SERIES 5B/C

VALVE STATUS MONITOR AS-i

Installation, Operation and Maintenance Manual

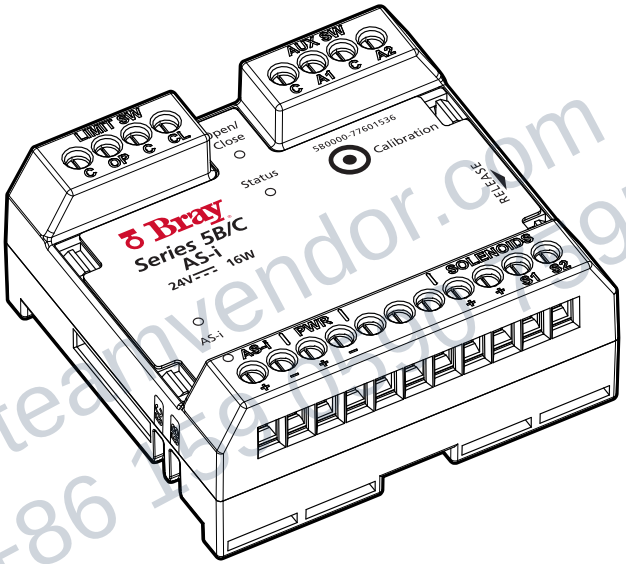

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TABLE OF CONTENTS

1.0 Introduction 2
2.0 Description of Operation 2
3.0 Hardware Description. 2
3.1 Field Connection Terminals 2
3.1.2 AS-i Connections 3
3.1.3 Power Supply 3
3.1.4 Load Connections 3
3.2 Factory Connection Terminals. 3
3.2.1 Limit Switches 3
3.2.2 Optional Auxiliary Switches 3
3.3 LED Description. 3
3.3.1 AS-i Indictators 3
3.3.2 Product Status 4
3.3.3 Open/Close 4
3.4 User Switches 4
3.4.1 Calibration Switch 4
4.0 AS-i Interface 4
4.1 Configuration 4
4.2 Communication 4
5.0 Quick Start Guide 5
6.0 Installation Instructions. 5
7.0 Exploded View Drawings. 6
7.1 Exploded View - 5B. 6
7.1 Exploded View - 5C 7
8.0 Technical Specifications 8

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1.0 INTRODUCTION

The Bray Series 5B/C (S5B/C) Valve Status Monitor (VSM) with Communication Protocol electronics (CommPro) is an intelligent switchbox device that provides both position feedback and diagnostic information for discrete valves. It accomplishes this by interfacing with a bus network, over which commands can be sent and feedback can be returned. Once connected to the network, the Bray S5B/C VSM with CommPro becomes part of a larger system, which is required to ensure proper operation of the device. To refer to the elements of the system, a common terminology is used throughout this document, as defined below.

Definition of Terms

- **CommPro** – Bray S5B/C Valve Status Monitor with AS-i Communication Protocol module
- **Valve** – Discrete valve being monitored by the CommPro module
- **Process Controller** – Device acting as the network master that communicates with the S5B/C via the CommPro module.

2.0 DESCRIPTION OF OPERATION

The function of the CommPro is to monitor the state of mechanical switches operated by a rotating cam shaft internal to the VSM. This cam shaft is set to trip the switches when the valve travel limits have been reached. Operation of the valve position can be controlled by the process, or the CommPro can operate the valve to the travel limits using solenoid valves. This operational capability, coupled with the position monitoring, gives the CommPro the ability to report degraded or erroneous operation to the Process Controller based on calibration procedures performed at the factory or on-site.

Every CommPro has been designed to communicate using a specific communication protocol, designated by the part number.

- **AS-i:** 5B-0000-77601-536

WARNING

If CommPro is installed in S5C VSM, refer to S5C IOM for additional requirements.

NOTICE

Operating the CommPro outside the operational constraints defined in this manual may impair the protection provided by the equipment.

3.0 HARDWARE DESCRIPTION

- One terminal strip (11 terminals) for field connections
- Two terminal strips (4 terminals each) for factory wiring of position switches
- LED User Interface
  - Red and green AS-i LEDs
  - Bi-color Red/Blue Product Status LED
  - Bi-color Red/Green Open/Close Position LED
- Parameter switches
  - Calibration switch

3.1 Field Connection Terminals

Each CommPro has 11 terminals dedicated to field connections. These terminals are where the bus connections are made, where external power is provided (if needed), and the load connections are terminated.

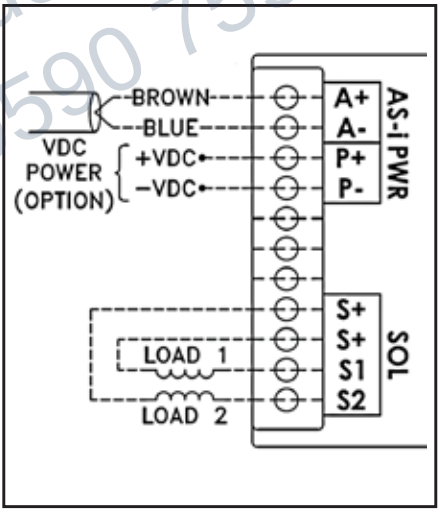

Figure 1: Field wiring of the CommPro

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3.1.2 AS-i Connections

The CommPro can be provided with a 4-pin AS-i M12 connector. This connector is factory terminated at the field terminals, so additional wiring is not required.

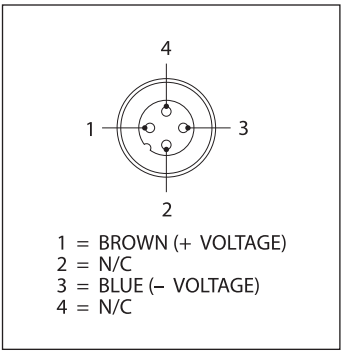

Figure 2: AS-i Male M12 Connector

3.1.3 Power Supply

For AS-i, power is provided to the CommPro via the communication bus connections. However, due to current limitations, the most current that can be drawn from the AS-i bus connection is 300mA. Exceeding this current limit will result in a fault state. If more current is needed for the load(s), then an external power connection is required.

If used, the power supply must provide 24VDC ± 10%, and must power the CommPro module along with any load connections. If the maximum output load is needed (13.8W), then the power supply should be able to supply at least 750mA. Since this is a DC connection, it is important that proper polarity is maintained when making this connection.

3.1.4 Load Connections

The CommPro is designed to operate up to two inductive loads at 24VDC. The product was specifically designed and tested to operate two 6.9W solenoid valves; however, any resistive or inductive load of equal or lesser wattage could be operated from this connection.

Each load connection has a wattage limit of 6.9W, and the CommPro has a total wattage limit of 13.8W. Exceeding these limits will result in a fault state. All loads are operated discretely (on/off) using 24VDC. Since these are DC connections, it is important that proper polarity is maintained when making these connections.

3.2 Factory Connection Terminals

Two terminal strips, located on the opposite side of the CommPro from the field connection terminals, are provided for making factory installed terminations. It is at these terminals that the position monitoring switches are connected.

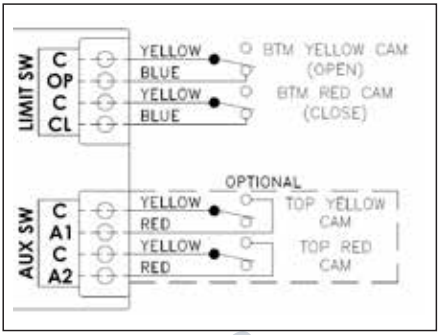

Figure 3: Factory wiring of the CommPro module

3.2.1 Limit Switches

The switches attached to this terminal strip have been set at the factory to be engaged when the travel limits have been reached, fully open and fully closed. The CommPro relies on this position feedback to report position to the Process Controller. If the switches are not being engaged at the fully open and close positions, the cams on the indicator shaft should be adjusted to ensure proper operation. If both switches are engaged at the same time, a fault state will occur.

3.2.2 Optional Auxiliary Switches

Auxiliary switches allow for custom indication to be provided to the Process Controller. The cams that engage the auxiliary switches can be positioned to any position desired in the field, as these switches do not affect standard operation of the CommPro.

3.3 LED Description

3.3.1 AS-i Indictators

Red and green LEDs indicate the status of AS-i communication. These LEDs can be referenced if there are issues establishing communication between the Process Controller and the S5B/C AS-i.

LEDs off	No power applied
Green LED on, Red LED off	Normal data communication
Green LED on, Red LED on	Possible issues - Slave is waiting for address assignment - Cyclic data exchange not detected
Green LED on, Red LED flashing	Periphery fault active

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3.3.2 Product Status

The bi-color (Red/Blue) LED indicates normal operation by cycling the blue LED on and off every second. In the event of a fault state, the indicator will alternate between red and blue every second. To clear the fault state, the Calibration Switch must be pressed to retest any load connections.

The possible faults that can occur are:

- Limit Switch Fault – Both limit switches engaged at the same time
- Solenoid Overload – One of the load connections is drawing too much current
- VSM Overload – The total output load is too large for the CommPro

3.3.3 Open/Close

The bi-color (Red/Green) LED indicates the current position of the VSM, based on the limit switch state. When in the open position, the green LED is on; when in the close position, the red LED is on.

3.4 User Switches

3.4.1 Calibration Switch

Switch that enters the CommPro into an automated test of its output connections. Both outputs are individually and quickly cycled (< 0.1s on time), which allows for the power draw of each load to be measured. In the event of excessive power draw at one or both load connections, a fault state will be entered.

If a fault state is active, then the Calibration Switch should be pressed for the load(s) to be retested. This ensures that the fault condition has been corrected by the user.

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4.0 AS-I INTERFACE

4.1 Configuration

When connecting the CommPro to an AS-i network, it must be assigned a unique address by the Process Controller. The Process Controller can identify the CommPro as an unassigned slave, and address assignment will either occur automatically or will have to be performed manually by the user, dependent on the capabilities of the Process Controller. The address that can be assigned to the CommPro ranges from 1A to 31A and 1B to 31B, for a maximum slave count of 62.

4.2 Communication

Once the CommPro has been configured by the Process Controller, data transmission can begin. Data is sent in data arrays that contain command and status information relevant to the control of the product. The CommPro has a 4-bit input array and a 4-bit output array. The input data array contains the states of the switches within the CommPro, indicating valve position, and the output data array sets the valve position.

Input Data Array			
Bit 3	Bit 2	Bit 1	Bit 0
Auxiliary Switch 2	Auxiliary Switch 1	Limit Switch Open	Limit Switch Close
1 – Switch Engaged 0 – Switch Disengaged	1 – Switch Engaged 0 – Switch Disengaged	1 – Switch Engaged 0 – Switch Disengaged	1 – Switch Engaged 0 – Switch Disengaged

Output Data Array			
Bit 3	Bit 2	Bit 1	Bit 0
N/A	N/A	Load 2	Load 1
		1 – Load 2 On 0 – Load 2 Off	1 – Load 1 On 0 – Load 1 Off

5.0 QUICK START GUIDE

1. If installation of the CommPro is required, follow the Installation Instructions.
2. Apply power to the AS-i network. The CommPro will individually illuminate the Product Status and Open/Close LEDs as part of the initialization procedure. Initialization is complete once the Product Status LED starts flashing.
3. The green AS-i LED should be on and solid (not flashing). This indicates that AS-i network power is present.
4. Using the AS-i master, assign the CommPro an address on the bus. The red AS-i LED should turn off, showing that data communication is occurring with the Process Controller.
5. Press the Calibration switch to detect the state of the connected output loads.
6. Product is ready for service.

6.0 INSTALLATION INSTRUCTIONS

1. Before beginning installation of the electronics package, install all external cabling at the conduit entries for the Bray VSM enclosure. Unused conduit entries should retain the supplied plugs.
2. Install all ground wires to the Bray VSM enclosure supplied ground screw(s).
3. Install the supplied electronics package mounting bracket using the supplied mounting hardware, e.g. flathead screws.
4. Orient the electronics package such that the 11 terminals are orientated towards the front of the Bray VSM.

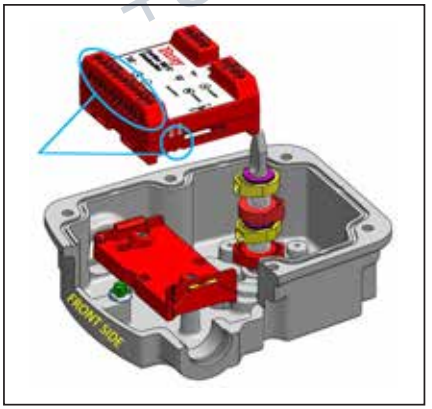

Figure 4: Correct orientation of the electronics package relative to Bray VSM and mounting bracket

5. Align the side slot on the electronics package with the notch on the mounting bracket, based on the Bray VSM (5B or 5C) that it is being installed in.

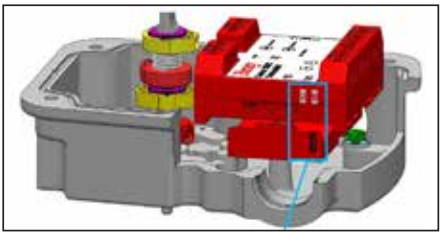

Figure 5: Alignment of appropriate slot

6. Pitch the electronics unit during installation to engage the horizontal slot on the electronics package with the non-adjustable hook of the mounting bracket.

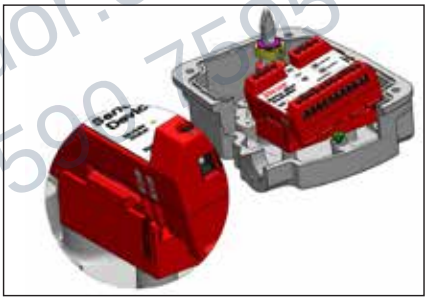

Figure 6: Pitching of the electronics package to begin installation

7. Push down on the electronics package to snap it into place on the mounting bracket.

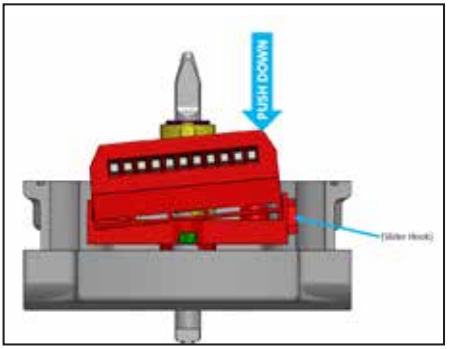

Figure 7: Push down on electronics package until the slider hook snaps in place

8. Mate all required wire terminations based on the provided wiring diagram.

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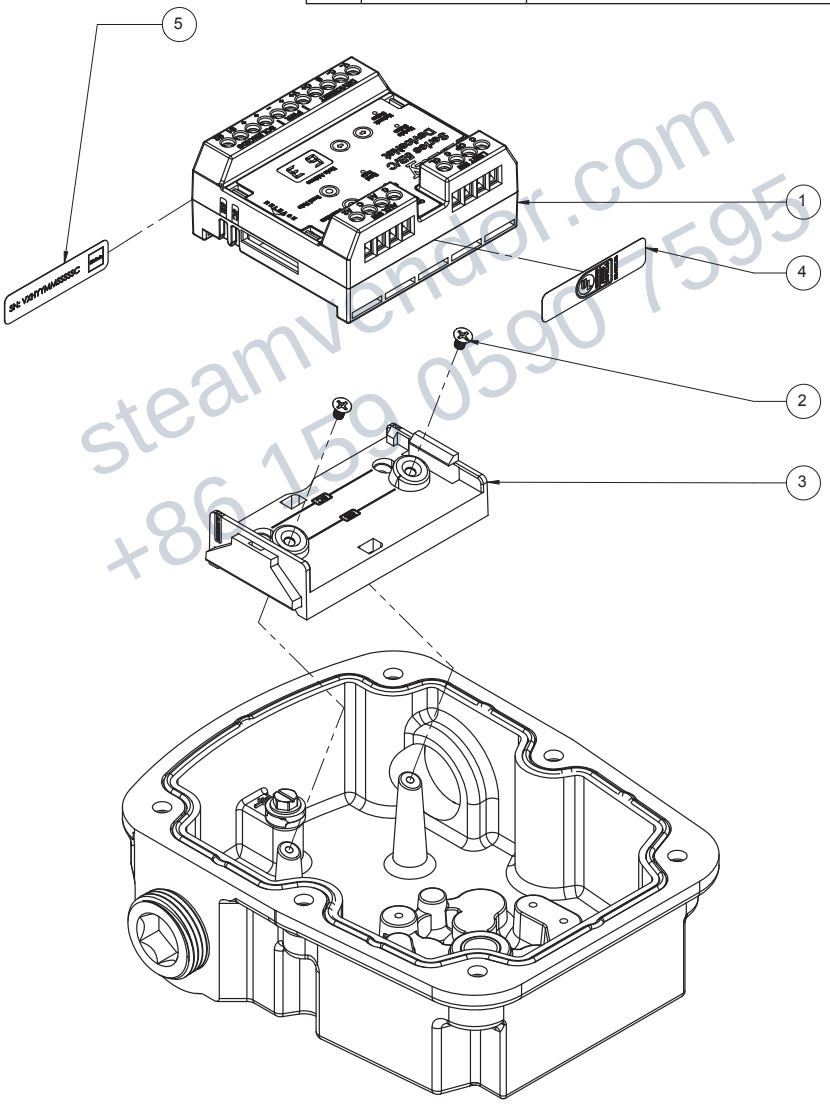
7.0 EXPLODED VIEW DRAWINGS

7.1 Exploded View - 5B

ITEM	PART NUMBER	DESCRIPTION	QTY
1	5B0000-77601536	CommPro Assembly, AS-i	1
2	075303-72105534	Screw, Flat Head, X-Drive	2
3	5B0000-23500536	Commpro Adapter Assembly	1
4	5B0000-73306533	Commpro Certification Label, Mylar	1
5	5B0000-73304533	Commpro Serial Tag, Mylar	1
ALTERNATIVE COMPONENTS			
1	5B0000-77600536	CommPro Assembly, DeviceNet	1
1	5B0000-77602536	CommPro Assembly, Profibus-DP	1



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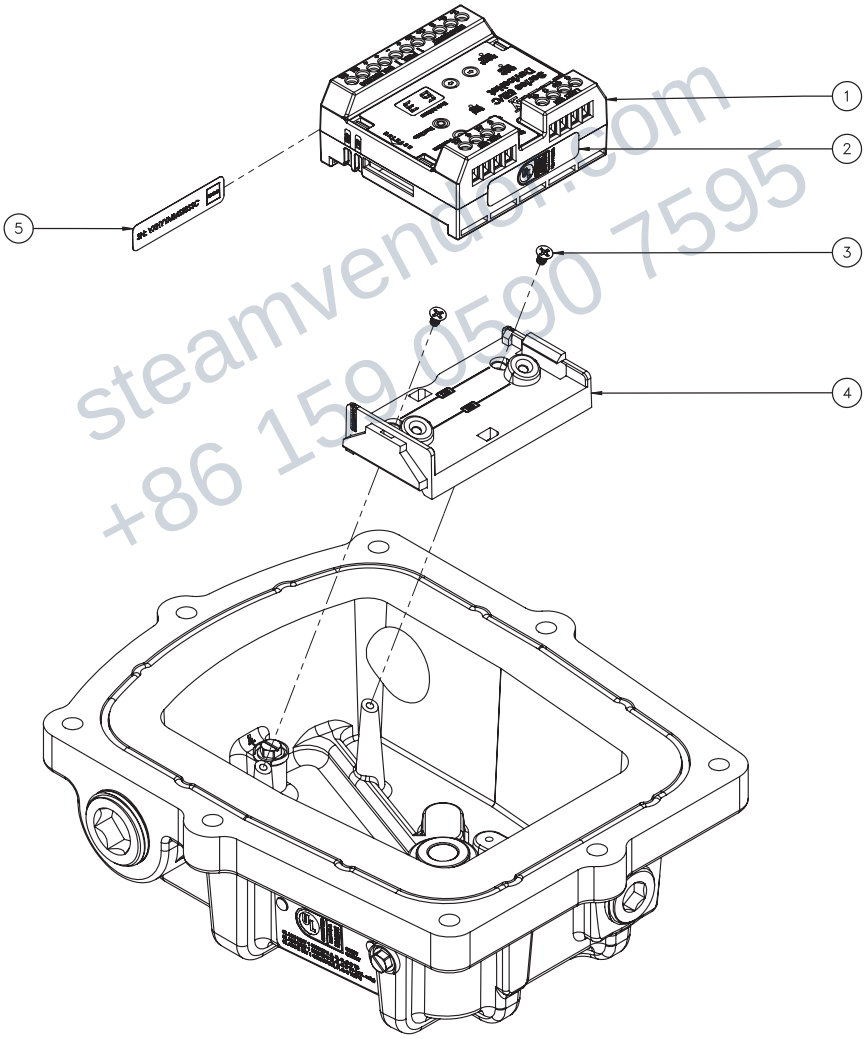
7.1 Exploded View - 5C

ITEM	PART NUMBER	DESCRIPTION	QTY
1	5B0000-77601536	CommPro Assembly, AS-i	1
2	5B0000-73306533	CommPro Certification Label, Mylar	1
3	075303-72105534	Screw, Flat Head, X-Drive, M3x0.5x5mm	2
4	5B0000-23500536	CommPro Adapter Assembly	1
5	5B0000-73304533	CommPro Serial Tag, Mylar	1
ALTERNATIVE COMPONENTS			
1	5B0000-77600536	CommPro Assembly, DeviceNet	1
1	5B0000-77602536	CommPro Assembly, Profibus-DP	1



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8.0 TECHNICAL SPECIFICATIONS

Mechanical	
Electronics Enclosure Material	PC/ABS Blend
Mounting Bracket Material	Glass-filled Nylon
Dimensions with bracket	3.05" x 2.53" x 1.43" [77.5 x 64.3 x 36.3mm]
Dimensions w/o bracket	2.73" x 2.53" x 1.21" [69.3 x 64.3 x 30.7mm]
Weight	Max 3.5 oz [100g]
Terminals	
Wire Gauge	26-16 AWG [0.13-1.31 mm2]
Torque Limit	3.5 in-lbs [15.6 N]
Temperature Rating	-13 to 149°F [25 to 65°C]
Installation	Designed for use within Bray VSMs
Switch connections	Only switches approved for use within Bray VSMs should be used with the product

Electrical	
Input Voltage	24 VDC ± 10%
Power Consumption	16 W Max
Load(s)	24 VDC Solenoids
# of Load Connections	2 Max
Load Switch	Solid-State (NMOS Open-Drain)
Load Limit	6.9 W per load 13.8 W max
LED Wavelengths	
Red	630 nm
Green	550 nm
Blue	470 nm

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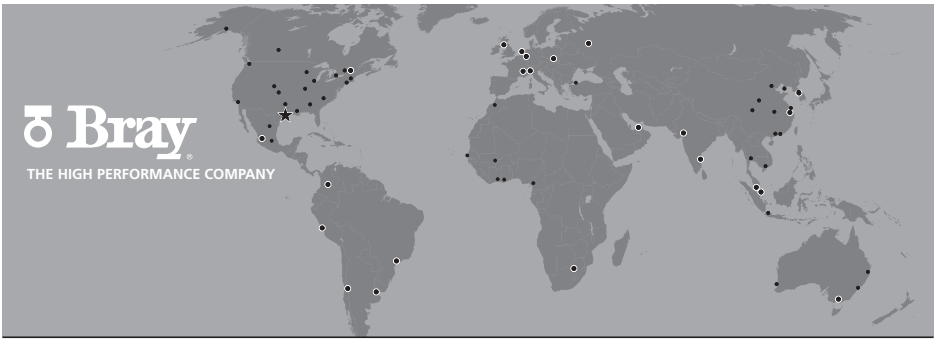

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