Compact I/O Selection Guide

1769 series

Rockwell Automation

I/O For Every Application

Rockwell Automation is the only company that can offer you the Complete Automation™ experience with world-class I/O products for virtually every application need. You can choose from I/O that is distributed with the application or integrated with the controller. The choice is yours.

Rockwell Automation offers block I/O, modular I/O and chassis-based I/O. The following table summarizes our modular I/O selection. This selection guide summarizes the 1769 Compact I/O offering.

I/O Family	Description
1734 POINT I/O	• 1, 2, or 4 I/O per module • compact modular assembly • configure backplane size by plugging in bases/modules • Auto Device Replace (ADR) • removable terminations
1794 FLEX I/O	• 4...32 I/O per module • more than 60 products to choose from • easy configuration • compact modular assembly • configure backplane size by plugging in terminal bases/modules • connect I/O directly - no separate terminal blocks required
1797 FLEX Ex I/O	• 2...16 I/O per module • Intrinsically Safe (IS) I/O for Class I, II, III, Div. 1 hazardous areas • compact modular assembly • RIUP and advanced diagnostics • no need for IS barriers
1798 FLEX Armor I/O	• 4 or 8 I/O per module • compact modular assembly • machine-mountable; IP67 and NEMA 4X, 6P • connect I/O directly with quick-disconnect connectors
1769 Compact I/O	• 8...16 I/O per module • compact modular assembly • configure backplane size by plugging in modules • use for local I/O with a MicroLogix 1500 controller or a CompactLogix controller module

Compact I/O Modules

What's New:

- *1769-IF8*

- *1769-OF8C*

- *1769-OF8V*

Compact I/O offers low cost per point, ease of acquisition, and flexible configuration and mounting options, Compact I/O provides an ideal solution for many industries. The flexibility of 1769 Compact I/O is such that it can be used with several different Allen-Bradley control systems.
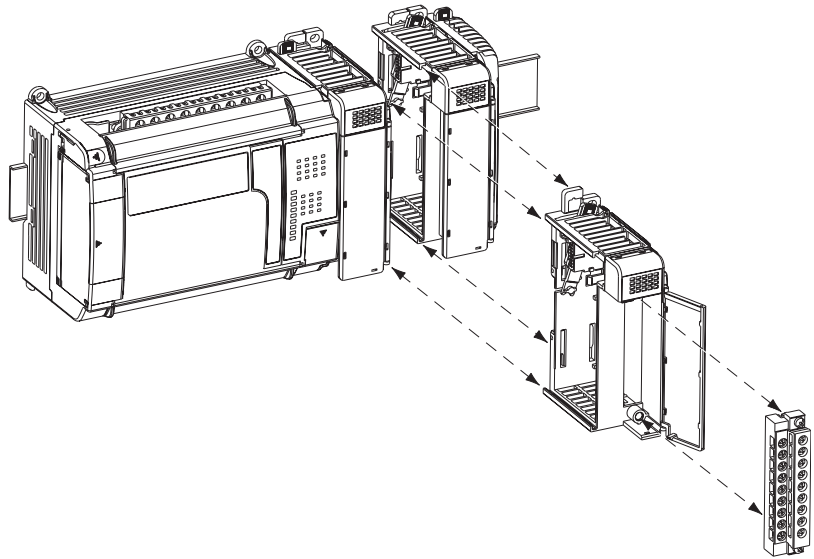
- Once the modules are locked together, the system becomes a rugged assembly.

- Upper and lower tongue-and-groove slots guide the module during installation and secure the module within the system.

- Removable terminal blocks help ease the wiring task.

- Self-lifting field-wire pressure plates cut installation time.

- The patented bus connector with locking function ensures reliable module and system communication.

- A color bar is provided on the front of the module.

- Digital and field circuits are optically isolated.

Specifying a Compact I/O System

Follow these steps as you specify your Compact I/O system:

✓	Step	See	
	1 Select I/O devices Use a spreadsheet to record: • location of the device • number of points needed • appropriate catalog number • number of points available per module • number of modules **Important:** For 1769-L20, -L30 CompactLogix controllers, verify backplane memory use to make sure that the controller can support the proposed system. See the worksheet at the back of this selection guide.	Digital I/O modules Analog I/O modules Specialty I/O modules Communication modules	page 4 page 15 page 33 page 34
	2 Select a 1492 wiring system Choose a wiring system as an alternative to the terminal block that comes with the module.	Wiring systems PanelConnect modules for sensors	page 35 page 38
	3 Select a control interface Select the appropriate controller based on the type and number of I/O points needed	1769 CompactLogix controller 1764 MicroLogix 1500 packaged controller 1769-ADN DeviceNet adapter module	page 39 page 42 page 43
	4 Select power supplies If power consumption exceeds the maximum for a single power supply, install additional power supplies.	Power supply specifications	page 45
	5 Select the mounting requirements Determine whether to panel mount or DIN rail mount the CompactLogix system.	Planning the mounting requirements	page 49
	6 Select software Based on the system design, determine the software products you need to configure and program your application.	Available software products Programming software Network configuration software	page 51 page 52 page 54

Step 1 - Select:

• *I/O modules*

Selecting Compact I/O Modules

The 1769 Compact I/O modules can be used with a CompactLogix controller, as well as for expansion I/O in a MicroLogix 1500 controller assembly or in an assembly with a 1769-ADN DeviceNet I/O adapter module. Unless connected to a MicroLogix 1500 base, each bank of I/O modules must include its own power supply.

Install the I/O modules on a panel with two mounting screws or on a DIN rail. The modules mechanically lock together by means of a tongue-and-groove design and have an integrated communication bus that is connected from module to module by a moveable bus connector.

Each I/O module includes a built-in removable terminal block with finger-safe cover for connections to I/O sensors and actuators. The terminal block is behind a door at the front of the module. I/O wiring can be routed from beneath the module to the I/O terminals.

For information on	See page
digital I/O modules	4
analog I/O modules	15
specialty I/O modules	33
communication modules	34

Important: When using a 1769-L20, -L30 CompactLogix controller, be sure to calculate the word usage to make sure that your system layout will operate properly. See the worksheet at the back of this guide.

About power supply distance ratings

Check each module's specification table for the power supply distance rating. This indicates how many slot positions the module can be from the power supply.
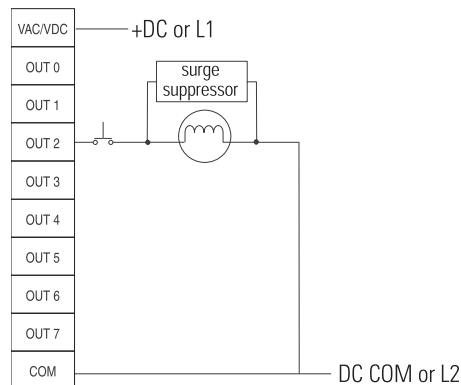
Digital I/O Modules

Choose digital I/O modules when you need:

Type of Module	Description
input module	An input module responds to an input signal in the following manner: • Input filtering limits the effect of voltage transients caused by contact bounce and/or electrical noise. If not filtered, voltage transients could produce false data. All input modules use input filtering. • Optical isolation shields logic circuits from possible damage due to electrical transients. • Logic circuits process the signal. • An input LED turns on or off indicating the status of the corresponding input device.
output module	An output module controls the output signal in the following manner: • Logic circuits determine the output status. • An output LED indicates the status of the output signal. • Optical isolation separates module logic and bus circuits from field power. • The output driver turns the corresponding output on or off.

Most output modules have built-in surge suppression to reduce the effects of high-voltage transients. Use an additional suppression device if an output is being used to control inductive devices, such as relays, motor starters, solenoids, or motors. Additional suppression is especially important if your inductive device is in series with or parallel to hard contacts, such as push buttons or selector switches.

Add a suppression device directly across the coil of an inductive device to reduce the effects of voltage transients caused by interrupting the current to that device and to prolong the life of the switch contacts.

Selecting digital I/O modules

Voltage Category	Catalog Number	Input/Output	See Page
AC Modules			
100/120V ac	1769-IA8I	8 inputs, individually isolated	5
100/120V ac	1769-IA16	16 inputs	6
200/240V ac	1769-IM12	12 inputs	6
100...240V ac	1769-OA8	8 outputs	7
120...240V ac	1769-OA16	16 outputs	7
DC Modules			
24V dc sinking/sourcing	1769-IQ16	16 inputs	8
24V dc sinking/sourcing	1769-IQ16F	16 inputs, high-speed	8
24V dc sinking/sourcing	1769-IQ32	32 inputs	9
24V dc sinking/sourcing input ac/dc normally open relay output	1769-IQ6XOW4	6 inputs 4 outputs	10
24V dc sourcing	1769-OB8	8 outputs	10
24V dc sourcing	1769-OB16	16 outputs	11
24V dc sourcing	1769-OB16P	16 outputs, protected	11
24V dc sourcing	1769-OB32	32 outputs	12
24V dc sinking	1769-OV16	16 outputs	13
AC/DC Modules			
ac/dc normally open relay	1769-OW8	8 outputs	13
ac/dc normally open relay	1769-OW8I	8 outputs, individually isolated	14
ac/dc normally open relay	1769-OW16	16 outputs	14
Certifications: C-UL (under CSA C22.2 No. 142), UL 508, CE			

1769 Compact Digital AC Input Modules
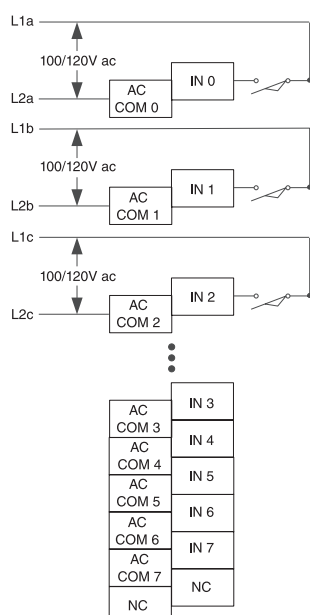
1769-IA8I isolated 120V ac input module

Specification	Value
Voltage Category/Type, Input	100 or 120V ac
Operating Voltage Range	79V ac...132V ac @ 47 Hz...63 Hz
Number of Inputs	8
Backplane Current (mA) at 5V	90 mA
Voltage, Off-State Input, Max.	20V ac
Current, Off-State Input, Max.	2.5 mA
Voltage, On-State Input, Min.	79V ac
Current, On-State Input, Min.	5 mA @ 79V ac
Inrush Current, Max.	250 mA
Nominal Impedance	12K Ω @ 50 Hz 10K Ω @ 60 Hz
IEC Input Compatibility	Type 1+
Power Supply Distance Rating	8 modules
Isolated Groups	8 individually isolated inputs
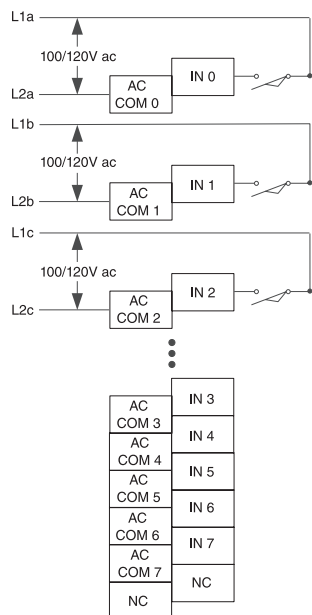
1769-IA16 120V ac input module

Specification	Value
Voltage Category/Type, Input	100 or 120V ac
Operating Voltage Range	79V ac...132V ac @ 47 Hz...63 Hz
Number of Inputs	16
Backplane Current (mA) at 5V	115 mA
Voltage, Off-State Input, Max.	20V ac
Current, Off-State Input, Max.	2.5 mA
Voltage, On-State Input, Min.	79V ac
Current, On-State Input, Min.	5 mA @ 79V ac
Inrush Current, Max.	250 mA
Nominal Impedance	12K Ω @ 50 Hz 10K Ω @ 60 Hz
IEC Input Compatibility	Type 1+
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: outputs 0 to 15 (internally connected to common)

1769-IM12 240V ac input module

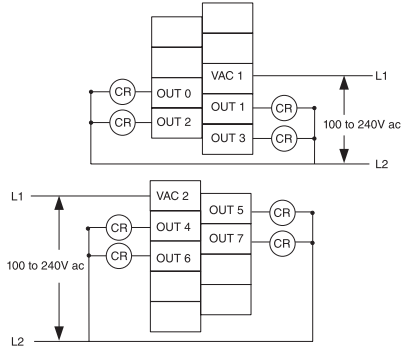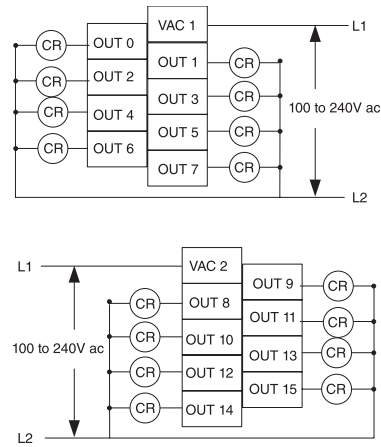| Specification	Value
Voltage Category/Type, Input	200 or 240V ac
Operating Voltage Range	159V ac...265V ac @ 47 Hz...63 Hz
Number of Inputs	12
Backplane Current (mA) at 5V	100 mA
Voltage, Off-State Input, Max.	40V ac
Current, Off-State Input, Max.	2.5 mA
Voltage, On-State Input, Min.	159V ac
Current, On-State Input, Min.	5 mA @ 159V ac
Inrush Current, Max.	250 mA
Nominal Impedance	27K Ω @ 50 Hz 23K Ω @ 60 Hz
IEC Input Compatibility	Type 1+
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: inputs 0 to 11 (internally connected commons)

1769 Compact Digital AC Output Modules

1769-OA8 120/240V ac output module

Specification	Value
Voltage Category/Type, Output	100…240V ac
Operating Voltage Range	85V ac...265V ac @ 47 Hz...63 Hz
Number of Outputs	8
Backplane Current (mA) at 5V	145 mA
Current Leakage, Off-State Output, Max.	2.0 mA at 132V ac 2.5 mA at 265V ac
Current, On-State Output, Min.	10.0 mA
Voltage Drop, On-State Output, Max.	1.5V ac at 0.5 A
Output Surge Current, Max.	10.0 A
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: outputs 0 to 3 Group 2: outputs 4 to 7

1769-OA16 120/240V ac output module

Specification	Value
Voltage Category/Type, Output	100…240V ac
Operating Voltage Range	85V ac...265V ac @ 47 Hz...63 Hz
Number of Outputs	16
Backplane Current (mA) at 5V	225 mA
Current Leakage, Off-State Output, Max.	2.0 mA at 132V ac 2.5 mA at 265V ac
Current, On-State Output, Min.	10.0 mA
Voltage Drop, On-State Output, Max.	1.5V ac at 0.5A
Output Surge Current, Max.	10.0 A
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: outputs 0 to 7 Group 2: outputs 8 to 15

1769 Compact Digital DC Input Modules
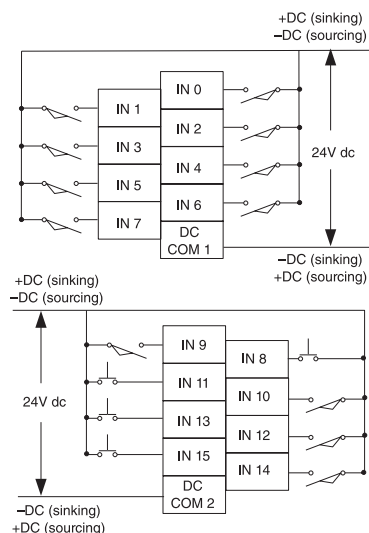
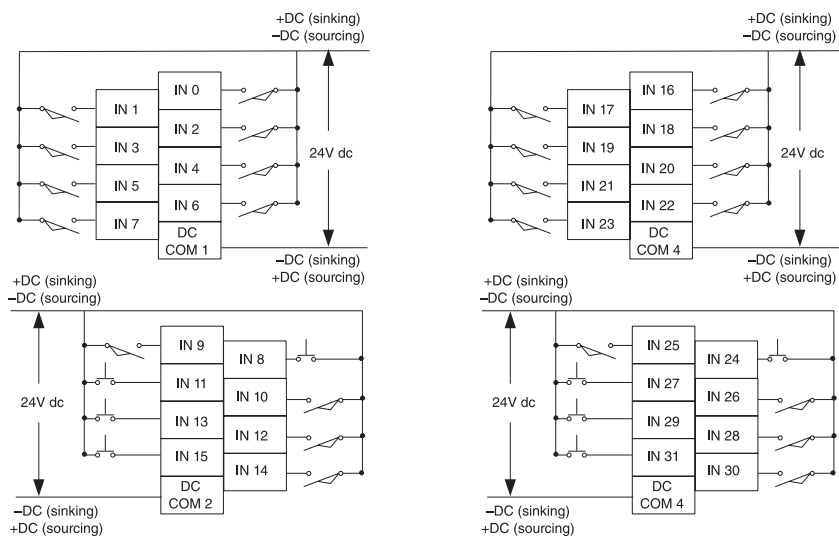

1769-IQ16 current sinking/sourcing 24V dc input module

Specification	Value
Voltage Category/Type, Input	24V dc, sinking or sourcing
Operating Voltage Range	10..30V dc @ 30°C (86°F) 10...26.4V dc @ 60°C (140°F)
Number of Inputs	16
Backplane Current (mA) at 5V	115 mA
Signal Delay	on delay: 8 ms off delay: 8 ms
Voltage, Off-State Input, Max.	5V dc
Current, Off-State Input, Max.	1.5 mA
Voltage, On-State Input, Min.	10V dc
Current, On-State Input, Min.	2 mA
Inrush Current, Max.	250 mA
Nominal Impedance	3K Ω
IEC Input Compatibility	Type 1+
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: inputs 0 to 7 Group 2: inputs 8 to 15

1769-IQ16F high-speed, current sinking/sourcing 24V dc input module

Specification	Value
Voltage Category/Type, Input	24V dc, sinking or sourcing
Operating Voltage Range	10..30V dc @ 30°C (86°F) 10...26.4V dc @ 60°C (140°F)
Number of Inputs	16
Backplane Current (mA) at 5V	110 mA
Signal Delay	on delay: 300 μs off delay: 1 ms
Voltage, Off-State Input, Max.	5V dc
Current, Off-State Input, Max.	1.5 mA
Voltage, On-State Input, Min.	10V dc
Current, On-State Input, Min.	2 mA
Inrush Current, Max.	250 mA
Nominal Impedance	3K Ω
IEC Input Compatibility	Type 1+
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: inputs 0 to 7 Group 2: inputs 8 to 15

1769-IQ32 current sinking/sourcing 24V dc input module
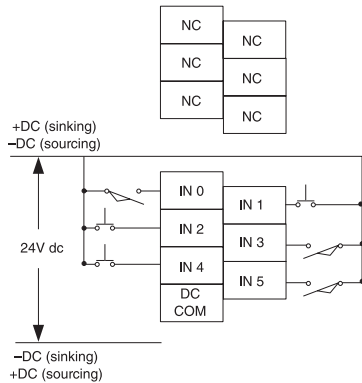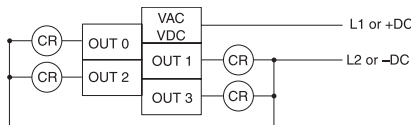

Specification	Value
Voltage Category/Type, Input	24V dc, sinking or sourcing
Operating Voltage Range	10..30V dc @ 30°C (86°F) 10...26.4V dc @ 60°C (140°F)
Number of Inputs	32
Backplane Current (mA) at 5V	170 mA
Signal Delay	on delay: 8 ms off delay: 8 ms
Voltage, Off-State Input, Max.	5V dc
Current, Off-State Input, Max.	1.5 mA
Voltage, On-State Input, Min.	10V dc
Current, On-State Input, Min.	2 mA
Inrush Current, Max.	250 mA
Nominal Impedance	3 KΩ
IEC Input Compatibility	Type 1+
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: inputs 0 to 7 Group 2: inputs 8 to 15 Group 3: inputs 16 to 23 Group 4: inputs 24 to 31

1769-IQ6XOW4 combination input/output module

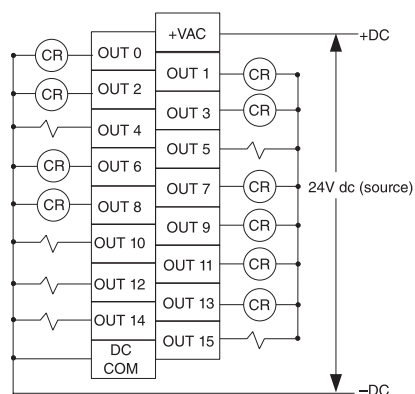| Specification	Value
Voltage Category	24V dc, sinking or sourcing inputs ac/dc normally-open relay outputs
Operating Voltage Range	10..30V dc @ 30°C (86°F) 10...26.4V dc @ 60°C (140°F)
Number of Inputs	6
Number of Outputs	4
Backplane Current (mA) at 5V	105 mA
Backplane Current (mA) at 24V	50 mA
Voltage, Off-State Input, Max.	5V dc
Current, Off-State Input, Max.	1.5 mA
Voltage, On-State Input, Min.	10V dc
Current, On-State Input, Min.	2 mA
Inrush Current, Max.	250 mA
Nominal Impedance	3 KΩ
IEC Input Compatibility	Type 3
Signal On Delay, Max (resistive load)	10 ms
Signal Off Delay, Max (resistive load)	10 ms
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: inputs 0 to 5 Group 2: outputs 0 to 13

1769 Compact Digital DC Output Modules
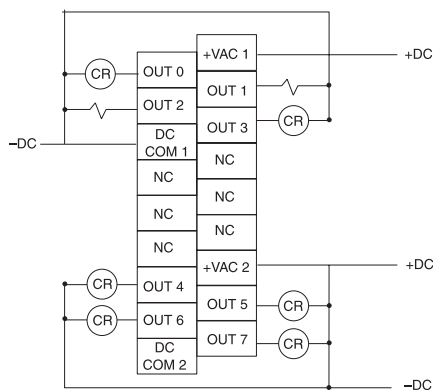
1769-OB8 current sourcing 24V dc output module

Specification	Value
Voltage Category/Type, Output	24V dc, sourcing
Operating Voltage Range	20.4V dc...26.4V dc
Number of Outputs	8
Backplane Current (mA) at 5V	145 mA
Signal On Delay, Max (resistive load)	0.1 ms
Signal Off Delay, Max (resistive load)	1.0 ms
Current Leakage, Off-State Output, Max.	1.0 mA @ 26.4V ac
Current, On-State Output, Min.	1.0 mA
Voltage Drop, On-State Output, Max.	1.0V dc @ 2 A
Output Surge Current, Max.	4.0 A
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: outputs 0 to 3 Group 2: outputs 4 to 7

1769-OB16 current sourcing 24V dc output module

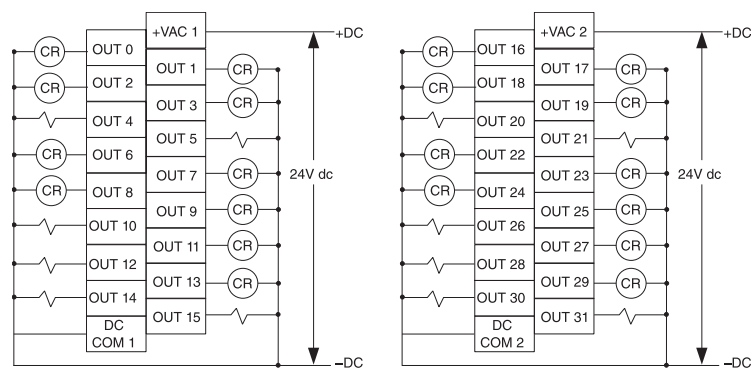| Specification	Value
Voltage Category/Type, Output	24V dc, sourcing
Operating Voltage Range	20.4V dc...26.4V dc
Number of Outputs	16
Backplane Current (mA) at 5V	200 mA
Signal On Delay, Max (resistive load)	0.1 ms
Signal Off Delay, Max (resistive load)	1.0 ms
Current Leakage, Off-State Output, Max.	1.0 mA @ 26.4V ac
Current, On-State Output, Min.	1.0 mA
Voltage Drop, On-State Output, Max.	1.0V dc @ 1 A
Output Surge Current, Max.	2.0 A
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: outputs 0 to 15 (internally connected to common)

1769-OB16P protected, current sourcing 24V dc output module

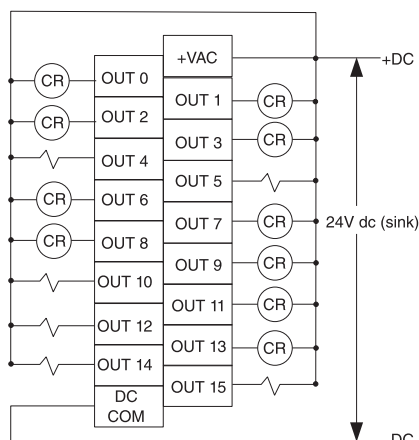| Specification	Value
Voltage Category/Type, Output	24V dc, sourcing
Operating Voltage Range	20.4V dc...26.4V dc
Number of Outputs	16
Backplane Current (mA) at 5V	160 mA
Signal On Delay, Max (resistive load)	0.1 ms
Signal Off Delay, Max (resistive load)	1.0 ms
Current Leakage, Off-State Output, Max.	1.0 mA @ 26.4V ac
Current, On-State Output, Min.	1.0 mA
Voltage Drop, On-State Output, Max.	1.0V dc @ 1 A
Output Surge Current, Max.	2.0 A
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: outputs 0 to 15 (internally connected to common)

1769-OB32 current sourcing 24V dc output module

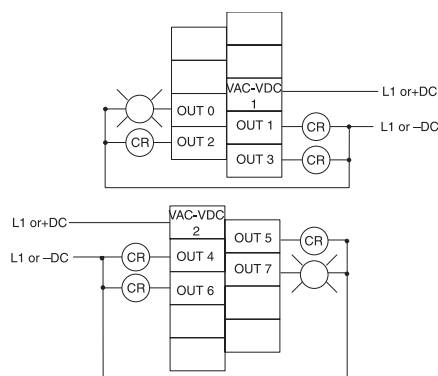| Specification	Value
Voltage Category/Type, Output	24V dc, sourcing
Operating Voltage Range	20.4V dc...26.4V dc
Number of Outputs	32
Backplane Current (mA) at 5V	300 mA
Signal On Delay, Max (resistive load)	0.1 ms
Signal Off Delay, Max (resistive load)	1.0 ms
Current Leakage, Off-State Output, Max.	1.0 mA @ 26.4V ac
Current, On-State Output, Min.	1.0 mA
Voltage Drop, On-State Output, Max.	1.0V dc @ 1 A
Output Surge Current, Max.	2.0 A
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: outputs 0 to 15 Group 2: outputs 16 to 31

1769-OV16 current sinking 24V dc output module

Specification	Value
Voltage Category/Type, Output	24V dc, sinking
Operating Voltage Range	20.4V dc...26.4V dc
Number of Outputs	16
Backplane Current (mA) at 5V	200 mA
Signal On Delay, Max (resistive load)	0.1 ms
Signal Off Delay, Max (resistive load)	1.0 ms
Current Leakage, Off-State Output, Max.	1.0 mA @ 26.4V ac
Current, On-State Output, Min.	1.0 mA
Voltage Drop, On-State Output, Max.	1.0V dc @ 1 A
Output Surge Current, Max.	2.0 A
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: outputs 0 to 15 (internally connected to common)

1769 Compact Digital Contact Output Modules

These ratings apply to the digital contact output modules.

Volts, Max.	Continuous Amps per Point	Amperes		Voltamperes		IEC 947	NEMA ICS 2-125
		Make	Break	Make	Break		
240V ac	2.5 A	7.5 A	0.75 A	1800 VA	180 VA	AC15*	C300
120V ac		15 A	1.5 A				
125V dc	1.0 A	0.22 A		28 VA		DC13*	R150
24V dc	2.0 A	1.2 A		28 VA		—	—

*Does not apply to the 1769-OW16 module.

1769-OW8 ac/dc relay output module

Specification	Value
Voltage Category/Type, Output	ac/dc normally open relay
Operating Voltage Range	5...265V ac 5...125V dc
Number of Outputs	8
Backplane Current (mA) at 5V	125 mA
Backplane Current (mA) at 24V	100 mA
Signal On Delay, Max (resistive load)	10 ms
Signal Off Delay, Max (resistive load)	10 ms
Current Leakage, Off-State Output, Max.	0
Current, On-State Output, Min.	10 mA
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: outputs 0 to 3 Group 2: outputs 4 to 7

1769-OW8I isolated ac/dc relay output module

Specification	Value
Voltage Category/Type, Output	ac/dc normally open relay
Operating Voltage Range	5...265V ac 5...125V dc
Number of Outputs	16
Backplane Current (mA) at 5V	125 mA
Backplane Current (mA) at 24V	100 mA
Signal On Delay, Max (resistive load)	10 ms
Signal Off Delay, Max (resistive load)	10 ms
Current Leakage, Off-State Output, Max.	0
Current, On-State Output, Min.	10 mA
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: outputs 0 to 3 Group 2: outputs 4 to 7

1769-OW16 ac/dc relay output module

Specification	Value
Voltage Category/Type, Output	ac/dc normally open relay
Operating Voltage Range	5...265V ac 5...125V dc
Number of Outputs	16
Backplane Current (mA) at 5V	205 mA
Backplane Current (mA) at 24V	180 mA
Signal On Delay, Max (resistive load)	10 ms
Signal Off Delay, Max (resistive load)	10 ms
Current Leakage, Off-State Output, Max.	0 mA
Current, On-State Output, Min.	10 mA
Power Supply Distance Rating	8 modules
Isolated Groups	Group 1: outputs 0 to 7 Group 2: outputs 8 to 15

Analog I/O Modules

Choose analog, thermocouple, or RTD modules when you need:

- Individually configurable channels
- Ability to individually enable and disable channels
- On-board scaling
- Autocalibration of inputs
- On-line configuration
- Selectable input filters
- Over-range and under-range detection and indication
- Selectable response to a broken input sensor
- Selectable power source
- Input modules offer both single-ended or differential inputs
- Ability to direct output device operation during an abnormal condition
- High accuracy ratings

Selecting analog modules

Catalog Number	Input/Output	Description	See Page
1769-IF4	4 inputs	analog input	16
1769-IF8	8 inputs	analog input	18
1769-OF2	2 outputs	analog output	20
1769-OF8C	8 outputs, current	analog output	21
1769-OF8V	8 outputs, voltage	analog output	22
1769-IF4XOF2	4 inputs 2 outputs	analog combination input and output	23
1769-IT6	6 inputs	thermocouple input	25
1769-IR6	6 inputs	RTD input	28
Certifications: C-UL (under CSA C22.2 No. 142), UL 508, CE, C-Tick			

1769-IF4 analog input module

Wiring differential inputs

Belden 8761 cable (or equivalent)

analog source

V/I in 0-   V in 0+
ANLG Com   I in 0+
V/I in 1-   V in 1+   earth ground the
ANLG Com   I in 1+   shield locally at
V/I in 2-   V in 2+   the module
ANLG Com   I in 2+
V/I in 3-   V in 3+
ANLG Com   I in 3+
dc NEUT   +24V dc

+ External 24V dc
   Power Supply
-      (optional)

Wiring single-ended sensor/
transmitter inputs

1769-IF4 Terminal Block

Sensor/ +
Transmitter -
Supply

Current
Transmitter
+ Signal

Voltage
Transmitter
+ Ground Signal

Voltage
Transmitter
+ Ground Signal

V in 0+
V/I in 0-
I in 0+
ANLG Com
V in 1+
V/I in 1-
I in 1+
ANLG Com
V in 2+
V/I in 2-
I in 2+
ANLG Com
V in 3+
V/I in 3-
I in 3+
ANLG Com
+24V dc
dc NEUT

External 24V dc   +
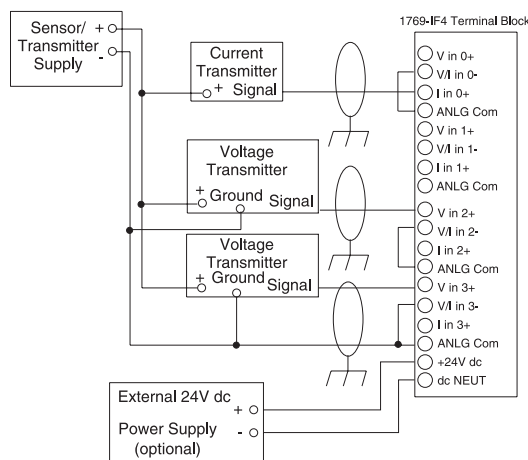Power Supply   -
   (optional)

Wiring mixed transmitter inputs

1769-IF4 Terminal B

Sigle-ended   Signal
Voltage
Transmitter
-         +

Differential   + Signal
Voltage
Transmitter   —
- Supply +

Differential   — Signal
Current
Transmitter   +
- Supply +

2-Wire   Signal
Current
Transmitter   +

Sensor/   +
Transmitter
Supply   -

V in 0+
V/I in 0-
I in 0+
ANLG Com
V in 1+
V/I in 1-
I in 1+
ANLG Com
V in 2+
V/I in 2-
I in 2+
ANLG Com
V in 3+
V/I in 3-
I in 3+
ANLG Com
+24V dc
dc NEUT

External 24V dc
Power Supply[1]
   (optional)[2]

(1) The external power supply must be rated Class 2, with a 24V dc range of 20.4 to 26.4V dc and 60 mA minimum.

(2) Series B and later modules provide this option.

1769-IF4 specifications

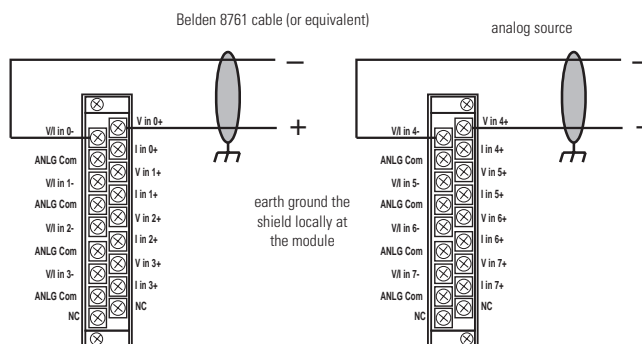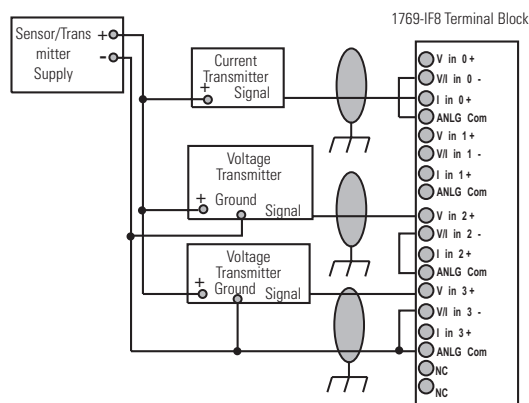| Specification	Value
Voltage Category/Type, Input	±10.5V dc -0.5…10.5V dc -0.5…5.25V dc 0.5…5.25V dc
Current Range, Analog Input	0…21 mA 3.2…21 mA
Number of Inputs	4
Backplane Current (mA) at 5V	105 mA
Backplane Current (mA) at 24V	60 mA
Input Resolution, Bits	14 bits (unipolar)
Normal Mode Rejection Ratio	-50 dB at 50 and 60 Hz with the 50 or 60 Hz filter selected, respectively.
Impedance, Voltage Input	220 Ω
Impedance, Current Input	250 Ω
Accuracy Drift w/Temp., Voltage Input	±0.003%/°C
Accuracy Drift w/Temp., Current Input	±0.0045%/°C
Non-linearity, Input	±0.03% full scale
Repeatability, Input	±0.03%
Module Error over Full Temperature Range	±0.03% - Voltage ±0.05% - Current
Input Channel Configuration	Configuration via configuration software screen or the user program (by writing a unique bit pattern into the module's configuration file). Refer to your controller's user manual to determine if user program configuration is supported.
Calibration	The module performs autocalibration on channel enable and on a configuration change between channels.
Diagnostics Description	Over- or under-range by bit reporting
Power Supply Distance Rating	8 modules
Isolation Voltage, Input Group to Bus	500V ac or 710V dc for 1 minute 30Vac/30Vdc working voltage (IEC Class 2 reinforced insulation)

1769-IF8 analog input module
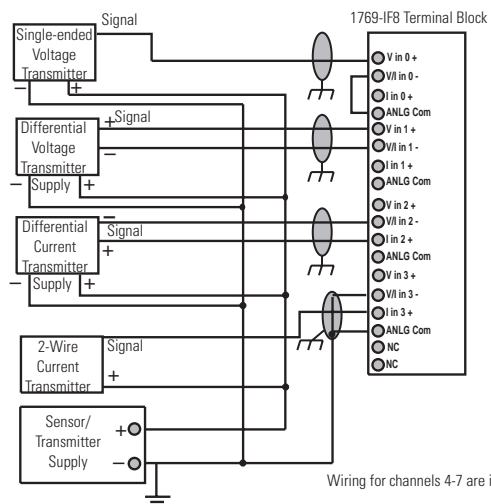
Wiring differential inputs

Belden 8761 cable (or equivalent)

analog source

V in 0+
V/I in 0-
ANLG Com
V/I in 1-
ANLG Com
V/I in 2-
ANLG Com
V/I in 3-
ANLG Com
NC

I in 0+
V in 1+
I in 1+
V in 2+
I in 2+
V in 3+
I in 3+
NC

V in 4+
V/I in 4-
ANLG Com
V/I in 5-
ANLG Com
V/I in 6-
ANLG Com
V/I in 7-
ANLG Com
NC

I in 4+
V in 5+
I in 5+
V in 6+
I in 6+
V in 7+
I in 7+
NC

earth ground the
shield locally at
the module

Wiring single-ended sensor/ transmitter inputs

1769-IF8 Terminal Block

Sensor/Trans mitter Supply

Current Transmitter Signal

Voltage Transmitter Ground Signal

Voltage Transmitter Ground Signal

V in 0 +
V/I in 0 -
I in 0 +
ANLG Com
V in 1 +
V/I in 1 -
I in 1 +
ANLG Com
V in 2 +
V/I in 2 -
I in 2 +
ANLG Com
V in 3 +
V/I in 3 -
I in 3 +
ANLG Com
NC
NC

Wiring for channels 4-7 are identical.

Wiring mixed transmitter inputs

Signal

1769-IF8 Terminal Block

Single-ended Voltage Transmitter

Differential Voltage Transmitter Supply

Differential Current Transmitter Supply

2-Wire Current Transmitter

Sensor/ Transmitter Supply

Signal

Signal

Signal

V in 0 +
V/I in 0 -
I in 0 +
ANLG Com
V in 1 +
V/I in 1 -
I in 1 +
ANLG Com
V in 2 +
V/I in 2 -
I in 2 +
ANLG Com
V in 3 +
V/I in 3 -
I in 3 +
ANLG Com
NC
NC

Wiring for channels 4-7 are identical.

1769-IF8 specifications

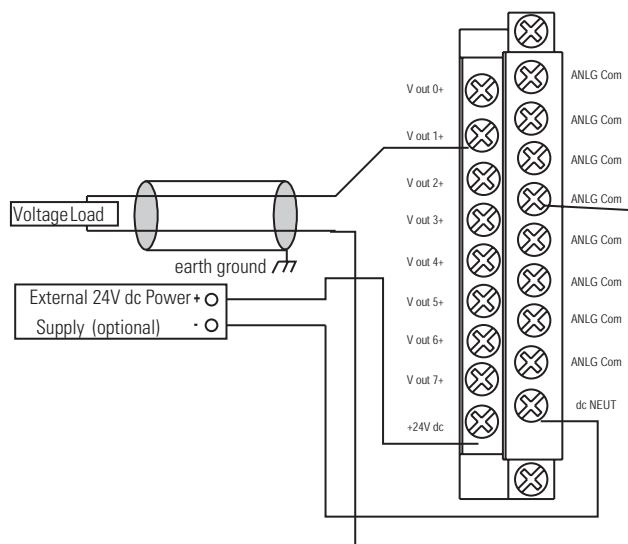| Specification	Value
Voltage Category/Type, Input	±10V dc, 0…10V dc, 0…5V dc, 1…5V dc
Current Range, Analog Input	0…20 mA, 4…20 mA†
Number of Inputs	8 differential or single-ended
Backplane Current (mA) at 5V	120 mA
Backplane Current (mA) at 24V	70 mA
Normal Mode Rejection Ratio	-50 dB at 50 and 60 Hz with the 10 Hz filter selected, respectively
Impedance, Voltage Input	220 KΩ (typical)
Impedance, Current Input	250 Ω
Accuracy Drift w/Temp., Voltage Input	±0.003% per °C
Accuracy Drift w/Temp., Current Input	±0.0045% per °C
Non-linearity, Input	±0.03%
Repeatability, Input	±0.03%‡
Module Error over Full Temperature Range	Voltage: ±0.3% Current: ±0.5%
Input Channel Configuration	via configuration software screen or the user program (by writing a unique bit pattern into the module's configuration file). Refer to your controller's user manual to determine if user program configuration is supported.
Calibration	The module performs autocalibration on channel enable and on aconfiguration change between channels
Diagnostics Description	Over- or under-range by bit reporting, process alarms
Power Supply Distance Rating	8 modules
Isolation Voltage, Input Group to Bus	500V ac or 710V dc for 1 min (qualification test) 30V ac/30V dc working voltage (IEC Class 2 reinforced insulation)

1769-OF2 analog output module

Specification	Value
Voltage Category/Type, Output	±10.5V dc -0.5…10.5V dc -0.5…5.25V dc 0.5…5.25V dc
Current Range, Analog Output	0…21 mA or 3.2…21 mA
Number of Outputs	2
Backplane Current (mA) at 5V	120 mA
Backplane Current (mA) at 24V	120 mA
Output Resolution, Bits	14 bits (unipolar); 14 bits plus sign (bipolar) ±10V dc: Sign + 14 bits, 0.64 mV 0 to +5V dc: Sign + 13 bits, 0.64 mV 0 to +10V dc: Sign + 14 bits, 0.64 mV +4 to +20 mA: Sign + 14 bits, 1.28 μA +1 to +5V dc: Sign + 13 bits, 0.64 mV 0 to +20 mA: Sign + 14 bits, 1.28 μA
Conversion Type, Outputs	Sigma-Delta
Step Response to 63% of FS, Voltage Output	2.9 ms
Step Response to 63% of FS, Current Output	2.9 ms
Current Load on Voltage Output, Max.	10 mA
Resistive Load on Current Output	0…500 Ω
Load Range, Voltage Output	>1 kΩ at 10V dc
Inductive Load	0.1 mH
Capacitive Load	1 μF
Calibration	None required
Accuracy Drift w/Temp., Current Input	±0.0058% Full Scale/°C
Accuracy Drift w/Temp., Voltage Input	±0.0086% Full Scale/°C
Non-linearity, Output	±0.05% full scale
Repeatability, Output	±0.05%
Module Error over Full Temperature Range	±0.8% - Voltage ±0.55% - Current
Open Circuit Protection	Yes
Short Circuit Protection	Yes
Overvoltage Protection	Yes
Diagnostics Description	Over- or under-range by bit reporting output wire broken or load resistance high by bit reporting (current mode only)
Power Supply Distance Rating	8 modules
Isolation Voltage, Output to Bus	500V ac or 710V dc for 1 minute (qualification test) 30Vac/30Vdc working voltage (IEC Class 2 reinforced insulation)

1769-OF8C analog output module
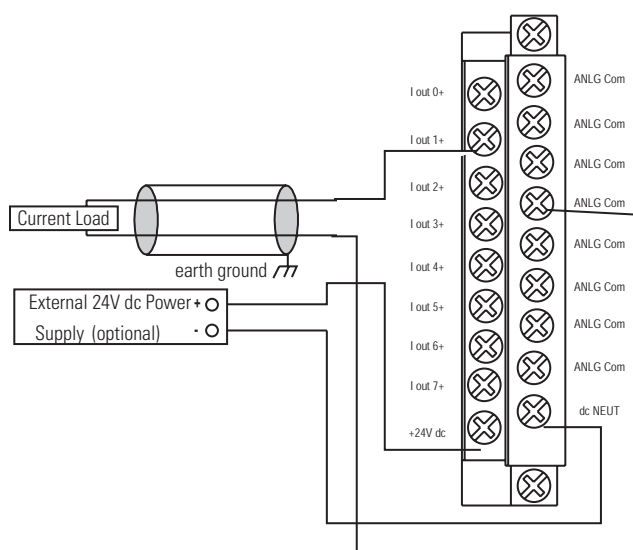
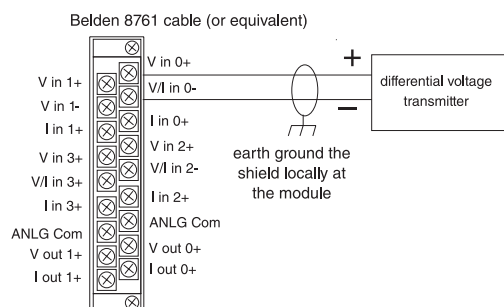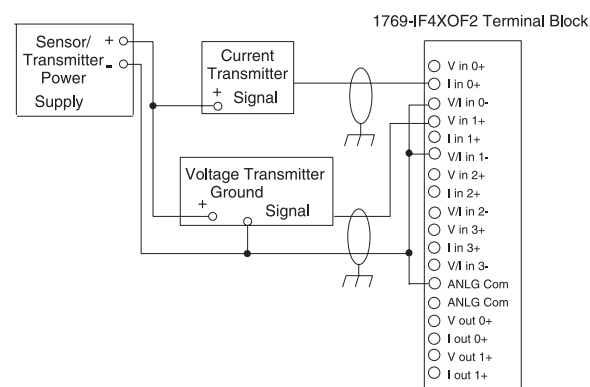| Specification	Value
Current Category/Type, Output	0...21 mA 3.2...21 mA
Number of Outputs	8 single-ended
Backplane Current (mA) at 5V	145 mA
Backplane Current (mA) at 24V	160 mA
Output Resolution, Bits	16 bits (unipolar) +4 to +20 mA: 15.59 bits, 0.323 μA/bit 0 to +20 mA: 15.91 bits, 0.323 μA/bit
Conversion Time	5 ms
Step Response to 63%	< 2.9 ms
Resistive Load on Current Output	0…500 Ω (includes wire resistance)
Inductive Load	0.1 mH max
Calibration	None required
Accuracy Drift with Temperature	±0.0058% FS °C
Non-linearity, Output	±0.05%
Repeatability, Output	±0.05%
Module Error over Full Temperature Range	±0.55% - Current
Open Circuit Protection	Yes
Short Circuit Protection	Yes
Overvoltage Protection	Yes
Diagnostics Description	Over- or under-range by bit reporting output wire broken or load resistance high by bit reporting
Power Supply Distance Rating	8 modules
Isolation Voltage, Output to Bus	500V ac or 710V dc for 1 min (qualification test) 30V ac/30V dc working voltage (IEC Class 2 reinforced insulation)

1769-OF8V analog output module

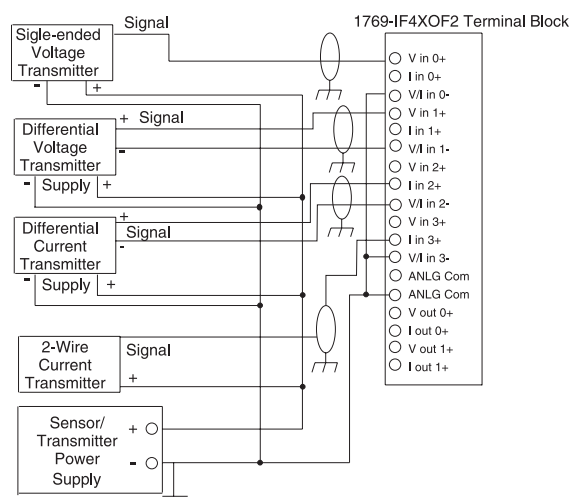| Specification	Value
Voltage Category/Type, Output	±10.5V dc -0.5...10.5V dc -0.5...5.25V dc 0.5...5.25V dc
Number of Outputs	8 single-ended
Backplane Current (mA) at 5V	145 mA
Backplane Current (mA) at 24V	125 mA
Output Resolution, Bits	16 bits (unipolar) ±10V dc: 15.89 bits, 330 μV/bit 0 to +5V dc:13.89 bits, 330 μV/bit 0 to +10V dc:14.89 bits, 330 μV/bit +1 to +5V dc: 13.57 bits, 330 μV/bit
Conversion Time	5 ms
Step Response to 63%	< 2.9 ms
Resistive Load on Current Output	0…500 Ω (includes wire resistance)
Inductive Load	0.1 mH max
Calibration	None required
Accuracy Drift with Temperature	±0.0086% FS °C
Non-linearity, Output	±0.05%
Repeatability, Output	±0.05%
Module Error over Full Temperature Range	±0.8% - Voltage
Open Circuit Protection	Yes
Short Circuit Protection	Yes
Overvoltage Protection	Yes
Diagnostics Description	Over- or under-range by bit reporting output wire broken or load resistance high by bit reporting
Power Supply Distance Rating	8 modules
Isolation Voltage, Output to Bus	500V ac or 710V dc for 1 min (qualification test) 30V ac/30V dc working voltage (IEC Class 2 reinforced insulation)

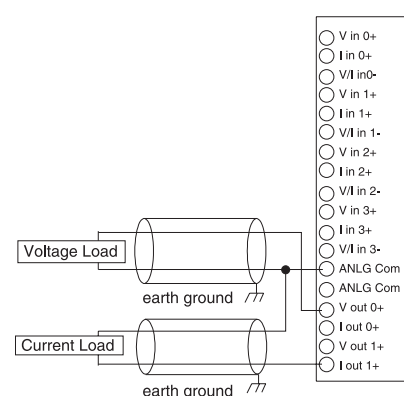# 1769-IF4XOF2 analog combination input/output module

Wiring differential inputs

Belden 8761 cable (or equivalent)

V in 0+
V/I in 0-
I in 0+
V in 2+
V/I in 2-
I in 2+
ANLG Com
V out 0+
I out 0+

V in 1+
V in 1-
I in 1+
V in 3+
V/I in 3+
I in 3+
ANLG Com
V out 1+
I out 1+

earth ground the shield locally at the module

differential voltage transmitter

Wiring single-ended sensor/ transmitter inputs

1769-IF4XOF2 Terminal Block

Sensor/ Transmitter Power Supply + −

Current Transmitter + Signal

Voltage Transmitter Ground + Signal

V in 0+
I in 0+
V/I in 0-
V in 1+
I in 1+
V/I in 1-
V in 2+
I in 2+
V/I in 2-
V in 3+
I in 3+
V/I in 3-
ANLG Com
ANLG Com
V out 0+
I out 0+
V out 1+
I out 1+

Wiring mixed transmitter inputs

1769-IF4XOF2 Terminal Block

Sigle-ended Voltage Transmitter − +
Signal

Differential Voltage Transmitter − Supply +
+ Signal

Differential Current Transmitter − Supply +
+ Signal

2-Wire Current Transmitter
Signal +

Sensor/ Transmitter Power Supply + −

V in 0+
I in 0+
V/I in 0-
V in 1+
I in 1+
V/I in 1-
V in 2+
I in 2+
V/I in 2-
V in 3+
I in 3+
V/I in 3-
ANLG Com
ANLG Com
V out 0+
I out 0+
V out 1+
I out 1+

Wiring analog outputs

Voltage Load

earth ground

Current Load

earth ground

V in 0+
I in 0+
V/I in0-
V in 1+
I in 1+
V/I in 1-
V in 2+
I in 2+
V/I in 2-
V in 3+
I in 3+
V/I in 3-
ANLG Com
ANLG Com
V out 0+
I out 0+
V out 1+
I out 1+

1769-IF4XOF2 input specifications

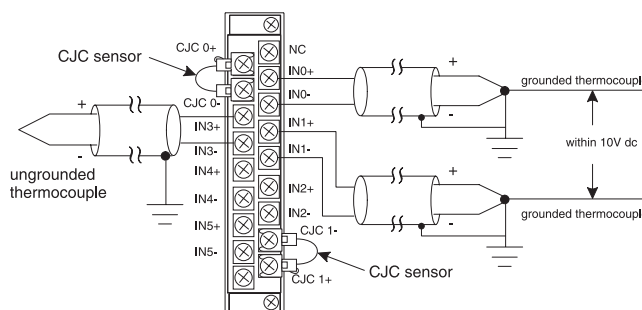| Specification	Value
Voltage Category/Type, Input	0…10.5V dc
Current Range, Analog Input	0…21 mA
Number of Inputs	4
Backplane Current (mA) at 5V	120 mA
Backplane Current (mA) at 24V	160 mA
Input Resolution, Bits	8 bits plus sign
Normal Mode Rejection Ratio	None
Impedance, Voltage Input	150 kΩ
Impedance, Current Input	150 Ω
Accuracy Drift w/Temp., Voltage Input	±0.006%/°C ±0.01% Full Scale/°C
Accuracy Drift w/Temp., Current Input	±0.006%/°C ±0.01% Full Scale/°C
Non-linearity, Input	±0.4% full scale
Repeatability, Input	±0.4%
Calibration	Not required
Diagnostics Description	Input: Overrange by bit reporting Output: Overrange by bit reporting
Power Supply Distance Rating	8 modules
Isolation Voltage, Input to Bus	500V ac or 710V dc for 1 minute 30Vac/30Vdc working voltage (IEC Class 2 reinforced insulation)

1769-IF4XOF2 output specifications

Specification	Value
Voltage Category/Type, Output	0…10.5V dc
Current Range, Analog Output	0…21 mA
Number of Outputs	2
Backplane Current (mA) at 5V	120 mA
Backplane Current (mA) at 24V	160 mA
Output Resolution, Bits	8 bits plus sign
Conversion Type, Outputs	Resistor String
Current Load on Voltage Output, Max.	10 mA
Resistive Load on Current Output	0…300 Ω
Load Range, Voltage Output	>1 kΩ @ 10V dc
Inductive Load	0.1 mH
Capacitive Load	1 µF
Calibration	Not required
Accuracy Drift w/Temp., Current Input	±0.006%/°C ±0.01% Full Scale/°C
Accuracy Drift w/Temp., Voltage Input	±0.006%/°C ±0.01% Full Scale/°C
Non-linearity, Output	±0.4% full scale
Repeatability, Output	±0.05%
Open Circuit Protection	Yes
Short Circuit Protection	Yes
Diagnostics Description	Input: Overrange by bit reporting Output: Overrange by bit reporting
Power Supply Distance Rating	8 modules
Isolation Voltage, Output to Bus	500V ac or 710V dc for 1 minute 30Vac/30Vdc working voltage (IEC Class 2 reinforced insulation)

1769-IT6 thermocouple input module

The module contains a removable terminal block. Channels are wired as differential inputs. Two cold junction compensation (CJC) sensors are attached to the terminal block to enable accurate readings from each channel. These sensors compensate for offset voltages introduced into the input signal as a result of the cold-junction where the thermocouple wires are connected to the module.

Important: For proper operation, the CJC sensors must be installed on the thermocouple module.

Specification	Value
Number of Inputs	6, plus 2 cold junction sensors
Backplane Current (mA) at 5V	100 mA
Backplane Current (mA) at 24V	40 mA
Conversion Type, Inputs	Delta-Sigma
Input Filtering	Programmable notch filter with multiple frequencies.
Normal Mode Rejection Ratio	85 dB (minimum) at 50 Hz (with 10 Hz or 50 Hz filter) 85 dB (minimum) at 60 Hz (with 10 Hz or 60 Hz filter)
Common Mode Rejection Ratio	115 dB (minimum) at 50 Hz (with 10 Hz or 50 Hz filter) 115 dB (minimum) at 60 Hz (with 10 Hz or 60 Hz filter)
Common Mode Voltage	±10V dc per channel
Non-linearity, Input	±0.03% full scale
Repeatability, Input	±0.03%
Open Circuit Detection Time	7 ms…2.1 s
Calibration	The module performs autocalibration upon power-up and whenever a channel is enabled. You can also program the module to calibrate every five minutes using the Enable/Disable Cyclic Calibration bit.
Diagnostics Description	Over- or underrange and open circuit by bit reporting.
Power Supply Distance Rating	8 modules

Data formats

Choose from these data formats:

- engineering units x 1 (in 0.1°C, 0.1°F or 0.01 mV)

- engineering units x 10 (in °C, °F, or 0.1 mV)

- scaled-for-PID (0...+16383)

- percent of full-scale (0...+10000)

- raw/proportional data (-32767...+32767)

Input Type	Engineering Units x1		Engineering Units x10	
	0.1°C	0.1°F	1.0°C	1.0°F
J	-2100...+12000	-3460...+21920	-210...+1200	-346...+2192
K	-2700...+13700	-4540...+24980	-270...+1370	-454...+2498
T	-2700...+4000	-4540...+7520	-270...+400	-454...+752
E	-2700...+10000	-4540...+18320	-270...+1000	-454...+1832
R	0...+17680	+320...32140	0...+1768	+32...3214
S	0...+17680	+320...32140	0...+1768	+32...3214
B	+3000...18200	+5720...32767∗	+300...1820	+572...3308
N	-2100...+13000	-3460...+23720	-210...+1300	-346...+2372
C	0...+23150	+320...32767∗	0...+2315	+32...4199
±50 mV	-5000...+5000†		-500...+500†	
±100 mV	-10000...10000†		-1000...1000†	

∗Type B and C thermocouples cannot be represented in engineering units x1 (°F) above 3276.7°F; therefore, it will be treated as an over-range error.
†When millivolts are selected, the temperature setting is ignored. Analog input data is the same for °C or °F selection.

Repeatability

Input Type	Repeatability for 10Hz Filter∗
J	±0.1°C (±0.18°F)
N (-110°C...+1300°C [-166°F...+2372°F])	±0.1°C (±0.18°F)
N (-210°C...-110°C [-346°F...-166°F])	±0.25°C (±0.45°F)
T (-170°C...+400°C [-274°F...+752°F])	±0 .1°C (±0.18°F)
T (-270°C...-170°C [-454°F...-274°F])	±1.5°C (±2.7°F)
K (-270°C...+1370°C [-454°F...+2498°F])	±0.1°C (±0.18°F)
K (-270°C...-170°C [-454°F...-274°F])	±2.0°C (±3.6°F)
E (-220°C...+1000°C [-364°F...+1832°F])	±0.1°C (±0.18°F)
E (-270°C...-220°C [-454°F...-364°F])	±1.0°C (±1.8°F)
S and R	±0.4°C (±0.72°F)
C	±0.7°C (±1.26°F)
B	±0.2°C (±0.36°F)
±50 mV	±6 μV
±100 mV	±6 μV

∗Repeatability is the ability of the input module to register the same reading in successive measurements for the same input signal.
Repeatability at any other temperature in the 0...60°C (32...140°F) range is the same as long as the temperature is stable.

Inputs and ranges

Input Type	Range
J	-210...+1200°C (-346...+2192°F)
K	-270...+1370°C (-454...+2498°F)
T	-270...+400°C (-454...+752°F)
E	-270...+1000°C (-454...+1832°F)
R	0...+1768°C (+32...3214°F)
S	0...+1768°C (+32...3214°F)
B	+300...+1820°C (+572...+3308°F)
N	-210...+1300°C (-346...+2372°F)
C	0...+2315°C (+32...+ 4199°F)
±50 mV	-50 to +50 mV
±100 mV	-100 to +100 mV

Accuracy

| Input Type	Autocalibration Enabled Accuracy for 10, 50, and 50Hz Filters, Max.		Autocalibration Disabled Temperature Drift, Max.
	25°C (77°F)	0...60°C (32...140°F)	0...60°C (32...140°F)
J (-210°C to 1200°C [-346°F to 2192°F])	±0.6°C (± 1.1°F)	±0.9°C (± 1.7°F)	±0.0218°C/°C (±0.0218°F/°F)
N (-200°C to +1300°C [-328°F to 2372°F])	±1.0°C (± 1.8°F)	±1.5°C (±2.7°F)	±0.0367°C/°C (±0.0367°F/°F)
N (-210°C to -200°C [-346°F to -328°F])	±1.2°C (±2.2°F)	±1.8°C (±3.3°F)	±0.0424°C/°C (±0.0424°F/°F)
T (-230°C to +400°C [-382°F to +752°F])	±1.0°C (± 1.8°F)	±1.5°C (±2.7°F)	±0.0349°C/°C (±0.0349°F/°F)
T (-270°C to -230°C [-454°F to -382°F])	±5.4°C (± 9.8°F)	±7.0°C (±12.6°F)	±0.3500°C/°C (±0.3500°F/°F)
K (-230°C to +1370°C [-382°F to +2498°F])	±1.0°C (± 1.8°F)	±1.5°C (±2.7°F)	±0.4995°C/°C [±0.4995°F/°F]
K (-270°C to -225°C [-454°F to -373°F])	±7.5°C (± 13.5°F)	±10.0°C (± 18.0°F)	±0.0378°C/°C (±0.0378°F/°F)
E (-210°C to +1000°C [-346°F to +1832°F])	±0.5°C (± 0.9°F)	±0.8°C (±1.5°F)	±0.0199°C/°C (±0.0199°F/°F)
E (-270°C to -210°C [-454°F to -346°F])	±4.2°C (± 7.6°F)	±6.3°C (±11.4°F)	±0.2698°C/°C (±0.2698°F/°F)
R	±1.7°C (± 3.1°F)	±2.6°C (± 4.7°F)	±0.0613°C/°C (±0.0613°F/°F)
S	±1.7°C (± 3.1°F)	±2.6°C (± 4.7°F)	±0.0600°C/°C (±0.0600°F/°F)
C	±1.8°C (±3.3°F)	±3.5°C (±6.3°F)	±0.0899°C/°C (±0.0899°F/°F)
B	±3.0°C (±5.4°F)	±4.5°C (±8.1°F)	±0.1009°C/°C (±0.1009°F/°F)
±50 mV	±15 μV	±25 μV	±0.44 μV/°C (±0.80μV/°F)
±100 mV	±20 μV	±30 μV	±0.69 μV/°C (±1.25μV/°F)

1769-IR6 RTD input module

Each channel is individually configurable via software for 2- or 3-wire RTD or direct resistance input devices. Channels are compatible with 4-wire sensors, but the fourth sense wire is not used. Two programmable excitation current values (0.5 mA and 1.0 mA) are provided, to limit RTD self-heating.

Important: The module accepts input from RTDs with up to 3 wires. If your application requires a 4-wire RTD, one of the two lead compensation wires is not used, and the RTD is treated like a 3-wire sensor. The third wire provides lead wire compensation.

When configured for RTD inputs, the module can convert the RTD readings into linearized digital temperature readings in °C or °F. When configured for resistance analog inputs, the module can convert voltages into linearized resistance values in ohms. The module assumes that the direct resistance input signal is linear prior to input to the module.
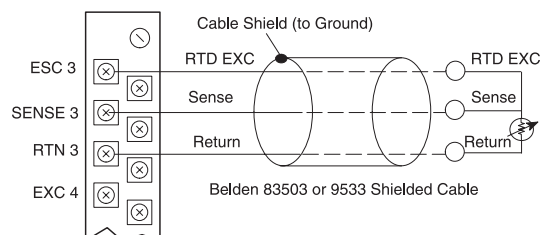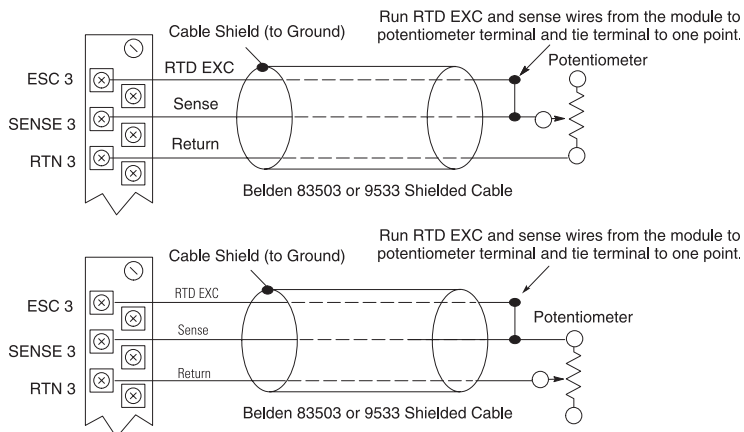
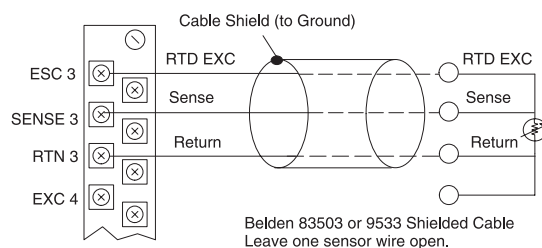### *2-wire RTD configuration*
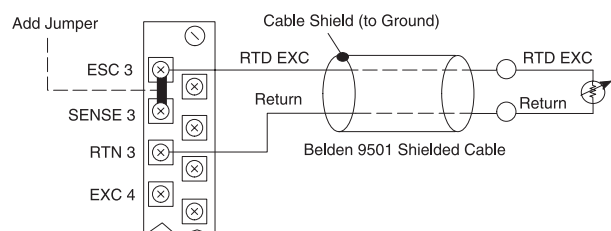
2-wire potentiometer configuration
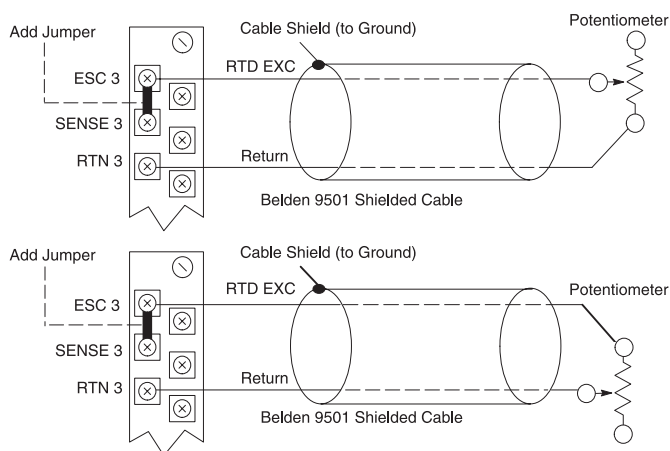
3-wire RTD configuration

3-wire potentiometer configuration

4-wire RTD configuration

1769-IR6 specifications

Specification	Value
Number of Inputs	6
Backplane Current (mA) at 5V	100 mA
Backplane Current (mA) at 24V	45 mA
Conversion Type, Inputs	Sigma-Delta
Input Filtering	Low pass digital filter with programmable notch filter.
Input Resolution, Bits	Input filter and configuration dependent
Normal Mode Rejection Ratio	70 dB minimum at 50 Hz with the 10 or 50 Hz filter selected 70 dB minimum at 60 Hz with the 10 or 60 Hz filter selected
Common Mode Rejection Ratio	110 dB minimum at 50 Hz with the 10 or 50 Hz filter selected 110 dB minimum at 60 Hz with the 10 or 60 Hz filter selected
Common Mode Voltage	±10V dc per channel
Non-linearity, Input	±0.5% full scale
Repeatability, Input	±0.01 °C (0.018 °F) for Ni and NiFe ±0.2 °C (0.36 °F) for other RTD inputs ±0.04 W for 150 W resistances ±0.2 W for other resistances
Open Circuit Detection Time	6 ms…303 s
Calibration	The module performs autocalibration on channel enable and on a configuration change between channels. You can also program the module to calibrate every five minutes.
Diagnostics Description	Over- or under-range or broken input by bit reporting.
Power Supply Distance Rating	8 modules

Data formats

Choose from these data formats:

- engineering units x 1 (in 0.1°C, 0.1°F or 0.1Ω)

- engineering units x 10 (in 1.0°C, 1.0°F, or 1.0Ω)

- scaled-for-PID (0...+16383)

- percent of full-scale (0...+10000)

- raw/proportional data (-32767...+32767)

Input Type	Engineering Units x1		Engineering Units x10	
	0.1°C	0.1°F	1.0°C	1.0°F
100Ω Platinum 385	-2000...+8500	-3280...+15620	-200...+850	-328...+1562
200Ω Platinum 385				
500Ω Platinum 385				
1000Ω Platinum 385				
100Ω Platinum 3916	-2000...+6300	-3280...+11660	-200...+630	-328...+1166
200Ω Platinum 3916				
500Ω Platinum 3916				
1000Ω Platinum 3916				
10Ω Copper 426	-1000...+2600	-1480...+5000	+100...+260	-148...+500
120Ω Nickel 618	-1000...+2600	-1480...+5000	+100...+260	-148...+500
120Ω Nickel 672	-800...+2600	-1120...+5000	-80...+260	-112...+500
604Ω Nickel Iron 518	-1000...+2000	-3280...+1560	-100...+200	-328...+156

Accuracy

Input Type	Autocalibration Enabled Scaled Accuracy, Max.		Autocalibration Disabled Temperature Drift, Max.
	25°C (77°F)	0...60°C (32...140°F)	0...60°C (32...140°F)
100Ω Platinum 385	±0.5°C (±0.9°F)	±0.9°C (±1.62°F)	±0.026°C/°C (±0.026°F/°F)
200Ω Platinum 385			
500Ω Platinum 385			
1000Ω Platinum 385			
100Ω Platinum 3916	±0.4°C (±0.72°F)	±0.8°C (±1.44°F)	±0.023°C/°C (±0.023°F/°F)
200Ω Platinum 3916			
500Ω Platinum 3916			
1000Ω Platinum 3916			
10Ω Copper 426	±0.6°C (1.08°F)	±1.1°C (1.98°F)	±0.032°C/°C (0.032°F/°F)
120Ω Nickel 618	±0.2°C (±0.36°F)	±0.4°C (±0.72°F)	±0.012°C/°C (±0.012°F/°F)
120Ω Nickel 672	±0.2°C (±0.36°F)	±0.4°C (±0.72°F)	±0.012°C/°C (±0.012°F/°F)
604Ω Nickel Iron 518	±0.3°C (±0.54°F)	±0.5°C (±0.9°F)	±0.015°C/°C (±0.015°F/°F)

When you use Platinum 385 RTDs with 0.5mA excitation current, the module's accuracy is:

- ±0.5°C (0.9°F) after you apply power to the module or perform an autocalibration at 25°C (77°F) ambient, with module operating temperature at 25°C (77°F).

- ±[0.5°C (0.9°F) + DT ± 0.026 deg./°C (±0.026deg./°F)] after you apply power to the module or perform an autocalibration at 25°C (77°F) ambient, with module operating temperature between 0 and 60°C (140°F). DT is the temperature difference between the actual module operating temperature and 25°C (77°F). The value 0.026 deg./°C (±0.026deg./°F) is the temperature drift shown in the table above.

- ±0.9°C after you apply power to the module or perform an autocalibration at 60°C (140°F) ambient, with module operating temperature at 60°C (140°F).

Cable specifications

Description	Belden 9501	Belden 9533	Belden 83503
Use	• 2-wire RTDs and potentiometers	• 3-wire RTDs and potentiometers • short runs less than 100 feet and normal humidity levels	• 3-wire RTDs and potentiometers • long runs greater than 100 feet or high humidity levels
Conductors	2, #24 AWG tinned copper (7 x 32)	3, #24 AWG tinned copper (7 x 32)	3, #24 AWG tinned copper (7 x 32)
Shield	Beldfoil aluminum polyester shield with copper drain wire	Beldfoil aluminum polyester shield with copper drain wire	Beldfoil aluminum polyester shield with tinned braid shield
Insulation	PVC	S-R PVC	Teflon
Jacket	Chrome PVC	Chrome PVC	Red Teflon
Agency Approvals	NEC Type CM	NEC Type CM	NEC Art-800 Type CMP
Temperature Rating	80°C	80°C	200°C

RTD standards

Input Type	α‡	IEC-751 1983, Amend. 2 1995	DIN 43760 1987	SAMA2 Standard RC21-4-1966§	Japanese Industrial Standard JIS C1604-1989	Japanese Industrial Standard JIS C1604-1997	Minco♣
100Ω Platinum 385	0.00385	X	X			X	
200Ω Platinum 385		X	X			X	
500Ω Platinum 385		X	X			X	
1000Ω Platinum 385		X	X			X	
100Ω Platinum 3916	0.03916				X		
200Ω Platinum 3916					X		
500Ω Platinum 3916					X		
1000Ω Platinum 3916					X		
10Ω Copper 426✶	0.00426			X			
120Ω Nickel 618†	0.00618		X				
120Ω Nickel 672	0.00372						X
604Ω Nickel Iron 518	0.00518						X

✶Actual value at 0°C (32°F) is 9.042Ω per SAMA standard RC21-4-1966.
†Actual value at 0°C (32°F) is 100Ω per SAMA standard RC21-4-1966.
‡This is the temperature coefficient of resistance which is defined as the resistance change per Ω per °C.
§Scientific Apparatus Makers Association.
♣Minco type "NA" (Nickel) and Minco type "FA" (Nickel-Iron).

Resistance device compatibility

Resistance Device Type	Resistance Range (0.5 mA excitation)	Resistance Range (1.0 mA excitation)
150 Ω	0...150 Ω	0...150 Ω
500 Ω	0...500 Ω	0...500 Ω
1000 Ω	0...1000 Ω	0...1000 Ω
3000 Ω	0...3000 Ω	not allowed

RTD and resistance input ranges

Input Type✶	Temperature Range (0.5mA excitation)	Temperature Range (1.0mA excitation)
100 Ω Platinum 385	-200...850°C (-328...1562°F)	-200...850°C (-328...1562°F)
200 Ω Platinum 385	-200...850°C (-328...1562°F)	-200...850°C (-328...1562°F)
500 Ω Platinum 385	-200...850°C (-328...1562°F)	-200...850°C (-328...1562°F)
1000 Ω Platinum 385	-200...850°C (-328...1562°F)	not allowed
100 Ω Platinum 3916	-200...630°C (-328...1166°F)	-200...630°C (-328...1166°F)
200 Ω Platinum 3916	-200...630°C (-328...1166°F)	-200...630°C (-328...1166°F)
500 Ω Platinum 3916	-200...630°C (-328...1166°F)	-200...630°C (-328...1166°F)
1000 Ω Platinum 3916	-200...630°C (-328...1166°F)	not allowed
10 Ω Copper 426	not allowed	-100...260°C (-148...500°F)
120 Ω Nickel 618†	-100...260°C (-148...500°F)	-100...260°C (-148...500°F)
120 Ω Nickel 672	-80...260°C (-112...500°F)	-80...260°C (-112...500°F)
604 Ω Nickel Iron 518	-200...180°C (-328...338°F)	-100...+200°C (-148...392°F)

✶Digits following the RTD type represent the temperature coefficient of resistance (Ω), which is defined as the resistance change per Ω per °C. For instance, platinum 385 refers to platinum RTD with α = 0.00385 Ω/Ω-°C, or simply 0.00385/°C.
†Actual value at 0°C is 100 Ω per DIN standard.

1769-HSC
High-Speed
Counter Module

Use the 1769-HSC when you need:

- Intelligent counter module with its own microprocessor and I/O that is capable of reacting to high-speed input signals.
- Count and rate values can be used to activate up to four embedded outputs and 12 virtual outputs based on user-defined ranges.
- Signals received at the inputs are filtered, decoded, and counted.
- Signals are also processed to generate rate and time-between-pulses (pulse interval) data.
- Counter module capable of interfacing with up to 2 channels of quadrature or 4 channels of pulse/count inputs.

Specification	Value
Backplane Current (mA) at 5V	425 mA
Power Supply Distance Rating	4 modules

Input specifications

Specification	Value
Voltage Category/Type, Input	2
Current Range, Analog Input	-30…+30V dc
Voltage, On-State Input, Max.	30V dc
Current, On-State Input, Max.	15 mA
Voltage, Off-State Input, Max.	1.0V dc
Current, Off-State Input, Max.	1.5 mA
Current Leakage, Off-State Input, Max.	1.5 mA
Input Impedance, Nom.	1950 Ω
Input Pulse Width, Min.	250 ns
Input Phase Separation, Min.	131 ns
Isolation Voltage, Input to Bus	1200V ac or 1659V dc for 1s 75V dc working voltage (IEC Class 2 reinforced insulation)

Output specifications

Specification	Value
Voltage Category/Type, Output	5…30V dc
Current Range, Analog Output	User Power - 0.1V dc
Current, On-State Output, Max.	1 A per point 4 A per module
Voltage Drop, On-State Output, Max.	0.5V dc
Current Leakage, Off-State Output, Max.	5 μA
Reverse Polarity Protection	30V dc
Isolation Voltage, Output to Bus	1200V ac or 1659V dc for 1s 75V dc working voltage (IEC Class 2 reinforced insulation)

Communication Modules

For DeviceNet connectivity, you can select from these communication modules:

To Connect	Catalog Number
CompactLogix controller to a DeviceNet network	1769-SDN
distributed 1769 I/O modules to a DeviceNet network	1769-ADN/B∗
Certifications: C-UL-US for Class I, Division 2, Group A,B,C,D Hazardous Locations, CE, C-Tick, ODVA	

∗The series A 1769-ADN adapter does not support the 1769-OA16, 1769-OW16, 1769-IF4XOF2, or 1769-HSC I/O modules.

1769-SDN DeviceNet scanner module

Specification	Value
Backplane Current (mA) at 5V	440 mA
DeviceNet Power Requirements, Max.	90 mA @ 11V dc 110 mA @ 25V dc (N.E.C. Class 2)
Communication Rate	125k Kbps 250k Kbps 500k Kbps
Cable Type	Allen-Bradley part no. 1485C-P1-Cxxx.
DeviceNet Communication Rate, Max.	125 Kbps (500 meters max) 500 Kbps (100 meters max)
Power Supply Distance Rating	4 modules
Isolation Voltage, DeviceNet to Bus	500V ac for 1 minute or 707V dc for 1 minute. 30V dc working voltage (IEC Class 2 reinforced insulation)
Vendor I.D. Code	1
Product Type Code	12
Product Code	105

1769-ADN DeviceNet adapter module

| Specification	Value
Backplane Current (mA) at 5V	450 mA
DeviceNet Power Requirements, Max.	90 mA @ 24V dc (+4%) (N.E.C. Class 2)
Communication Rate	125 Kbps 250 Kbps 500 Kbps
Cable Type	Allen-Bradley part no. 1485C-P1-Cxxx.
I/O Module Capacity	30
Power Supply Distance Rating	5 modules (series B)
Isolation Voltage, Output to Bus	710V dc, 1 minute
Vendor I.D. Code	1
Product Type Code	12
Product Code	69

Step 2 - Select:

- *wiring system (instead of the terminal block that comes with module)*
- *PanelConnect modules and cables to connect input modules to sensors*

Selecting a Wiring System

As an alternative to buying RTBs and connecting the wires yourself, you can buy a wiring system of:

- interface modules (IFMs) that mount on DIN rails provide the output terminal blocks for the I/O module. Use the IFMs with the pre-wired cables that match the I/O module to the interface module.
- I/O-module-ready cables. One end of the cable assembly is an RTB that plugs into the front of the I/O module. The other end has individually color-coded conductors that connect to a standard terminal block.
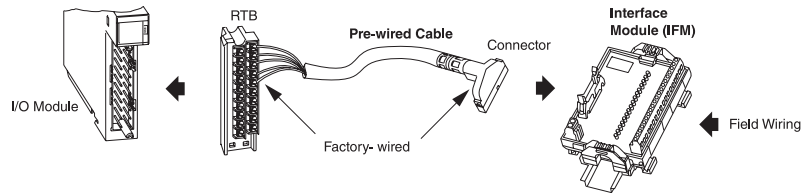
Feed through IFMs for 1769 digital I/O modules

Cat. No.	Description	IA8I	IA16	IM12	IQ16	OA8	OB16	OV	OW8	OW8I
1492-IFM20F	standard	F69	A69	G69	B69	C69	E69	E69	C69	D69
1492-IFM20FN	narrow standard	F69	A69		B69	C69	E69	E69	C69	
1492-IFM20F-2	extra terminals		A69	G69	B69	C69	E69	E69	C69	
1492-IFM20F-3	3-wire sensor type input devices		A69		B69					
1492-XIMF-2	feed through expander with eight feed-through channels✱						E69			

Find the column for the digital I/O module. Follow the column down to see what digital IFMs are compatible with the I/O module as indicated by a letter code. When you select the IFM, use the letter code from this chart to find the compatible cable in the following table for digital pre-wired cabled. The letter code must match the last character of the catalog number for the cable.
✱Connect one expander module to a master to provide a total of 16 outputs. An extender cable is included with each expander to connect it to the master.

LED indicating IFMs for 1769 digital I/O modules

Cat. No.	Description	IA8I	IA16	IM12	IQ16	OA8	OB16	OV	OW8	OW8I
1492-IFM20D24	standard with 24V ac/dc LEDs				B69		E69	E69		
1492-IFM20D24N	narrow standard with 24V ac/dc LEDs				B69		E69			
1492-IFM20D120	standard with 120V ac LEDs		A69							
1492-IFM20D120N	narrow standard with 120V ac LEDs		A69							
1492-IFM20D24-2	24V ac/dc LEDs and extra terminals for outputs						E69	E69		
1492-IFM20D24A-2	24V ac/dc LEDs and extra terminals for inputs				B69					
1492-IFM20D120A-2	120V ac LEDs and extra terminals for inputs		A69							
1492-IFM20D24-3	3-wire sensor with 24V ac/dc LEDs				B69					
1492-IFM20DS24-4	isolated with 24/48V ac/dc LEDs and 4 terminals for outputs								C69	D69
1492-IFM20DS120-4	isolated with 120V ac LEDs and 4 terminals for outputs					C69			C69	D69
1492-IFM20D240-2	240V ac LEDs and extra terminals for inputs			G69						

Find the column for the digital I/O module. Follow the column down to see what digital IFMs are compatible with the I/O module as indicated by a letter code. When you select the IFM, use the letter code from this chart to find the compatible cable in the following table for digital pre-wired cabled. The letter code must match the last character of the catalog number for the cable.

Fusible IFMs for 1769 digital I/O modules

Cat. No.	Description	IA8I	IA16	IM12	IQ16	OA8	OB16	OV	OW8	OW8I
1492-IFM20F-F-2	extra terminals for outputs						E69	E69		
1492-IFM20F-F24-2	extra terminals with 24V ac/dc blown fuse indicators						E69	E69		
1492-IFM20F-F24A-2	extra terminals with 24V ac/dc blown fuse indicators				B69✶		E69			
1492-IFM20F-F120A-2	extra terminals with 120V ac/dc blown fuse indicators		A69							
1492-IFM20F-FS-2	isolated with extra terminals for outputs					C69			C69	D69
1492-IFM20F-FS24-2	isolated with extra terminals and 24V ac/dc blown fuse indicators								C69	D69
1492-IFM20F-FS120-2	isolated with extra terminals with 120V ac blown fuse indicators					C69			C69	D69
1492-IFM20F-FS120-4	isolated with 4 terminals with 120V ac blown fuse indicators					C69			C69	D69
1492-IFM20F-FS240-4	isolated with 4 terminals with 240V ac blown fuse indicators									D69
1492-XIMF-F24-2	fusible expander with eight 24V dc channels with blown fuse indicators†						E69			

Find the column for the digital I/O module. Follow the column down to see what digital IFMs are compatible with the I/O module as indicated by a letter code. When you select the IFM, use the letter code from this chart to find the compatible cable in the following table for digital pre-wired cabled. The letter code must match the last character of the catalog number for the cable.
✶ Sink mode only.
†Connect one expander module to a master to provide a total of 16 outputs. An extender cable is included with each expander to connect it to the master.

Relay IFMs for 1769 digital I/O modules

Cat. No.	Description	IA8I	IA16	IM12	IQ16	OA8	OB16	OV	OW8	OW8I
1492-XIM2024-8R	20-pin master with eight 24V dc relays						E69			
1492-XIM24-8R	relay expander with eight 24V dc relays✶						E69			

Find the column for the digital I/O module. Follow the column down to see what digital IFMs are compatible with the I/O module as indicated by a letter code. When you select the IFM, use the letter code from this chart to find the compatible cable in the following table for digital pre-wired cabled. The letter code must match the last character of the catalog number for the cable.
✶ Connect one expander module to a master to provide a total of 16 outputs. An extender cable is included with each expander to connect it to the master.

Pre-wired cables for digital I/O modules

Cat. No.✶	Number of Conductors	Conductor Size	Nominal Outer Diameter	RTB at the I/O Module End
1492-CABxA69	20	22 AWG	9.0 mm (0.36 in)	1769-RTBN18
1492-CABxB69	20	22 AWG	9.0 mm (0.36 in)	1769-RTBN18
1492-CAExC69	20	22 AWG	9.0 mm (0.36 in)	1769-RTBN10
1492-CAExD69	20	22 AWG	9.0 mm (0.36 in)	1769-RTBN18
1492-CAExE69	20	22 AWG	9.0 mm (0.36 in)	1769-RTBN18
1492-CAExF69	20	22 AWG	9.0 mm (0.36 in)	1769-RTBN18
1492-CAExG69	20	22 AWG	9.0 mm (0.36 in)	1769-RTBN18

✶ Cables are available in lengths of 0.5m, 1.0m, 2.5m, and 5.0m. To order, insert the code for the desired cable length into the catalog number in place of the x: 005=0.5m, 010=1.0m, 025=2.5m, 050=5m.

I/O-module-ready cables for digital I/O modules

Cat. No.✶	Number of Conductors	Conductor Size	Nominal Outer Diameter	RTB at the I/O Module End
1492-CABxRTN10	20†	18 AWG	11.4 mm (0.45 in)	1769-RTBN10
1492-CABxRTN18	20‡	18 AWG	11.4 mm (0.45 in)	1769-RTBN18

✶ Cables are available in lengths of 1.0m, 2.5m, and 5.0m. To order, insert the code for the desired cable length into the catalog number in place of the x: 010=1.0m, 025=2.5m, 050=5m. Build-to-order cable lengths are also available.
†Ten conductors are not connected to the RTB.
‡Two conductors are not connected to the RTB.

For example, a 1769-OB16 with LEDs and extra terminals uses:

- 1492-IFM20D24-2 interface module

- 1492-ACABxE69 cable (replace x with the appropriate length)

AIFMs for 1769 analog I/O modules

Cat. No.	Type of AIFM	Description	IF4 (single-end voltage)	IF4 (single-end current)	IF4 (differential voltage)	IF4 (differential current)	OF2 (voltage)	OF2 (current)
1492-AIFM4-3	feed through	4 channels with 3 terminals/channel	AA69	AB69	BA69	BB69	BC69	BD69

Find the column for the analog I/O module. Follow the column own to see what AIFMs are compatible with the I/O module as indicated by a letter code. When you select the AIFM, use the letter code from this chart to find the

Pre-wired cables for analog I/O modules

Cat. No.∗	Number of Conductors†	Conductor Size	Nominal Outer Diameter	RTB at the I/O Module End
1492-ACABxAA69	5 twisted pairs	22 AWG	7.44 mm (0.293 in)	1769-RTBN10
1492-ACABxAB69	5 twisted pairs	22 AWG	7.44 mm (0.293 in)	1769-RTBN10
1492-ACABxBA69	5 twisted pairs	22 AWG	7.44 mm (0.293 in)	1769-RTBN18
1492-ACABxBB69	5 twisted pairs	22 AWG	7.44 mm (0.293 in)	1769-RTBN18
1492-ACABxBC69	5 twisted pairs	22 AWG	7.44 mm (0.293 in)	1769-RTBN18
1492-ACABxBD69	5 twisted pairs	22 AWG	7.44 mm (0.293 in)	1769-RTBN18

∗Cables are available in lengths of 0.5m, 1.0m, 2.5m, and 5.0m. To order, insert the code for the desired cable length into the catalog number in place of the x: 005=0.5m, 010=1.0m, 025=2.5m, 050=5m. Build-to-order cable lengths are also available.
†Each cable for analog I/O has an overall shield with a ring lug on a 200mm (8.87 in) exposed drain wire at the I/O module end of the cable.

For example, a 1769-IF4 in single-end voltage mode uses:

- 1492-AIFM4-3 interface module

- 1492-ACABxBA69 cable (replace x with the appropriate length)

1492 PanelConnect Modules for Connecting Sensors

A PanelConnect module and its sensor connection systems lets you connect as many as 16 sensors directly to 16-point input modules using convenient pre-built cables and connectors.

The PanelConnect module mounts on the enclosure and creates the correct seal for the entry of the sensor connections. You do not need to seal the opening where the sensor cables enter the enclosure, create custom connectors, or wire to those custom connectors.

Cat. No.	System Voltage	Connects to These Distribution Boxes	Connector Style	Connectors	LEDs
1492-TPMA1008		Allen-Bradley, Brad Harrison (Daniel Woodhead), Crouse-Hinds, and Lumberg	mini-plus (1 1/8 in.)	10 pin	without
1492-TPMA1207	ac	Allen-Bradley, Brad Harrison (Daniel Woodhead), Crouse-Hinds, and Lumberg		12 pin	with
1492-TPMA2209		Turck	metric M23	12 pin	either with or without
1492-TPMD1004		Allen-Bradley, Brad Harrison (Daniel Woodhead), and Crouse-Hinds	mini-plus (1 1/8 in.)	10 pin	without
1492-TPMD1201		Allen-Bradley		12 pin	with
1492-TPMD1202	dc	Brad Harrison (Daniel Woodhead)		12 pin	with
1492-TPMD1203		Lumberg		12 pin	with
1492-TPMD2205		Turck	metric M23	12 pin	either with or without
1492-TPMD2206		Turck		12 pin	either with or without

You can select these PanelConnect modules and cables, depending on the 16-point input modules in your system:

I/O Module *	1492-TPMA1008	1492-TPMA1207	1492-TPMA2209	1492-TPMD1004	1492-TPMD1201	1492-TPMD1202	1492-TPMD1203	1492-TPMD2205	1492-TPMD2206
1769-IA16	1492-CABxA69	1492-CABxA69	1492-CABxA69	na	na	na	na	na	na
1769-IQ16	na	na	na	1492-CABxB69	1492-CABxB69	1492-CABxB69	1492-CABxB69	1492-CABxB69	1492-CABxB69

✶Cables are available in lengths of 0.5m, 1.0m, and 5.0m. To order, insert the code for the desired cable length into the catalog number in place of the x: 005=0.5m, 010=1.0m, 050=5m.

Select a patchcord to connect the PanelConnect module to the sensor distribution box, depending on the type of connector:

Cat. No.✶	Diameter - mm (in)	Wire Rating	Connector Type
889N-F10AFNU-x	17 (0.67)	16 AWG 600V 7 A	10 pin Mini-Plus (1 18"), straight male
889N-F12AFNU-x	18 (0.71)		12 pin Mini-Plus (1 18"), straight male
889N-F10AFNV-x	17 (0.67)		10 pin Mini-Plus (1 18"), right-angle male
889N-F12AFNV-x	18 (0.71)		12 pin Mini-Plus (1 18"), right-angle male
889N-F10ACNU-x	9 (0.36)	18/22 AWG 300V 3 A	10 pin Mini-Plus (1 18"), straight male
889N-F12ACNU-x	9 (0.36)		12 pin Mini-Plus (1 18"), straight male
889N-F10ACNV-x	9 (0.36)		10 pin Mini-Plus (1 18"), right-angle male
889N-F12ACNV-x	9 (0.36)		12 pin Mini-Plus (1 18"), right-angle male

✶Cables are available in lengths of 2m, 3m, 5m, and 10m. To order, insert the code for the desired cable length into the catalog number in place of the x: 2=2m, 3=3m, 5=5m, 10=10m.

Step 3 - Select:

• *a control interface - choose between:*

> *1769 CompactLogix controller*
>
> *1764 MicroLogix 1500 controller*
>
> *1769-ADN DeviceNet adapter*

Selecting a Control Interface

The 1769 Compact I/O modules can be used with a:

• 1769 CompactLogix controller

• 1764 MicroLogix 1500 controller assembly

• 1769-ADN DeviceNet I/O adapter

CompactLogix Controllers

Cat. No.	User Memory✶		Number of Tasks	Ports	Bus Current Draw	Power Dissipation	Maximum Number of I/O Modules	Power Supply Distance Rating
	Battery-Backed Static RAM	Nonvolatile Memory						
1769-L35E	1.5 Mbytes	64 Mbytes CompactFlash†	8 tasks	1 port EtherNet/IP 1 port RS-232	660 mA @ 5V dc 90 mA @ 24V dc	4.74 W	30 in a maximum of 3 banks	4 modules
1769-L32E	750 Kbytes	64 Mbytes CompactFlash†	6 tasks	1 port EtherNet/IP 1 port RS-232	660 mA @ 5V dc 90 mA @ 24V dc	4.74 W	16 in a maximum of 3 banks	4 modules
1769-L31	512 Kbytes	64 Mbytes CompactFlash†	4 tasks	1 port RS-232 (DF1 only) 1 port RS-232 (DF1 or ASCII)	330 mA @ 5V dc 40 mA @ 24V dc	2.61 W	16 in a maximum of 3 banks	4 modules
1769-L30	256 Kbytes	integrated 256 Kbytes	4 tasks	1 port RS-232 (DF1 only) 1 port RS-232 (DF1 or ASCII)	800 mA @ 5V dc 0 mA @ 24V dc	4 W	16 in a maximum of 3 banks	4 modules
1769-L20	64 Kbytes	integrated 64 Kbytes	4 tasks	1 port RS-232	600 mA @ 5V dc 0 mA @ 24V dc	3 W	8 in a maximum of 2 banks	4 modules

✶Available user memory is the amount of memory available to the user after RSLogix 5000 Enterprise Series software is connected and a null program is loaded.
†The CompactFlash card is available separately as 1784-CF64.

Selecting expansion cables

How you orient I/O banks determines which expansion cables you need to connect the I/O banks:

If you add a:	And connect the chassis from:	Use this cable:∗
second bank	right to left	1769-CRLx
	right to right	1769-CRRx
third bank	right to left	1769-CRLx
	right to right	1769CRRx
	left to left	1769-CLLx

∗Where x = 1 for 1 ft. (305 mm) or 3 for 3.28 ft. (1 m)

Bank 1   Bank 2   Bank 3

Horizontal Orientation

1769-CRLx   1769-CRLx

Vertical Orientation

Bank 1

1769-CRRx

Bank 2
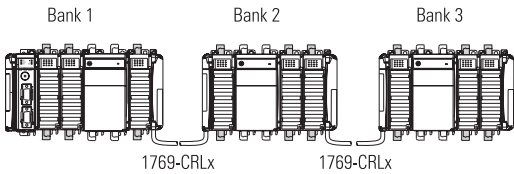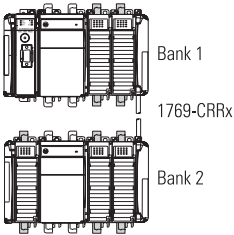
Verifying I/O layout for 1769-L20, -L30 controllers

Each module in a CompactLogix system uses a set amount of backplane memory, in addition to the data that the module stores or transfers. Some modules require a considerable amount of backplane memory. Take this into account when designing your system because it affects how many modules a 1769-L20, -L30 controller can support.

The 1769-L20, -L30 controllers support 256, 16-bit words of backplane data.

Cat. No.	Number of Modules	Number of Words Used	Calculated Number of Words
1769-IA8I		8	
1769-IA16		8	
1769-IM12		8	
1769-IQ16		8	
1769-IQ16F		8	
1769-IQ32		8	
1769-IQ6XOW4		12	
1769-OA8		12	
1769-OA16		12	
1769-OB8		12	
1769-OB16		12	
1769-OB16P		12	
1769-OB32		12	
1769-OV16		12	
1769-OW8		12	
1769-OW8I		12	
1769-OW16		12	
1769-IF4		14	
1769-IF8		63	
1769-OF2		14	
1769-OF8C		84	
1769-OF8V		84	
1769-IF4XOF2		20	
1769-IR6		14	
1769-IT6		16	
1769-HSC		187 (35 words input, 34 words output, 118 words configuration)	
1769-SDN		76 plus total words in scanlist	
system overhead (per controller)		34	34
Total Words Required:∗			

∗The total words required for a 1769-L20, -L30 controller cannot exceed 256 words.

MicroLogix 1500 Packaged Controllers

Use the 1764 MicroLogix 1500 packaged controller when Compact I/O is the modular expansion I/O (8 modules maximum) for the base I/O. You can have up to 16 modules when you use the MicroLogix 1500 Series C processor with a Series B base and RSLogix 500 (version 5.0 or greater).

If the power capacity of the embedded MicroLogix 1500 power supply is insufficient to drive all the I/O modules in the system, a 1769 power supply can be used.

A maximum of one 1769 power supply and one communication cable can be used in a MicroLogix 1500 system, allowing for two banks of I/O modules (one connected directly to the controller, and the other connected via the cable). The local bank (bank 0, which includes the controller) supports 8 modules and the expansion bank supports 8 modules, for a maximum total of 16 I/O modules in one system. Each I/O bank requires its own power supply (bank 0 uses the controller's embedded power supply.

Important: The expansion power supply cannot be connected directly to a controller that has an embedded power supply, such as the MicroLogix 1500. It must be connected using one of the expansion cables. Only one power supply (embedded or expansion) may be used on an I/O bank. Exceeding these limitations may damage the power supply and result in unexpected operation.

Checking the MicroLogix firmware revision

To use a MicroLogix 1500 controller with a 1769 Expansion I/O Power Supply, verify that you have the following:
- MicroLogix 1500 Processor Catalog Number 1764-LSP, Series A, Revision C and higher
- Operating System Version: Firmware Revision Number (FRN) 3 and higher

You can check the FRN by looking at word S: 59 (Operating System Firmware Revision Number) in the status file.

Important: If your processor is at an older revision, you must upgrade the operating system to FRN 3 or higher to use an expansion cable and power supply. On the Internet, go to:

http://www.ab.com/plclogic/prodinfo/plcweb/products/mlogix/ABMicroIndex.html

to download the operating system upgrade. Enter MicroLogix 1500 and go to Tools and Tips.

Selecting expansion cables

The following illustrations provide examples of vertical and horizontal system expansion of the MicroLogix 1500 using Compact I/O.
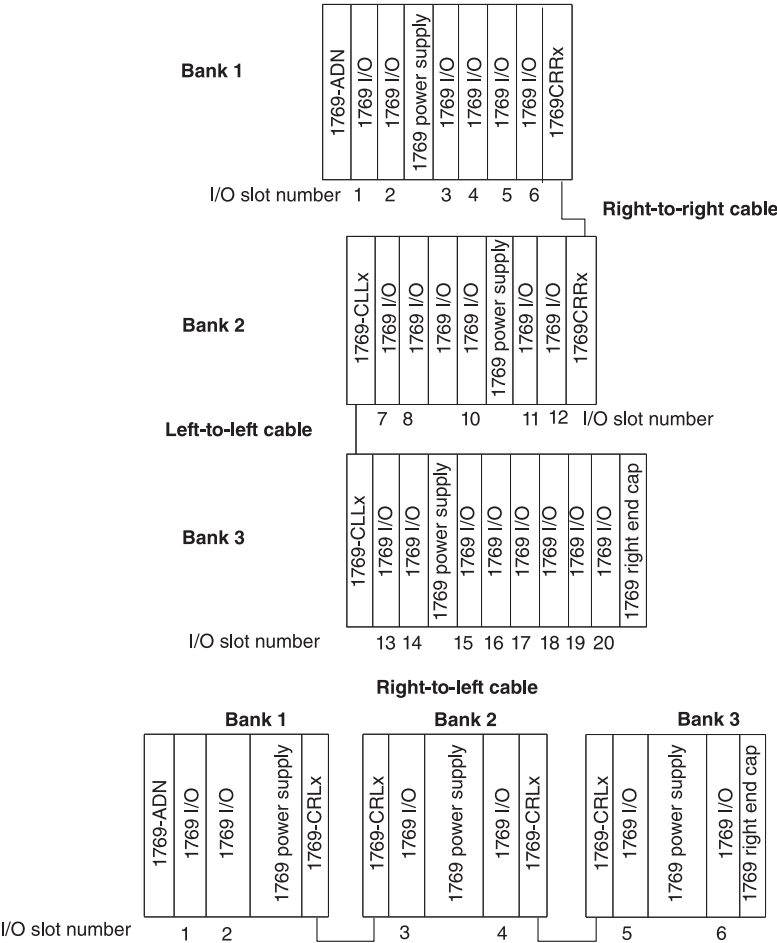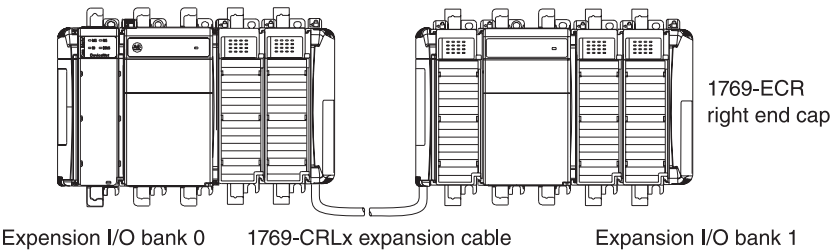
Vertical orientation

Expansion
I/O bank 0

1769-CRRx [1]
expansion
cable

1769-ECL
left end cap

Expansion
I/O bank 1

(1) The x in this catalog number can be either a 1 or
a 3 representing the length of the cable:
1 = 1 foot (305mm) and 3 = 3.28 feet (1 meter).

Horizontal orientation

1769-ECR
right end cap

Expansion
I/O bank 0

1769-CRRx [1]
expansion cable

Expansion
I/O bank 1
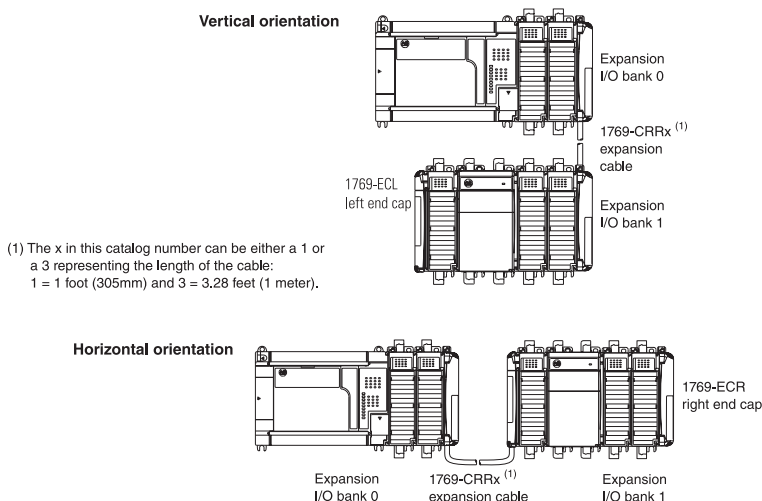
1769-ADN DeviceNet Adapter Module

Use the 1769-ADN DeviceNet adapter module when Compact I/O is the primary I/O for the adapter (30 modules maximum). The 1769-ADN allows 1769 Compact I/O to be used with a DeviceNet Master

Category	Guidelines

Capacity	• The 1769-ADN adapter can communicate with up to 30 Compact I/O modules on a single DeviceNet node.
	• You can have a maximum of three banks1 of I/O connected with up to two communication expansion cables.
	• The adapter supports a total of:
	    180 words of input data from the I/O modules
	    180 words of output data to the I/O modules
	    724 words of configuration data for the I/O modules
	• A typical 16-point input module uses one input word, and a typical 16-point output uses one input and output word.

Configuration	• The adapter must be the first and left-most module in the system (the first module of bank 1). • I/O banks must be connected using a bus communication cable (e.g. 1769-CRL1). • Each bank of I/O must have its own power supply. • Each module type has its own distance rating (the number of modules from the power supply). Each module must be within its distance rating. The 1769-ADN adapter has a distance rating of four, therefore the adapter must be within four modules of the power supply. • I/O modules are not required between either the adapter and an end cap or, between the power supply and an end cap. • An end cap terminator (e.g. 1769-ECR or 1769-ECL) must be used on the last I/O bank. • Address slots contiguously left-to-right within each bank. (Power supplies, cables, and end caps do not use an address.) • A bank of I/O can have a maximum of 16 modules with a maximum of eight on either side of the power supply, depending upon module loading of the power supply. The maximum amount of current each bank supports in one direction (either side of the power supply) is: 2A at 5V dc and 1A at 24V dc.

Example configurations

The 1769-ADN is always the left-most module of bank one. The 1769-ADN DeviceNet adapter can interface with up to 30 Compact I/O modules on a single DeviceNet node. The number of I/O modules cannot exceed 16 on a single bank.

Expension I/O bank 0   1769-CRLx expansion cable   Expansion I/O bank 1

1769-ECR
right end cap

Bank 1

1769-ADN | 1769 I/O | 1769 I/O | 1769 power supply | 1769 I/O | 1769 I/O | 1769 I/O | 1769 I/O | 1769CRRx

I/O slot number 1 2   3 4 5 6

Right-to-right cable

Bank 2

1769-CLLx | 1769 I/O | 1769 I/O | 1769 I/O | 1769 I/O | 1769 power supply | 1769 I/O | 1769 I/O | 1769CRRx

7 8   10   11 12   I/O slot number

Left-to-left cable

Bank 3

1769-CLLx | 1769 I/O | 1769 I/O | 1769 power supply | 1769 I/O | 1769 I/O | 1769 I/O | 1769 I/O | 1769 I/O | 1769 I/O | 1769 right end cap

I/O slot number   13 14   15 16 17 18 19 20

Right-to-left cable

| Bank 1 | Bank 2 | Bank 3 |

1769-ADN | 1769 I/O | 1769 I/O | 1769 power supply | 1769-CRLx || 1769-CRLx | 1769 I/O | 1769 power supply | 1769 I/O | 1769-CRLx || 1769-CRLx | 1769 I/O | 1769 power supply | 1769 I/O | 1769 right end cap

I/O slot number   1   2   3   4   5   6

Step 4 - Select:

• *if power consumption exceeds the maximum for a single power supply, install additional banks and power supplies*

Selecting Power Supplies

Compact I/O power supplies distribute power from either side of the power supply. For example, a 2A at 5V dc power supply (1769-PA2, -PB2) can provide 1A to the right side of the power supply and 1A to the left. A 4A at 5V dc power supply (1769-PA4, -PB4) can provide 2A to the right side of the power supply and 2A to the left.

Specification	1769-PA2	1769-PB2	1769-PA4	1769-PB4
Nominal Input Voltage	120V ac or 240V ac	24V dc	120V ac or 240V ac	24V dc
Input Voltage Range	85...265V ac	19.2...31.2V dc	85...265V ac	19.2...32V dc
Maximum Line Requirement	100 VA @ 120V ac 130 VA @ 240V ac	50 VA @ 24V dc	200 VA @ 120V ac 240 VA @ 240V ac	100 VA @ 24V dc
Output Bus Current Capacity (0° to 55°C)	2 A @ 5V dc 0.8 A @ 24V dc		4 A @ 5V dc 2 A @ 24V dc	
24V dc User Power Capacity (0° to 55°C)	250 mA	na	na	na
Maximum Inrush	25 A at 132V ac, 10 Ω source impedance 40 A at 265V ac, 10 Ω source impedance	30 A at 31.2V dc	25 A at 132V ac, 10 Ω source impedance 40 A at 265V ac, 10 Ω source impedance	30 A at 31.2V dc
Line Loss Ride Through	10 ms (minimum) to 10s (maximum)		5 ms (minimum) to 10s (maximum)	
Minimum Load Current	0 mA at 5V dc; 0 mA at 24V dc			
Short Circuit Protection	Front Access Fuse (replacement part number: Wickmann 19195-3.15A, Wickmann 19343-1.6A, or Wickmann 19181-4A)	Front Access Fuse (replacement part number: Wickmann 19193-6.3A)	Front Access Fuse (replacement part number: Wickmann 19195-3.15A or Wickmann 19181-4A)	Front Access Fuse (replacement part number: Wickmann 19193-6.3A)
Bus Overvoltage Protection	for both +5V dc and for +24V dc			
Isolation Voltage (input power to 1769 bus) Verified by one of these dielectric tests	1836V ac for 1s or 2596V dc for 1s or 265V Working Voltage (IEC Class 1 - grounding required)	1200V ac for 1s or 1697V dc for 1s or 75V Working Voltage (IEC Class 1 - grounding required)	1836V ac for 1s or 2596V dc for 1s or 265V Working Voltage (IEC Class 1 - grounding required)	1200V ac for 1s or 1697V dc for 1s or 75V Working Voltage (IEC Class 1 - grounding required)
Power Supply Distance Rating	8 (up to eight I/O modules can be connected on either side of the power supply for a maximum of 16 modules)			

Certifications: UL 508, CSA (Class I, Division 2, Group A, B, C, D), CE

Considerations for system expansion using power supplies and cables:

• Expansion power supplies must be used with the expansion cables.

• Only one power supply may be used on an I/O bank, with a maximum of 16 modules per bank.

• Using an expansion power supply on the same I/O bank as your MicroLogix 1500 controller or two expansion power supplies on the same bank may damage a power supply and may result in unexpected I/O operation.

Power
Requirements and
Transformer Sizing

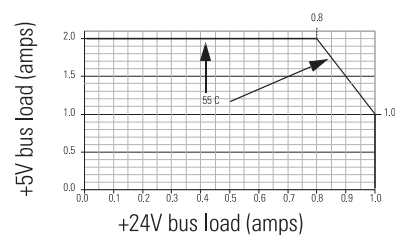**1769-PA2 output derating**

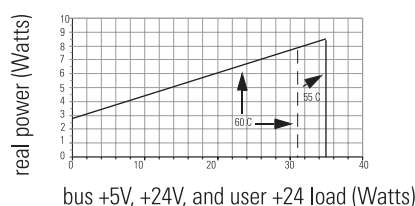user +24V current draw at 0A
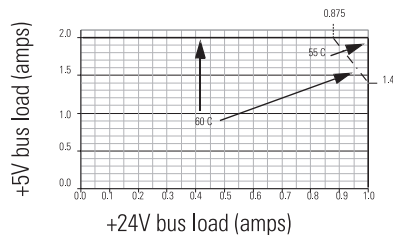
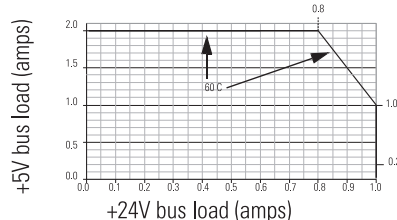user +24V current draw at 0.2A
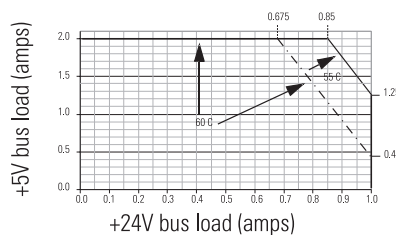
user +24V current draw at 0.25A
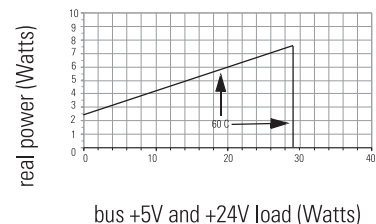

1769-PA2 power dissipation

1769-PB2 output derating
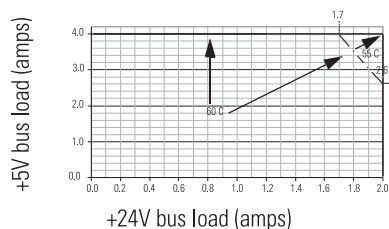
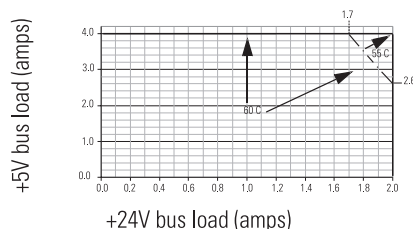total output: 29W @ 60°C or below

1769-PB2 power dissipation

1769-PA4 output derating
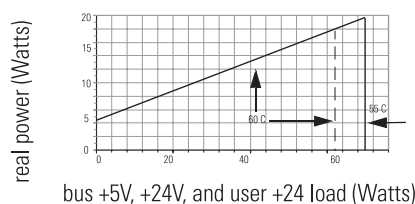
total output: 68W @ 55°C or below
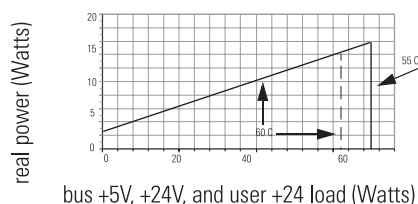61W @ 60°C or below

1769-PB4 output derating

total output: 68W @ 55°C or below
61W @ 60°C or below

1769-PA4 power dissipation

1769-PB4 power dissipation

Validating system power

1. After you calculate the current consumed by your system, use the graphs on page 57 to verify that your power supply has adequate capacity for its bank of I/O modules. Compare the graphs to your calculated totals for the following:

- total 5V dc

- total 24V dc

- total 24V dc sensor power (1769-PA2 only)

2. If your power supply load is at or near the limits of the allowable ranges shown in the graphs on page 57, you must add an additional I/O bank.

Important: The additional I/O bank must include a power supply. An end cap/terminator (1769-ECR or -ECL) must also be used if the I/O bank is the last in the system.

Calculating system power requirements

Compact I/O power supplies distribute power from either side of the power supply. For example, a 2A at 5V dc power supply (1769-PA2, -PB2) can provide 1A to the right side of the power supply and 1A to the left. A 4A at 5V dc power supply (1769-PA4, -PB4) can provide 2A to the right side of the power supply and 2A to the left.

Cat. No.	Number of Modules	Module Current Requirements (mA)		Calculated Current (mA) = (number of modules) x (module current requirements)	
		5V dc	24V dc	5V dc	24V dc
1769-HSC		425	0		
1769-IA8I		90	0		
1769-IA16		115	0		
1769-IF4		120	60		
1769-IF4XOF2		120	160		
1769-IF8		120	70		
1769-IM12		100	0		
1769-IQ16		115	0		
1769-IQ16F		110	0		
1769-IQ32		170	0		
1769-IQ6XOW4		105	50		
1769-IR6		100	45		
1769-IT6		100	40		
1769-OA8		145	0		
1769-OA16		225	0		
1769-OB8		145	0		
1769-OB16		200	0		
1769-OB16P		160	0		
1769-OB32		300	0		
1769-OF2		120	120		
1769-OF8C		145	160		
1769-OF8V		145	125		
1769-OV16		200	0		
1769-OW8		125	100		
1769-OW8I		125	100		
1769-OW16		205	180		
1769-L35E		660	90		
1769-L32E		660	90		
1769-L31		330	40		
1769-L30		800	0		
1769-L20		600	0		
1769-ADN		500	0		
1769-SDN		440	0		
1769-ECL✶		5	0		
1769-ECR✶		5	0		
Total Current Required:†					

✶One 1769-ECL or 1769-ECR end cap/terminator is required in the system. The end cap/terminator used is dependent on your configuration.
†The total current required must not exceed the power supply capacity listed below.

Power supply capacity

| Specification	1769-PA2	1769-PB2	1769-PA4	1769-PB4
output current capacity (0° to 55° C)	2A @ 5V dc 0.8A @ 24V dc	2A @ 5V dc 0.8A @ 24V dc	4A @ 5V dc 2A @ 24V dc	4A @ 5V dc 2A @ 24V dc
24V dc user output capacity (0° to 55° C)	250mA	na	na	na

Mounting a Compact I/O System

You can panel mount or DIN rail mount a CompactLogix system. The CompactLogix system must be mounted so that the modules are horizontal to each other.

If you separate modules into multiple banks, the banks can be vertical or horizontal to each other.

Horizontal
Orientation

Vertical
Orientation
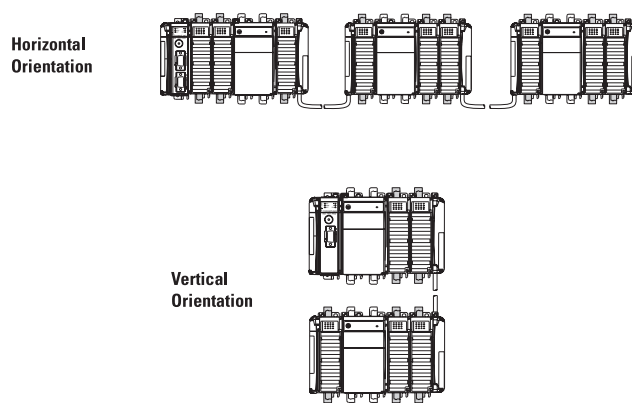
If you decide to use a DIN rail, use steel, 35 x 7.55mm DIN rails (A-B part number 199-DR1; 46277-3; EN 50022). The DIN rails for all CompactLogix system components must be mounted on a common, conductive surface to ensure proper electromagnetic interference (EMI) performance.

You can ground a Compact I/O system through the:
- non-coated, steel DIN rail
- panel-mount screw hole containing the ground strap

If you divide the modules into multiple banks:
- the controller or adapter must be in the leftmost position of the first bank
- each bank needs its own power supply
- use expansion cables to connect the banks
- the last I/O bank requires an end cap

If you add a:	And connect the chassis from:	Use this cable:∨
second bank	right to left	1769-CRLx
	right to right	1769-CRRx
third bank (1769-L35E, -L32E, -L31, -L30 controllers only)	right to left	1769-CRLx
	right to right	1769CRRx
	left to left	1769-CLLx

VWhere x = 1 for 1 ft. (305 mm) or 3 for 3.28 ft. (1 m)

Adding end caps

The controller or adapter is the leftmost module in the Compact I/O system. The controller or adapter has built-in termination, so the leftmost end of the system is terminated.

The final I/O bank in the Compact I/O system needs an end cap on the end without the expansion cable.

For a:	Order:
right end cap	1769-ECR
left end cap	1769-ECL

Power Supply Distance Rating

Modules can be placed to the left and the right of the power supply. As many as eight I/O modules can be placed on each side of the power supply.

Each 1769 module also has a power supply distance rating (the number of modules from the power supply). Each module must be located within its distance rating. See the specs for the module to determine its distance rating.

The CompactLogix controller has a power supply distance rating of 4 modules. The controller must be the leftmost module in the first bank of the system. The maximum configuration for the first bank of a CompactLogix controller is the controller and three I/O modules to the left of the power supply and eight I/O modules to the right of the power supply.

Mounting Dimensions

Spacing for single-wide modules: 35 mm (1.378 in.)
Spacing for one-and-a-half-wide modules: 52.5 mm (2.067 in.)
See host controller documentation for this dimension

Overall hole spacing tolerance: ±0.4 mm (0.016 in.)

A   Spacing for single-wide modules: 40 mm (1.58 in.)
     Spacing for one-and-a-half-wide modules: 57.5 mm (2.21 in.)

B   Spacing for single-wide modules: 28.5 mm (1.12 in.)
     Spacing for one-and-a-half-wide modules: 35.5 mm (1.38 in.)

Step 6 - Select:
- *the appropriate programming software and any options*
- *other software packages for your application*

Selecting Software

Your selection of modules and network configuration determines what software packages you need to configure and program your system.

If you have a:	You need:	Order this catalog number:
1769 CompactLogix controller	RSLogix 5000 Enterprise Series software	9324 series (RSLogix 5000 Enterprise Series software)
1764 MicroLogix 1500 packaged controller	RSLogix 500 programming software	9324-RL0300ENE
DeviceNet interface (scanner or adapter)	RSNetWorx for DeviceNet (comes with the standard/NetWorx option of RSLogix 5000 Enterprise Series software)	9324-RLD300NXENE (RSLogix 5000 Enterprise Series software plus RSNetWorx option) **or** 9357-DNETL3 (RSNetWorx for DeviceNet)
communication card in a workstation	RSLinx software (RSLinx Lite comes with RSLogix 5000 Enterprise Series software)	9324 series (RSLogix 5000 Enterprise Series software)

RSLogix 5000 Programming Software
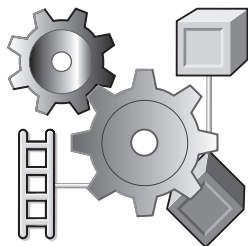
RSLogix 5000 Enterprise Series software is designed to work with Rockwell Automation's Logix platforms. RSLogix 5000 Enterprise Series software is an IEC 61131-3 compliant software package that offers relay ladder, structured text, function block diagram, and sequential function chart editors for you to develop application programs. RSLogix 5000 Enterprise Series software also includes axis configuration and programming support for motion control.

RSLogix 5000 Enterprise Series software requirements

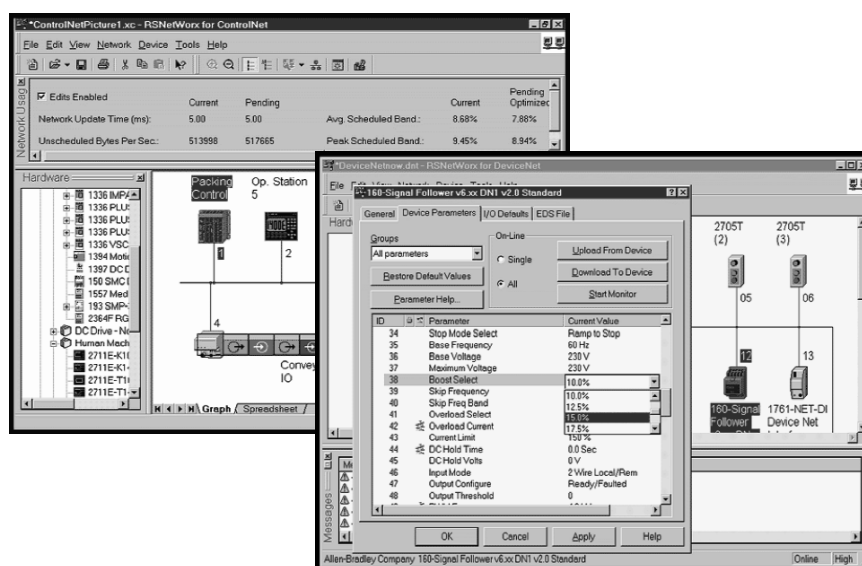| Description	Value
personal computer	Pentium II 450 MHz minimum Pentium III 733 MHz (or better) recommended
software requirements	Supported operating systems: • Microsoft Windows XP Professional version 2002 (with Service Pack 1) or XP Home version 2002 • Microsoft Windows 2000 Professional with Service Pack 1, 2, or 3 • Microsoft Windows NT version 4.0 with Service Pack 5 or 6A
RAM	128 Mbytes of RAM minimum 256 Mbytes of RAM recommended
hard disk space	100 Mbytes of free hard disk space (or more based on application requirements)
video requirements	256-color VGA graphics adapter 800 x 600 minimum resolution (True Color 1024 x 768 recommended)

RSLogix 500 Programming Software

The RSLogix 500 ladder logic programming package (9324-RL series) supports Allen-Bradley's MicroLogix families of processors and SLC 500 controllers, RSLogix 500 was the first PLC programming software to offer unbeatable productivity with an industry-leading user interface.

RSLogix 5000 Enterprise Series software requirements

Description	Value
personal computer	Pentium II 450 MHz minimum Pentium III 733 MHz (or better) recommended
software requirements	Supported operating systems: • Microsoft Windows XP Professional version 2002 (with Service Pack 1) or XP Home version 2002 • Microsoft Windows 2000 Professional with Service Pack 1, 2, or 3 • Microsoft Windows NT version 4.0 with Service Pack 5 or 6A
RAM	128 Mbytes of RAM minimum 256 Mbytes of RAM recommended
hard disk space	100 Mbytes of free hard disk space (or more based on application requirements)
video requirements	256-color VGA graphics adapter 800 x 600 minimum resolution (True Color 1024 x 768 recommended)

Network Configuration Software
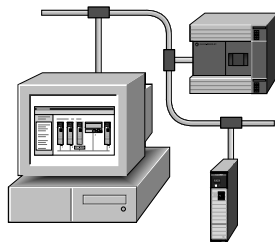
RSNetWorx software is the configuration tool for your control network. With RSNetWorx software you can create a graphical representation of your network configuration and configure the parameters that define your network.

Use RSNetWorx for:

- ControlNet to schedule network components. The software automatically calculates network bandwidth for the entire network, as well as the bandwidth used by each network component. You must have RSNetWorx software to configure and schedule ControlNet networks.

- DeviceNet to configure DeviceNet I/O devices and create a scan list. The DeviceNet scanner stores the configuration information and scan list.

- EtherNet/IP to configure EtherNet/IP devices using IP addresses or host names.

RSNetWorx system requirements

Description	ControlNet	DeviceNet	EtherNet/IP
personal computer	Intel Pentium or Pentium-compatible computer		
operating system	Supported operating systems: • Microsoft Windows XP • Microsoft Windows 2000 • Microsoft Windows 2000 Terminal Server • Microsoft Windows NT version 4.0 with Service Pack 6 or greater • Microsoft Windows ME • Microsoft Windows 98		
RAM	32 Mbytes of RAM minimum more memory is required for large networks		
hard disk space	minimum: 115 Mbytes (includes program files and hardware files) full support: 168...193 Mbytes (includes program files, online help, tutorial, and hardware files)	minimum: 190 Mbytes (includes program files and hardware files) full support: 230...565 Mbytes (includes program files, online help, tutorial, and hardware files)	minimum: 108 Mbytes (includes program files and hardware files) full support: 115...125 Mbytes (includes program files, online help, tutorial, and hardware files)
video requirements	16-color VGA graphics adapter 640 x 480 resolution minimum 800 x 600 resolution recommended		
other	RSLinx Lite 2.4 or later to use RSNetWorx online	RSLinx Lite 2.4 or later to use RSNetWorx online	RSLinx Lite 2.41 or later to use RSNetWorx online

In most cases, RSNetWorx software comes bundled with controller programming software packages.

Summary

Use a spreadsheet to record the amount and type of devices your CompactLogix system needs. For example, this sample system:
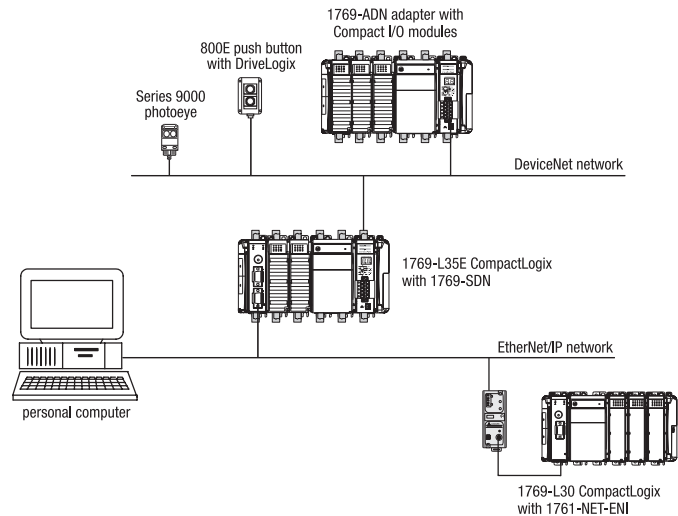
could result in this spreadsheet:

Controller 1 - 1769-L35E				
Device	**Number of Points Needed**	**Cat. No.**	**I/O Points per Module**	**Number of Modules**
120V ac digital inputs	12	1769-IA816	16	1
4-20mA analog inputs	3	1769-IF4XOF2	4	1
4-20mA analog outputs	2	1769-IF4XOF2	2	1 (part of same module from analog input requirements)
DeviceNet scanner	na	1769-SDN	na	1
DeviceNet adapter	na	1769-ADN	na	1
remote 24V dc digital outputs	30	1769-OB16	16	2
remote contact outputs	3	1769-OW6	6	1
Controller 1 subtotal				2 local 1769 I/O modules 1 1769-SDN 1 remote 1769-ADN 3 remote 1769 I/O modules

Controller 2 - 1769-L30				
Device	**Number of Points Needed**	**Cat. No.**	**I/O Points per Module**	**Number of Modules**
24V dc digital outputs	28	1769-OB16	16	2
high-speed counter	na	1769-HSC	na	1
EtherNet/IP interface devices	na	1761-NET-ENI	na	1
Controller 2 subtotal				3 I/O modules 1 1761-NET-ENI

As you select devices for your CompactLogix system, keep in mind:

✓	Step	Remember to select
	1 Select I/O devices Use a spreadsheet to record: • location of the device • number of points needed • appropriate catalog number • number of points available per module • number of modules **Important:** For 1769-L20, -L30 CompactLogix controllers, verify backplane memory use to make sure that the controller can support the proposed system. See the worksheet at the back of this guide.	• I/O modules
	2 Select a 1492 wiring system Choose a wiring system as an alternative to the terminal block that comes with the module.	• wiring system (instead of the terminal block that comes with the module) • PanelConnect modules and cables to connect input modules to sensors • expansion cables for multiple banks of I/O modules
	3 Select controllers Select the appropriate controller based on the type and number of I/O points needed	1769 CompactLogix controller 1764 MicroLogix 1500 packaged controllers
	4 Select power supplies If power consumption exceeds the maximum for a single power supply, install additional power supplies.	Power supply specifications
	5 Select the mounting requirements Determine whether to panel mount or DIN rail mount the CompactLogix system.	Planning the mounting requirements
	6 Select software Based on the system design, determine the software products you need to configure and program your application.	Available software products Programming software Network configuration software

Notes: