Brüel & Kjær Vibro
a spectris company

Product specifications and ordering information

Rack Connection Module, Power Connection Module, External Power Supplies

SETPOINT® by Brüel & Kjær Vibro

The Rack Connection Module (RCM) accepts +24 Vdc[1] from one or two independent power sources and distributes the power along the rack backplane where it is used by all other modules including UMMs, TMMs, and SAMs. When redundant power sources are used, the voltages from both are distributed on the backplane; each UMM, TMM, and SAM automatically and independently selects the highest in-specification voltage. As soon as one voltage is removed or drops below the other, all modules seamlessly switch to the alternate source, assuring uninterrupted operation.

The RCM also provides connections common to the entire rack. These include the System OK relay, a local Reset (Acknowledge) pushbutton, and terminals for wiring remote contacts that invoke the rack's Trip Multiply, Inhibit, Reset, and Special Alarm Inhibit features. A special set of connectors is also provided with buffered transducer signals from every channel in the rack[2]. This connector set is intended primarily for permanently wired patch panels or selected data acquisition instruments that accept more than 4 channels at a time.

One RCM is required for each SETPOINT rack and must reside in slot 1. Slots 2-16 are reserved for other module types.

The Power Connection Module (PCM) is an optional accessory that may reside in any rack slot, and is used in conjunction with the RCM for redundant power schemes. The PCM is identical to the RCM, but has connections only for Power 1 (P1) and Power 2 (P2). The presence of both an RCM and a PCM in a rack allows either of these modules to be removed without interrupting rack power, providing the highest level of tolerance to single point failures. Refer to pages 11 and 12 of this datasheet for diagrams showing typical redundant power configurations.

1. 24 Vdc nominal. RCM accepts continuous voltages between +22 and +30 Vdc (SIL: +23.1 to +26 Vdc) with transients between +18 and +36 Vdc.
2. Vibration, speed, phase, and position channels in slots 3-16 only. TMM channels are not included at this connector set. Slot 2 channels are not included at this connector set.

Features and Benefits

- **Industry-standard 24 Vdc power** – Many facilities already have 24 Vdc instrument power readily available. In such instances, the SETPOINT system requires no special power supplies – simply connect your 24 Vdc power source(s) directly to the Rack Connection Module.
- **Flexible power choices** – 24 volts not readily available? No problem. The SETPOINT system allows you to use your choice of off-the-shelf power supplies from a variety of leading suppliers including Phoenix, Weidmuller, Traco, and others. These industry-standard DIN-rail modules readily convert a variety of AC and DC voltages to 24 Vdc instrument power. For convenience, we offer these external supplies as an ordering option with your SETPOINT system. All are approved for use in Div 2 / Zone 2 hazardous areas.
- **Less heat, longer life** – Because power supplies are located outside the rack, heat inside the rack is minimized and the life of the system is prolonged.
- **Truly redundant supplies** – The RCM accepts two independent 24 volt supply inputs. Via the backplane, these supplies are delivered to each and every module in the rack. The module in each slot individually determines the best available supply. As soon as one supply is removed (or drops below the other), all modules seamlessly switch to the alternate supply assuring uninterrupted system operation.
- **Distributed power regulation for improved reliability** – Unlike systems that centrally regulate or condition incoming power and then distribute every voltage needed, the RCM merely assures that primary and secondary (if present) supplies are within acceptable limits and passes their voltage to the backplane. Each monitor module creates its own regulated voltages. This design philosophy reduces the potential for rack single-point failures compared to systems that generate all regulated voltages centrally. In the SETPOINT system, regulator problems affect only a single module, not the entire rack.
- **Programmable rack control options** – Rack control signals can be invoked via hardwired connections to the RCM on a rack-wide basis, or on a per-channel or group basis when invoked via Modbus or via UMM discrete inputs. Channel groupings for control signals are fully programmable, allowing necessary flexibility when multiple machines are monitored in a single instrument rack.
- **56-channel buffered transducer output connection** – The SETPOINT system provides unparalleled flexibility for accessing buffered transducer outputs with 3 programmable BNC connectors on the front panel, 4-channel RJ45 connectors on each UMM, and two 30-pin connectors on the RCM for simultaneous access to all vibration / speed / position channels. This connector is ideal for permanent patch panel installations or connection to multi-channel data acquisition instruments.
- **SIL-Capable Architecture**
  SETPOINT® is suitable for use as part of a SIS, to implement safety instrumented functions up to SIL 2 when configured, installed and commissioned properly as per instructions provided within the Operations and Maintenance Manual (S1079330) and safety manuals (C107577, C107576, C107578, C107579).

RCM / PCM Specifications

All specifications are at +25C (+77° F) unless otherwise noted.

Inputs	
Number of Supplies	Accepts up to two 24 Vdc independent power sources
Allowable Wiring Sizes	PWR: 12-16 AWG Fault Relay: 12-24 AWG Rack Control Inputs: 14-28 AWG
Connectors	Removable, with positive retention
Reverse Polarity Protection	Power inputs protected from continuous input polarity reversal.
Input Voltage	• Nominal: +24 Vdc • Continuous: + 22 to +30 Vdc (SIL: +23.1 to +26 Vdc) • Transient (< 1 sec): +18 to + 36 Vdc • Ripple: < 100mV pk to pk
Power Consumption	≤ 1.25 W when input power voltage is 22 to 26 Vdc. **NOTE:** Power consumption is for RCM only, not entire rack. For rack power consumption, refer to SETPOINT System Overview datasheet S1077785.
Power Input Fuse Rating	10 A
Ground Select	• System common tied to chassis ground (external jumper* installed) • System common isolated from chassis ground** (external jumper* removed) *Jumper is accessible from the front of the rack and may be installed on either the P1 or P2 removable wiring connectors. ** This configuration is commonly used for systems with IS barriers where a separate IS ground must be established.

Control Inputs	Function
	1. Alarm Reset **2.** Trip Multiply **3.** Rack Inhibit **4.** Special Alarm Inhibit All invoke their respective conditions on a rack-wide basis. To invoke functions on a per-channel or group basis, UMM discrete input channels or the MODBUS interface on the System Access Module (SAM) may be used.
	Logic Type*
	Short = true * Active low TTL voltage mode
	Contact Type
	Dry (switched current < 1 mA)

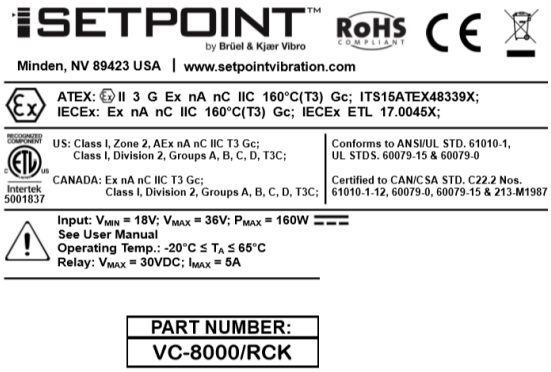
Outputs	
Fault Relay	• Quantity: 1 • Normally Energized (ensures relay will change state and annunciate rack loss of power) • Contact Labeling: NO: Open under fault* conditions NC: Closed under fault* conditions • Type: SPDT, form C • Sealant: epoxy • Min. Switched Current: 10 mA • Max switched power (resistive): 5A @ 48 Vrms or 30 Vdc • Maximum voltage in hazardous areas: 30 Vdc • Life: > 10,000 cycles * Bypassed channels do not vote in determining fault condition.

LEDs	• **OK LED** **On** – The entire rack is operating correctly; the fault relay is inactive **Off** – The system has detected a fault or a NOT OK on any channel*; the fault relay is active • **P1 LED** **On** - Power input 1 is connected and within specification Off – Power input 1 is disconnected or outside specification • **P2 LED** **On** – Power input 2 is connected and within specification **Off** – Power input 2 is disconnected or outside specification * Bypassed channels do not vote in determining OK condition. ** P1 is not necessarily primary power and P2 is not necessarily secondary power. Each installed module in the rack will evaluate the P1 and P2 voltages on the backplane and select the highest in-spec voltage.
Buffered Transducer Outputs	**Channels**
	56* * Only Universal Monitoring Module (UMM) channels. TMM (temperature) channels are not provided.
	Connector Qty / Type
	Two Molex® Pico-Clasp® 30-pin receptacles, each with 28 buffered output channels.* * Buffered outputs are also available on each UMM via an RJ45 connector with all 4 channels, and on the optional rack faceplate via 3 programmable BNC-type connectors.
	Impedance
	• 550 Ω
	Short-Circuit Protected
	• Yes
	Signal Type
	• Raw (unfiltered, no integration) transducer signal in mV/engineering units

Environmental		
Temperature	**Operating**	-20 °C to +65 C
	Storage	-40 °C to +85 °C
	Operating Ramp	Do not exceed 0.5C/minute
	Storage Ramp	Do not exceed 10C/minute
Humidity		5 % to 95 %, non-condensing
CE Mark Directive		
ESD		• Contact: 6 kV* • Air: 8 kV * Criteria B
Radiated EMI Susceptibility		• 80 – 1000 MHz: 20 V/m* • 1.4 – 2 GHz: 6 V/m* • 2 – 2.7 GHz: 3 V/m* * Criteria A
Magnetic Field		30 A/m, Criteria A
EFT Burst		2 kV, Criteria B
Signal and Power Lines	**EFT Surge**	2 kV line to ground, Criteria B
	Conducted RFI	150 kHz to 80 MHz, Criteria A
	Conducted RF Common Mode Immunity	• 15 Hz – 150 Hz: 10 V* • 150 Hz – 1.5 kHz: 1V* • 1.5 kHz – 150 kHz: 10 V* * Criteria A
Radiated EMI Emissions		30 dB µV/m @ 30 m, 30 MHz – 1000 MHz, Class A
Conducted Emission		60 dB µV/m @ 30 m, 0.5 MHz – 30 MHz, Class A
Power Voltage Dip Interruption		AC: 250 periods, 95% reduction DC: 30 ms, 100% reduction (Criteria B for both AC and DC)
Power Voltage Dip Immunity		AC: ½ period, 30% reduction DC: 10 ms, 60% reduction (Criteria B for both AC and DC)

Low Voltage Directive	Council Directive 2014/35/EU Low voltage using BK Vibro-supplied power supply (rack ordering option –CC) or other Low Voltage Directive approved supply.

Hazardous Area Approvals (RCM/PCM only – see Table 1 for EPS approvals)



Physical	
Size	9.1” H x 9.0” D x 1.0” W (231 mm x 229 mm x 25 mm)
Weight	9.2 oz (262 g)
Rack Slots Required	One (must reside in rack slot 1)

Safety Integrity Level (SIL) Capability*

SETPOINT® is suitable for use as part of a SIS, to implement safety instrumented functions up to SIL 2 when configured, installed and commissioned properly as per instructions provided within the Operations and Maintenance Manual (doc S1079330) and safety manuals:

- VC-8000 Backplane and Rack Safety Manual (C107579)
- RCM Safety Manual (C107578)
- TMM Safety Manual (C107576)
- UMM Safety Manual (C107577)

*Hardware availability in Q4 2019.

EPS Specifications

Refer to Table 1 below for summary specifications of External Power Supplies (EPSs) and compatibility with various rack sizes. For comprehensive EPS specifications, refer to the respective manufacturers' datasheets.

TABLE 1 – SUMMARY SPECIFICATIONS AND RACK COMPATIBILITY FOR EXTERNAL POWER SUPPLIES

SETPOINT P/N	MFR[1]	MFR P/N[2]	INPUT			OUTPUT				RACK COMPATIBILITY			MX2020/RCK-CC				Agency Apprvls
			Voltage	Frequency (Hz)	Phase	Voltage	Current	Power @ 25C	Power @65C	4-P	8-P	16-P	CC=	QTY	CC=	QTY	
100411[3]	TR	TSP 360-124EX	110/220 Vac	50/60	1	24Vdc	15A	360W	194W	Y	Y	Y	01	1	02	2	Y[5]
	WD	110 582 00 00															
100414	TR	TSP 480-124-3PAC400EX	400 Vac	50/60	3	24Vdc	20A	480W	420W	Y	Y	Y	03	1	04	2	Y[5]
100416	TR	TSP 480-124-3PAC500EX	500 Vac	50/60	3	24Vdc	20A	480W	420W	Y	Y	Y	05	1	06	2	Y[5]
100417	PH	23 20 91 1	110/220 Vac 90-250 Vdc	50/60	1	24Vdc	10A	240W	210W	Y	Y	Y	07	1	08	2	Y[6]
100417A		28 66 76 3															N[7]
100546	TR	TSP 180-124EX	110/220 Vac	50/60	1	24Vdc	7.5A	180W	97W	Y	Y	N	09	1	10	2	Y[5]
	WD	110 581 00 00															
100547	TR	TSP 090-124EX	110/220 Vac	50/60	1	24Vdc	3.75A	90W	48W	Y	N	N	11	1	12	2	Y[5]
	WD	110 579 00 00															
100548	PH	23 20 90 8	110/220 Vac 90-250 Vdc	50/60	1	24Vdc	5A	120W	105W	Y	Y	N	13	1	14	2	Y[6]
100548A[3]		28 66 75 0															N[4]

NOTES:

1. TR=TRACO, WD=Weidmuller, PH=Phoenix Contact
2. Refer to manufacturer's datasheets for comprehensive specifications.
3. Part numbers 100411 and 100548A have lead times of 1-2 weeks; other power supplies may incur longer lead times.
4. Identical to SETPOINT p/n 100548, but power supply carries no agency approvals and has no conformal coating. May be used in installations where agency approvals not required.
5. Provided with following multiple approvals as standard:
   - CSA Class I, Division 2, Groups A-D; Class I, Zone 2, Ex nC IIC T4
   - ATEX II 3G Eex nAC IIC T4
   - IEC/EN Class I, Zone 2, Eex nC II C T4 U
   - CE
6. Provided with following multiple approvals as standard: - UL/c-UL Recognized UL 1604 Class I, Division 2, Groups A-D
   - ATEX II 3G Eex nAC IIC T4
   - CE
7. Identical to SETPOINT p/n 100417, but power supply carries no agency approvals and has no conformal coating. May be used in installations where agency approvals not required

RCM Ordering Information

Spare RCM Cards

When ordering spare RCM cards, use the part number below. When ordering as part of a system, do not order RCM cards and other rack components individually. Instead, order using part number VC-8000/RCK options AA through VV. Refer to SETPOINT® system datasheet S1077785 to specify rack size, module types for each slot, faceplate, touchscreen, mounting style, and other options.

VC-8000/RCM-AA

Rack Connection Module (spare)

AA		**Agency Approvals and Certifications**
0	**5**	Multiple Approvals (ETLc, IEC, ATEX)
0	**7**	SIL & Multi (ETLc, IEC, ATEX)

CAUTION

Monitor system modules are shipped with default factory configuration settings, which are not necessarily suitable for any particular application. Before use, each module and channel must be configured properly for its application via SETPOINT® configuration software. This software is included with each system or module ordered and is also available for download at www.setpoint.bkvibro.com

PCM Ordering Information

Power Connection Module

Refer to page 1 for a description of the Power Connection Module (PCM). Pages 11 and 12 show various RCM and PCM redundant power configurations along with corresponding failure modes each can address. Unlike an RCM, a PCM does not come pre-installed in the rack. Order separately using the information below.

VC-8000/PCM-AA

Power Connection Module

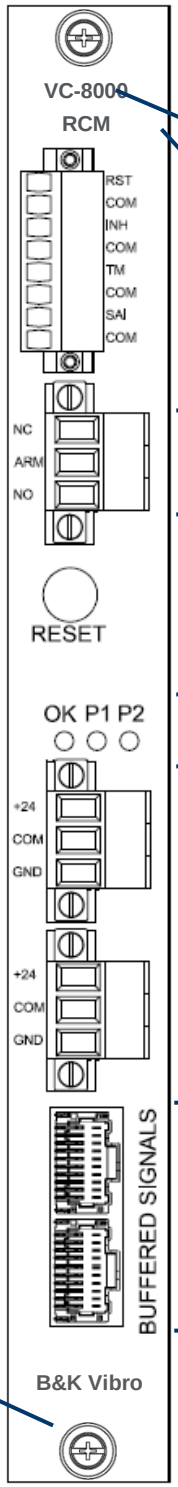
AA		**Agency Approvals**
0	**5**	**Multiple Approvals (ETLc, IEC, ATEX)**

EPS Ordering Information

Spare External Power Supplies

When ordering spare power supplies, use the part numbers in Table 1 on page 6. When ordering as part of a system, do not order power supplies separately. Instead, specify using part number VC-8000/RCK via the CC ordering option (see SETPOINT System Overview datasheet S1077785).

Wiring and Outline Diagrams



Captive thumbscrew for securing RCM in SETPOINT rack slot.

RCM may reside only in rack slot #1.

Discrete inputs for invoking rack-wide functions:
- Alarm Reset (Acknowledge)
- Rack Inhibit (Bypass)
- Trip Multiply
- Special Alarm Inhibit

Dry contact or TTL-compatible active when pulled to common or TTL zero.

System Fault (i.e. NOT OK) Relay.

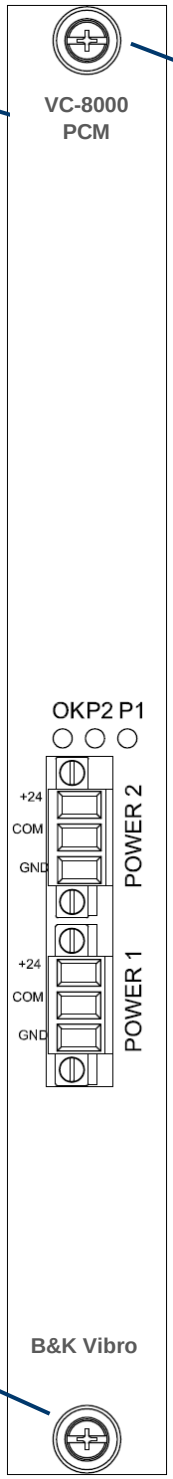
Local Alarm Reset (Acknowledge) Pushbutton. Performs same function as when RST and COM discrete input terminals are shorted.

SYSTEM OK, Power 1, and Power 2 LEDs. SYSTEM OK LED is green when no faults are present. P1 is green when supply 1 detected and within specs. P2 is green when supply 2 detected and within specs.

Primary/Secondary +24 Vdc (nominal) power source connections. Power 2 is on top, Power 1 is on bottom (labels are visible behind connectors).

Buffered transducer outputs for all rack UMM channels (up to 56). Intended primarily for wiring to permanent patch panels or multi-channel data acquisition instruments.

Captive thumbscrew for securing RCM in SETPOINT rack slot.



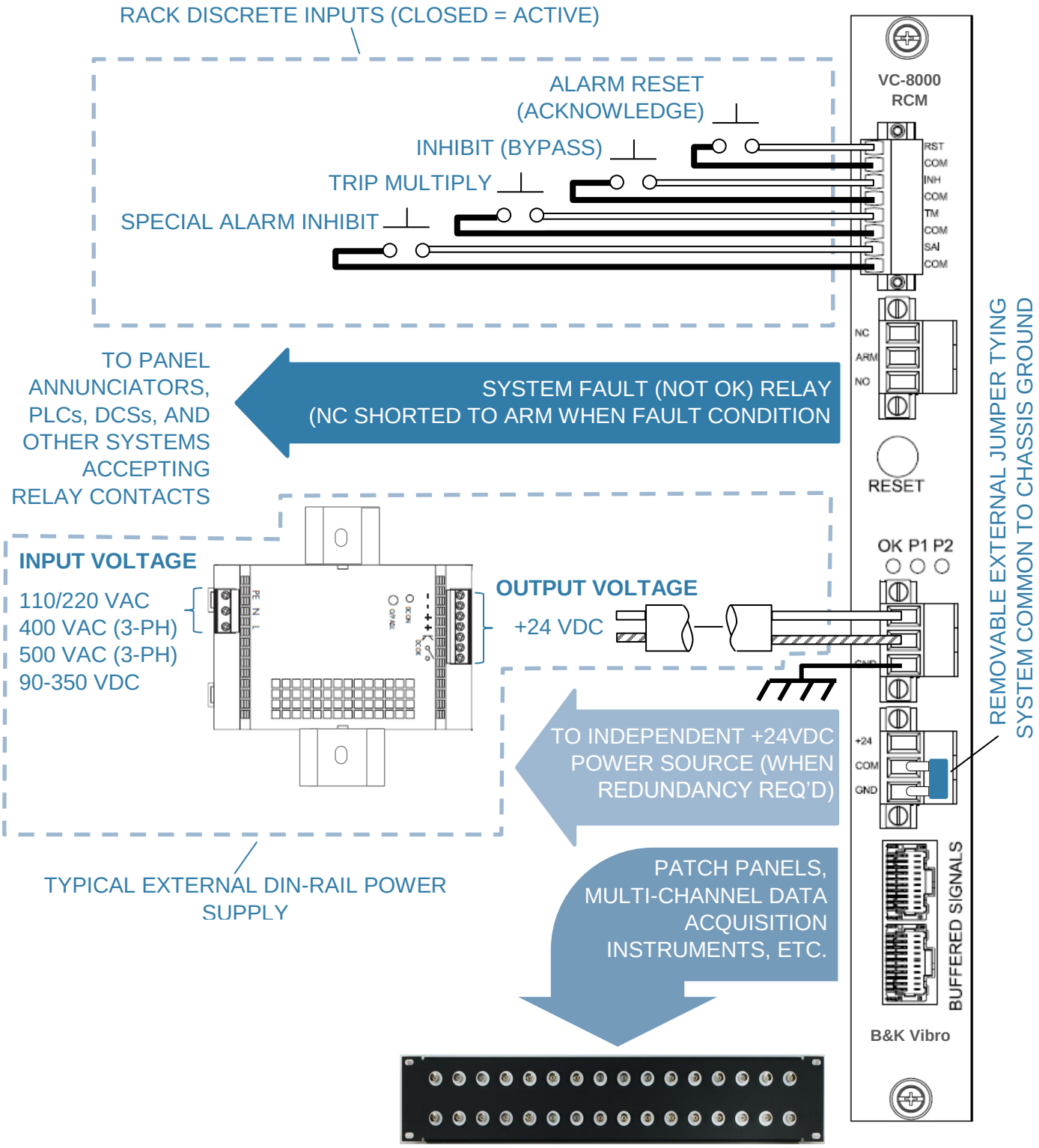
PCM may reside in any rack slot 1-16.

Captive thumbscrew for securing PCM in SETPOINT rack slot.

OK, Power 1, and Power 2 LEDs. OK LED is green when no faults are present on the PCM. P1 is green when supply 1 detected and within specs. P2 is green when supply 2 detected and within specs.

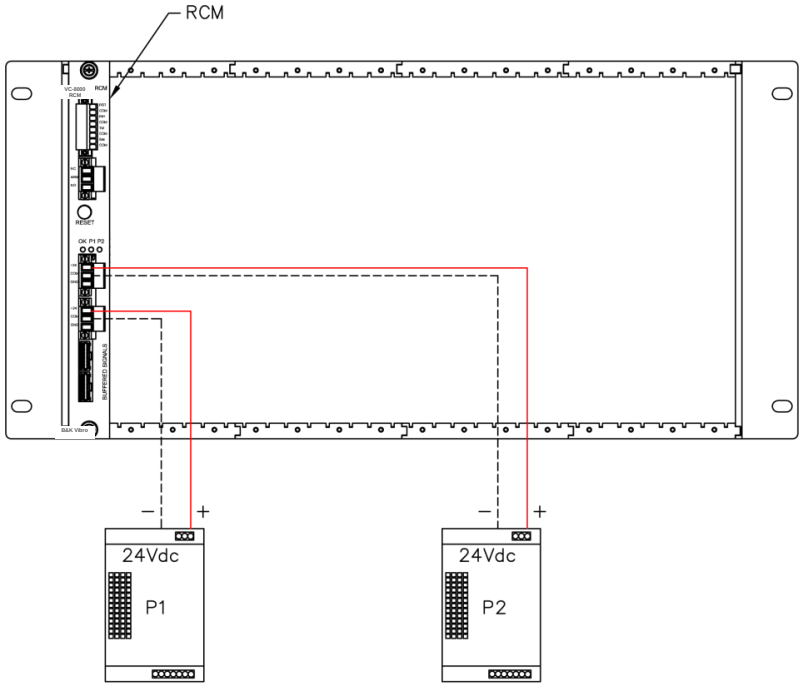
Primary/Secondary +24 Vdc (nominal) power source connections. Power 2 is on top, Power 1 is on bottom (labels are visible behind connectors).

Captive thumbscrew for securing PCM in SETPOINT rack slot.



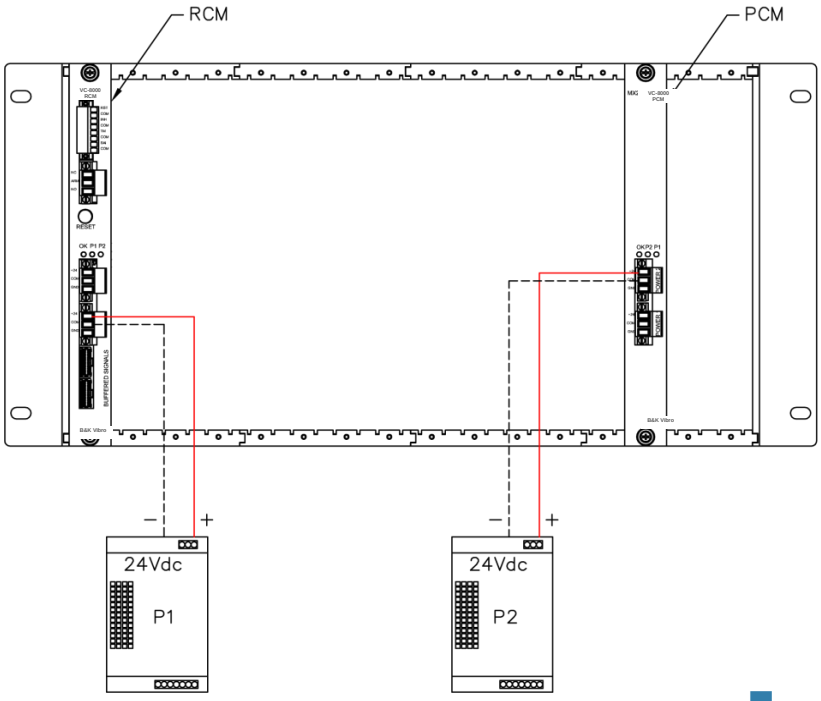
Configuration 1: RCM Only, Redundant Power Supplies

Failure Mode	Coverage
RCM Failure	×
PCM Failure	N/A
P1 Failure	✓
P2 Failure	✓
RCM + P1 Failure	×
RCM + P2 Failure	×
PCM + P1 Failure	N/A
PCM + P2 Failure	N/A
RCM + PCM Failure	N/A
P1 + P2 Failure	×



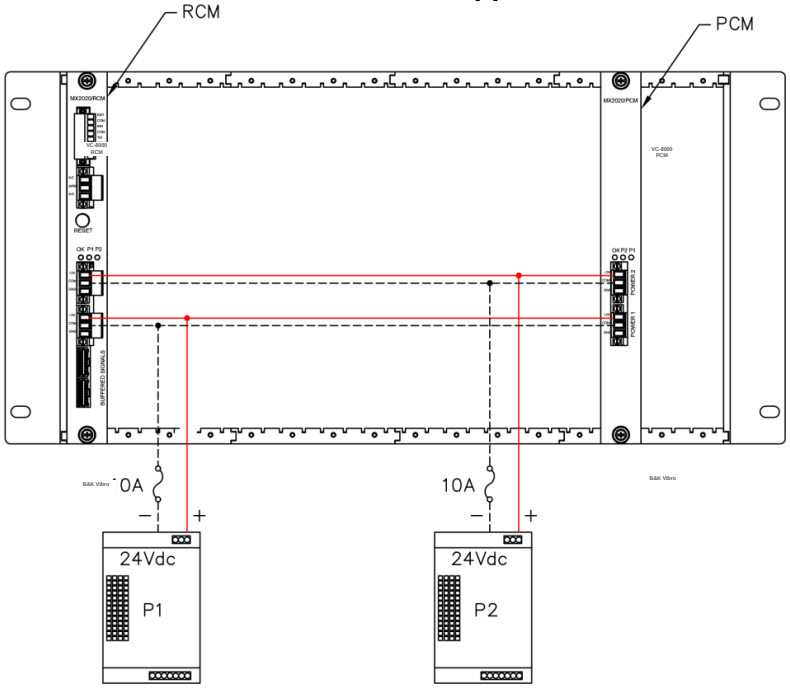
Configuration 2: RCM and PCM, Separate Power Supplies

Failure Mode	Coverage
RCM Failure	×
PCM Failure	N/A
P1 Failure	✓
P2 Failure	✓
RCM + P1 Failure	✓
RCM + P2 Failure	×
PCM + P1 Failure	×
PCM + P2 Failure	✓
RCM + PCM Failure	×
P1 + P2 Failure	×



Configuration 3: RCM and PCM, Shared Power Supplies

Failure Mode	Coverage
RCM Failure	✓
PCM Failure	✓
P1 Failure	✓
P2 Failure	✓
RCM + P1 Failure	✓
RCM + P2 Failure	✓
PCM + P1 Failure	×
PCM + P2 Failure	✓
RCM + PCM Failure	×
P1 + P2 Failure	×



NOTE:

External fuses required as shown to limit current in each branch to 10A.

Accessories

System Power Cable

This cable is used to connect 24Vdc power from an external source to the P1 or P2 connectors on the RCM. One end of the cable is pre-wired to the RCM mating connector and the other end has no connector installed, allowing it to be trimmed to length in the field. Cable is a shielded twisted pair (black = COM, red = +24 Vdc) with drain wire.

A separate conductor (green) is provided for connection of chassis ground. All conductors are 12 AWG. A jumper is installed in the RCM connector tying COM to chassis ground. It may be removed for installations in which chassis ground and COM must be at different potentials
(e.g., intrinsically safe installations).

100435-AA
System Power Cable

AA	Cable Length
1 0	10 foot (3 m) cable length

Contact

Brüel & Kjær Vibro GmbH
Leydheckerstrasse 10
64293 Darmstadt
Deutschland

Phone: +49 (0) 6151 428 0
Fax: +49 (0) 6151 428 10 00
E-Mail: support@bkvibro.com
www.bkvibro.com

BK Vibro America Inc
SETPOINT Operations
2243 Park Place, Suite A
Minden, Nevada 89423
USA

Phone: +1 (775) 552 3110

E-Mail: support@bkvibro.com
www.setpoint.bkvibro.com

Document S1078950.002 / V03 ●