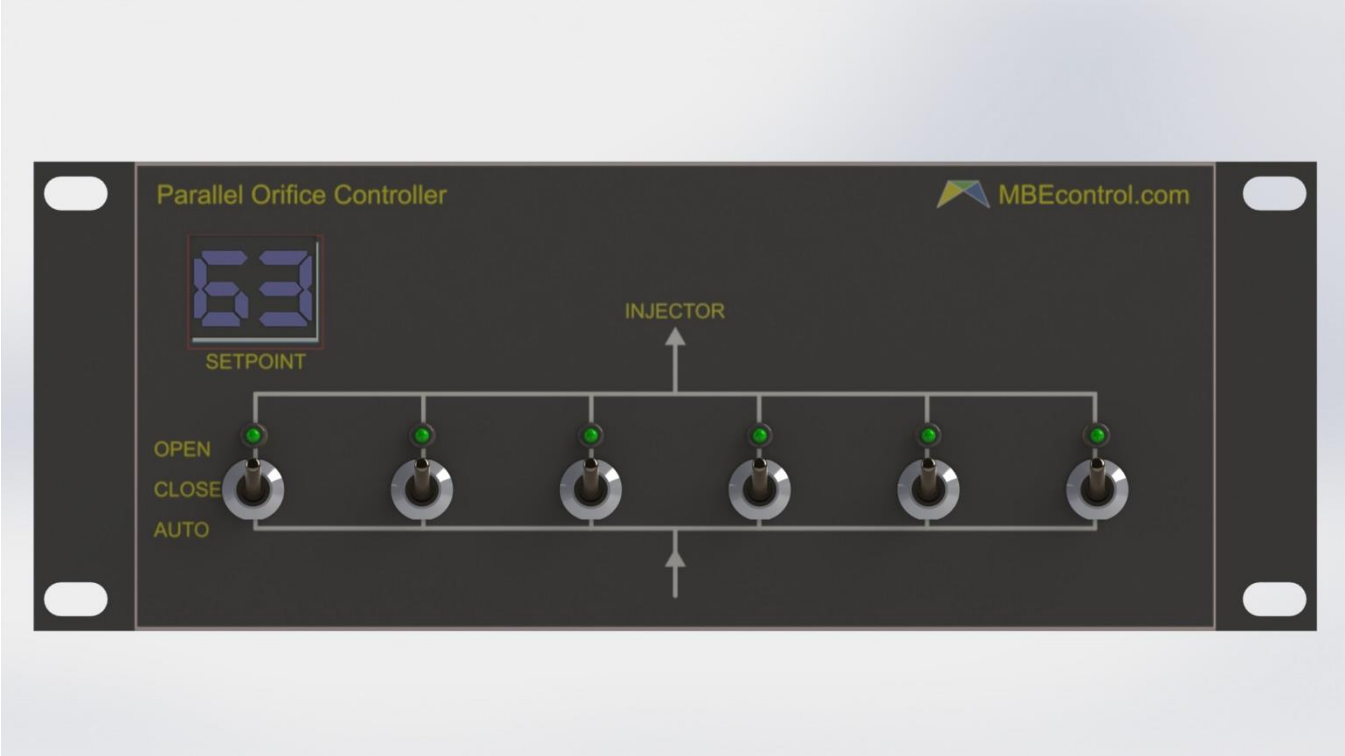
User Operation Manual:

Orifice Controller



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BEFORE YOU BEGIN

Safety Precautions

As with all industrial electronic equipment, safety depends on proper installation, use and maintenance of the instrument. Riber USA has designed the Orifice Controller (OC) with operator safety in mind.

Please read in full this operation manual before attempting to install or operate the OC. Refer to your respective facility guidelines on the installation of electronic and pneumatic equipment.

Under no circumstances should the OC be used for a purpose other than intended nor in a manner that may create a potentially hazardous condition should a failure occur in the operation of the system.

Please contact Riber USA for all servicing needs, our contact information is shown below.

Product Specifications

Physical Dimensions (Relay Box)	9.5 x 6.5 x 3.5Inches
Operating Temperature	0 to 55°C
Operating Humidity	0-85%; non-condensing
DC Power Connector	2.5 x 5.5 x 12mm Barrel (Center Positive)
DC Input Voltage Range	24VDC +/- 1V
DC Power Supply: Input Voltage	90-264 VAC
DC Power Supply: Input Frequency	47-63 Hz
DC Power Supply: Input Current (Maximum)	1.85 A
Output Connector	DB-25 Female
Output Voltage	24VDC
Output Current (@24VDC)	1 Amp Maximum (Sum of all channels)
Serial Connector	DE-9 Male
Serial Baud Rate	9600
Serial Data Bits/Parity/Stop Bits	7-EVEN-1
Serial Protocol	Eurotherm EI Bisynch

Support

For product related questions or assistance, please use the contact information below:

Riber USA
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Goleta, CA 93117
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INTRODUCTION

Product Description

The Orifice Controller is a microprocessor based controller that allows the remote and local control of up to 6 independent orifice control valves typically housed in the Riber USA Multi-Orifice Gas Delivery System. The combination of the Orifice Controller and the Multi-Orifice Gas Delivery System allows controlled high speed flow rate changes with a large dynamic range for gas sources. The 64 controller states can be set manually using the front panel switches or automatically using the AMBER growth software via the RS-232 serial port on the rear panel.

The Riber USA Orifice Controller has been designed with the end user in mind, by incorporating a simple to use front panel interface and high quality components to provide excellent and reliable performance.

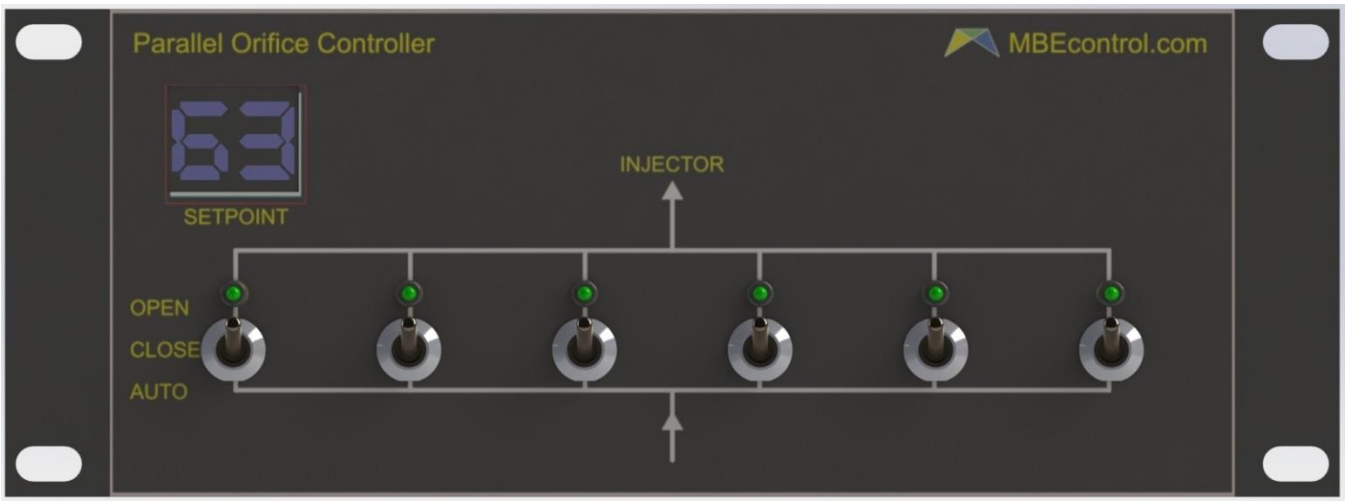

Figure 1 - Front Panel

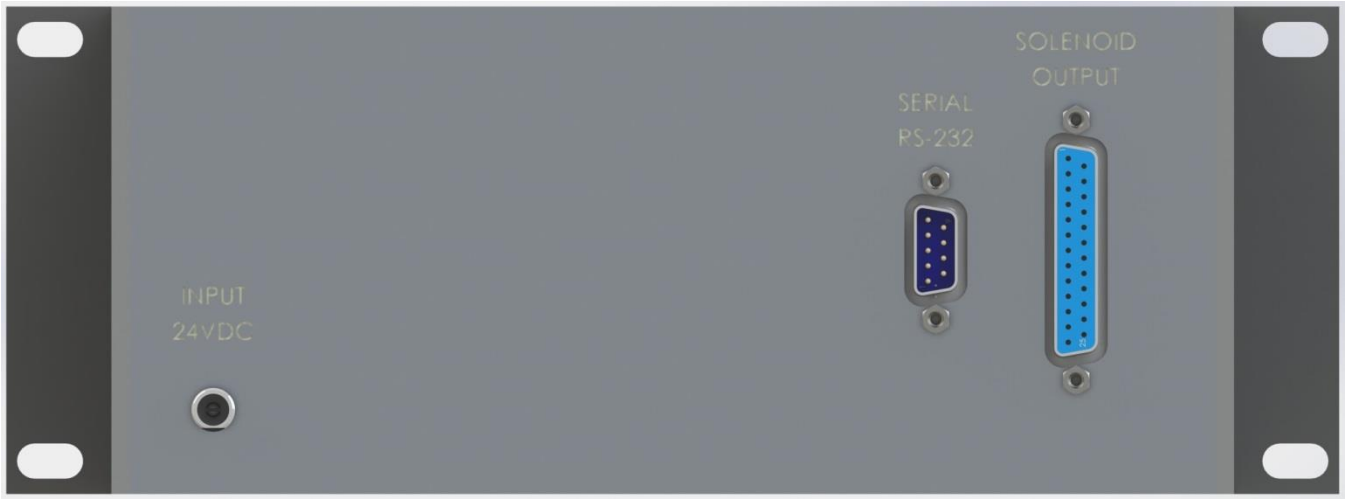

Figure 2 - Back Panel

INSTALLATION

This section will explain how to setup the Orifice Controller for use.

WARNING: Before making any cable connections, make sure the controller DC power supply is unplugged, ensuring that the unit is powered off. When plugging in the DC power supply, make sure that the switches are in the off position. Failing to do so may cause injury or damage to equipment. Never install/remove cabling with the power on to the unit as damage can occur.

Mounting the Orifice Controller

The orifice controller is designed to easily mount on a 19 inch half rack frame. The unit requires 2U (3.5 inches) of rack height (see Figure 3 for more details).

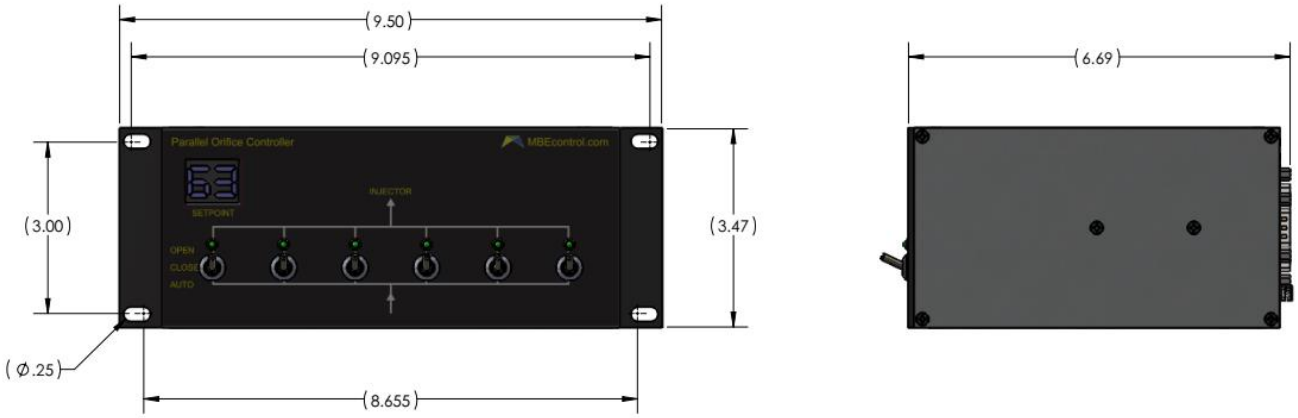

Figure 3 - Mounting Dimesions

Connecting the Orifice Controller to the Solenoid Relays

The Orifice Controller output is wired to the female DB-25 pin on the rear panel. If the controller was supplied with the Multi-Orifice Gas Delivery System, the connection to the solenoid relays is made using a straight through DB-25 Male/Female cable. The cable will plug into DB-25 breakout board connected to the pneumatic solenoids driving the orifice valves. For other implementations, please see the pinout of the DB-25 connector to make the appropriate wiring connections.

Connecting the Orifice Controller to the AMBER Computer

The Orifice Controller requires a DE-9 pin null serial cable (Female/Female) to interface with a standard PC 9 pin serial port. Once the controller is connected to the AMBER computer, the controller can be configured as a temperature loop in AMBER.

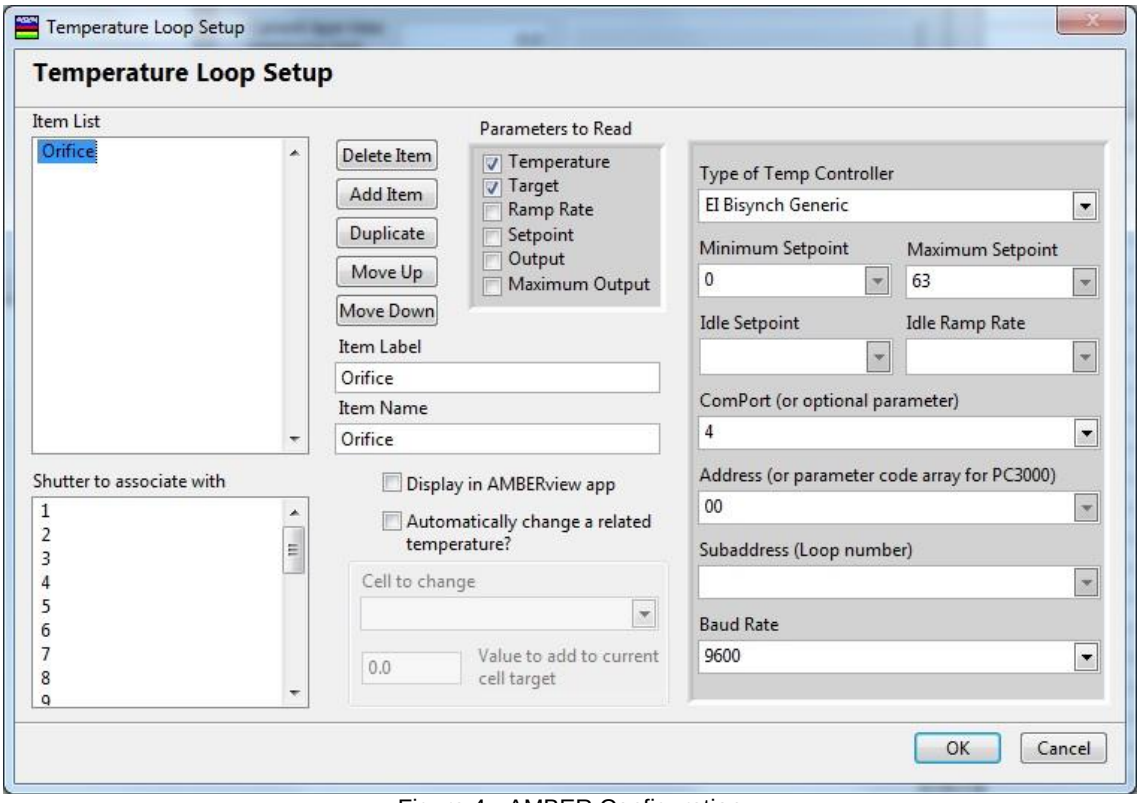

Figure 4 - AMBER Configuration

As seen in Figure 4, the Orifice Controller should be configured using the following settings:

- **Protocol (Type of Temp Controller):** EI Bisynch Generic
- **Minimum Setpoint:** 0
- **Maximum Setpoint:** 63
- **Address:** 00
- **Subaddress:** (blank)
- **Baud Rate:** 9600

Connecting the Orifice Controller to the DC Power Supply

The Orifice Controller DC Power Supply should be connected to the DC power jack on the rear panel. As soon as the power supply is plugged into an appropriate AC power source (90-264 VAC / 47-63 Hz) the Orifice Controller will power up.

NOTE: Please ensure that all the switches on the front panel are set to the OFF position before turning on the Orifice Controller.

OPERATION

The basic function of the Orifice Controller is to open and close the 6 connected valves as instructed by the user. The individual valve state can be controlled in two modes:

- Manual (Front Panel Control)
- Remote (Computer Control)

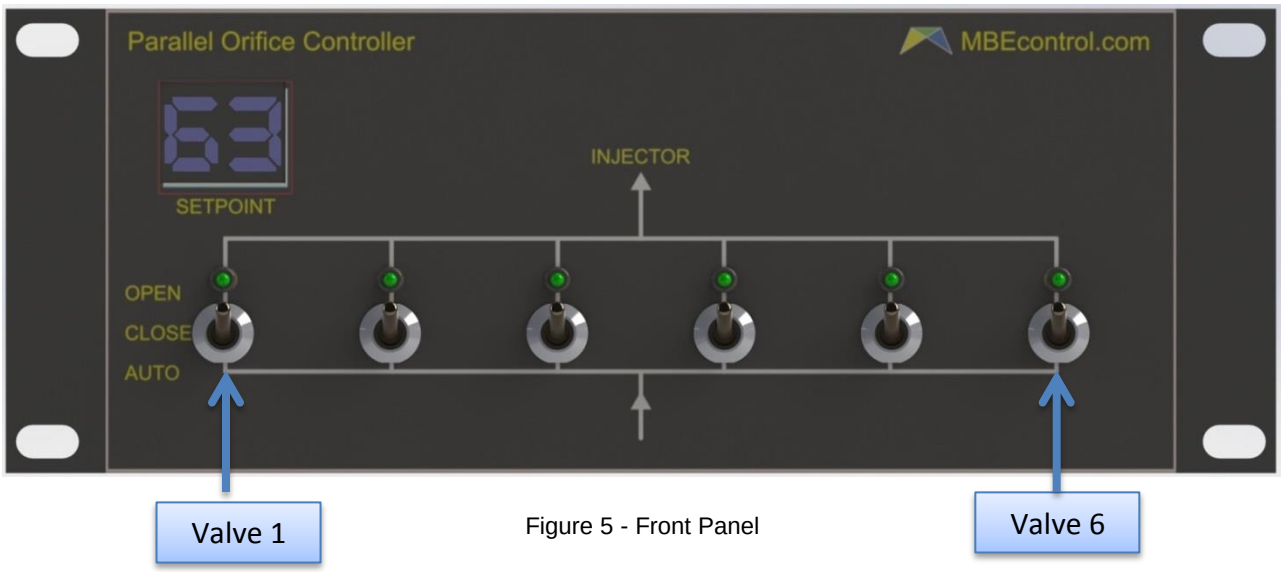

Figure 5 - Front Panel

Manual Operation

To operate the valve in manual mode, the user should use the ***upward*** (OPEN) or ***middle*** (CLOSE) positions on the front panel mechanical switches (see Figure 6). All switches have a latching mechanism to ensure that the switch stays in place. To change the switch position, the lever must be pulled towards the user and then moved to the desired position. Each manual switch will only affect that valve. When the valve is open, the green LED above will turn ON. When the valve is closed the LED will be OFF.

Figure 6 - Switch Positions

Note: All valves in Manual mode will not be affected or be represented by the 2 digit digital display value on the front panel.

Remote Operation

To operate the individual valve in remote mode, the switch for that valve should be placed in the ***downward*** or AUTO position. When in remote mode, the valve output state of any switch in AUTO mode will be controlled by the computer commanded setpoint sent through the serial interface. The valves are numbered 1 to 6, starting from the left. The setpoint is the decimal representation of the binary number represented by switch 1 being the least significant bit and switch 6 being the most significant bit. Please refer to Table 1 in the appendix for conversion table. Only the switches in the AUTO position are controlled by the remote setpoint. But, the LED ON/OFF state will always indicate the valve state.

Figure 7 - Setpoint Display

Note: Please refer to the Eurotherm Series 2000 Communications Handbook (P/N HA026230) for detailed information on the EI-Bisynch Protocol.

APPENDIX A - CONNECTOR PINOUTS

The Orifice Controller has 3 connector ports on the rear panel, a DB-25 Female connector for Solenoid Control, a DE-9 Male connector for Serial Communications, and a DC Jack for 24VDC Input Power.

Figure 8 - Rear Panel

Solenoid Output (DB-25 Female) - +24VDC Output

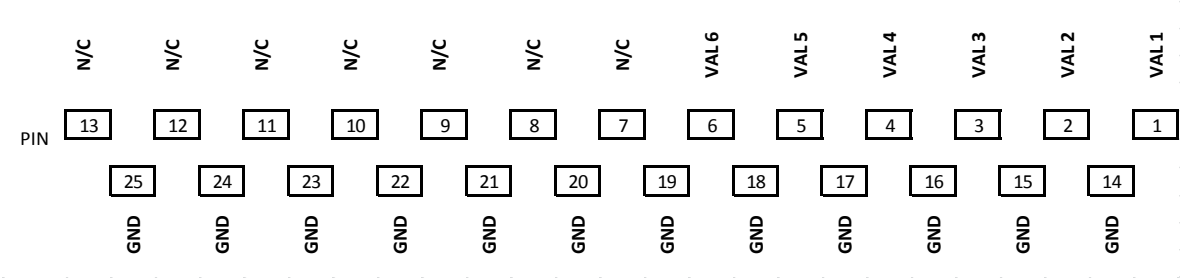

Figure 9 – DB25 Solenoid Output Connector Pin-Out

Serial Communications (DE-9 Male) – (RS-232 DTE Configuration)

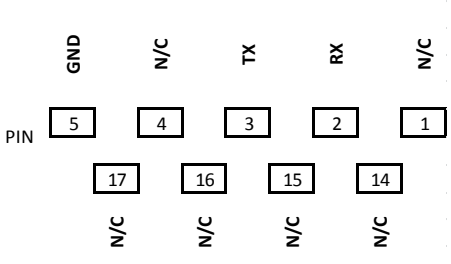

Figure 10 - DE9 Serial Communications Connector Pin-Out

APPENDIX B – SWITCH SETPOINT TABLE

0 = CLOSED; 1 = OPENNED

Table 1 - Switch Setpoint Table

Decimal Setpoint	Bit/Valve/Switch					
	1	**2**	**3**	**4**	**5**	**6**
0	0	0	0	0	0	0
1	1	0	0	0	0	0
2	0	1	0	0	0	0
3	1	1	0	0	0	0
4	0	0	1	0	0	0
5	1	0	1	0	0	0
6	0	1	1	0	0	0
7	1	1	1	0	0	0
8	0	0	0	1	0	0
9	1	0	0	1	0	0
10	0	1	0	1	0	0
11	1	1	0	1	0	0
12	0	0	1	1	0	0
13	1	0	1	1	0	0
14	0	1	1	1	0	0
15	1	1	1	1	0	0
16	0	0	0	0	1	0
17	1	0	0	0	1	0
18	0	1	0	0	1	0
19	1	1	0	0	1	0
20	0	0	1	0	1	0
21	1	0	1	0	1	0
22	0	1	1	0	1	0
23	1	1	1	0	1	0
24	0	0	0	1	1	0
25	1	0	0	1	1	0
26	0	1	0	1	1	0
27	1	1	0	1	1	0
28	0	0	1	1	1	0
29	1	0	1	1	1	0
30	0	1	1	1	1	0
31	1	1	1	1	1	0
32	0	0	0	0	0	1
33	1	0	0	0	0	1

34	0	1	0	0	0	1
35	1	1	0	0	0	1
36	0	0	1	0	0	1
37	1	0	1	0	0	1
38	0	1	1	0	0	1
39	1	1	1	0	0	1
40	0	0	0	1	0	1
41	1	0	0	1	0	1
42	0	1	0	1	0	1
43	1	1	0	1	0	1
44	0	0	1	1	0	1
45	1	0	1	1	0	1
46	0	1	1	1	0	1
47	1	1	1	1	0	1
48	0	0	0	0	1	1
49	1	0	0	0	1	1
50	0	1	0	0	1	1
51	1	1	0	0	1	1
52	0	0	1	0	1	1
53	1	0	1	0	1	1
54	0	1	1	0	1	1
55	1	1	1	0	1	1
56	0	0	0	1	1	1
57	1	0	0	1	1	1
58	0	1	0	1	1	1
59	1	1	0	1	1	1
60	0	0	1	1	1	1
61	1	0	1	1	1	1
62	0	1	1	1	1	1
63	1	1	1	1	1	1

REVISION HISTORY

18.02.28 – REV 1 – Create document – GAM