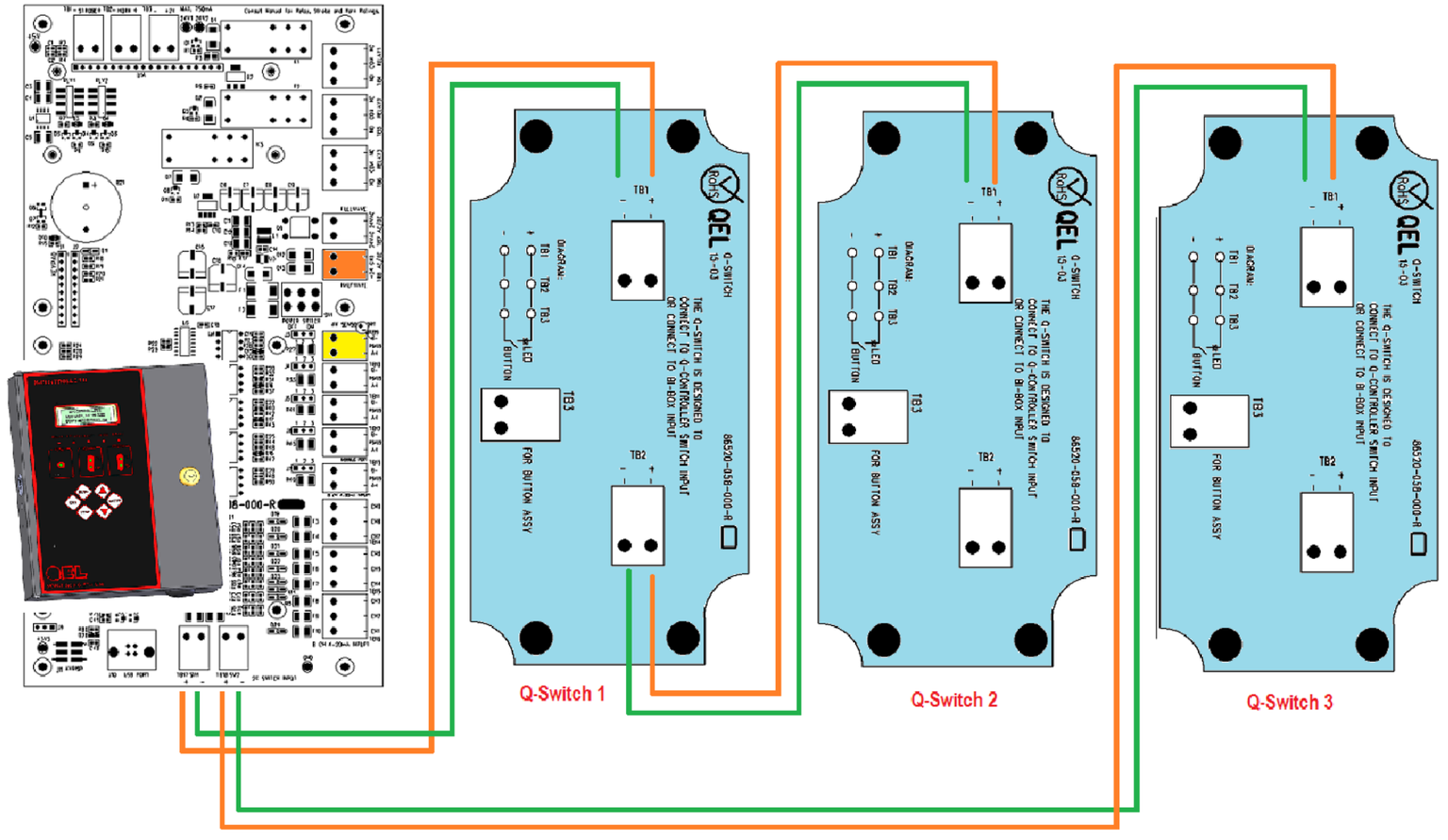
M-Controller AO-Board (Option)

- 8 Channel programmable 4-20mA Output
- 1500VDC isolation
- Output impedance up to 500ohms
- Output can be based on
  - either Inputs gas concentration
  - or Inputs mA value
- Ouput can be based on
  - either Averaging value among the inputs
  - or Peaking value among the inputs



M-Controller BI Switch Inputs

- Q-Switch1 and Q-Switch2 have the same functions
- BI CH1 and CH2 can be defined independently



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TITLE:

M-Controller II, GES Installation Drawing

SIZE	DWG. NO.	REV
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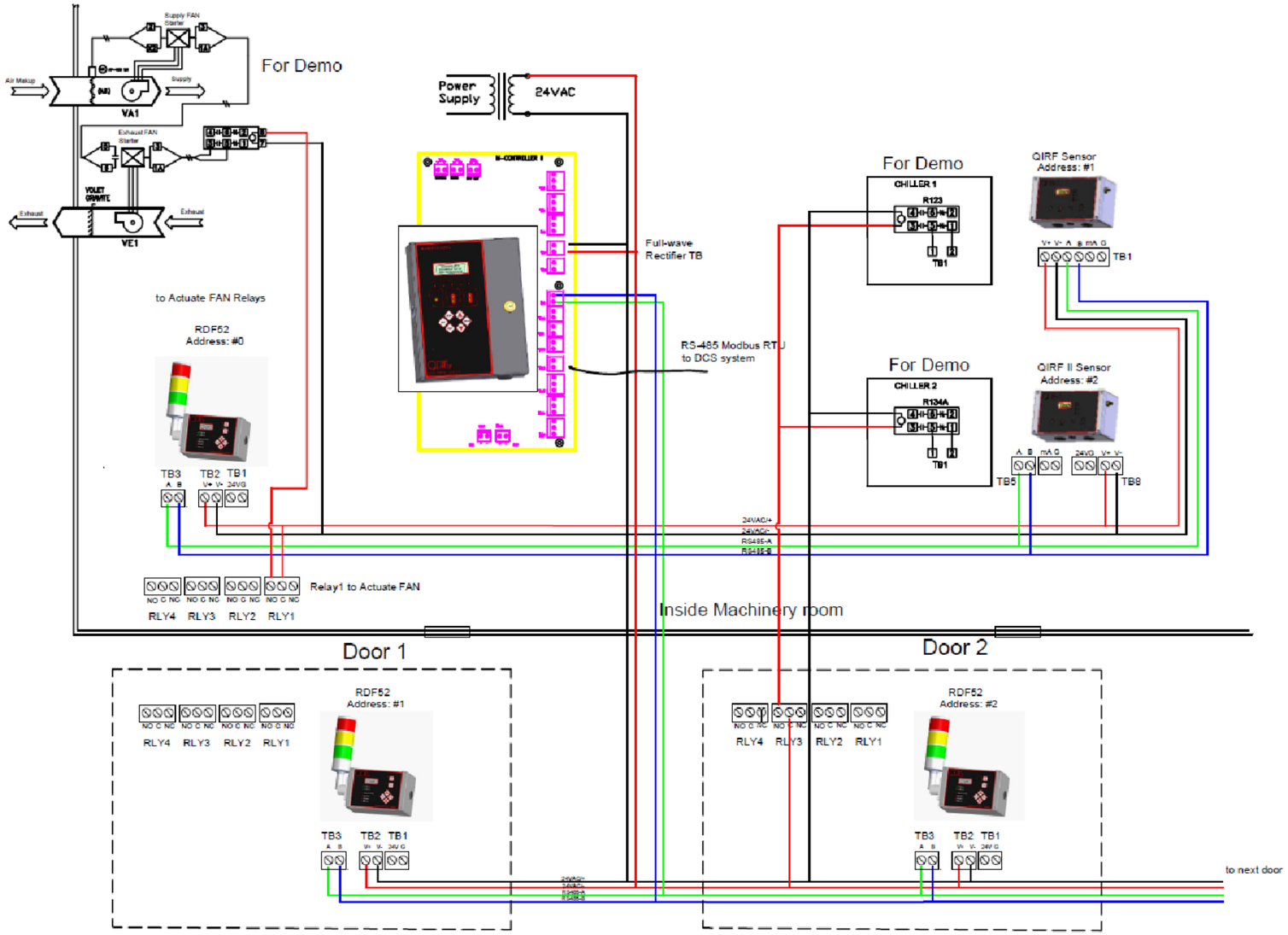
SCALE: 1:2 | WEIGHT: | SHEET 8 OF 9

M-Controller and QIRF meet B52 standard (Mechannical Refrigeration Code)



Refrigerant vapour detector: QEL QIRF Freson detecctor

Settings:
The RDF52 Fan Switches inside of the room is set to "Unlatched", the RDF52 Fan Switch outside of the room is set to "Latched". If they all in the same zone, any Fan Switch is pressed, the relay1 will actuate the FAN relay, but the Fan Switch outside of the room shall be capable of starting but not stopping the ventilation.
The RDF52 located inside room is option. Actually you can reset the latched relay1 through M-Controller Keypad, but with the RDF52 inside the operating is more straight-forward.

RDF52 Relays:
Relay1: turns ventilation fans on
when gas > 300ppm
or when any FAN SW is pressed
Relay2:
Relay3: shuts down Chiller1/2
when gas > 500ppm
Relay4:
Buzzer will be on when relay3 is on

RDF52 defaults: (programmable)
Low alarm: 300ppm / 250ppm
High alarm: 500ppm / 450ppm
FAN Switch to trigger Relay1

M-Controller can connect to max. 16 RDF52

M-Controller can connect to max. 32 IR Freon Sensors

In B52 standard, the Fan switches requires:
Accessible independent fan switches shall be installed inside and outside the machinery room. Fan switch located outside the machinery room shall be capable of staring but not stopping the ventilation.

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SCALE: 1:2 | WEIGHT: | SHEET 9 OF 9