

DeltaV™ S-series LocalBus Design

This document provides clarifications and guidelines for laying out S-series traditional I/O carriers, also in combination with M-series horizontal and vertical plus I/O carriers to support DeltaV SIS.

Table of Contents

Introduction 3
LocalBus Length 3
Supported Hardware configurations 3
Single Carrier Layout 4
Dual Carrier Layout 5
Triple Carrier Layout 5
Supported Hardware configurations in combination with SIS 6
Single Carrier Layout combined with SIS 7
Dual Carrier Layout combined with SIS 8
Triple Carrier Layout combined with SIS 9
Double Side Layout 10
Conclusion 11

Tables and Figures

Table 1: Available Cable Extenders. 3
Fig 1: 1 wide Layout 4
Fig 2: 2 wide Layout 5
Fig 3: 3 wide Layout 5
Table 2: Available SIS Cable Extenders. 6
Fig 4: 1 wide Layout combined with SIS. 7
Fig 5: 2 wide Layout combined with SIS 8
Fig 6: 3 wide Layout combined with SIS 9
Fig 7: Double Side Layout combined with SIS 10

Introduction

This document looks at various cable options available for DeltaV™ S series traditional I/O carriers and how to calculate the effective bus length. It also provides specific layouts that are supported by Emerson, for which specific cables are to be used.

LocalBus Length

The DeltaV S-series LocalBus length is defined to be a maximum of 6.5 m (21.3 ft). This limit ensures that the electrical profile of the communication signal remains well within normal parameters all the way to the last card. To allow online expansion of the I/O subsystem, the LocalBus does not have terminators. The limited supported distance prevents the creation of signal reflections on the communication bus due to the absence of these terminators.

Another factor in the bus length is the power distribution of the 12 VDC bus. As the bus gets longer, voltage drop occurs and the voltage available to the last card on the bus must be within spec. The cable quality and connectors contribute significantly to this voltage drop and must be carefully considered.

S-series carriers and extender cables have been improved with new inter-carrier connectors and rugged power conductors in the cables. As a result, the LocalBus length calculation for S-series hardware has been simplified as follows:

$$\text{Localbus Length} = (\# \text{ of 8-wide I/O carriers}) + (\text{Sum of cable lengths}) \leq 6.5 \text{ m (21.3 ft)}$$

Although the supported length is still 6.5 m (21.3 ft), the calculation now excludes the 2-wide carriers and 1-wide extenders. With S-series, additional 2-wide carriers can be installed anywhere along the LocalBus in order to inject power for I/O cards. These additional 2-wide carriers are not counted when calculating the S-series LocalBus length.

Supported Hardware Configurations

When designing the I/O carrier installations, there are many combinations of carriers and cables possible, from 0 cables to 3 or 4 cables. For custom designs, the overall calculation must be kept at or below the published limit. To ensure the architecture will operate reliably, the overall LocalBus length should not exceed the published length.

The following table lists the available Extender Cables for S-series carriers:

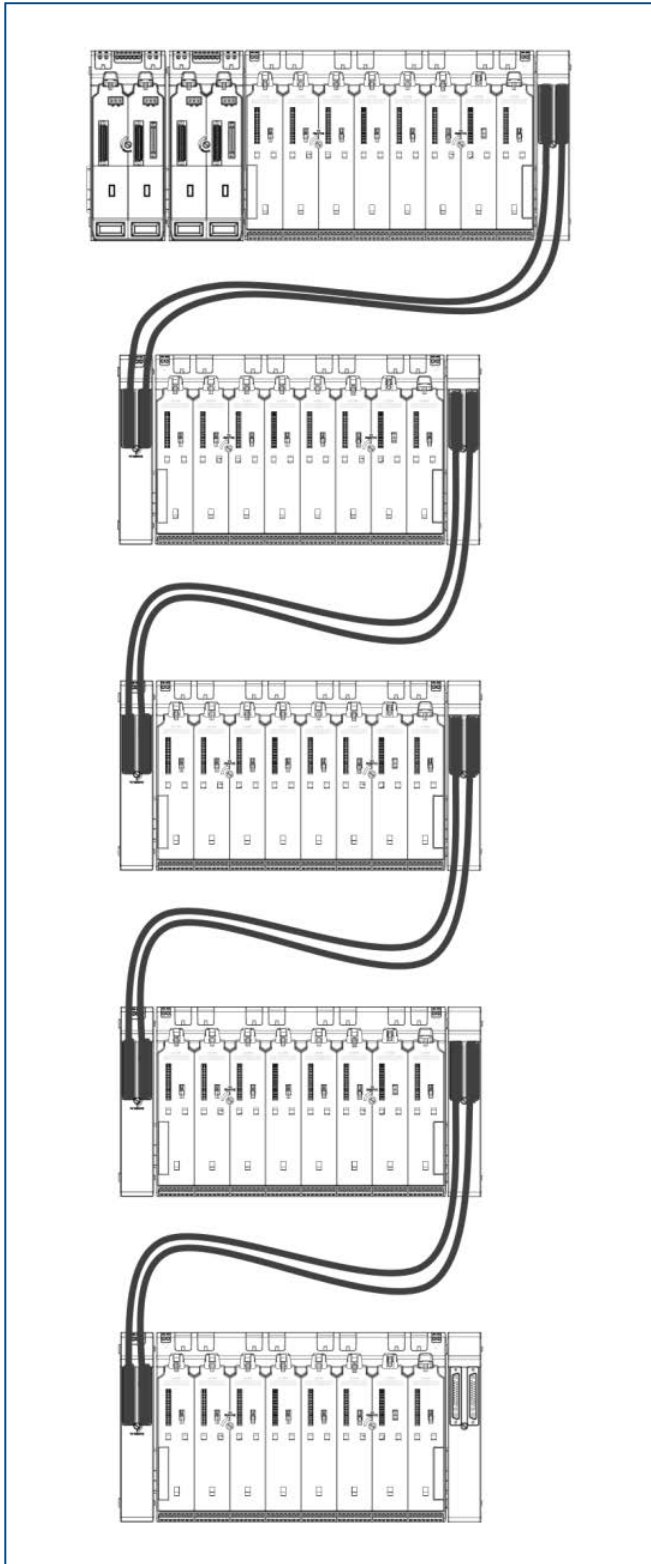
Part Number	Description
KJ4003X1-BH1	Extender Cable, 1.1 meter (43 inches), for VerticalPLUS and S-series Carriers
KJ4003X1-BH2	Extender Cable, 0.4 meter (17 inches), for VerticalPLUS and S-series Carriers
KJ4003X1-BH3	Extender Cable, 0.8 meter (31 inches), for VerticalPLUS and S-series Carriers
KJ4003X1-BH4	Extender Cable, 1.5 meter (58 inches), for VerticalPLUS and S-series Carriers
KJ4003X1-BH5	Extender Cable, 1.9 meters (77 inches), for VerticalPLUS and S-series Carriers

Table 1 — Available Cable Extenders.

The published cable lengths for these cables includes the 1-wide extenders. Also, the physical cable length may vary by as much as 3 inches. This is taken into consideration in the design and testing of the extender cables. Always use the published length of the cable in bus length calculations.

The following combinations of carriers and cables have been tested by DeltaV engineers to ensure that they meet the robust specifications for the LocalBus. None of these arrangements exceed the 6.5 m limit, due to the enhanced S-series cables and reduced number of connections, these specific arrangements are approved and can be used with confidence when designing I/O cabinets. The LocalBus Length calculation is provided for each solution.

Single Carrier Layout



Suitable for 800 mm wide cabinets. This arrangement is typically limited to 5 carriers within one cabinet.

	Quantity	Unit Length	Total
8-wide Carriers	5	0.35	1.75
KJ4003X1-BH3	4	0.8	3.2
Total LocalBus Length			4.95m

Note:

- Controller 2-wide carriers and 1-wide extenders are not counted in the calculation.
- The I/O LocalBus starts at the right side of the right-hand controller.
- Adding 2-wide carriers to support additional System Power supplies or to add VIMs does not change the LocalBus calculation.

Figure 1 – 1 wide Layout.

Dual Carrier Layout

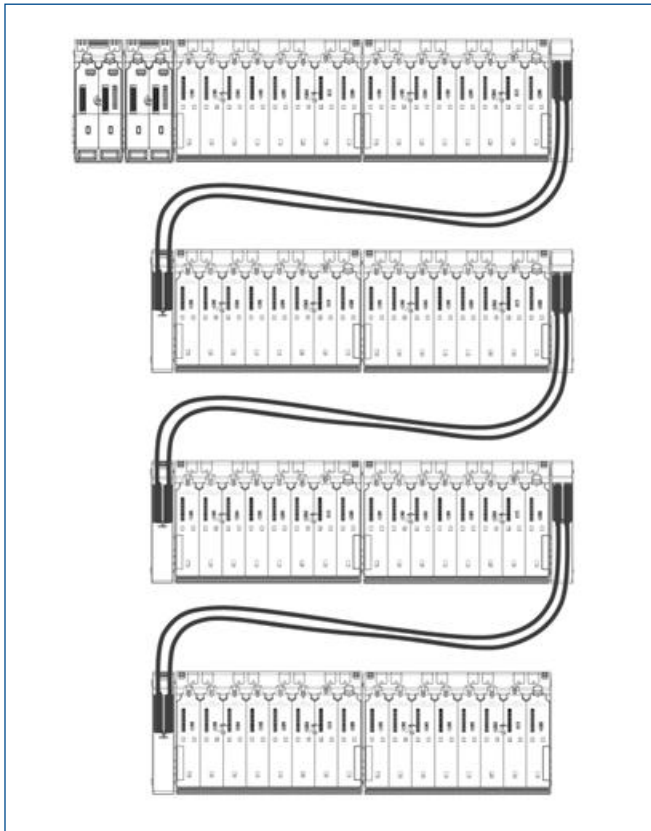


Figure 2 – 2 wide Layout.

Suitable for 1200 mm wide cabinets. This arrangement allows the max. of 8 carriers within one cabinet.

	Quantity	Unit Length	Total
8-wide Carriers	8	0.35	2.8
KJ4003X1-BH1	3	1.1	3.3
Total LocalBus Length			6.1m

Note:

- Controller 2-wide carriers and 1-wide extenders are not counted in the calculation
- The I/O LocalBus starts at the right side of the right-hand controller.
- Adding 2-wide carriers to support additional System Power supplies or to add VIMs does not change the LocalBus calculation.

Triple Carrier Layout

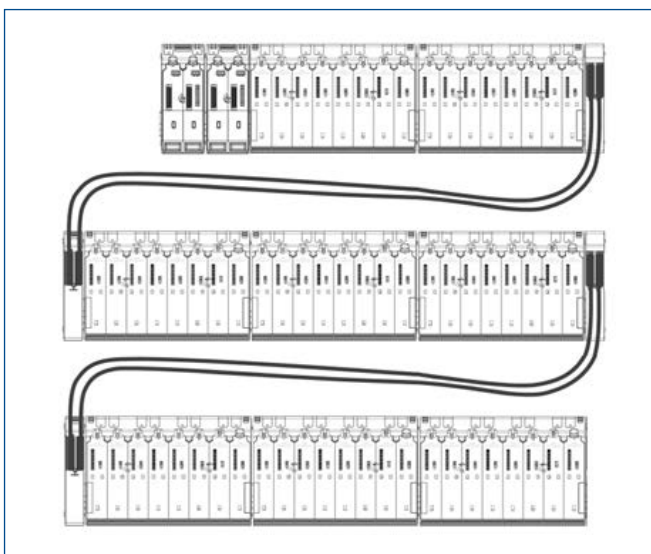


Figure 3 – 3 wide Layout.

Suitable for 1600 mm wide cabinets. This arrangement allows the max. of 8 carriers within one cabinet.

	Quantity	Unit Length	Total
8-wide Carriers	8	0.35	2.8
KJ4003X1-BH4	2	1.5	3.0
Total LocalBus Length			5.8m

Note:

- Controller 2-wide carriers and 1-wide extenders are not counted in the calculation.
- The I/O LocalBus starts at the right side of the right-hand controller.
- Adding 2-wide carriers to support additional System Power supplies or to add VIMs does not change the LocalBus calculation.

Supported Hardware Configurations in Combination with SIS

When designing the I/O carrier installations, there are many combinations of carriers and cables possible, from 0 cables to 3 or 4 cables, combining S-series Carrier with SIS makes the calculation a little bit different. For custom designs the overall calculation must be kept at or below the published limit. To ensure the architecture will operate reliably, the overall LocalBus length should not exceed the published length.

The following table lists the available Extender SIS Cables sets for M-series carriers:

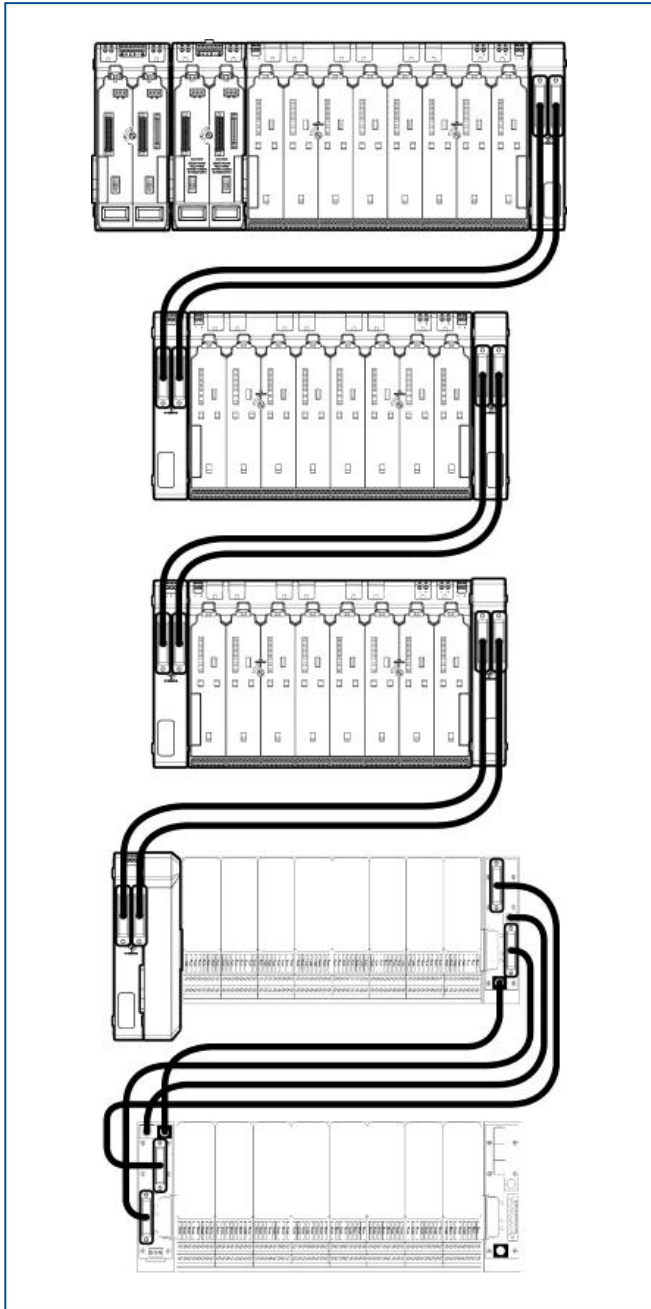
Part Number	Description
VS -	SIS Extender Cable Set, 0.4 meter (17 inches), for VerticalPLUS Carriers
VE -	SIS Extender Cable Set , 0.87 meter (34 inches), for M-series Carriers
VE -	SIS Extender Cable Set, 1.2 meter (46 inches), for M-series Carriers
VE -	SIS Extender Cable Set, 1.53 meter (59 inches), for M-series Carriers

Table 2 — Available SIS Cable Extenders.

For more information on the various VE/VS Numbers please refer to the DeltaV SIS Product Data Sheet. The published cable lengths for these cables do not include the 1-wide extenders. Also, the physical cable length may vary by as much as 3 inches. This is taken into consideration in the design and testing of the extender cables. Always use the published length of the cable in bus length calculations.

The following combinations of S-series and M-Series carriers and cables have been tested by DeltaV engineers to ensure that they meet the robust specifications for the LocalBus. None of these arrangements exceed the 6.5 m limit, due to the enhanced S-series cables and reduced number of connections, these specific arrangements are approved and can be used with confidence when designing I/O cabinets. The LocalBus Length calculation is provided for each solution.

Single Carrier Layout combined with SIS



Suitable for 800 mm wide cabinets. This arrangement is typically limited to 5 carriers within one cabinet.

	Quantity	Unit Length	Total
8-wide Carriers	3	0.35	1.05
KJ4003X1-BH3	3	0.8	2.4
KJ4005X1-BD1	1	-	-
8-wide Carrier	1	0.35	0.35
KJ4001X1-NA1	1	0.05	0.05
SIS Cable Set	1	0.87	0.87
KJ4001X1-NB1	1	0.05	0.05
8-wide Carrier	1	0.35	0.35
KJ4001X1-NA1	1	0.05	0.05
Total LocalBus Length			5.8m

Note:

- Controller 2-wide carriers and 1-wide extenders are not counted in the calculation.
- The I/O LocalBus starts at the right side of the right-hand controller.
- Adding 2-wide carriers to support additional System Power supplies or to add VIMs does not change the LocalBus calculation.
- All SIS related single parts will count as for M-Series specified.

Figure 4 — 1 wide Layout combined with SIS.

Dual Carrier Layout combined with SIS

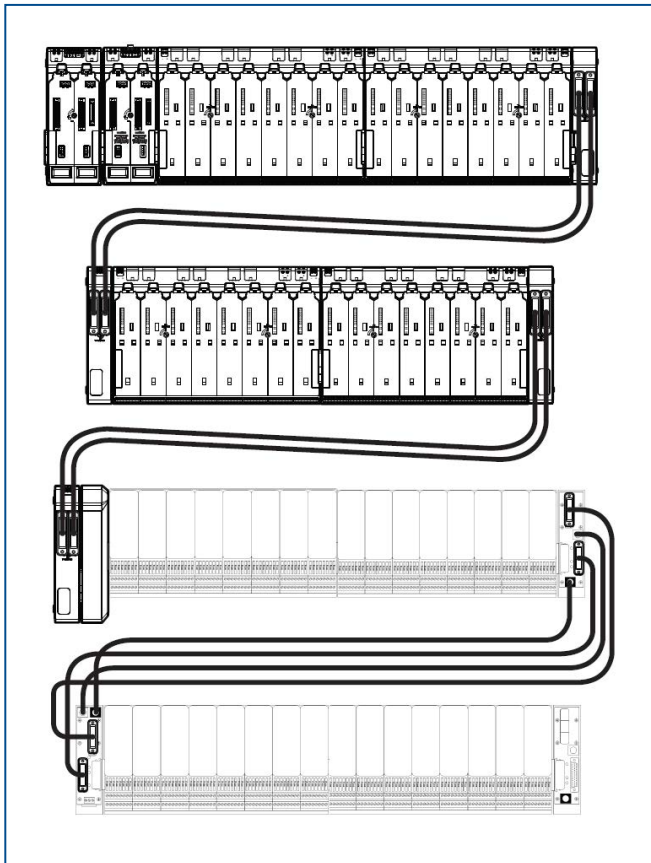


Figure 5 — 2 wide Layout combined with SIS.

Suitable for 1200 mm wide cabinets. This arrangement allows for 8 carriers within one cabinet.

	Quantity	Unit Length	Total
8-wide Carriers	4	0.35	1.4
KJ4003X1-BH1	2	1.1	2.2
KJ4005X1-BD1	1	-	-
8-wide Carrier	2	0.35	0.70
KJ4001X1-NA1	1	0.05	0.05
SIS Cable Set	1	1.2	1.2
KJ4001X1-NB1	1	0.05	0.05
8-wide Carrier	2	0.35	0.70
KJ4001X1-NA1	1	0.05	0.05
Total LocalBus Length			6.35m

Note:

- Controller 2-wide carriers and 1-wide extenders are not counted in the calculation.
- The I/O LocalBus starts at the right side of the right-hand controller.
- Adding 2-wide carriers to support addition System Power supplies or to add VIMs does not change the LocalBus calculation.
- All SIS related single parts will count as for M-Series specified.

Triple Carrier Layout combined with SIS

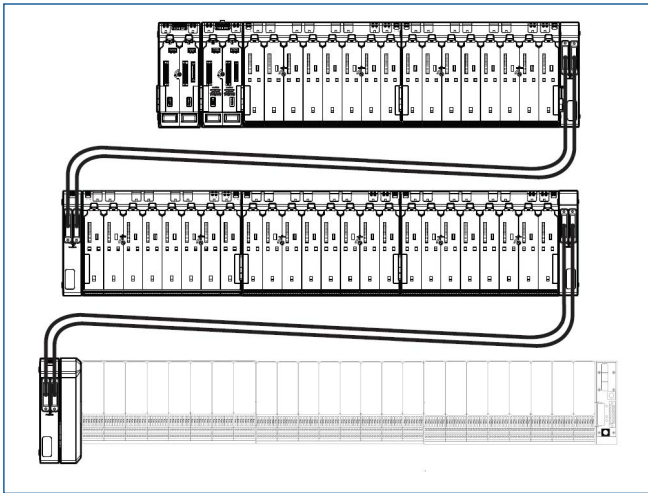


Figure 6 — 3 wide Layout combined with SIS.

Suitable for 1600 mm wide cabinets. This arrangement allows 8 carriers within one cabinet.

	Quantity	Unit Length	Total
8-wide Carriers	5	0.35	1.75
KJ4003X1-BH4	2	1.5	3.0
KJ4005X1-BD1	1	-	-
8-wide Carrier	3	0.35	1.05
KJ4001X1-NA1	1	0.05	0.05
Total LocalBus Length			5.85m

Note:

- Controller 2-wide carriers and 1-wide extenders are not counted in the calculation.
- The I/O LocalBus starts at the right side of the right-hand controller.
- Adding 2-wide carriers to support addition System Power supplies or to add VIMs does not change the LocalBus calculation.
- All SIS related single parts will count as for M-Series specified.

Double Side Layout combined with SIS

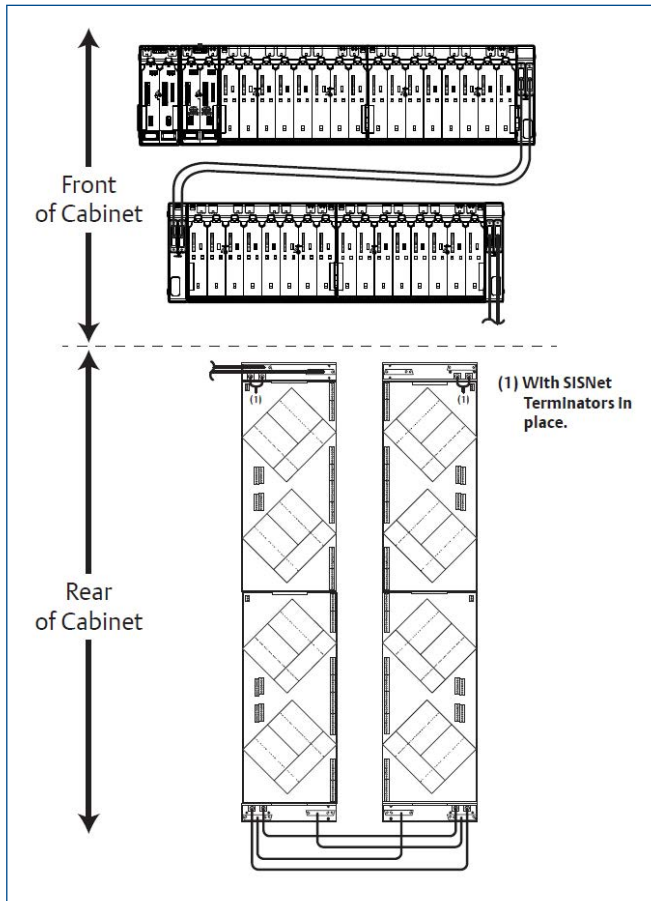


Figure 7 – Double Side Layout combined with SIS.

Suitable for 1200 mm wide cabinets. This arrangement allows for 8 carriers within one double sided cabinet and provides space for additional other SIS Hardware like Barriers. It also separates DCS and SIS physically.

	Quantity	Unit Length	Total
8-wide Carriers	4	0.35	1.40
KJ4003X1-BH1	1	1.1	1.1
KJ4003X1-BH4 (from front to backside max.)	1	1.5	1.5
8-wide Vertical	2	0.51	1.02
SIS Cable Set	1	0.4	0.4
8-wide Vertical	2	0.51	1.02
Total LocalBus Length			6.44m

Note:

- Controller 2-wide carriers and 1-wide extenders are not counted in the calculation.
- The I/O LocalBus starts at the right side of the right-hand controller.
- Adding 2-wide carriers to support addition System Power supplies or to add VIMs does not change the LocalBus calculation.
- All SIS related single parts will count as for M-Series specified.

Conclusion

The enhancements to S-series carrier connectors and extender cables have allowed the effective bus length to be extended slightly and allow the overall bus length calculation to be simplified. The calculation should use the published length of the cables along with the 8-wide I/O card carriers. The specific examples provided in this paper have been sanctioned by Emerson product engineering, and are supported, even though they do exceed the published design length. Custom design solutions that are different than these specific examples must respect the published bus limit to be considered a supported installation.

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