

DA High Speed Rate Counter Module Installation Guide

- Adds three counters to the DA70 products
- Four count inputs, four user inputs, four setpoint outputs, and four digital outputs
- Offers complete isolation; inputs, outputs, power, and communication
- Dual channel counter inputs configurable for count, rate, or quadrature counting modes
- Outputs are sinking with max of 1 A per channel



FOR USE IN HAZARDOUS LOCATIONS:
 Class I, Division 2, Groups A, B, C, and D
 T4



II 3 G Ex ec IIC T4 Gc
 DEMKO 20 ATEX 2268X
 IECEx UL 20.0007X
 UL22UKEX2576X

MODULE PACKAGE CHECKLIST

This product package should contain the items listed below. If any items are missing or damaged, contact Red Lion immediately.

- DIN Rail Mount DA HSRC Module
- Installation Guide

GENERAL DESCRIPTION

The DA HSRC module features three counters designed for use with the DA70 controllers. This module is an ideal choice to monitor quadrature/direction encoders, count events, measure pulse width, and measure rates.

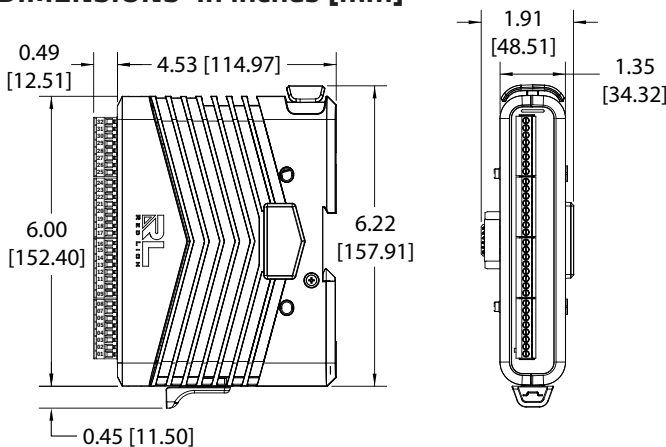
The digital inputs accept standard DC inputs or contact closures. Each counter has a software selectable input filter that can be used to prevent contact bounce. 4 SSR outputs can indicate the status of a count total or rate measurement.

Counting modes include quadrature/direction encoders, count events on one input, sum events on two inputs, count with direction, count SSR output activations, etc.

The SSR outputs are capable of switching up to one amp DC each. For applications requiring large loads to be controlled or AC voltages, several DIN rail mount interposing relays are available.

The modules connect and communicate via proprietary backplane to the DA host device. The DA host device, equipped

DIMENSIONS In inches [mm]



with serial ports as well as an Ethernet port(s), allows the system to share data with PCs, PLCs, and SCADA systems.

Internal power management circuits allow the module to be replaced while power is applied, which reduces downtime in the event of a module failure. All configuration information is stored locally within the module, as well as in the Host, so replacement modules do not need to be configured.

CONFIGURATION

The DA HSRC modules are configured with Windows® compatible Crimson® software. The software is an easy to use, graphical interface which provides a means of configuration and commissioning of new systems, as well as routine module re-calibration.


SAFETY SUMMARY


All safety related regulations, local codes as well as instructions that appear in this document or on equipment must be observed to ensure personal safety and to prevent damage to either the device or equipment connected to it.

Do not use these products to replace proper safety interlocking. No software-based device (or any other solid-state device) should ever be designed to be responsible for the maintenance of personnel safety or consequential equipment not equipped with safeguards. Red Lion disclaims any responsibility for damages, either direct or consequential, that result from the use of this equipment in a manner not consistent with these specifications.

	<p>CAUTION: Risk of Danger Read complete instructions prior to installation and operation of the unit.</p> <p>ATTENTION : Risque de danger Lire les instructions complètes avant l'installation et l'utilisation de l'appareil.</p>
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	<p>WARNING - Explosion Hazard - Substitution of components may impair suitability for Class I, Division 2. AVERTISSEMENT - Danger d'explosion - Le remplacement de composants peut nuire à l'aptitude à la classe I, division 2.</p>
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 This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D, or non-hazardous locations only.
Cet équipement est adapté à une utilisation dans des endroits de classe I, Division 2, Groupes A, B, C, D, ou dans des endroits non dangereux seulement.

 **WARNING - Explosion Hazard.** Not hot swappable. Do not remove or replace while circuit is live unless the area is free of ignitable concentrations.
AVERTISSEMENT - Risque d'explosion. Non échangeable à chaud. Ne pas retirer ou remplacer sous tension sauf si la zone est exempte de concentrations inflammables.

SPECIFICATIONS

1. POWER REQUIREMENTS:

Power is supplied by the DA host controller. Modules may be hot-swapped (replaced while powered up) in non-hazardous locations only.

Max Power: 2.0 W

2. LEDs: One LED indicator for each I/O point and a status LED.

3. MEMORY: Non-volatile memory retains all programmable parameters. The Controller also stores the parameters in order to reprogram any modules that need updates.

4. COUNTER INPUTS:

2 dual channel inputs, individual screw terminals for channel-to-channel isolation and independent Sink/Source hardware configuration

Maximum input voltage: 30 VDC, reverse polarity protected

Guaranteed ON voltage: 2.5 V

Guaranteed OFF voltage: 1.5 V

TTL compatible

Current draw: 10.5 mA @ 30 VDC, 4.5 mA @ 2.5 VDC,
nominal spec: 8 mA

Range: -2,147,483,648 to 2,147,483,647

Maximum Count Rates:

MODE	COUNTER A	COUNTER B
Count X1	500 KHz	500 KHz
Count X1 with Direction	50 KHz	50 KHz
Dual Input X1 Add/Add	50 KHz	50 KHz
Dual Input X1 Add/Subtract	50 KHz	50 KHz
Quad X1	50 KHz	50 KHz
Quad X2	500 KHz	50 KHz
Quad X4	500 KHz	500 KHz
Count X2	500 KHz	500 KHz
Count X2 with Direction	50 KHz	50 KHz
Pulse Width Fall/Fall	Accuracy: ± 2.0 msec	Accuracy: ± 2.0 msec
Pulse Width Fall/Rise	Accuracy: ± 2.0 msec	Accuracy: ± 2.0 msec
Pulse Width Rise/Fall	Accuracy: ± 2.0 msec	Accuracy: ± 2.0 msec
Pulse Width Rise/Rise	Accuracy: ± 2.0 msec	Accuracy: ± 2.0 msec

Software debounce filtering modes: None or Debounce.

Debounce limits input frequency to 50 Hz and input pulse widths to 10 msec min.

Input isolation: 500 Vrms

5. RATE INPUTS:

Range: 0 to 999,999

Maximum Frequency: 500 KHz

Minimum Frequency: 0.001 Hz

Display Update Time: 0.1 to 999.9 seconds

Accuracy: ±0.01%

6. DIGITAL OUTPUT:

8 solid state N-channel open drain MOSFETs

Load Type: General purpose, resistive and Pilot Duty

All outputs share the same common

Rating: 1 ADC max

V_{DS} ON: < 0.2 V @ 1 A

V_{DS} MAX: 30 VDC

Offstate leakage current: 0.5 µA max

7. SIGNAL INPUTS (INPUT A and INPUT B):

Selectable inputs accept pulses from a variety of sources

including switch contacts, TTL outputs, and standard RLC

sensors. Inputs accept current sinking or current sourcing

outputs and provide software selectable input filtering for

low frequency signals or switch contact debounce.

8. USER INPUTS: Four programmable user inputs

Max. Continuous Input: 30 VDC

Channel-to-channel isolation

Response Time: 12 msec. max.

Independent Sink/Source hardware configuration

Guaranteed ON voltage: 2.5 V

Guaranteed OFF voltage: 1.5 V

TTL compatible

Current draw: 10.5 mA @ 30 VDC, 4.5 mA @ 2.5 VDC,
nominal spec: 8 mA

9. COMMUNICATIONS: Provided by the DA70 Controller

10. ENVIRONMENTAL CONDITIONS:

Operating Temperature Range: -40 to 75 °C T_{AMB}

Storage Temperature Range: -40 to 80 °C T_{AMB}

Operating and Storage Humidity: 0 to 95% max. RH non-condensing

Vibration to IEC 60068-2-6: Operational 5-500 Hz, 2 g

Shock to IEC 60068-2-27: Operational 15 g

Altitude: Up to 2000 meters

Installation Category II, Pollution Degree 2 as defined in IEC/EN 60664-1.

11. CERTIFICATIONS AND COMPLIANCES:

CE Approved

EN 61326-1 Immunity to Industrial Locations

Emission CISPR 11 Class A

IEC/EN 61010-1

RoHS Compliant

ATEX Approved

Ⓜ II 3 G Ex ec IIC T4 Gc

DEMKO 20 ATEX 2268X

IECEX Approved

IECEX UL 20.0007X

UKEX Approved

UL22UKEX2576X

UL Hazardous: File # E317425

Rugged IP30 enclosure

ABS Type Approval for Shipboard Applications

12. CONNECTIONS: Removable wire clamp screw terminal blocks

Wire Strip Length: 0.3" (7.5 mm)

Wire Gauge Capacity: 14 to 24 AWG (2.08 to 0.20 mm²)
copper wire only

Torque: 2 inch-lbs (0.23 N-m)

13. CONSTRUCTION: Plastic enclosure with IP30 rating. For use only in an approved enclosure.

14. MOUNTING REQUIREMENTS: Mounts onto standard DIN style top hat (T) profile mounting rails according to EN50022

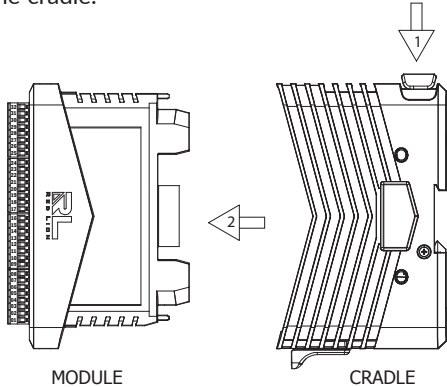
- 35 x 7.5 mm and 35 x 15 mm.

15. WEIGHT: 10.2 oz (317.25 g)

HARDWARE INSTALLATION

Removing Module From Cradle

To remove the module from the cradle, push in the module release button at the top of the cradle and pull the module out of the cradle.

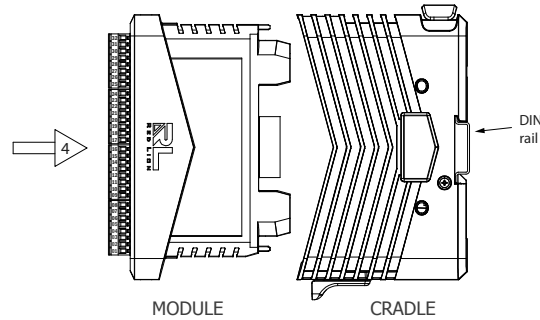


For hazardous location installation, the following shall be taken into consideration:

- The equipment shall only be used in an area of at least pollution degree 2, as defined in EN/IEC 60664-1.
- The equipment shall be installed in an enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC 60079-0. The enclosure shall be accessible only with the use of a tool.
- Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value at the supply terminals to the equipment.

Installing Module into Cradle

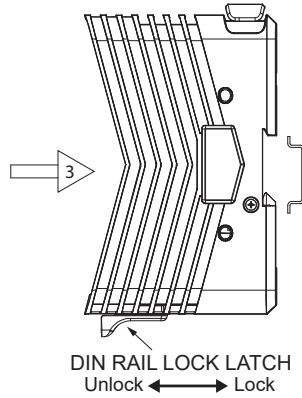
Push module into cradle until you hear an audible click indicating it is properly latched.



Attaching the Module/Cradle to the DIN Rail

The DIN rail should be mounted horizontally so that the unit's ventilation holes are vertical in relation to installation orientation. A minimum clearance of 1 inch (25.4 mm) should be maintained above and below the unit to ensure proper thermal regulation.

The cradle can be installed on the DIN rail with or without the module attached. Ensure the DIN rail lock latch is in the outward most position (unlocked). Hook the top back of the cradle DIN rail clip over the DIN rail. Press the cradle until flush with the rail and push the DIN rail lock latch to the latched (in) position.



MODULE HOT SWAPPING


If the area is known to be non-hazardous (free of ignitable concentrations), then a module can be removed and/or installed into a cradle attached to the controller while power is applied. However, it is **NOT** recommended to connect to or remove from the controller, a module/cradle pair or group of modules/cradles, while power is applied. The power should be turned off anytime a cradle or group of cradles (with or without modules) is plugged into or removed from the controller.

COUNT / RATE INPUT OPERATION

Reference the Crimson 3.2 Software Guide for more details.

MODE	COUNTER X INPUT A	COUNTER X INPUT B
Count X1	Adds Input A falling edge.	Not Used.
Count X1 with Direction	Adds Input A falling edge if Input B is high.	Subtracts if Input B is low.
Dual Input X1 Add/Add	Adds Input A falling edge.	Adds Input B falling edge.
Dual Input X1 Add/Subtract	Adds Input A falling edge.	Subtracts Input B falling edge.
Quad X1	Adds Input A rising edge when Input B is high.	Subtracts on reverse rotation.
Quad X2	Adds Input A rising edge when Input B is high and Input A falling edge when Input B is low.	Subtracts on reverse rotation.
Quad X4	Adds Input A falling edge when Input B is high, Input A rising edge when Input B is low, Input B rising edge when Input A is high, and Input B falling edge when Input A is low.	Subtracts on reverse rotation.
Count X2	Adds Input A rising and falling edges.	Not Used.
Count X2 with Direction	Adds Input A rising and falling edges if Input B is high.	Subtracts if Input B is low.
Pulse Width Fall to Fall	Measures the time between an Input A falling edge and the next Input A falling edge.	Not Used.
Pulse Width Fall to Rise	Measures the time between an Input A falling edge and the next Input A rising edge.	Not Used.
Pulse Width Rise to Fall	Measures the time between an Input A rising edge and the next Input A falling edge.	Not Used.
Pulse Width Rise to Rise	Measures the time between an Input A rising edge and the next Input A rising edge.	Not Used.

WIRING

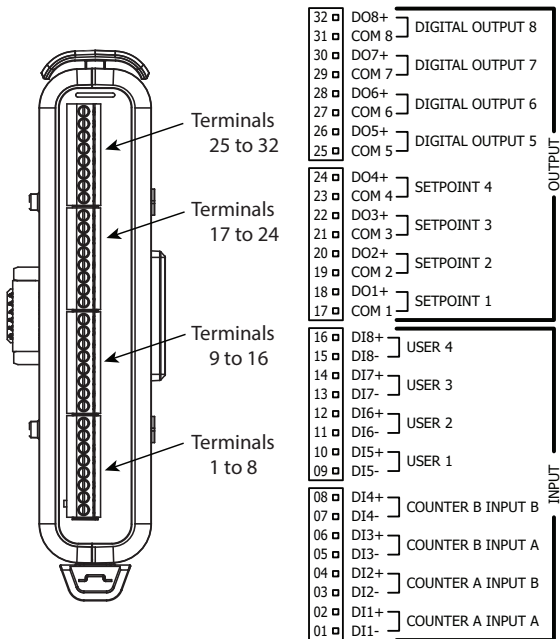


CAUTION: Only UL listed wiring with temperature ratings greater than 90 °C permitted for Class I, Division 2, Zone 2 and ATEX, IECex and UKEX installations.

ATTENTION: Seul le câblage homologué UL avec des températures nominales supérieures à 90°C est autorisé pour les installations de classe I, Division 2, zone 2 et ATEX, IECex and UKEX.

All power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.

All conductors should meet voltage and current ratings for each terminal. When wiring the module, use the numbers on the label to identify the position number with the proper function. Strip the wire, leaving approximately 0.3" (7.5 mm) of bare wire exposed. Insert the wire into the terminal, and tighten.

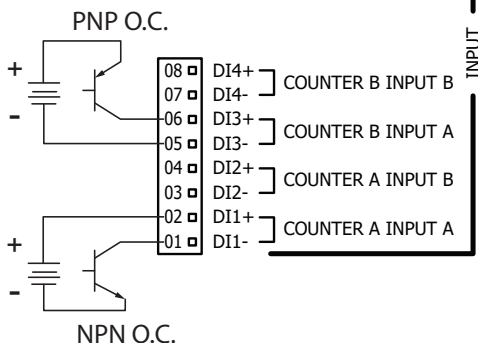


I/O WIRING

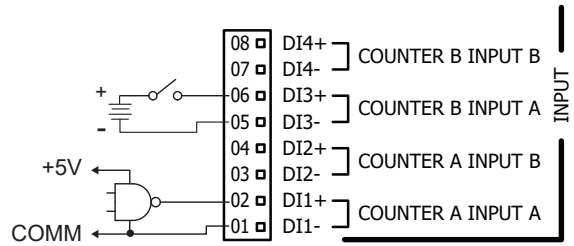
The DA HSRC module offers 4 discrete count inputs, 4 discrete user inputs, 4 discrete setpoint outputs, and 4 discrete digital outputs. The discrete inputs and outputs operate on the same voltage that powers the unit. Pluggable screw block terminals are provided for the I/O wiring connections. Refer to the diagrams below on how to make your I/O connections.

INPUT SIGNAL WIRING

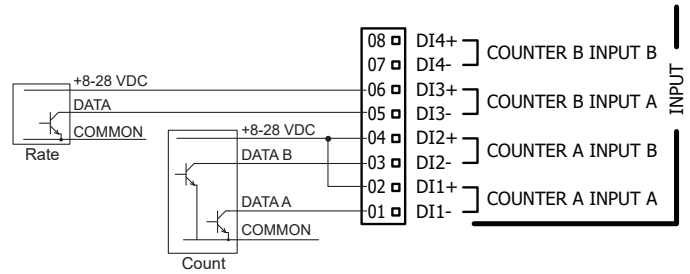
Current Sourcing Output; Current Sinking Output



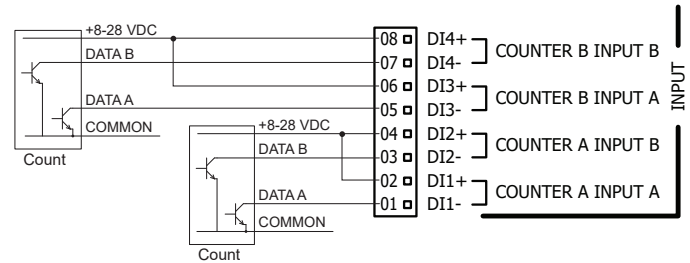
Switch; TTL Output



Rate; Quad/Direction

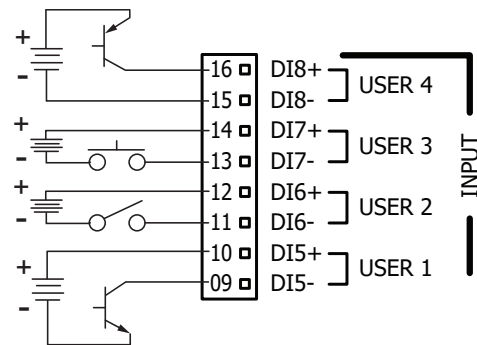


Dual Quad

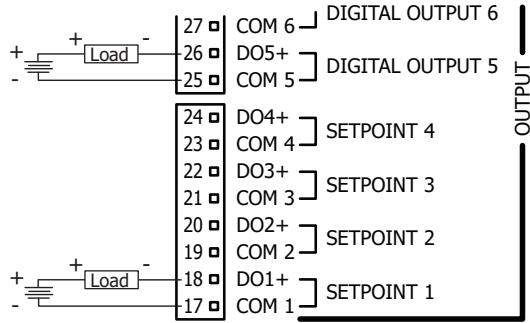


USER INPUT WIRING

User Input terminals do not need to be wired in order to remain in an inactive state



SETPOINT/DIGITAL OUTPUT WIRING



RED LION CONTROLS TECHNICAL SUPPORT

If for any reason you have trouble operating, connecting, or simply have questions concerning your new product, contact Red Lion’s technical support.

Support: support.redlion.net

Website: www.redlion.net

Inside US: +1 (877) 432-9908

Outside US: +1 (717) 767-6511

Corporate Headquarters

Red Lion Controls, Inc.

1750 5th Avenue York, PA 17403

STATUS LED

LED COLOR(S)	LED STATE	MEANING
Blue	3 quick flashes	Module is booting.
Green	Solid	Module is configured and running.
Green/Off	Flashing	Module is running but is not configured.
Green/Purple	Flashing	Module is performing calibration.
Red/Green	Flashing	Module is running but communication with the controller is inactive. If status persists, contact technical support.
Red/Off	Flashing	An internal error has occurred. If status persists, contact technical support.
Yellow/Off	Flashing	Module position is unassigned. If status persists, contact technical support.
Off	Solid	Module application is not running or the module is not powered. If status persists, contact technical support.

ORDERING INFORMATION

DESCRIPTION	PART NUMBER
DA Series I/O Module High-Speed Rate Counter	DAM00102C0000000

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