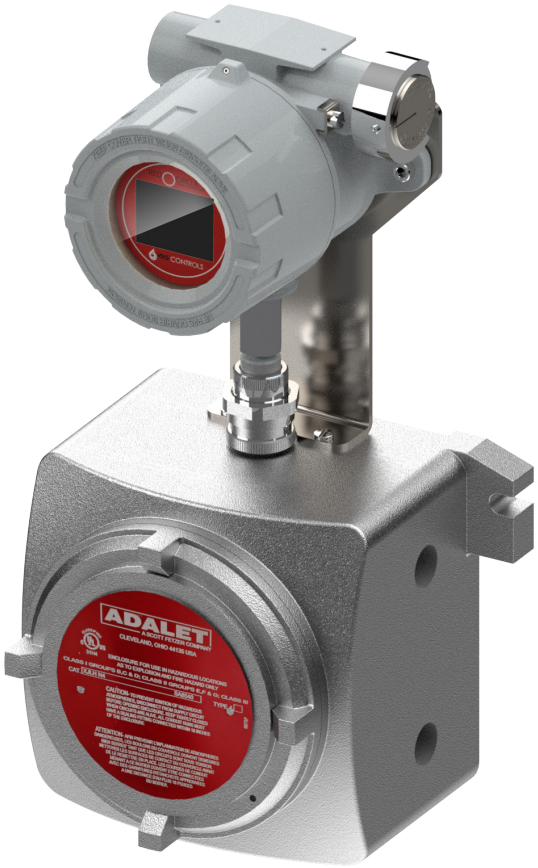
RCVC 3000
INSTRUCTION MANUAL



Applicable Models:
This Instruction Manual applies to the following VRG - RCVC 3000. To confirm suitability for additional models and/or componenents, please contact VRG Controls or view us online at www.vrgcontrols.com

RCVC 3000

STAY IN TOUCH!
Scan the QR Code at right for company information and product updates.

ADDRESS: VRG Controls, LLC.
1199-B Flex Court
Lake Zurich, IL 60047, USA
TOLL FREE: (800) 844-FLOW-VRG
E-MAIL: sales@vrgcontrols.com
WEBSITE: vrgcontrols.com

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Scope of Manual

This Insturction Manual provides instructions for operation, maintenance, adjustment and troubleshooting of VRG Controls RCVC - Red Circle Valve Controller.

Configuration Methods

1. Navigation Wheel
2. Setup Application vis USB Setup Cable

Navigation Wheel

USB Setup Cable

Features

- Reverse Valve Action: Can easily switch between Direct Acting and Reverse Acting.
- Three states of Edit Fail Modes: Lock Last, Fail Open and Fail Close
- Three modes of Lockup Mode: Lock up Open, Lock up Close or both.
- Split Range Configuration: Can set to any Range
- Dead Band Calibration for Open and Close: can be independently set.
- Pulse Control: can adjust the Range when the Pulse is activated
- Pulse Zone Timers: Adjust the length and duration of pulse
- Fixed Command: Output for Pilot Override Applications
- Enable Anti-Surge Control: Set the Range for when the Surge will Activate.
- Various Alarm Functions dependent on Failure State.
- Zero Out Solenoid Count: Can reset for new Solenoids both Open and Close Count.
- Remote Command and Remote Override using 24VDC.

Technical Assistance

Should you have any questions, you may contact your local VRG Controls sales representative or VRG Controls technical assistance at:

VRG Controls

Attn: 1199 Flex Court
Lake Zurich, IL 60047
Toll-Free: 844-FLOW-VRG (844-356-9874)
Tel: + 1 847-778-6740
e-mail: sales@vrgcontrols.com
websight: www.vrgcontrols.com

To facilitate requests for technical assistance, please have the following information immediately available:

- Job number or serial number
- Fail states or messages
- Command signal Configuration
  4ma to open or 20ma to open
- Interaction method
  (navigation wheel or computer software)

Warning

Do NOT use a multimeter to check the feedback readings. Do NOT use a multimeter to check feedback Retransmission Signal. By connecting the negative lead to the feedback (AI1) and the positive lead to 24 VDC, you will short out the board. This will require a replacement board to fix the issue.

Warning

The new RCVC app is not compatible with the old setup files. To use the new RCVC you will need to load a new setup file into the RCVC. The new setup files are compatible with the old VRG Programming Application. Any RCVC purchased after 3/1/2021 will have the new setup file already installed in the RCVC.

Table 1.0 RCVC Specifications

Power Supply	
Power Supply	19-30 VDC
RCVC Module Current	50mA max
RCVC Total Assembly Rating	2A max
Onboard Fuse	Limitron: FNQ-R-2 600VAC IR 200kA
Digital Outputs	
Configurable Solenoids	3 Max
Voltage	24 VDC
Load Current (max)	1.0 Amps
Digital Inputs	
No. Digital Inputs	2 (Configurable)
Voltage	24 VDC
Input Current	5.0 mAmps
Digital Outputs	
No. Digital Outputs	3 (Open Sol, Close Sol, Auxiliary)
Voltage	24 VDC
Load Current (max)	250 mAmp
Analogue Inputs	
No. Analogue Inputs	2 (Feedback, Command)
Input Type	Current / Voltage
Voltage Input Range	1 - 5.0 VDC
Voltage Input Impedance	100 kOhms
Current Input Range	4 - 20 mA
Current Input Impedance	300 Ohms
Resolution	1 in 3600
Analogue Outputs	
Output Type	Current / Voltage
Voltage Output Range	4.0 - 20.0 ma / 0 - 3.0 VDC
Resolution	1 in 3600
Solenoid Ohms	
AAA	58 - 65 Ohms
Asco	43 - 54 Ohms

Navigation Wheel Common Tasks

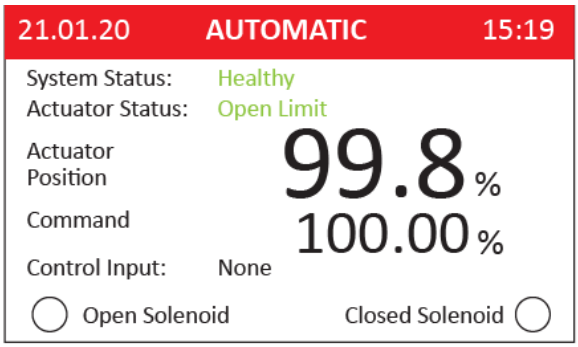
1. Local Manual Operation
2. Command Signal Calibration
3. Feedback Signal Calibration
4. Retransmission Signal Calibration
5. Reverse Valve Action
6. Edit Fail Modes
7. Edit Lockup Mode
8. Split Range Configuration
9. Determine RCVC Version
10. Zero Out Solenoid Count

#1 Local Manual Operation

1. Apply 24 VDC Power Supply to RCVC
2. SHORT PUSH Navigation Wheel on RCVC Head to enter MANUAL mode.
3. Rotate Navigation Wheel AWAY (CW) to increase valve position percentage (%).
4. Rotate Navigation Wheel to NEUTRAL (center) position to hold position.
5. Rotate Navigation Wheel Toward (CCW) to decrease valve position percentage (%).
6. Rotate Navigation Wheel to NEUTRAL (center) position to hold position.
7. Return Navigation Wheel to Neutral (Center) Rotation Position. SHORT PUSH Navigation Wheel on RCVC Head to exit Manual mode. RCVC display Header should read AUTOMATIC.

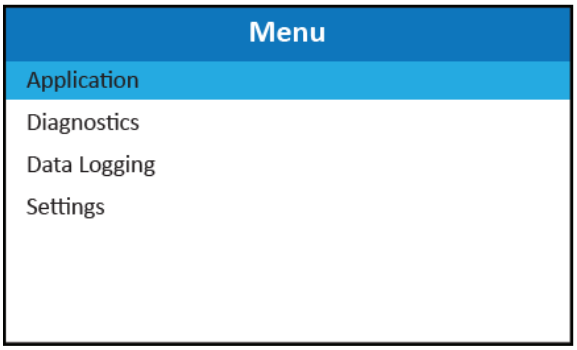
#2 Command Signal Calibration

1. Apply 24 VDC Power Supply to RCVC
2. SHORT PUSH Navigation Wheel on RCVC Head to enter MANUAL mode.

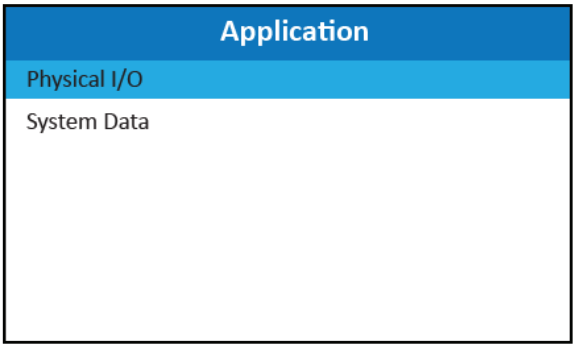


Navigation Wheel

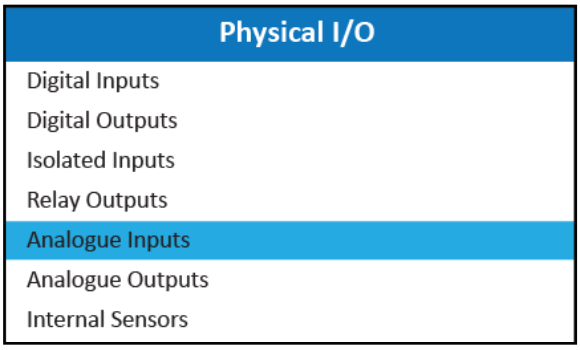
3. LONG PUSH Navigation Wheel on RCVC Head to enter MENU mode.



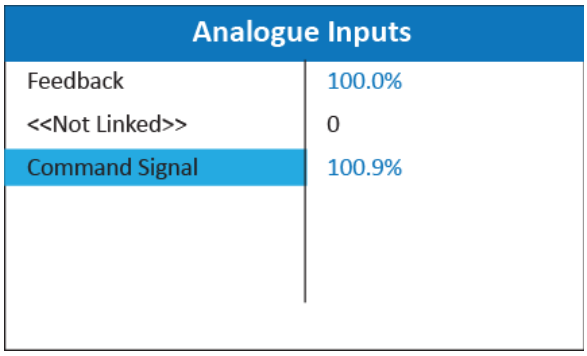
4. Select “Application” and SHORT PUSH to enter.



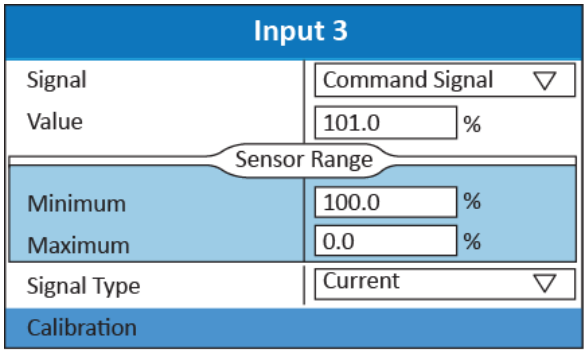
5. Select “Physcial I/O” and SHORT PUSH to enter.



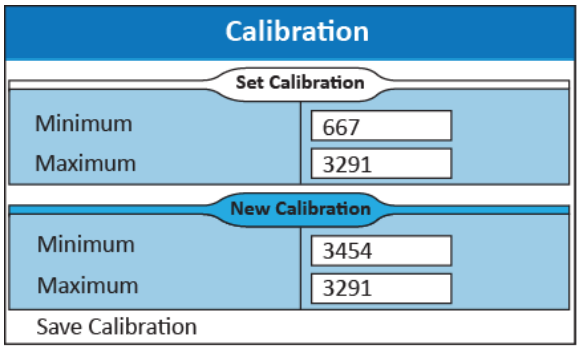
6. Select “Analogue Inputs” and SHORT PUSH to enter.



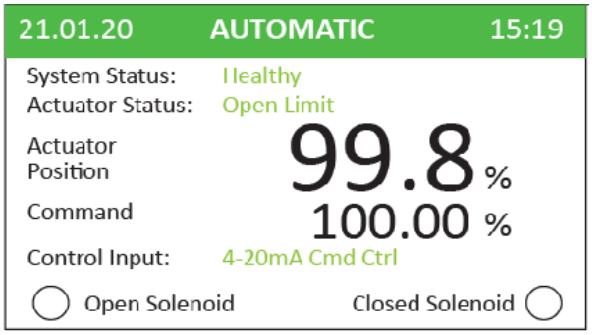
7. Select “Command Signal” and SHORT PUSH to enter.



8. Select “Calibration” and SHORT PUSH to enter.



9. Select “New Calibration” and SHORT PUSH to enter.
10. Select “Minimum” and SHORT PUSH to enter.
11. Apply 4.0 mA Command Signal (MIN) and SHORT PUSH to enter.
12. Select “Maximum” and SHORT PUSH to Enter.
13. Apply 20 mA Command Signal (MAX) and SHORT PUSH to Enter.
14. Rotate Navigation Wheel to ESC Position to reselect NEW CALIBRATION.
15. Rotate Navigation Wheel Toward (CCW) to select SAVE CALIBRATION and SHORT PUSH to enter.
16. Rotate Navigation Wheel to HOLD ESC Position until menu stops at MANUAL on DISPLAY HEADER.
17. Return Navigation Wheel to Neutral (Center) Rotation Position. SHORT PUSH Navigation Wheel on RCVC Head to exit MANUAL mode. RCVC display Header should read AUTOMATIC.



#3 Feedback Signal Calibration

1. Apply 24 VDC Power Supply to RCVC
2. SHORT PUSH Navigation Wheel on RCVC Head to enter Manual mode.
3. LONG PUSH Navigation Wheel on RCVC Head to enter MENU mode.
4. Select “Application” and SHORT PUSH to enter.
5. Select “Physical I/O” and SHORT PUSH to enter.
6. Select “Analogue Inputs” and SHORT PUSH to enter.
7. Select “Feedback” and SHORT PUSH to enter.
8. Select “Calibration” and SHORT PUSH to enter.
9. Select “New Calibration” and SHORT PUSH to enter.
10. Select “Minimum” and SHORT PUSH to enter.
11. Use VMO or other method Stroke control valve to VALVE OPEN (MIN) position and SHORT

PUSH to enter.
12. Select “Maximum” and SHORT PUSH to enter.
13. Use VMO or other method Stroke control valve to VALVE CLOSED (MAX) position and SHORT PUSH to enter.
14. Rotate Navigation Wheel to ESC Position to reselect NEW CALIBRATION.
15. Rotate Navigation Wheel Toward (CCW) to select SAVE CALIBRATION and SHORT PUSH to enter.
16. Rotate Navigation Wheel to HOLD ESC Position until menu stops at MANUAL on DISPLAY HEADER.
17. Return Navigation Wheel to Neutral (Center) Rotation Position. SHORT PUSH Navigation Wheel on RCVC Head to exit MANUAL mode. RCVC display Header should read AUTOMATIC.

#4 Retransmission Signal Calibration

1. Apply 24 VDC Power Supply to RCVC
2. SHORT PUSH Navigation Wheel on RCVC Head to enter Manual mode.
3. LONG PUSH Navigation Wheel on RCVC Head to enter MENU mode.
4. Select “Application” and SHORT PUSH to enter.
5. Select “Physical I/O” and SHORT PUSH to enter.
6. Select “Analogue Outputs” and SHORT PUSH to enter.
7. Select “Feedback” and SHORT PUSH to enter.
8. Select “Calibration” and SHORT PUSH to enter.
9. Select “New Calibration” and SHORT PUSH to enter.
10. Select “Minimum” and SHORT PUSH to enter.
11. Use Navigation Wheel to set the Value so the Output is equal to 4 ma, then SHORT PUSH to save value.
12. Select “Maximum” and SHORT PUSH to enter.
13. Use Navigation Wheel to set the Value so the Output is equal to 20 ma, then SHORT PUSH to save value.
14. Rotate Navigation Wheel to ESC Position to reselect NEW CALIBRATION.
15. Rotate Navigation Wheel Toward (CCW) to select SAVE CALIBRATION and SHORT PUSH to enter.
16. Rotate Navigation Wheel to HOLD ESC Position until menu stops at MANUAL on DISPLAY HEADER.
17. Return Navigation Wheel to Neutral (Center) Rotation Position. SHORT PUSH Navigation Wheel on RCVC Head to exit MANUAL mode. RCVC display Header should read AUTOMATIC.

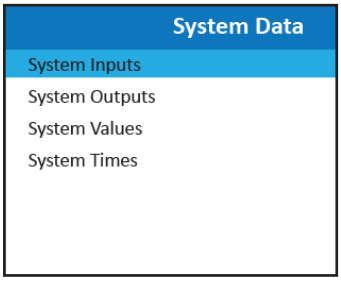
#5 Reverse Valve Action

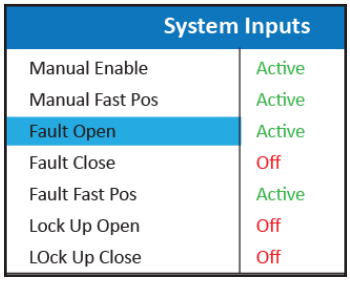
1. Apply 24 VDC Power Supply to RCVC
2. Apply Command Signal to RCVC
3. SHORT PUSH Navigation Wheel on RCVC Head to enter MANUAL mode.
4. LONG PUSH Navigation Wheel on RCVC Head to enter MENU mode.
5. Select “Application” and SHORT PUSH to enter.
6. Select “Physical I/O” and SHORT PUSH to enter.
7. Select “Analogue Inputs” and SHORT PUSH to enter.
8. Select “Command Signal” and SHORT PUSH to enter.
9. Select “Sensor Range” and SHORT PUSH to enter.
10. Select “Minimum” and SHORT PUSH to enter.
11. Use Navigation Wheel TOWARD (CCW) to ad just value to 100% on Minimum. SHORT PUSH to enter.
12. Select “Maximum” and SHORT PUSH to enter.
13. Use Navigation Wheel AWAY (CW) to adjust value to 0.0% on Minimum. SHORT PUSH to enter.
14. Rotate Navigation Wheel to HOLD ESC Position until menu stops at MANUAL on DISPLAY HEADER.
15. Return Navigation Wheel to Neutral (Center) Rotation Position. SHORT PUSH Navigation Wheel on RCVC Head to exit MANUAL mode. RCVC display Header should read AUTOMATIC.

#6 Edit Fail Modes

1. Apply 24 VDC Power Supply to RCVC
2. Apply Command Signal to RCVC
3. SHORT PUSH Navigation Wheel on RCVC Head to enter MANUAL mode.
4. LONG PUSH Navigation Wheel on RCVC Head to enter Menu mode.
5. Select “Application” and SHORT PUSH to enter.
6. Select “System Data” and SHORT PUSH to enter.
7. Select “System Inputs” and SHORT PUSH to enter.
8. For FAIL OPEN Mode:
    A. Select Line 8 - “Fault Open” and Click Radio Button Current Status = “ACTIVE”
    B. Select Line 9 - “Fault Close” and Click Radio Button Current Status = “OFF”
9. For FAIL CLOSED Mode:
    A. Select Line 8 - “Fault Open” and Click Radio Button Current Status = “OFF”
    B. Select Line 9 - “Fault Close” and Click Radio Button Current Status = “ACTIVE”
10. For FAIL LAST Mode:
    A. Select Line 8 - “Fault Open” and Click Radio Button Current Status = “OFF”
    B. Select Line 9 - “Fault Close” and Click Radio Button Current Status = “OFF”

Mode	Line 8 - Fault Open	Line 9 - Fault Close
Fail OPEN Loss 4-20 mA	ACTIVE	OFF
Fail CLOSED Loss 4-20 mA	OFF	ACTIVE
LOCK LAST Loss 4-20 mA	OFF	OFF





#7 Edit Lockup Mode

1. Apply 24 VDC Power Supply to RCVC
2. Apply Command Signal to RCVC
3. SHORT PUSH Navigation Wheel on RCVC Head to enter MANUAL mode.
4. LONG PUSH Navigation Wheel on RCVC Head to enter Menu mode.
5. Select “Application” and SHORT PUSH to enter.
6. Select “System Data” and SHORT PUSH to enter.
7. Select “System Inputs” and SHORT PUSH to enter.
8. For LOCKUP OPEN Mode:
    A. Select Line 11 - “Lockup Open” and Click Radio Button Current Status = “ACTIVE”
    B. Select Line 12 - “Lockup Close” and Click Radio Button Current Status = “OFF”
9. For LOCKUP CLOSED Mode:
    A. Select Line 11 - “Lockup Open” and Click Radio Button Current Status = “OFF”
    B. Select Line 12 - “Lockup Close” and Click Radio Button Current Status = “ACTIVE”

Mode	Line 11 - LOCKUP OPEN	Line 12 - LOCKUP CLOSED
LOCKUP OPEN	ACTIVE	OFF
LOCKUP CLOSED	OFF	ACTIVE

1. Apply 24 VDC Power Supply to RCVC
2. Apply Command Signal to RCVC
3. SHORT PUSH Navigation Wheel on RCVC Head to enter MANUAL mode.
4. LONG PUSH Navigation Wheel on RCVC Head to enter MENU mode.
5. Select “Application” and SHORT PUSH to enter.
6. Select “System Data” and SHORT PUSH to enter.
7. Select “System Values” and SHORT PUSH to enter.
8. Select Value 4 Open Limit and SHORT PUSH to enter.
    A. Set Open Limit to desired value when Lockup needs to engage.
9. Select Value 5 Close Limit and SHORT PUSH to enter.
    A. Set Close Limit to desired value when Lockup needs to engage.

#8 Split Range Configuration

1. Apply 24 VDC Power Supply to RCVC
2. Apply Command Signal to RCVC
3. SHORT PUSH Navigation Wheel on RCVC Head to enter Manual mode.
4. LONG PUSH Navigation Wheel on RCVC Head to enter MENU mode.
5. Select “Application” and SHORT PUSH to enter.
6. Select “Physical I/O” and SHORT PUSH to enter.
7. Select “Analogue Inputs” and SHORT PUSH to enter.
8. Select “Command Signal” and SHORT PUSH to enter.
9. Select “Calibration” and SHORT PUSH to enter.
10. Select “New Calibration” and SHORT PUSH to enter.
11. Select “Minimum” and SHORT PUSH to enter.
12. Apply desired Command Signal value (## mA Custom Value Here) for VALVE CLOSED position (MIN) and SHORT PUSH to enter.
13. Select “Maximum” and SHORT PUSH to enter.
14. Apply desired Command Signal value (## mA Custom Value Here) for VALVE OPEN position (MAX) and SHORT PUSH to enter.
15. Rotate Navigation Wheel to ESC Position to reselect NEW CALIBRATION.
16. Rotate Navigation Wheel Toward (CCW) to select SAVE CALIBRATION and SHORT PUSH to enter.
17. Rotate Navigation Wheel to HOLD ESC Position until menu stops at MANUAL on DISPLAY HEADER.
18. Return Navigation Wheel to Neutral (Center) Rotation Position. SHORT PUSH Navigation Wheel on RCVC Head to exit MANUAL mode. RCVC display Header should read AUTOMATIC.

#9 Determine RCVC Version

1. Apply 24 VDC Power Supply to RCVC
2. SHORT PUSH Navigation Wheel on RCVC Head to enter MANUAL mode.
3. LONG PUSH Navigation Wheel on RCVC Head to enter MENU mode.
4. Scroll to SETTINGS and SHORT PUSH to select.
5. Scroll to ABOUT and SHORT PUSH to select.
6. SOFTWARE VERSION will read
   A. “V3.13.3” for RCVC 1000
   B. “V4.10.2” for RCVC 2000
   C. “V4.24.6” for RCVC 3000

#10 Zero Out Solenoid Count

1. Apply 24 VDC Power Supply to RCVC
2. SHORT PUSH Navigation Wheel on RCVC Head to enter MANUAL mode.
3. LONG PUSH Navigation Wheel on RCVC Head to enter MENU mode.
4. Select “Application” and SHORT PUSH to enter.
5. Select “System Data” and SHORT PUSH to enter.
6. Scroll to “Open Sol. Count” and SHORT PUSH to enter.
7. Select “Value” and SHORT PUSH to enter.
8. Use the Wheel to decrease the value to Zero and SHORT PUSH to save.
9. Rotate Navigation Wheel to ESC position to exit OPEN SOL COUNT.
10. Select “Close Sol Count” and SHORT PUSH to enter.
11. Select “Value” and SHORT PUSH to enter.
12. Use the wheel to decrease the value to Zero and SHORT PUSH to save.
13. Rotate Navigation Wheel to HOLD ESC Position until menu stops at MANUAL on DISPLAY HEADER.
14. Return Navigation Wheel to Neutral (Center) Rotation Position. SHORT PUSH Navigation Wheel on RCVC Head to exit MANUAL mode. RCVC display Header should read AUTOMATIC.

System Values	
Close Pulse Zone	2.0%
Anti-Surge Zone	10.0%
Min Command	0.0%
Split Command	120.0%
Max Command	100.0%
Open Sol Count	13
Close Sol Count	6

1 RCVC PROGRAMMING OVERVIEW

RCVC Programming Application is a windows based stand-alone piece of software which is used to communicate with a RCVC using a wired Modbus communication protocol.

2 INSTALLATION

2.1 System Requirements

To ensure proper functionality of the RCVC programming application a standard PC is required with at least the following system resources:

- 1 gigahertz (GHz) or faster 32-bit (x86) or 64-bit (x64) processor
- 1 gigabyte (GB) RAM (32-bit) or 2 GB RAM (64-bit)
- Screen resolution at least 1024 x 768 pixels

2.2 Operating Systems

The RCVC programming application will run on the following operating systems:

- Windows 7 SPI (32 and 64 bit)
- Windows 8.1 (32 and 64 bit)
- Windows 10 (32 and 64 bit)

2.3 Hard Disk Space

The RCVC programming application requires approximately 20MB of hard disk space.

2.4 Installation

Extract the installation package to the local disk. Follow the instructions on the setup wizard to complete the installation.

3 CONNECTION DETAILS

3.1 Modbus Modern

The USB-RS485 modbus modern recommended to be used to communicate between RCVC programming application and a RCVC is:

- DSD Tech SH-U10 USB to RS485 Converter with CP2102 chip compatible with Windows 7, 8 and 10

3.2 Modbus Connection to a RCVC

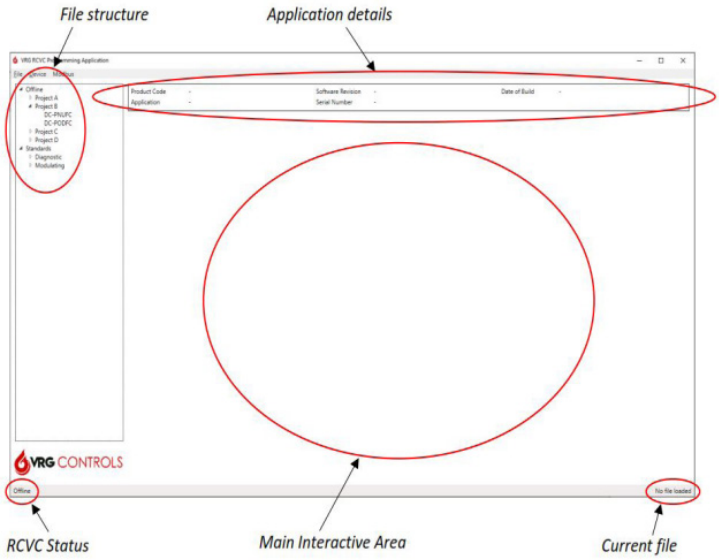
To connect from a Modbus modem to a RCVC the positive terminal of the modem must be connected to MOD+ of the RCVC terminal, and the negative terminal of the modem must be connected to MOD- of the RCVC terminal.

It must be noted that the specified baud rate and Modbus address in the RCVC must match the set baud rate and address in RCVC programming application in order for the communication to be successful.

4 RCVC PROGRAMMING APPLICATION USER GUIDE

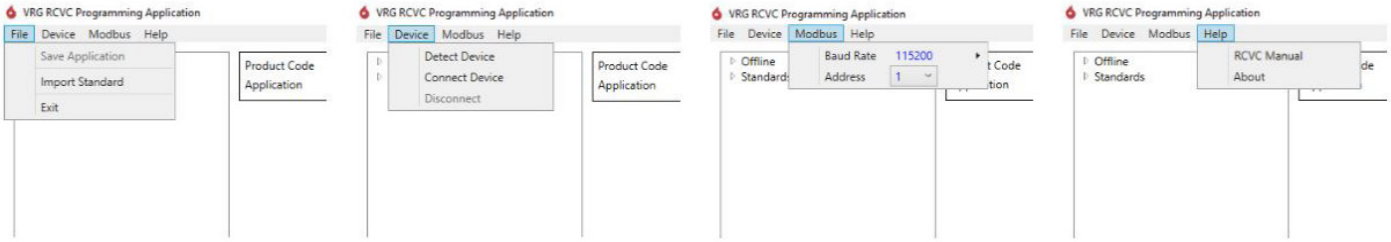
4.1 Loading Page

When first loading RCVC Programming Application the following screen will be shown:



- **File Structure** - this area contains a list of all controllers that have been connected to and can be loaded by double clicking on a file. They are split into three sections:
  - Online - the project and application of the controller currently connect to
  - Offline - a list of all projects and applications (read-only)
  - Standards - a list of saved standard applications which can be re-used on projects to ensure similar setups
- **Application Details** - detail;s of the application currently loaded into the RCVC Programming Application
- **RCVC Status** - Indicates whether a controller is connected and “Online” or not connected and “Offline”
- **Current File** - the program name of the application loaded
- **Main Interactive Area** - the area where the application is shown and can be interacted with. An application is loaded when a file is double-clicked in the file structure or when a RCVC is connected to

4.2 Toolbars



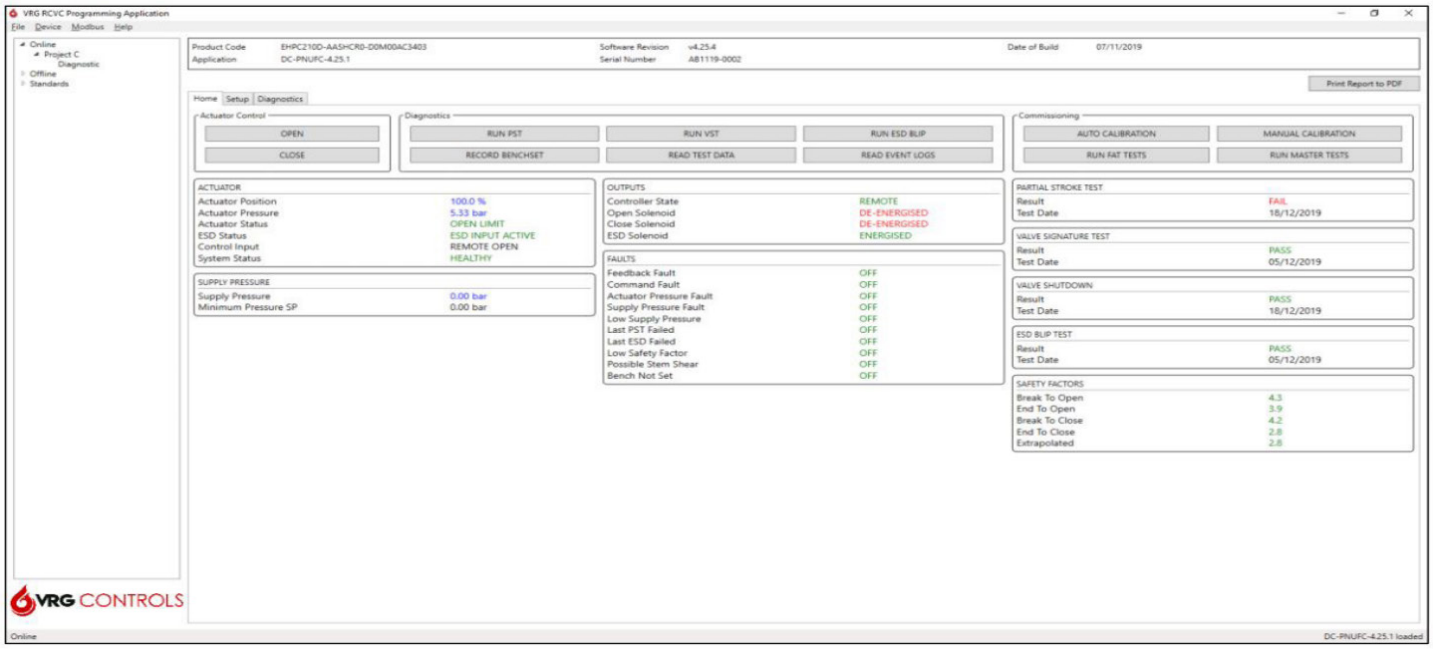
- **File/Save Application** - use to save the currently loaded application as a standalone text file. This file can then be loaded as a standard on a different computer or sent back to engineering for analysis (only enabled when a file has been loaded)
- **File/Import Standard** - use to import a new standard application into the Standard folder in the file structure.
- **File/Exit** - use to exit the application (NOTE: *if currently connected to a controller, exiting the application will automatically disconnect from the controller*)
- **Device/Detect Device** - use to determine if a controller can be seen using the Modbus connection. If a controller is found it will indicate on which COM port it was found, otherwise it will indicate that it is unable to find a device (*only enabled when not currently connected to a contoller*)
- **Device/Connect Device** - use to connect to a controller. It will automatically download the application loaded on the device and open up the corresponding application details in the main interactive area (*only enabled when not currently connected to a controller*)
- **Device/Disconnect Device** - use to disconnect from controller (*only enabled when connected to a controller*)
- **Modbus/Baud Rate** - use to set the baud rate to match the baud rate of the controller (*only enabled when not connected to a controller*)
- **Modbus/Address** - use to set the required Modbus address to match the controller address (*only enabled when not connected to a controller*)
- **Help/RCVC Manual** - use to load this operation manual
- **Help/About** - use to load details for the current RCVC programming application

4.3 Screens

4.3.1 Home Tab

When RCVC programming application successfully connects to a controller it downloads the application loaded on the controller and loads a Home Page showing all relevant operational data relevant to the application.
All the information on the home page is read-only and is continuously polled so that it reflects the current status of the controller.

Buttons are included on the home page which can be used to calibrate the controller, and in the case of a diagnostic application, operate the actuator and run diagnostic tests. Each button with ask the user to confirm that the action should be completed to prevent accidental operation of the controller.



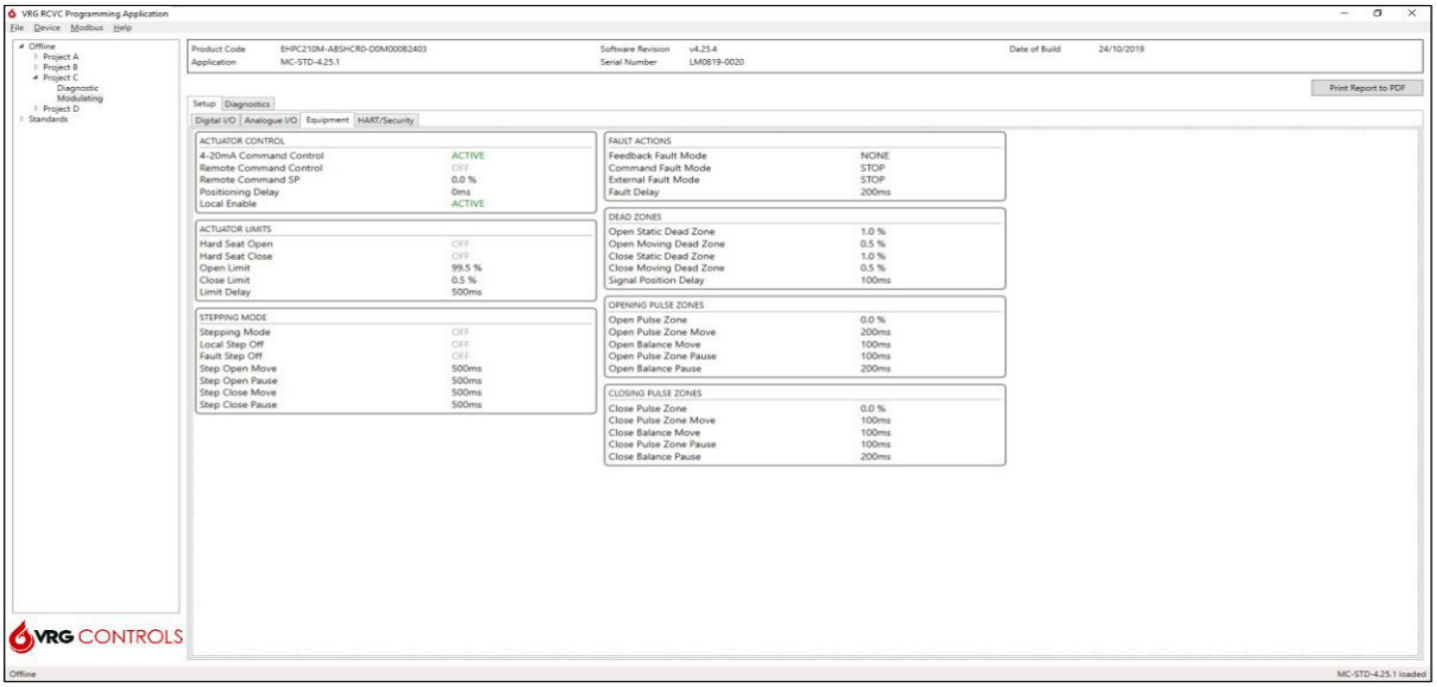
4.3.2 Setup Tab

The setup tab contains a number of sub-tabs which contain all the settings within the application which can be changed to affect the operation of the controller.

If the controller is online then the settings can be updated and the change is immediately uploaded to the controller (*Note: a confirmation is required before a change is made to ensure accidental changes are not made*).

If viewing an offline application then the settings are read-only as the offline application shows the status of that controller when it was last connected as a record of each controller.

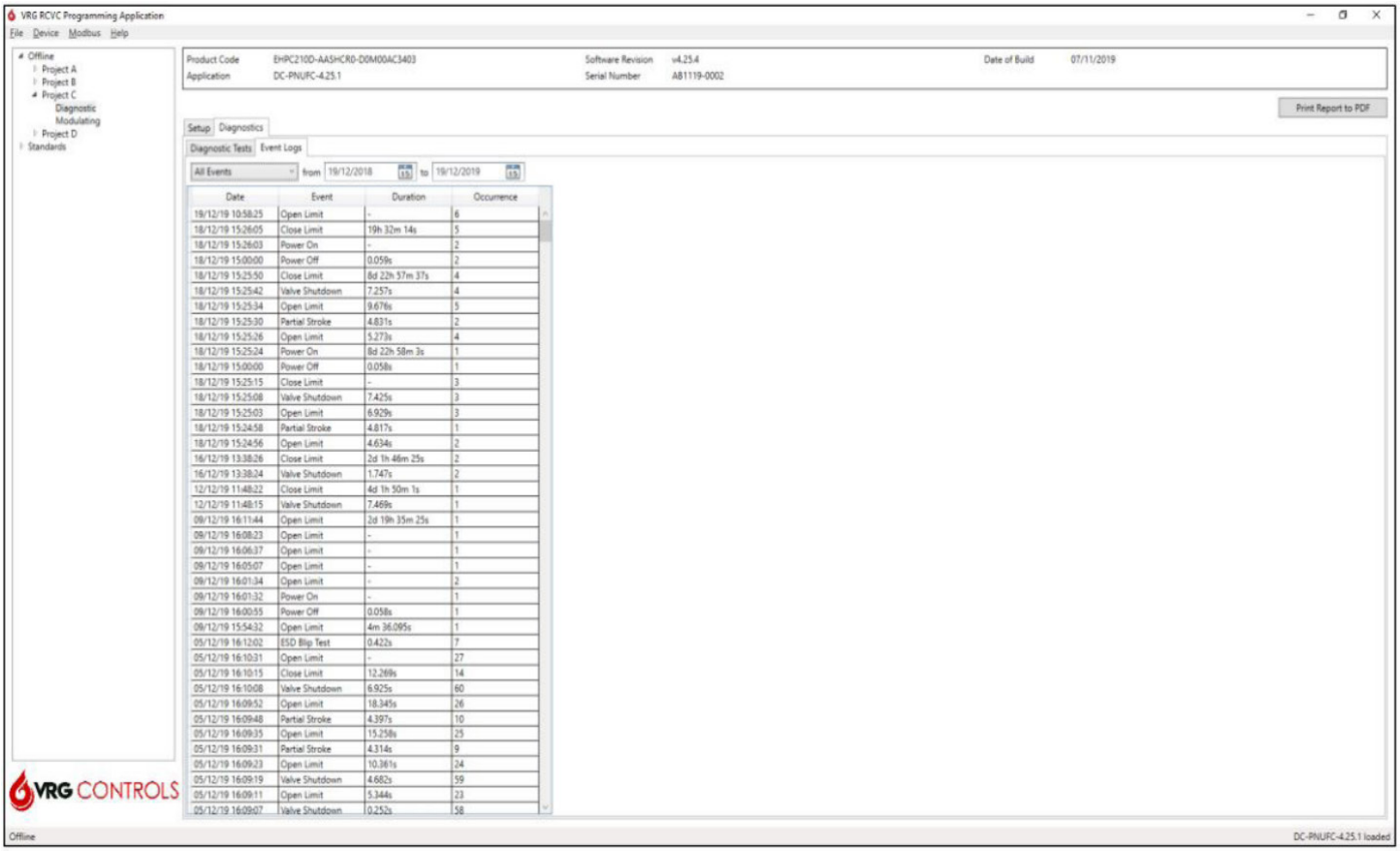
If viewing a standard application then settings can be updated as to change what settings are required for that standard application. Changes are immediately saved when they are made.



4.3.3 Diagnostics Tab

EVENT LOGS

The Event Logs tab contains a list of all event logs recorded within the controller. It details the event that occurred, the date it occurred, the duration of the event and the number of times that the specific event has occurred.
The combo box at the top of the tab can be used to filter down to specific events and the “from” and “to” dates can be used to narrow down the time period of events.
The column headers in the table can be clicked to sort the events in either ascending or descending order to further interrogate the data.
When connected to a controller a button will be shown which can be clicked to update the Event Logs to show the most current status of the controller.



4.4 Controller Report

The RCVC programming application contains the ability to create a report detailing all the settings included in the controller.

By clicking the “Print Report to PDF” button in the top right corner when either online or offline a report will be generated for the loaded application.

Open Programming Connection to RCVC

1. Ensure that the RCVC App is installed on the computer and the USB drivers have been installed. To install USB drivers, connect the USB to the computer and the drivers will install automatically if there is an internet connection.
2. Open the RCVC App and ensure there is 24VDC power to the RCVC.
3. Verify the USB is connected to the computer and select DEVICE from the menu. Click on detect device to ensure the RCVC App can communicate to the RCVC. Once a connection is established click on Device and select Connect to device.
4. The program will automatically load the setup file from the RCVC into the program. A window will appear asking for a folder name and a file name. For the folder name it is recommended to put the station name. For the file name it is recommended to put the job number, this way it is easier to keep the files organized.

Eliminate Excessive COM PORTS on Computer

When attempting to Open Programming Connection to RCVC using the Setup Application operator may experience difficulty establishing a COM PORT. It may be necessary to remove excessive COM PORTS on your Windows™ operating system.

1. Click Windows Button on Computer.
2. Type “Device Manager” and Select.
3. Click View, Show Hidden Devices.
4. Click Ports (COM & LPT)
5. Select any “Gray” COM Port and Click red “X” at top of Window or DELETE.
6. Select uninstall when prompted “Do you want to uninstall this connection?”

Read and Write Setup File from Controller

1. When connecting to the device the program will automatically read the setup file. This can be found under the Online tab on the left side of the window. You can expand the online tab to see the folder and file associated with the device.
2. To write a file to the device, right click on the file name under the online section. Select Load Standard File and then select the desired file from the drop-down menu. Click OK to accept the file and then select Yes to confirm you want to overwrite the current file.
3. Once complete a message will appear saying “Write setup file successful-clearing memory.” Once the memory has been cleared a new window will pop up letting you know this has finished. Once complete, select device and connect to device to reconnect.

Determining Setup file version in the RCVC App

1. Open RCVC app software
2. Connect to the RCVC Via the USB connection
3. Once connected to the device Assign a project and file name.
4. In the top information box the Application number (VRG.4.24.4-2) will display the current setup file version. VRG.4.24.4-1 for the old version and VRG.4.24.4-2 for the new version.

Determining Setup file version On the RCVC Controller

1. Short push the navigation wheel to go into manual mode.
2. Long push the navigation wheel to go into the menu.
3. Scroll down to Settings and short push to select.
4. Scroll to About and short push to select
5. Next to App Revision will be the setup file version number. VRG.4.24.4-1 for the old version and VRG.4.24.4-2 for the new version.

New RCVC software setup file upgrade

1. Open RCVC app software
2. Connect to the RCVC Via the USB connection
3. Once connected to the device Assign a project and file name.
4. Select the setup tab followed by the analog input tab.
5. Copy the calibration values for Feedback, Command and Retransmission.

a. You can write the values down or you can put them directly into a new setup file located in standards -> VRG Defaults -> BV-LL (Ball Valve Lock Last)
6. Copy over any other changes from the old setup file: Dead bands, pulse zone, solenoid count, lock up and fail modes. Ensure that you new setup file matches the old one.
7. Next right click on the file name below the online section and select load standard file. Select the correct file from the drop-down menu (BV-LL) and click OK.
8. After the file finished writing to the device. Select device -> connect to reconnect to the RCVC. The RCVC has now been updated with the latest version of the setup file.
9. Verify that all calibrations are accurate and run a new calibration if any need to be changed.
10. Once all settings and calibrations have been re-stored save the setup file (File -> Save Application)

a. To save the file as a standard file, for future RCVC applications. Disconnect from the device and find the project/ file under the offline section. Right click on the file and select save as standard, this will allow you to select this file when writing to a new device.

Alternative Method for new Setup file

1. Open RCVC app software
2. Connect to the RCVC Via the USB connection
3. Once connected to the device Assign a project and file name.
4. Right click on file name under the online section and select load standard file and select the correct file from the drop-down menu.
5. Once the file has ben loaded, select device -> connect to device.
6. Once connected run through calibration procedures to recalibrate the RCVC

a. Auto calibration to calibrate the Balluff (Westlock/ Soldo) to the RCVC

b. Manual calibration -> Analog Input-> Command signal for 4-20ma command

c. Manual Calibration -> Analog output -> Feedback for feedback to RTU (Gas Control)

7. Once all settings and calibrations have been restored save the setup file (File -> Save Application)

a. To save the file as a standard file, for future RCVC applications. Disconnect from the device and find the project/ file under the offline section. Right click on the file and select save as standard, this will allow you to select this file when writing to a new device.

Command Signal Calibration

1. Open programming connection to RCVC and connect to the device.
2. On the Home Tab, select Manual Calibration under the calibration section.
3. In the calibration window select Analog Input from the Type drop-down menu. Select command Signal from the Signal drop-down menu.
4. Select start calibration, then send a 4ma signal to the device and select the Set button for the Minimum. Then send a 20ma signal to the device and select the Set button for Maximum.
5. Once both values have been set Select the Stop Calibration button to end calibration. Close out of the window and select the Setup tab and the Analog Input tab to verify that the values have been updated under the COMMAND section.

Feedback Signal Calibration

1. Open programming connection to RCVC and connect to the device.
2. On the home tab, under the CALIBRATION section select Auto Calibration.
3. In the Calibration window select Start Auto Calibration. The valve will automatically move and save the values for full open and full close.
4. Once the calibration is complete there will be a Finished message next to the Start Auto Calibration button.
5. NOTE ** The Auto Calibration can ONLY be used for the analog input feedback.

Manual Calibration of Feedback Signal

1. Open programming connection to RCVC and connect to the device.
2. On the Home Tab, select Manual Calibration under the calibration section.
3. In the calibration window select Analog Input from the Type drop-down menu. Select Feedback from the Signal drop-down menu.
4. Select start calibration, then move the valve to the Full Open Position and accept the value in the Minimum or Maximum depending of the value. If the value is between 550-750 this is a 4ma signal and it will be set to MINIMUM. If the value is between 3200-3700 this is a 20ma signal and should be set to MAXIMUM. Stroke the Valve to the full close position and accept the value.
5. Once both values have been set Select the Stop Calibration button to end calibration. Close out of the window to finish the calibration.

Reverse Valve Action

1. Open programming connection to RCVC and connect to the device.
2. Select the Setup Tab and under the COMMAND section select the box next to the Minimum Range. A window will appear that will contain the current Minimum range valve (100%). Change this value to 0% and click OK.
3. Select the box next to Maximum Range. A window will appear that will contain the current Maximum Range (0%). Change this value to 100% and click OK.
4. This process will need to be repeated in the RETRANSMISSION section as well.
5. MAKE SURE THAT COMMAND AND RETRANS MISSION SIGNAL RANGE VALES ARE THE SAME FOR MIN AND MAX

Mode	Sensor Range MINIMUM	Sensor Range MAXIMUM
Open on Increasing / Direct Acting	0.0%	100.0%
Close on Increasing / Reverse Acting	100.0%	0.0%
Click	CLICK RECORD MIN	CLICK RECORD MAX

Edit Fail Modes

1. Open programming connection to RCVC and connect to the device.
2. Click on the Setup Tab then select the Equipment Tab.
3. Under the Fault actions section select the box next to the Feedback fault Mode.
4. In the window that pops up, select the desired fault mode in the drop-down menu. The fault modes are OPEN, CLOSE, and STOP (lock last position). Select OK to accept the current fault mode.
5. Repeat the steps with the Command Fault Mode.

Mode	Line 8 - Fault Open	Line 9 - Fault Close
Fail OPEN Loss 4-20 mA	ACTIVE	OFF
Fail CLOSED Loss 4-20 mA	OFF	ACTIVE
LOCK LAST Loss 4-20 mA	OFF	OFF

Edit Lockup Mode

1. Open programming connection to RCVC and connect to the device.
2. Click on the Setup Tab then select the Equipment Tab.
3. Under the Actuator Limits section, select the box next to the Lock up Open or Lock up Close.
4. A window will pop up asking if you would like to active “Hard seat Open/Close” Click OK to turn lock up on.
5. To turn off simply select the box next to Lock Up Open/Lock Up Close and select OK when prompted by the window to turn Lock Up off.

Setting Open and Close Limits

1. Open programming connection to RCVC and connect to the device.
2. Click on the Setup Tab then select the Equipment Tab, the Limits will be found in the Actuator Limits section.
3. To change the Open or Close limits, click on the box next to the limit that needs to be changed. In the pop-up window change to the desired value and click OK.
4. The Open and Close limit is used to determine when Lock up will occur. If the valve position is below the Close limit or above the Open limit Lock up will engage if it is turned on.

Split Range Configuration

1. Open programming connection to RCVC and connect to the device.
2. On the Home Tab, select Manual Calibration under the calibration section.
3. In the calibration window select Analog Input from the Type drop-down menu. Select Command Signal from the Signal drop-down menu.
4. Adjust Command Signal Input to desired value for the valve CLOSE position and select Record Minimum or Record Maximum depending on value.
5. Adjust Command Signal Input to desired value for the valve OPEN position and select Record Minimum.

Mode	FULL Closed	FULL Open
Open on Increasing / Direct Acting	6.0, 8.0, 10, 12 mA Typ.	20 mA
Close on Increasing / Reverse Acting	18, 16, 14, 12 mA Typ.	4.0 mA
Click	CLICK RECORD MIN	CLICK RECORD MAX

Dead Band Calibration

1. Open programming connection to RCVC and connect to the device.
2. Click on the Setup Tab then select the Equipment Tab the dead band will be in the Dead Zone section.
3. In the Dead Zone section select the box next to the value that needs to be changed. In the pop-up window change the value to desired value.
    a. NOTE: The static Dead Zone should always be 0.1% greater than the moving Dead Zone.
4. It is recommended to change both the open and close dead bands, so they have the same value. This can help reduce cycling issues when the valve is in control.

Pulse Zone Control

1. Open programming connection to RCVC and connect to the device.
2. Click on the Setup Tab then select the Equipment Tab, the Opening and Closing Pulse Zone sections will contain the value and the times
3. To change the Pulse zones, click on the box next to the value and in the pop-up window change to the new value. Click OK to accept the changes.
4. In this section the Pulse Zone times can be changed as well to modify the duration of the pulse.
    a. Open/Close Max Move: Maximum time Pulse will be active. VRG Value: 100ms
    b. Open/Close Min Move: Minimum time Pulse will be active. VRG Value: 30ms
    c. Open/Close Max Pause: Maximum time Pulse will be inactive. VRG Value: 150ms
    d. Open/Close Min Pause: Minimum time Pulse will be inactive. VRG Value: 150ms

Fixed Command Output

1. Open programming connection to RCVC and connect to the device.
2. Click on the Setup Tab then select the Digital I/O Tab.
3. Under the Digital output 3 section, select the box in line with Signal and select Command Output from the drop-down menu in the pop-up window. Then click OK to accept
4. Click on the Equipment Tab and under the External Control section the Split Command value will determine when the RCVC will relinquish control.
5. Ex: For a 5mA signal on open, the increasing system value entered needs to be 6.2%. This means when command is at 6.2% or below the auxiliary digital output will activate. Alternatively, for closed, the increasing system value entered for 5mA would be 93.8%.

Enable Anti-Surge Control

1. Open programming connection to RCVC and connect to the device.
2. Click on the Setup Tab then select the Digital I/O Tab.
3. Under the Digital output 3 section, select the box in line with Signal and select Anti-Surge Valve from the drop-down menu in the pop-up window. Then click OK to accept.
4. Click on the Equipment tab and under the External Control section the Anti-Surge Zone value will determine when a surge will occur.

NOTE: the value represents the difference in command signal. IF the value is 10% then a command change greater than 10% is needed to active the surge.

Remote Command Control

1. Open programming connection to RCVC and connect to the device.
2. Click on the Setup Tab then select the Equipment Tab, the Remote Command Control can be found in the Actuator Control section.
3. Click the box in line with Remote Command Control, a window will pop-up with a message asking if you want to set Remote Command Control to active. Click OK to make this change.
4. Land the wires to the Digital Input terminal inside the RCVC. The valve can be controlled using 24VDC. This can only open and close the valve, it is not recommended for control.

#18 System Inputs Description

1. 4-20ma CMD Ctrl - 4-20ma command control option
2. Remote CMD Ctrl - Separate command signal option (will override 4-20 signal)
3. Remote Override - Remote control to override fail or fault. Open or Close only.
4. Remote Open - Set to active to use open command in Digital Inputs (will override 4-20ma signal)
5. Remote Close - Set to active to use close command in Digital Inputs (will override 4-20ma signal)
6. Manual Enable - Allows manual mode to be enabled or disabled (only automatic mode if disabled)
7. Manual Fast Pos - Removes pulse function when using the manual wheel to control valve.
8. Fault Open - Set failure mode to open the valve on loss of Command or Feedback.
9. Fault Close - Set failure mode to open the valve on loss of Command or Feedback.
10. Fault Fast Pos - Disables pulse setting when a failure occurs.
11. Lock Up Open - Enables lock up on the open side of the valve.
12. Lock Up Close - Enables lock up on the close side of the valve.
13. Lock Up Fast Pos - Disables Pulse setting when Lock Up engages.
14. Fail on Feedback Fault - Enters failure mode if a Feedback fault occurs.
15. Fail on CMD Fault - Enter failure mdoe if a Command Fault occurs.
16. Auto Mode Switch - Switches to Automatic Mode.
17. Man Mode Timer - Enables a time limit for Manual mode, switches back to Auto mode after time ends.

RCVC Troubleshooting

Problem	Resolution
Actuator Position (feedback) scaling problem, showing 60-120% or 0-70% even after calibration.	I/O card is damaged and needs to be replaced.
Healthy System status but will not show change in command signal	Check system inputs to verify 4-20ma control is active. Reload setup file to reset system.
Command signal scaling issue. Ends are correct at 4ma and 20ma, show 0% and 100% but 8ma, 12ma, 16ma are not scaled correctly	The ISO card is bad and needs to be replaced. Board on the right side.
Feedback to RTU (Retransmission) not showing any signal at RTU	Make sure the Feedback loop is powered by the RTU. RCVC is a dry loop needs external power.
RCVC not triggering the solenoids on open or close signal, Auto/Manual	Move valve to 50% for testing. Test solenoids in Manual mode to verify if solenoids are working or not. 1. Solenoid may be bad, test using external 24VDC. If solenoid does not trigger replace solenoid. 2. Display board may be bad. Connect multimeter to SV1 or SV2 and trigger solenoid when in manual. Verify 24VDC signal when solenoid should be active. If no signal, replace display board.
Valve not moving when full open or close but will move when not at full open or close position.	Check sensor range in analog input for Feedback to check it matches values from transmitter. (VRG default 4ma = 100% 20ma = 0%) recalibrate or change sensor range to fix. Test at full open/close to verify.
Solenoid cycling issue. Valve will not reach set point and solenoids continue to trigger.	Go into system values and adjust Deadband. Increase to static to 1.0% and moving to 0.9%. Test to verify functionality and adjust as needed. If Deadband exceeds 1.5% and issue persists then adjust pulse zone to 3% or 4% and retest.

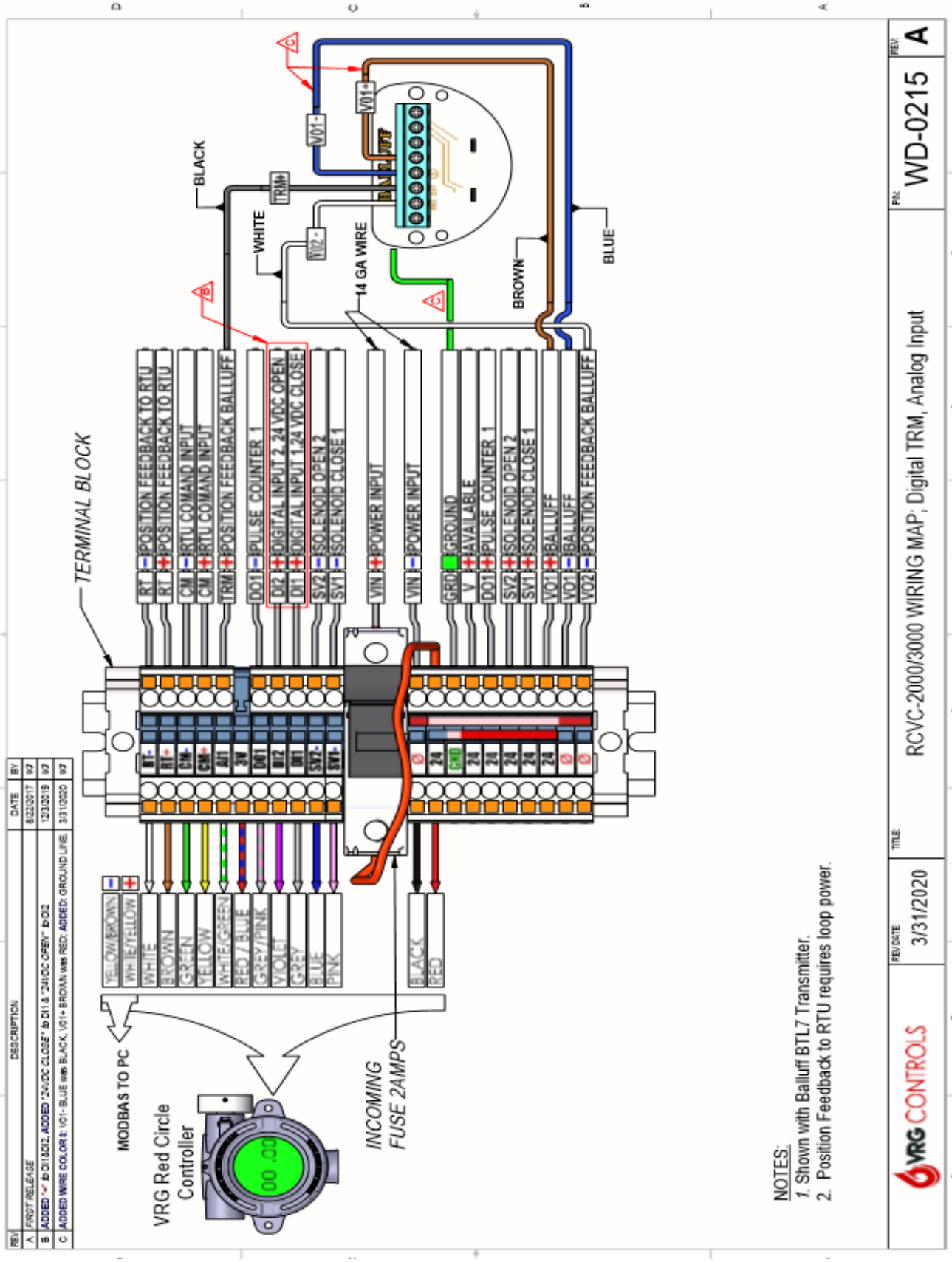


Figure 2: Wiring Diagram RCVC Digital Potentiometer Transmitter

Figure 1: Wiring Diagram RCVC Analog Potentiometer Transmitter

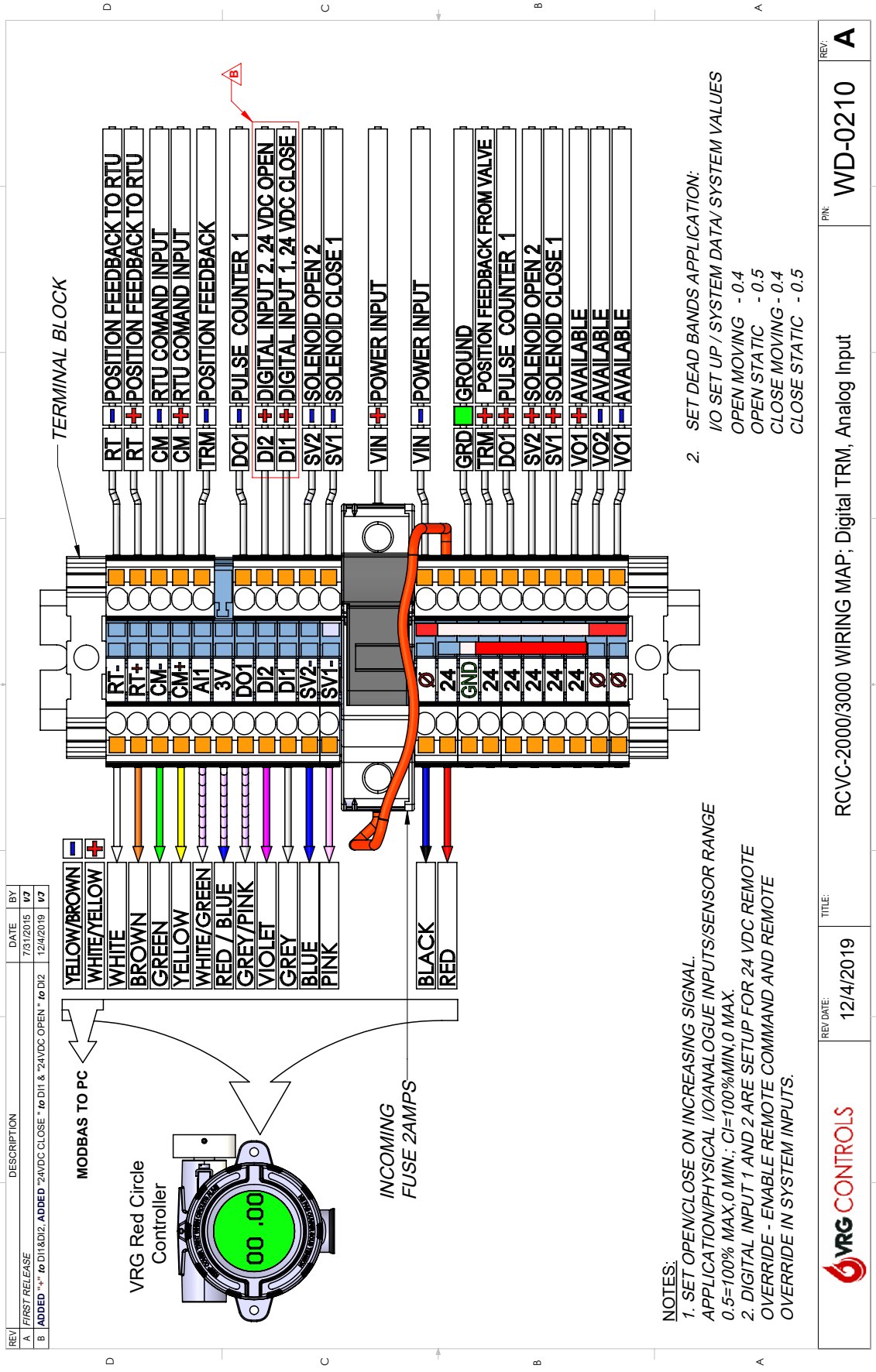


Figure 3: Wiring Diagram RCVC with Balluff Model BTL5 Linear Sensor

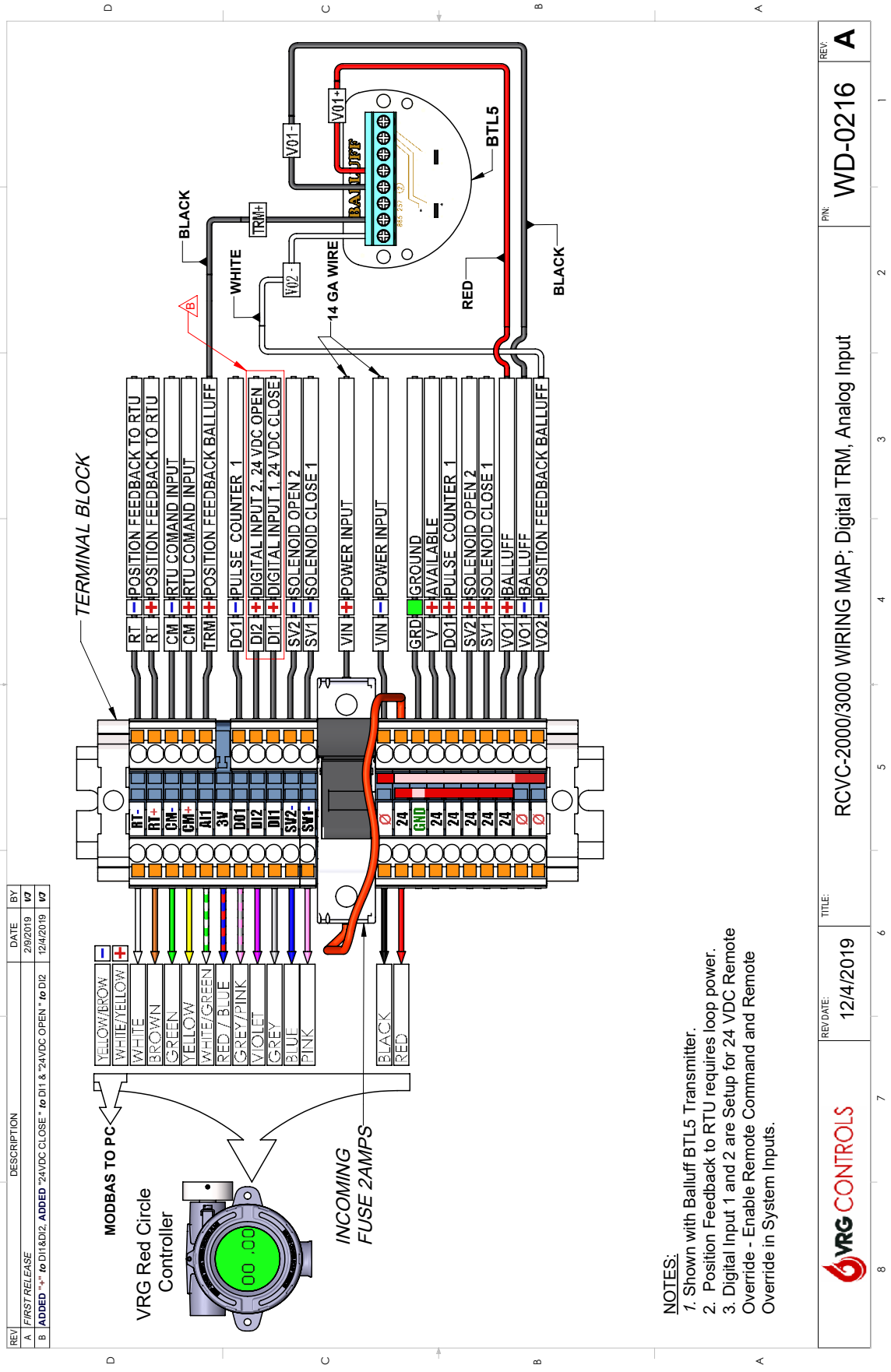


Figure 4: Wiring Diagram Remote RCVC Analog Potentiometer Transmitter

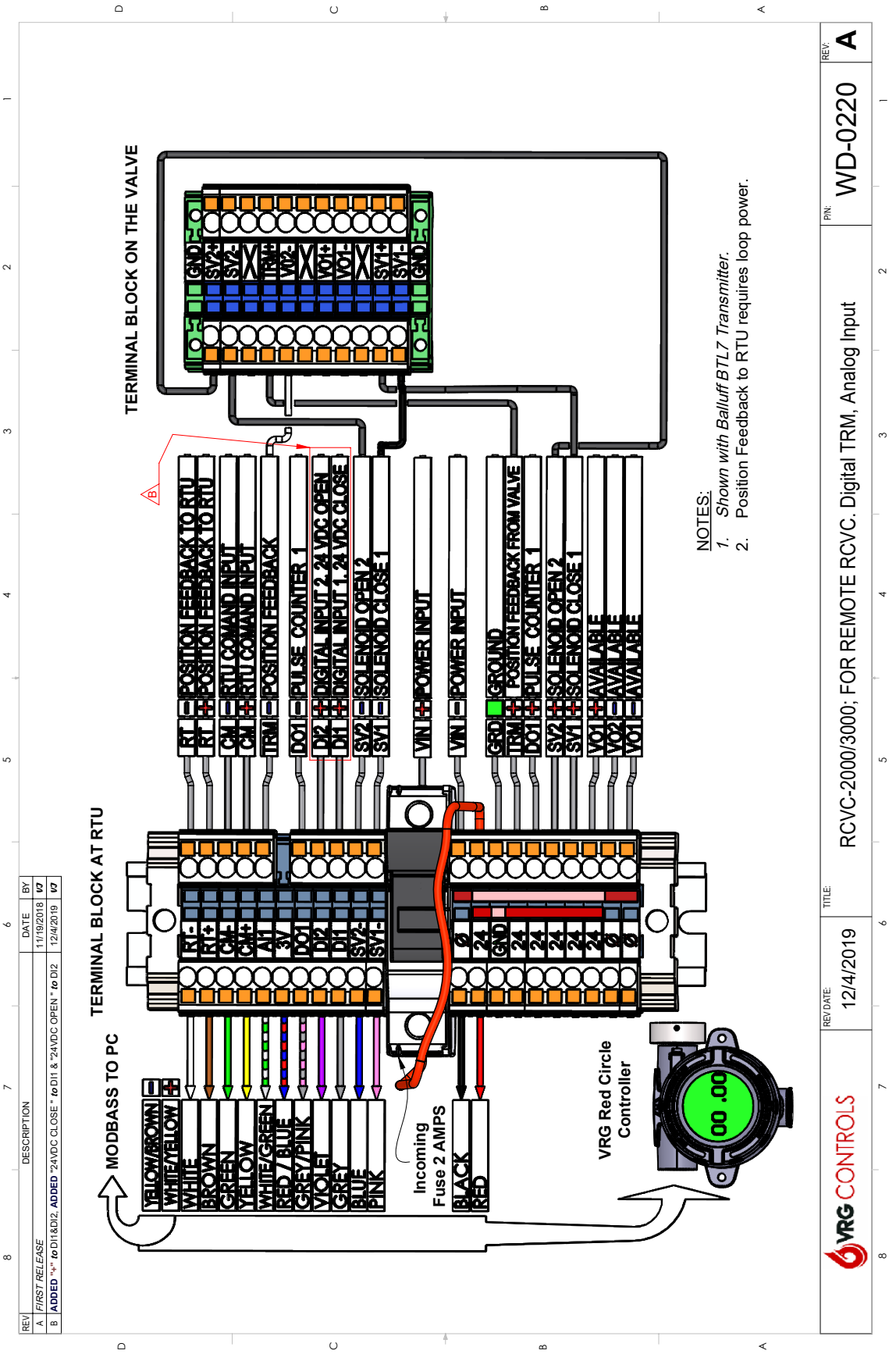


Figure 5: Wiring Diagram Remote RCVC with Balluff Model BTL7 Linear Sensor

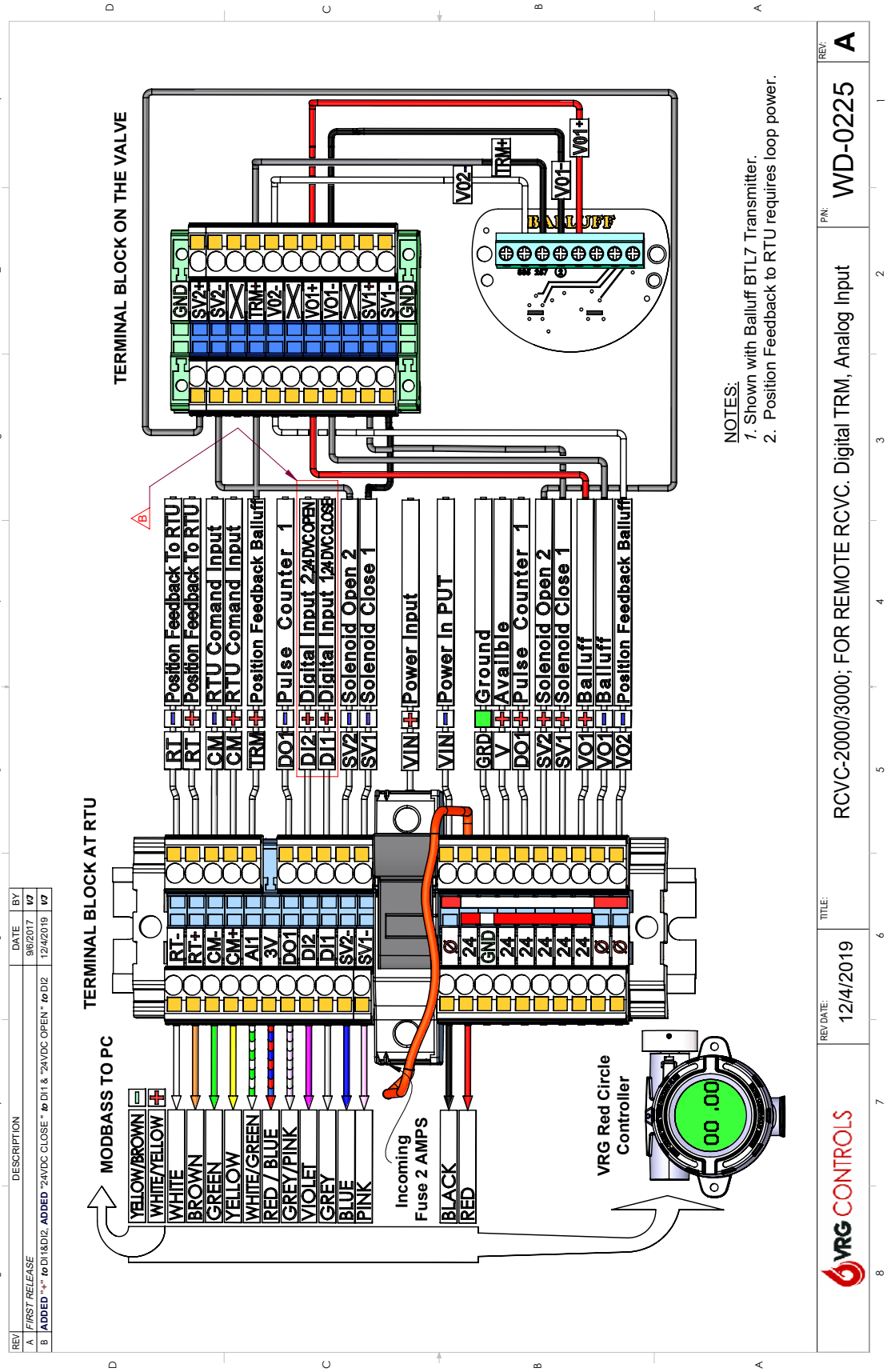
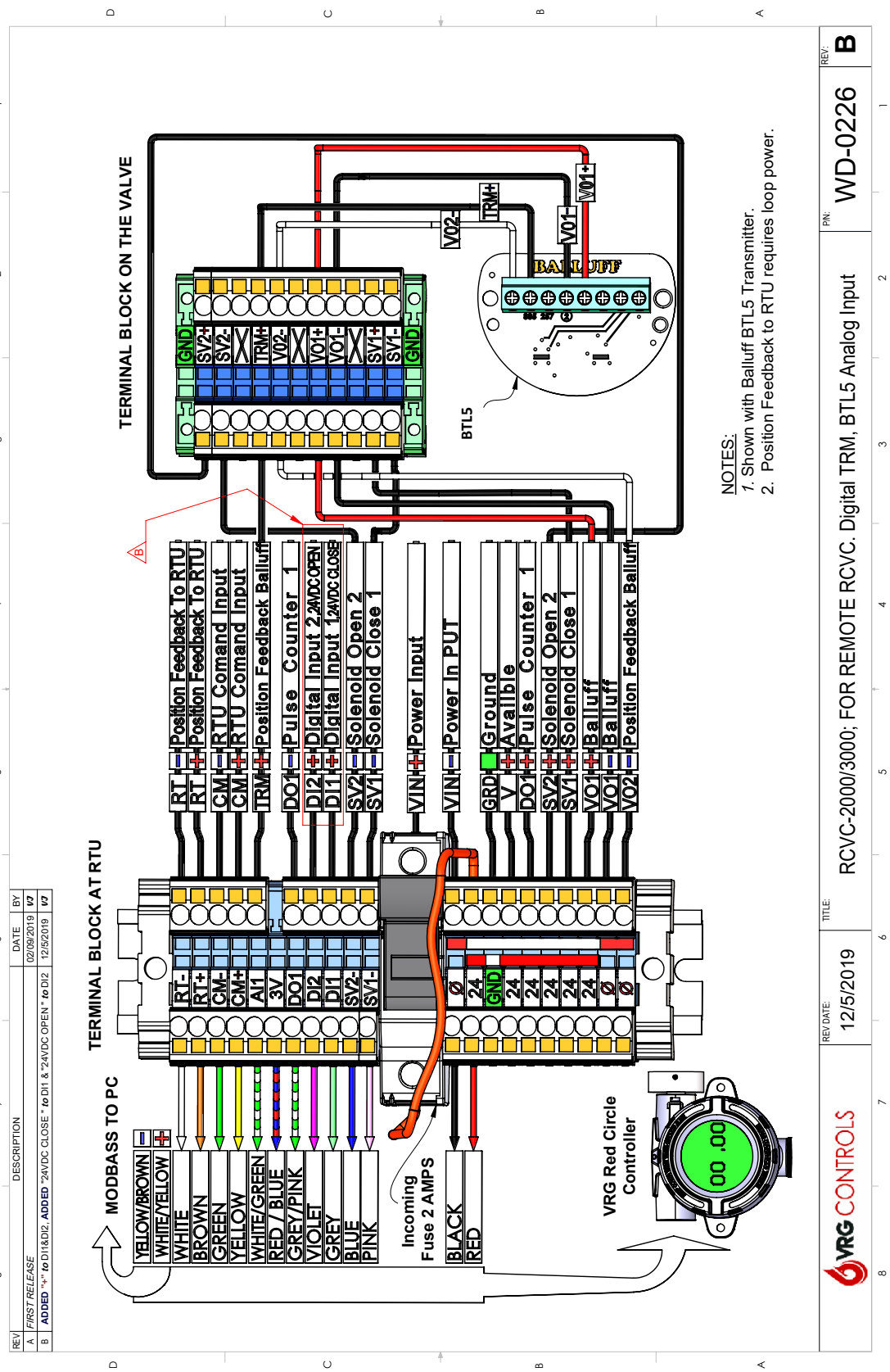


Figure 6: Wiring Diagram Remote RCVC with Balluff Model BTL5 Linear Sensor



8 Teach-in with the calibration device

NOTICE!

Interference in function

Teach-in while the system is running may result in malfunctions.

► Stop the system before performing teach-in.

		LED display		Displayed values (example)	
		LED1	LED2	At 0 to 10 V	At 4 to 20 mA
Initial situation: – Transducer with magnet within measuring range		●	●	5.39 V	9.15 mA
Activate teach-in ► Press ❶ for at least 4 s.	> 4 s ❶	⇄		5.39 V	9.15 mA
Set null point ► Bring magnet to the new null point. ► Press ❶ for at least 2 s.	> 2 s ❶	●	○	1.04 V	4.82 mA
⇒ The new null point is set once the button is released.		⇄		0.00 V	4.00 mA
Set end point ► Bring magnet to the new end point. ► Press ❷ for at least 2 s.	> 2 s ❷	○	●	9.89 V	19.13 mA
⇒ The new end point is set once the button is released.		⇄		10.00 V	20.00 mA
Invert curves ► Simultaneously press ❶ and ❷ for at least 4 s, until both LEDs are illuminated in red.	❶+❷	○	○		
	> 4 s	●	●		
⇒ The curves of both outputs are inverted once the buttons are released.		⇄			
End teach-in ► Briefly press ❶ and ❷ simultaneously (< 1 s). ⇒ The current position value is displayed once the buttons are released.	< 1 s ❶+❷	●	●		

i Any of the individual steps for settings can be selected. The teach-in process can be ended at any time.

LED legend: ○ LED not on; ● LED green; ● LED red; ⇄ LED 1 and LED 2 flashing green-green in alternation

9 Adjust with the calibration device

NOTICE!

Interference in function

Adjustment while the system is running may result in malfunctions.

► Stop the system before performing adjustment.

Initial situation:

– Transducer with magnet within measuring range

Activate adjusting

► Press ❷ for at least 4 s.

Set start point

► Bring magnet to the new start point.

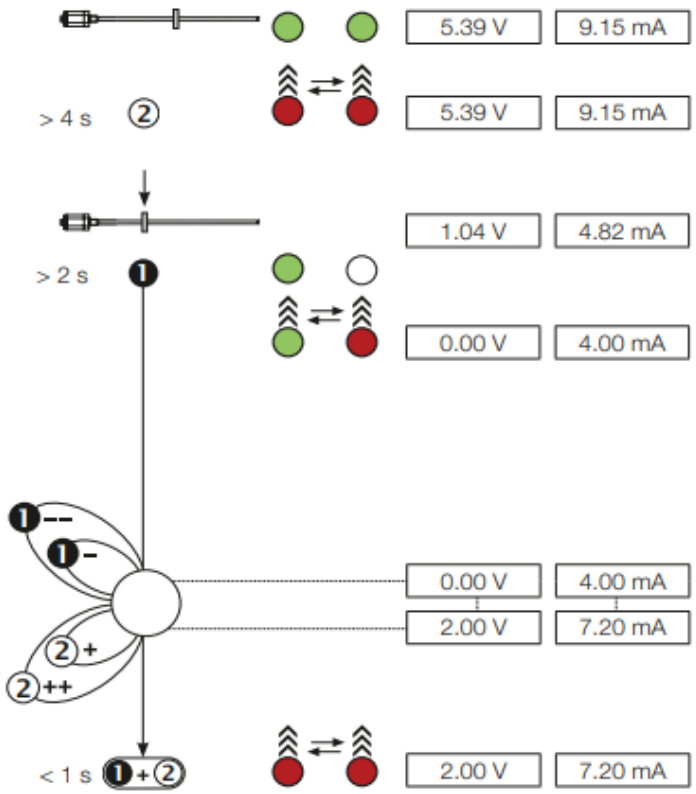
► Press ❶ for at least 2 s.

⇒ The new start point is set with the last valid start value.

Adjust start value

► The start value can be changed using ❶ and ❷[1]. The gradient of the curve changes (see page 18).

► End calibration procedure: Briefly press ❶ and ❷ simultaneously (< 1 s).
⇒ Set position value is saved.



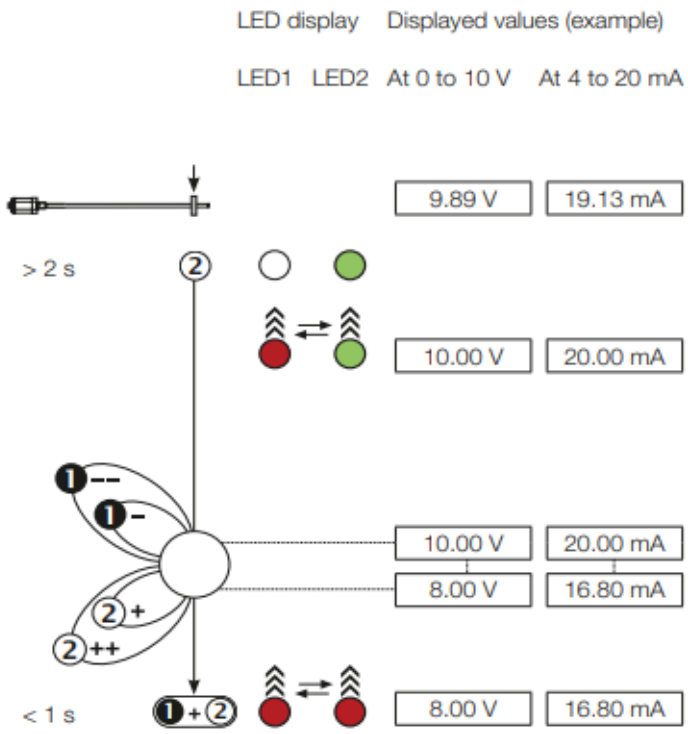
For setting the end point, adjusting the end value, and exiting adjustment, see page 21.

i Any of the individual steps for settings can be selected. The adjustment process can be ended at any time.

1) Briefly press button: Current value is increased or decreased by approx. 1 mV or 1 µA.
If a button is held down longer than 1 s, the step interval is increased.

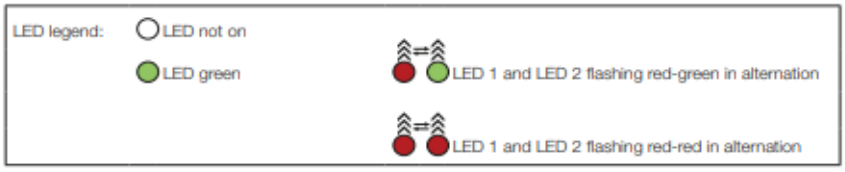
LED legend:
- LED not on
- LED green
- LED 1 and LED 2 flashing green-red in alternation
- LED 1 and LED 2 flashing red-red in alternation

9 Adjust with the calibration device (continued)



> **i** Any of the individual steps for settings can be selected. The adjustment process can be ended at any time.

1) Briefly press button: Current value is increased or decreased by approx. 1 mV or 1 µA. If a button is held down longer than 1 s, the step interval is increased.



9 Adjust with the calibration device (continued)

Switch the output to be adjusted (optional)

> **i** As standard, the values are adjusted at output 1 and the values at output 2 are inverted accordingly.
> From serial number 100503000xxxxx xx, it is possible to optionally switch adjustment from output 1 to output 2.

Initial situation:

– Transducer with magnet within measuring range

Activate adjusting

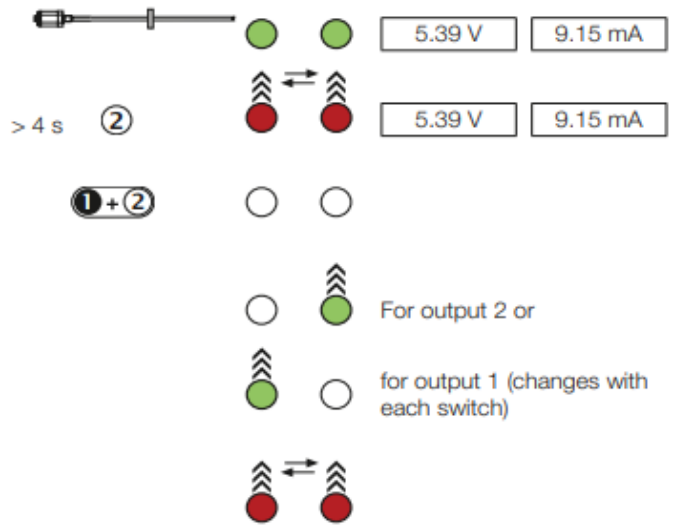
► Press ❷ for at least 4 s.

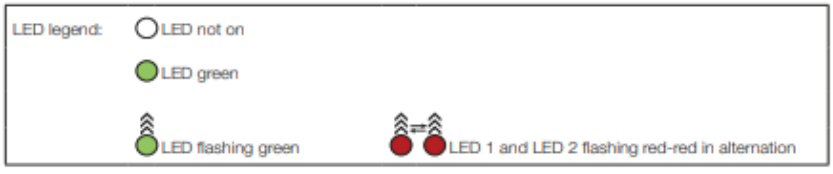
Switch the output to be adjusted

► Press ❶ and ❷ for at least 4 s, until one LED flashes green.

⇒ Both LEDs will flash again once the buttons are released.

► Continue with Set start point (see page 20).





10 Reset all values with the calibration device (reset)

NOTICE!

Interference in function

Resetting all values while the system is running may result in malfunctions.

► Stop the system before performing the reset.

The reset function can be used to restore all the settings to the factory settings. For a reset the magnet may also be located outside the measuring range.

			LED display LED1	LED2
Activate reset ► Simultaneously press ❶ and ❷ for at least 4 s. ► Release buttons. ⇒ Reset is activated.	> 4 s	❶+❷		
Reset ► Press ❶ and ❷ for at least 4 s. ► Release buttons. ⇒ All values are reset. ⇒ Current position value is displayed. ⇒ Reset is deactivated.	> 4 s	❶+❷		
Abort reset ℹ Resetting can be aborted without any changes being saved after the Activate reset step. ► Briefly press ❶ and ❷ simultaneously (< 1 s). ► Release buttons. ⇒ Current position value is displayed.	< 1 s	❶+❷		

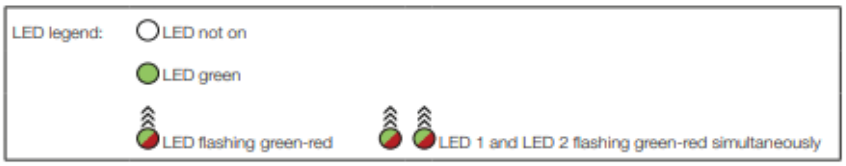


Figure 7: Spring to Open Ball Control Valve with RCVC, VMO & Balluff TRM: XA-6015-AP01

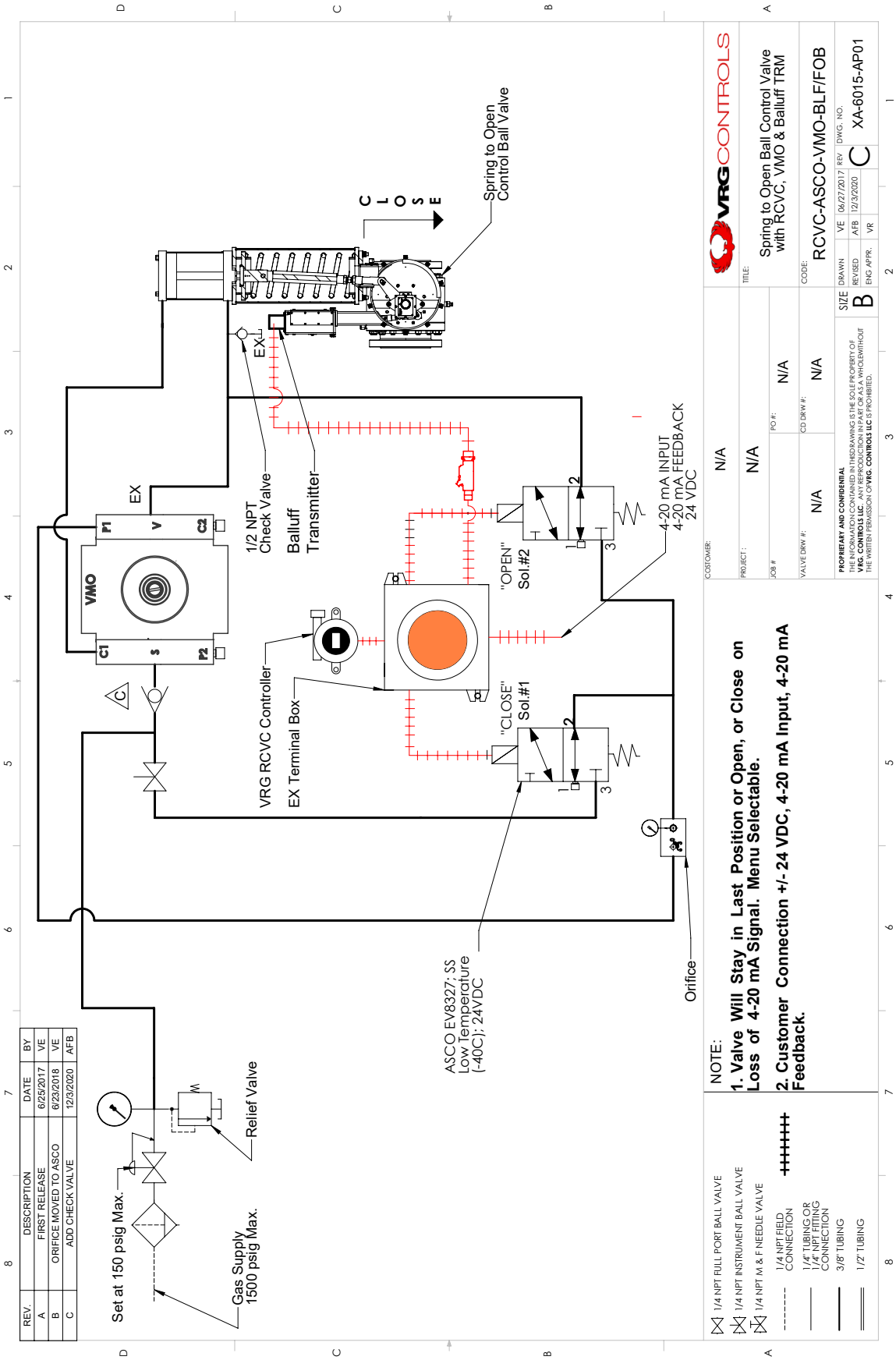


Figure 8: Spring to Open Ball Control Valve with RCVC, VMO & Balluff TRM: XA-6018-AP01

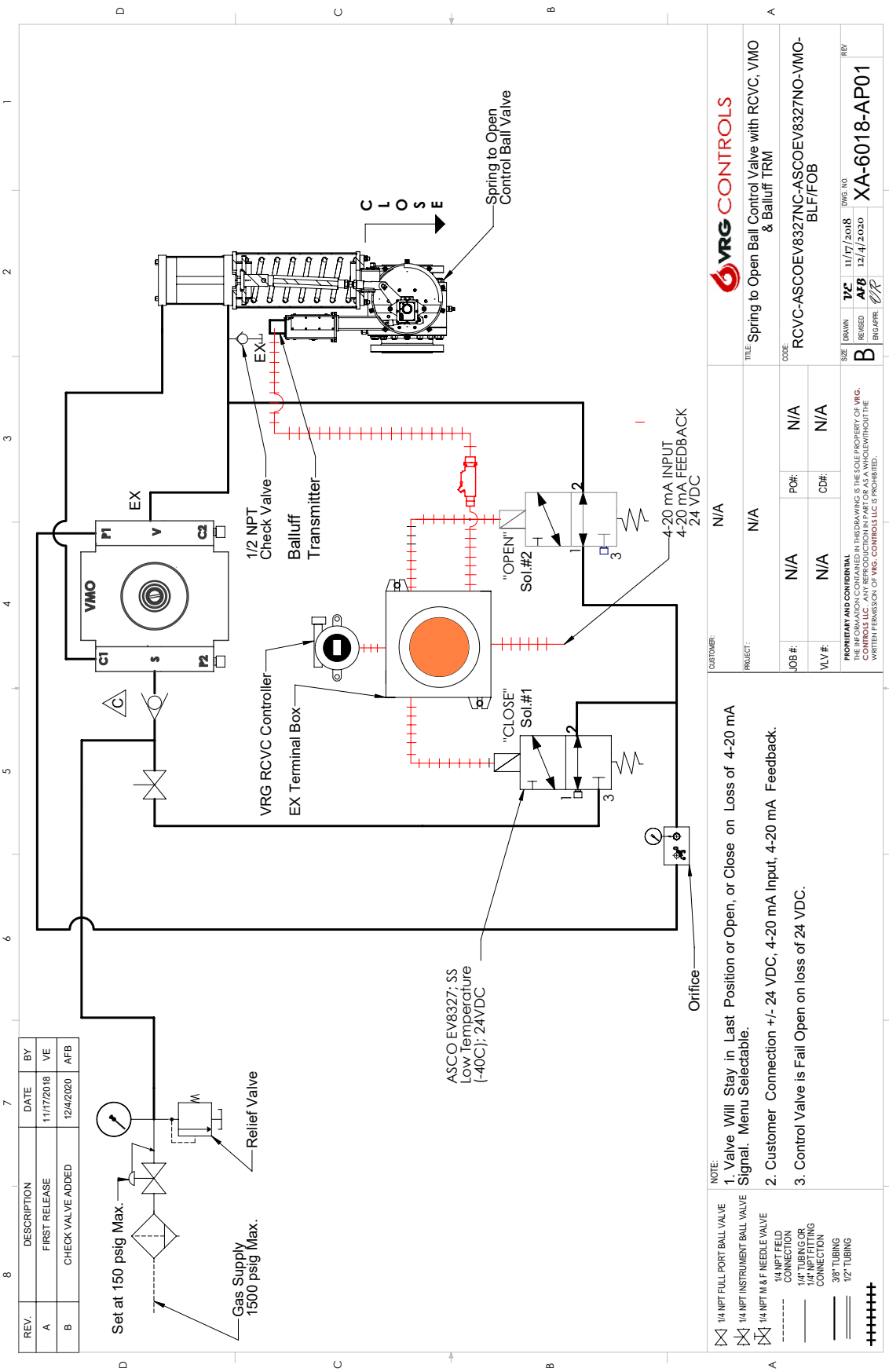


Figure 9: Spring to Open Ball Control Valve with RCVC, VMO & Balluff TRM - Fail Closed

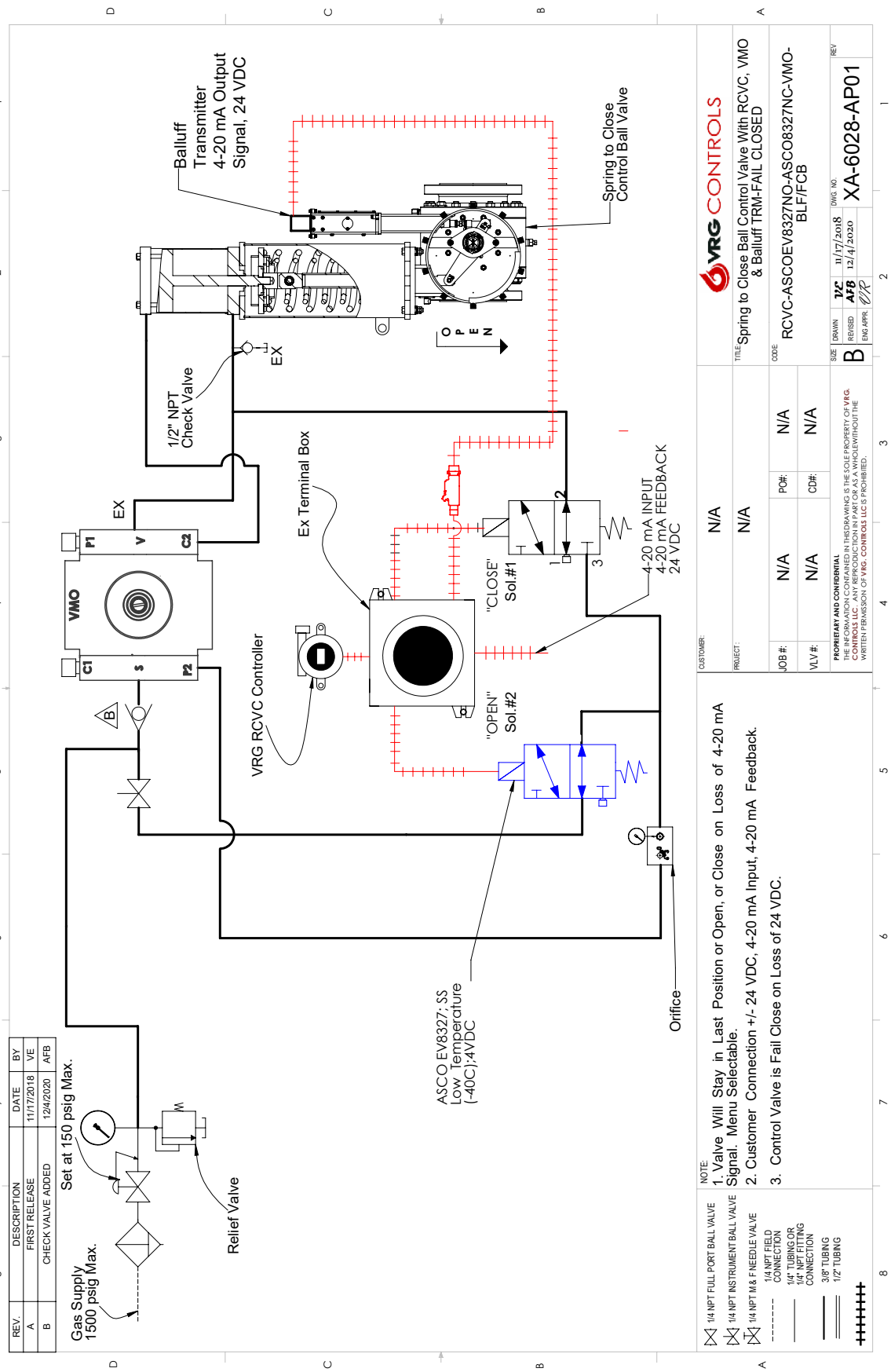


Figure 10: Spring to Open Globe Control Valve with RCVC, VMO & Balluff TRM

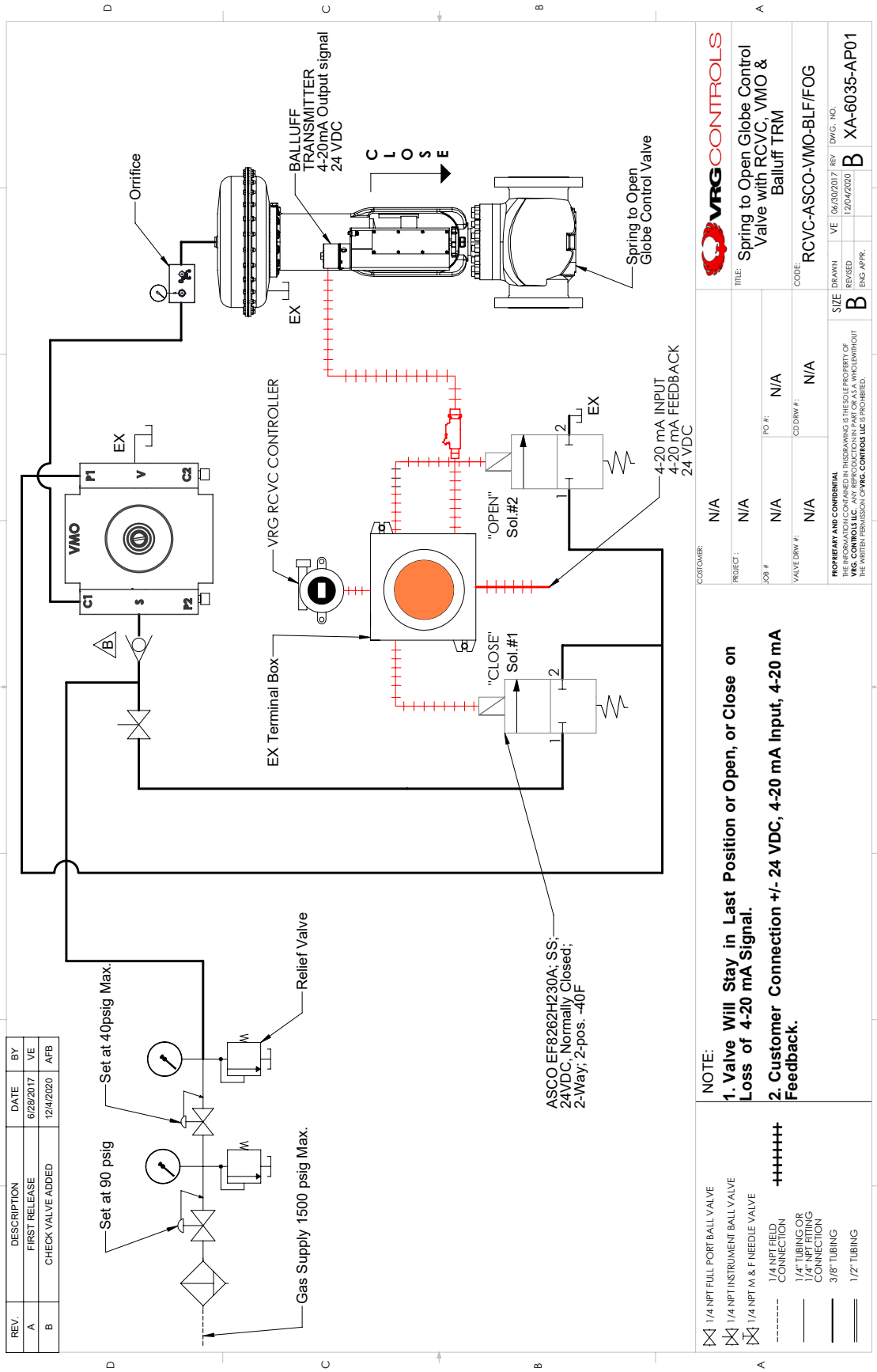


Figure 11: Spring to Close Globe Control Valve with RCVC & Balluff TRM

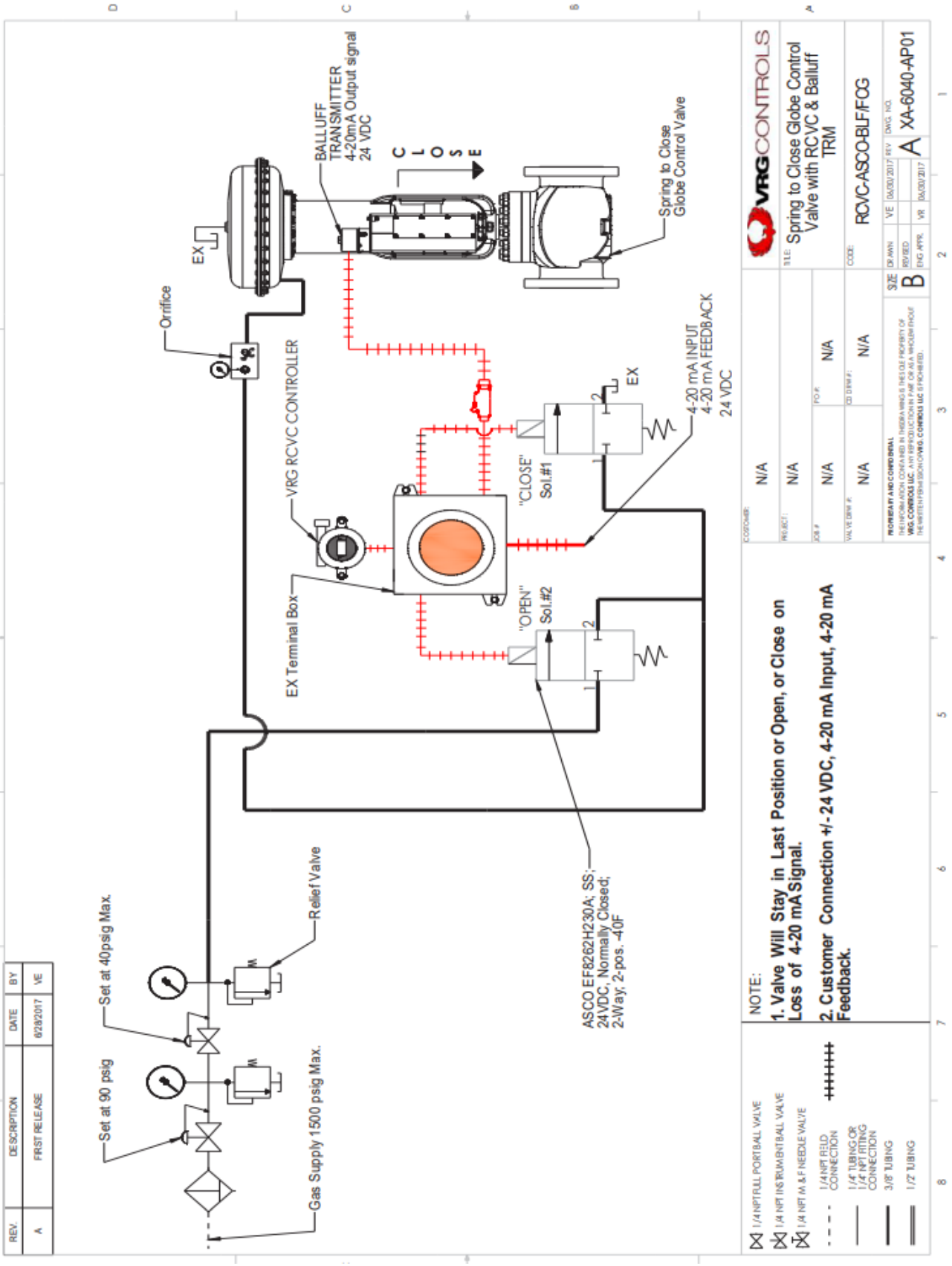
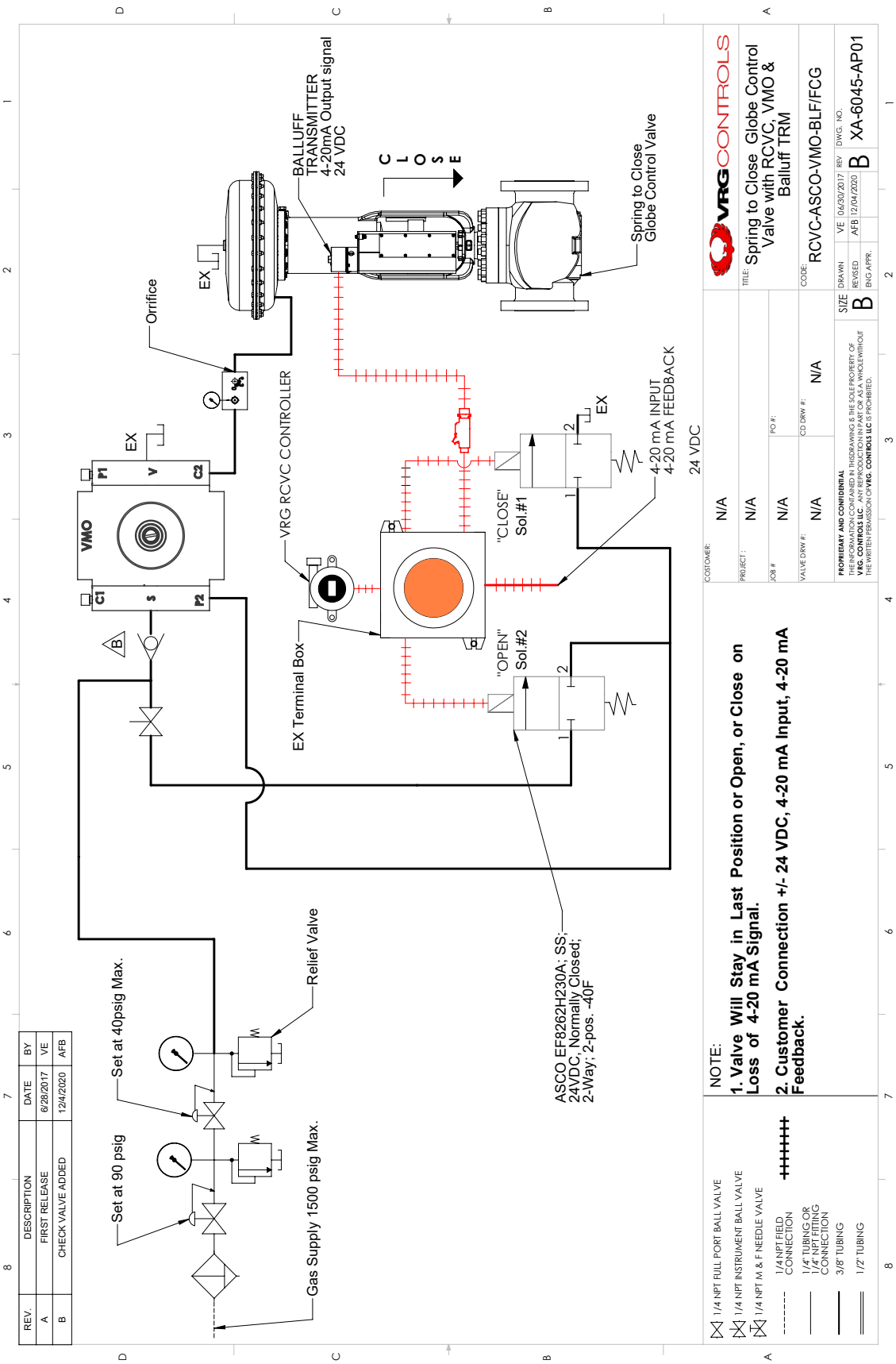


Figure 12: Spring to Close Globe Control Valve with RCVC, VMO & Balluff TRM



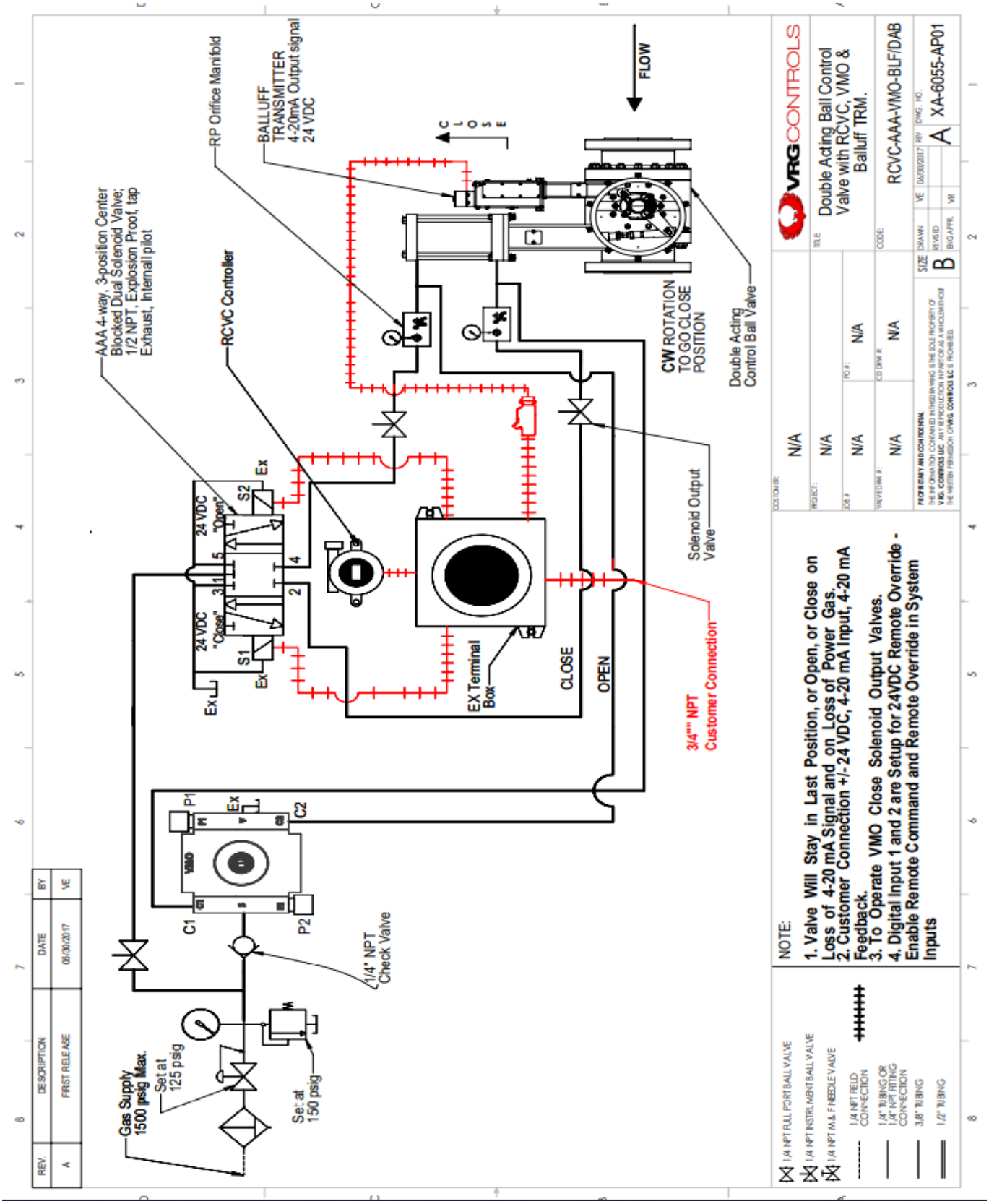


Figure 13: Double Acting Ball Control Valve with RCVC, VMO & Balluff TRM.

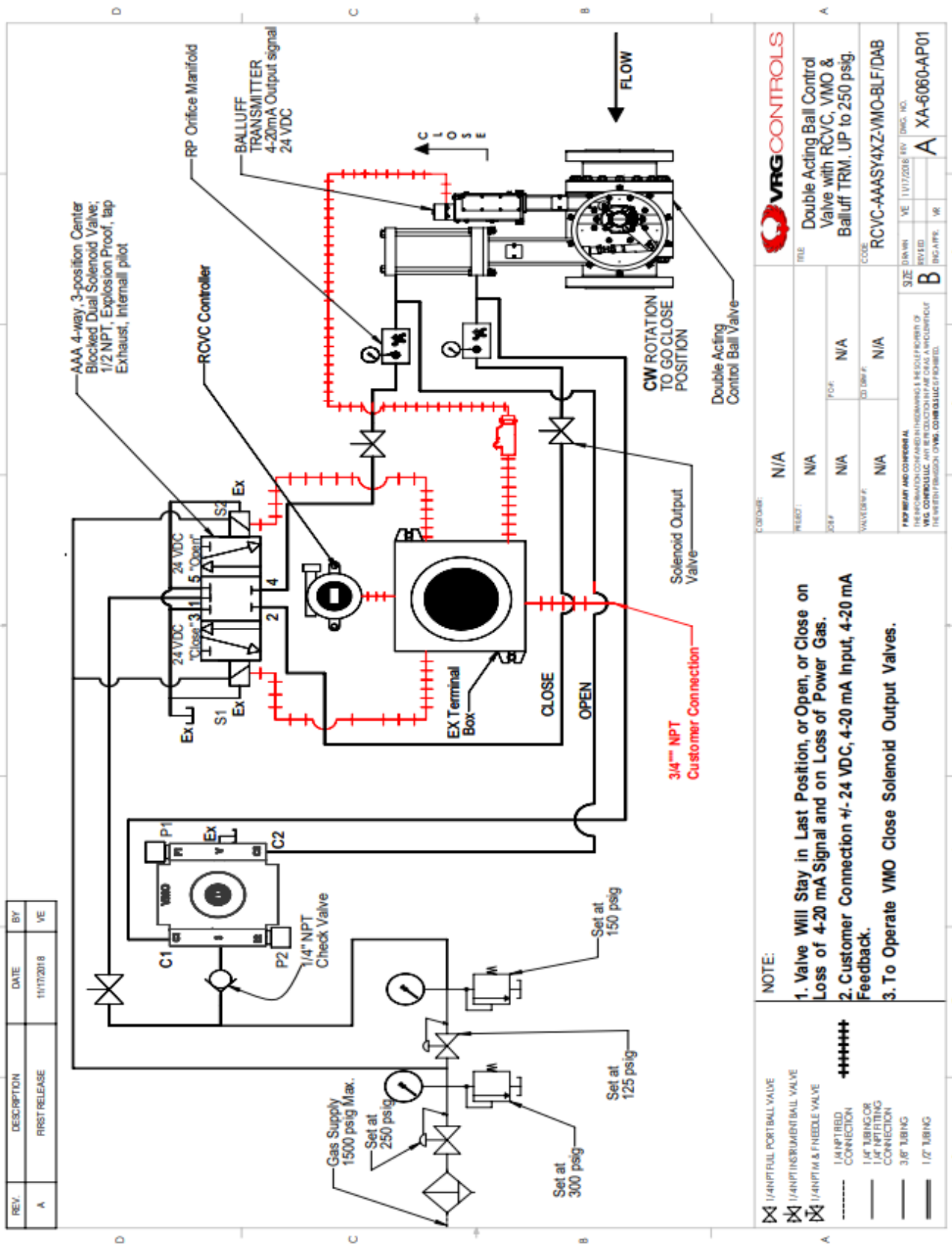


Figure 14: Double Acting Ball Control Valve with RCVC, VMO & Balluff TRM. Up to 250psig

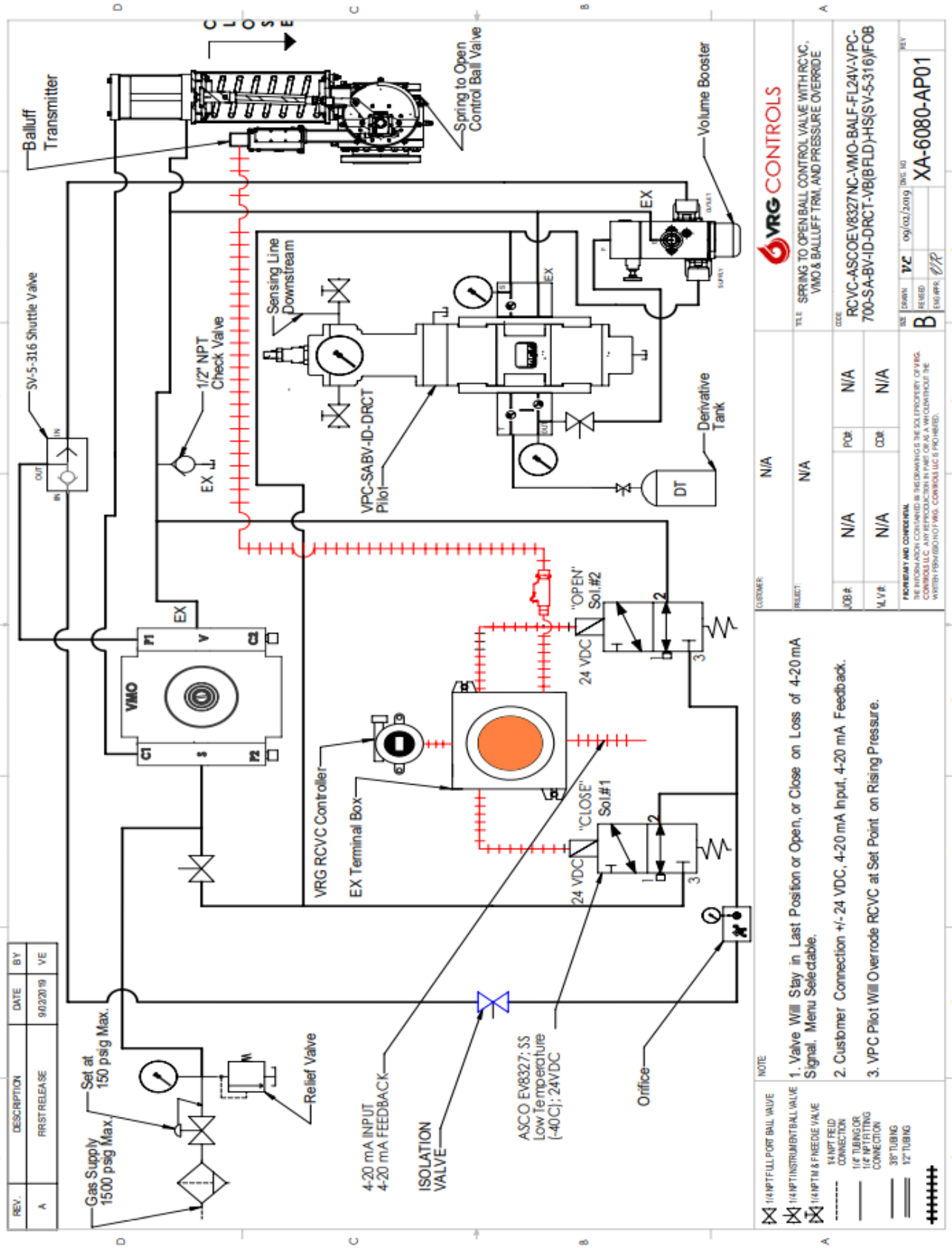
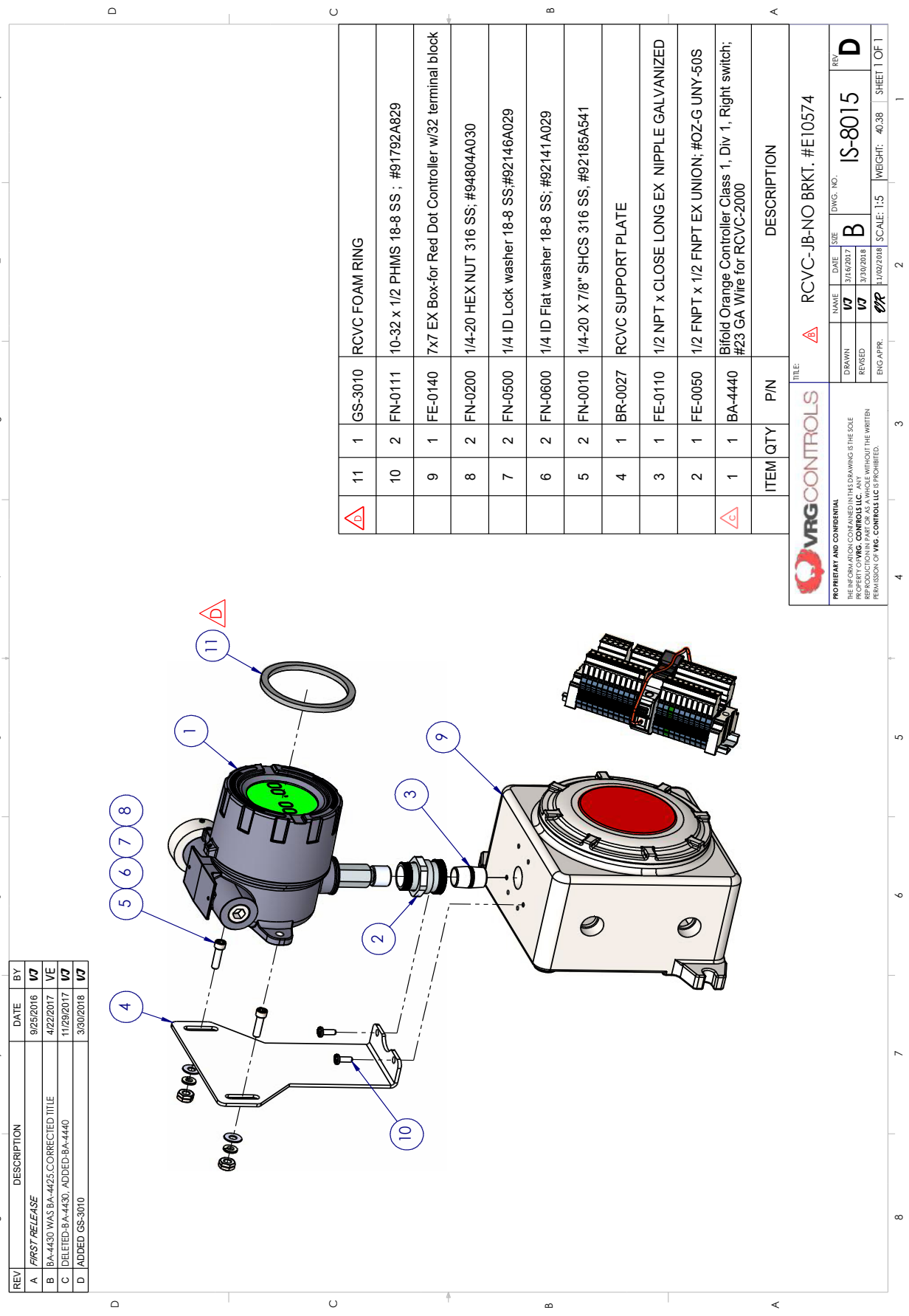


Figure 15: Spring to Open Ball Control Valve with RCVC, VMO & Balluff TRM, and Pressure Override

Figure 16: RCVC 2D Drawings for Single and Double Acting Applications



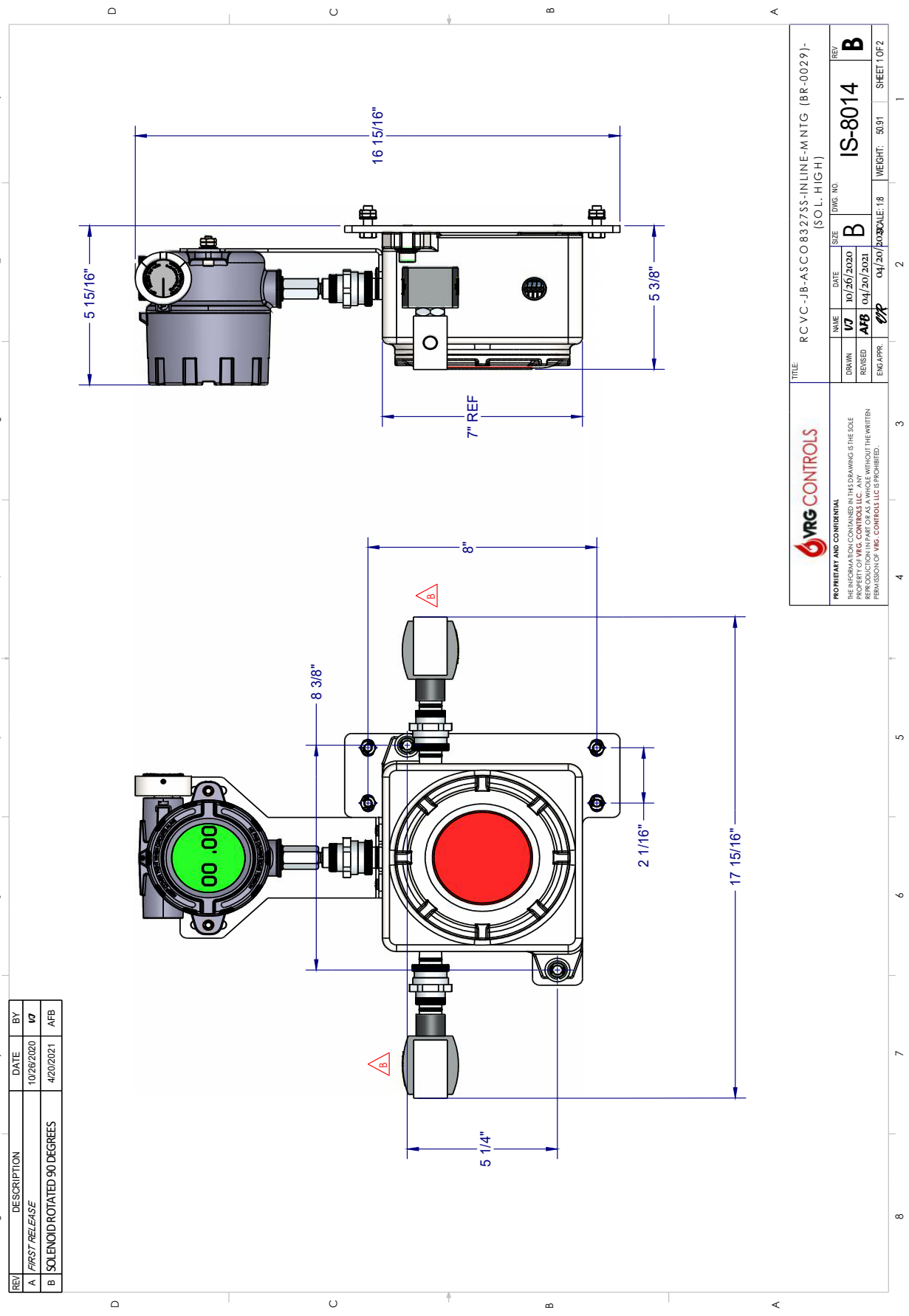


Figure 16: RCVC 2D Drawings for Single and Double Acting Applications

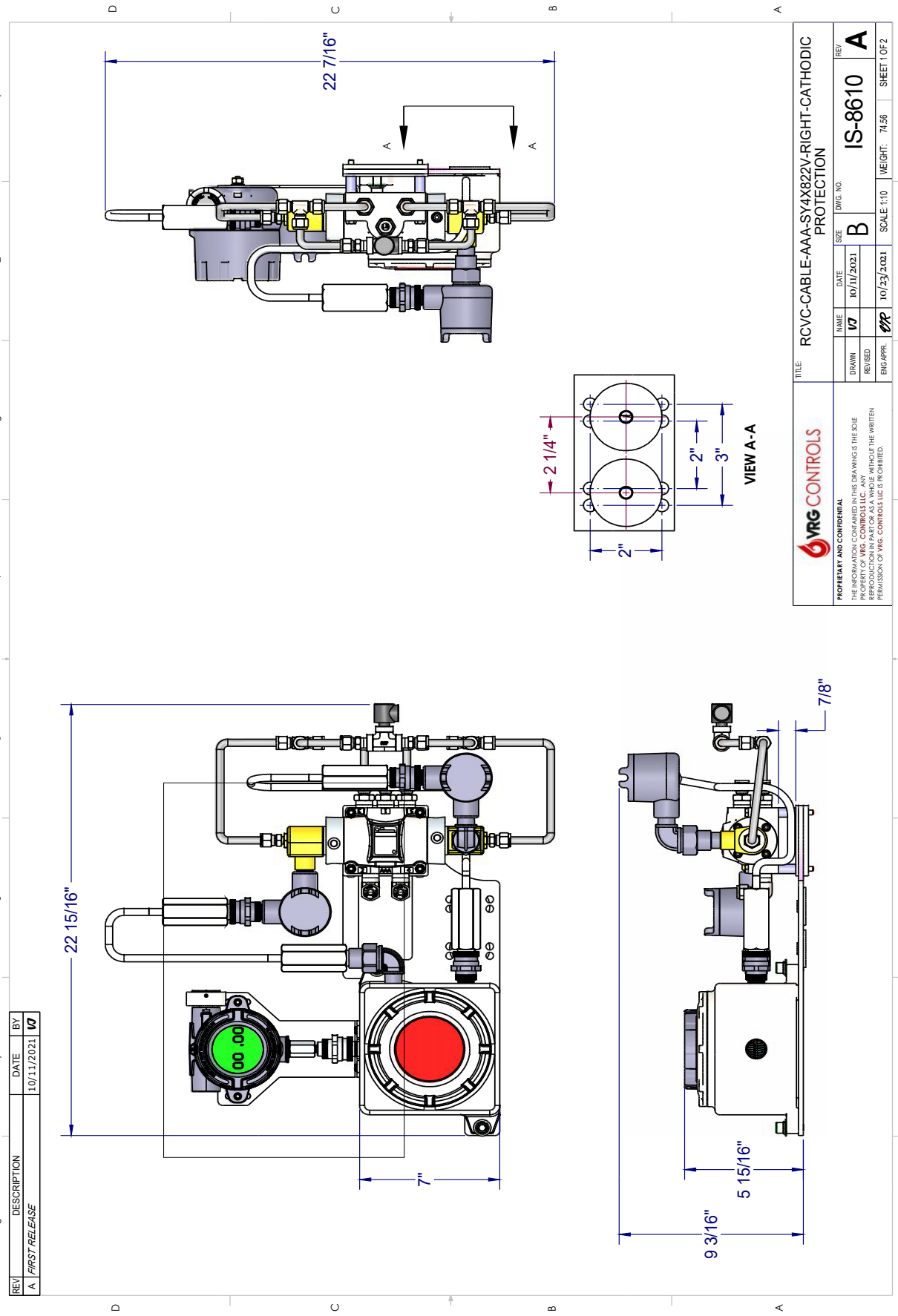


Figure 16: RCVC 2D Drawings for Single and Double Acting Applications

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ADDRESS: VRG Controls, LLC.
Lake Zurich, IL 60047, USA
TOLL FREE: (800) 844-FLOW-VRG
E-MAIL: sales@vrgcontrols.com
WEBSITE: vrgcontrols.com