Multifunction DAQ Cable and **Accessory Selection Guides**

NI Cable Design Advantages

The SH68-68-EP cable is the most commonly used E Series and S Series cable. The cable is designed to work specifically with the NI Multifunction DAQ devices to preserve signal integrity through these technologies:

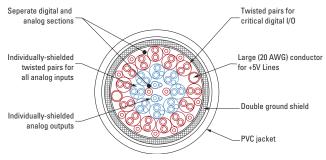
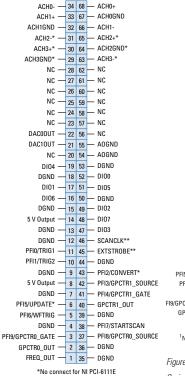


Figure 1. SH68-68-EP Cable

A variety of cabling and accessory options are available for your needs. Use the following tables to choose the most appropriate cables and accessories. To determine which Multifunction DAQ device best fits your needs, please see page 192.



ACH1 33 67 AIGND AIGND 32 66 ACH9 31 65 ACH10 ACH2 ACH3 AIGND AIGND 29 63 ΔCH4 AISENSE 28 62 ΔIGND 27 61 ACH12 ACH13 26 60 ACH5 ACH6 25 | 59 AIGND AIGND 24 58 ACH14 ACH15 23 57 22 56 AIGND DACOOUT1 DAC10UT1 21 55 AOGND EXTREF¹ 20 54 AOGND1 DI04 19 53 DGND DGND 18 52 D100 DIO1 17 51 DI05 D106 16 50 DGND DGND 15 49 DIN2 +5 V 14 48 DI07 DGND 13 47 DI03 DGND 12 46 SCANCIK PFI0/TRIG1 11 45 EXTSTROBE⁴ PFI1/TRIG2 10 44 DGND DGND 9 43 PFI2/CONVERT* PFI3/GPCTR1_SOURCE +5 V 8 42 DGND 7 41 PFI4/GPCTR1_GATE PFI5/UPDATE* 6 40 GPCTR1_OUT PFI6/WFTRIG 5 39 DGND DGND 4 38 PFI7/STARTSCAN FI9/GPCTR0_GATE 3 37 PFI8/GPCTR0_SOURCE GPCTRO OUT 2 FREQ_OUT 1 35

¹Not used on NI PCI-6032E, NI PCI-6023, NI PCI-6034E, NI PCI-6013

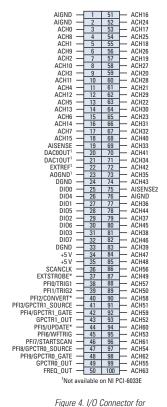
Figure 3. I/O Connector for 16-channel E Series Devices, except NI 6025E

Figure 2. S Series Devices Connector

Platform	Shielding	Connect to	Cable	Adapter	Accessory
PCI/PXI/USB/FireWire	Shielded	SCC portable signal	SH68-68-EP	-	SC-2345 and modules, p. 320
		conditioning per channel			
		SCXI high-performance	SCXI-1349	-	SCXI Chassis and Modules, p. 246
		signal conditioning			
		Screw terminals ¹	SH68-68-EP or SH68-68R1-EP	-	SCB-68
		BNC terminal block	SH68-68-EP	-	BNC-2110, BNC-2120, BNC-2090
		50-pin connector	SH6850	-	CB50, custom or 3rd party
		Configurable connectivity box	SH68-68-EP	-	CA-1000
	Unshielded	Screw terminals ¹	R6868	-	TBX-68, CB-68LP, CB-68LPR,
					DAQ Signal Accessory
		50-pin connector	R6850	-	CB50, custom or 3rd party
PXI only	Shielded	Front-mounted screw terminals	N/A	-	TB-2705
PCMCIA	Shielded	Screw terminals ¹	SHC68-68-EP or SHC68U-68-EP ²	-	SCB-68, CA-1000
		50-pin connector	SHC68-68-EP or SHC68U-68-EP ²	68M-50F MIO	CB50, custom or 3rd party
	Unshielded	Screw terminals 1	RC68-68		TBX-68, CB-68LP, CB-68LPR,
					DAQ Signal Accessory
		50-pin connector	RC68-68	68M-50F MIO	CB50, custom or 3rd party
SA - Visit ni.com/info and e Unshielded Cables can cor		ore information on ISA products and vice-versa.			
In adiacent PCMCIA slots.	both cables types are	required because the same cable would cause	e mechanical hindrance.		

Table 1. Cable Connection Specifications for 16-Channel E Series Devices (except NI 6025E)

Multifunction DAQ Cable and Accessory Selection Guides



ACH1 PC5 GND PC4 GND PC3 GND ACH10 ACH3 ACH11 ACH4 ACH12 PC2 GND ACH12 ACH5 ACH13 ACH6 ACH14 ACH7 ACH15 ALSENSE DACOOUT DACTOUT RESERVED AOGND DGND DIOO DIO7 DGND +5 V +5 V SCANCLK EXTSTROBE* GND PA5 EXTSTROBE*
PFI0/TRIG1
PFI1/TRIG2
PFI2/CONVERT*
PFI3/GPCTR1_SOURCE
PFI4/GPCTR1_GATE
GPCTR1_OUT
PFI5/UPDATE*
PFIG/WFTRIG
PFI7/STARTSCAN
GPCTR0_SOURCE
GPCTR0_GATE
GPCTR0_GATE GND PA3 GND — PA1 — GND — PA0 — GND

64-channel NI devices

Figure 5. I/O Connector for the NI 6025E device

E Series Devices (NI 6031E, NI 6033E, NI 6071E, NI 6025E)

Platform	Shielding	Connect to	Cable	Cable Leg	Adapter	Accessory
PCI, PXI	Shielded	Screw Terminals	SH100100	-	-	SCB-100
		Screw Terminals	SH1006868	MIO:	-	SCB-68
				Extended:	-	SCB-68
		Screw Terminals ¹	SH1006868	MIO:	-	TBX-68, CB-68LP, CB-68LPR,
						DAQ Signal Accessory
				Extended:	-	TBX-68, CB-68LP, CB-68LPR
		BNC Terminal Block	SH1006868	MIO:	-	BNC-2110, BNC-2120, BNC-2090
				Extended:	-	BNC-2115
		50-pin Connectors	SH1006868	MIO:	68M-50F MIO	custom or 3rd party
				Extended:	68M-50F Extended	custom or 3rd party
	Unshielded	50-pin Connector	R1005050	MIO:	-	custom or 3rd party
				Extended:	_	custom or 3rd party
ISA - Visit ni.com/info and enter in "legacy" for more information on ISA Products. Shielded cable with unshielded accessories						

Table 1. Cable Connection Specifications for 64-Channel E Series Devices and the NI 6025E

SCXI High-Performance Modular Signal Conditioning (see Figure 1)

SCXI is a high-performance modular signal conditioning platform that you use as a front end to your E Series DAQ device. With the SCXI multiplexing architecture, you can expand your analog inputs to 3,072 channels. Additionally, SCXI offers a variety of modules for connecting to thermocouples, RTDs, strain gauge transducers, LVDT position sensors, ICP-compatible accelerometers/microphones, thermistors, millivolt inputs, voltage inputs up to 1000 V, current inputs (0-20mA), frequency inputs or dynamic signals.

See page 246 for details on SCXI Signal Conditioning.

SCC Portable Modular Signal Conditioning for Low-Channel-Count Applications (see Figure 2)

The SCC Series portable modular signal conditioning system consists of SCC modules that plug into a low-profile SC-2345 shielded carrier. SCC modules give you single or dual-channel signal conditioning for up to 16 analog input channels and eight digital I/O lines of your E Series or basic multifunction DAQ device. The SCC Series offers signal conditioning for a variety of inputs, including thermocouples, RTDs, strain gauges, ICP-compatible accelerometers, accelerators, analog inputs requiring isolation, high voltage (up to 100 V), current (0-20mA), and optically isolated digital I/O. Lowpass filtering and breadboard modules are also available.

See page 320 for details on SCC Signal Conditioning.

Connector Blocks BNC-2100 Series Connector Blocks (see Figure 3)

The BNC-2100 Series are shielded connector blocks with signal-labeled BNC connectors for easy connectivity of your analog input, analog output, digital I/O and counter/timer signals to your multifunction DAQ device, including analog input devices. The BNC-2110 and BNC-2120 work with all E Series devices. The BNC-2120 also provides a function generator, quadrature encoder, temperature reference, thermocouple connector, and LED so that you can test the functionality of your hardware. The BNC-2115 has 24 BNC inputs for connecting to the extended I/O channels of our 100-pin E Series DAQ devices.

BNC-2110	777643-01
Dimensions – 20.3 by 11.2 by 5.5 cm (8.0 by 4.4 by 2.2 in.)	
BNC-2115	777807-01
Dimensions – 20.3 by 11.2 by 5.5 cm (8.0 by 4.4 by 2.2 in.)	
BNC-2120	777960-01
Dimensions – 26.7 by 11.2 by 6.0 cm (10.5 by 4.4 by 2.4 in.)	

SC-2075 Breadboard Connector Block (see Figure 4)

The SC-2075 provides breadboard area for prototyping and BNC and spring terminal connectivity for 68-pin E Series DAQ devices. The built-in ±15 V or adjustable 0 to 5 V power supply and LEDs for digital lines make the SC-2075 a cost-effective device, ideal for academic laboratories.

Dimensions – 26.72 by 20.70 by 4.37 cm (10.52 by 8.15 by 1.72 in.)



Figure 1. SCXI High-Performance Signal Conditioning



Figure 2. SCC Portable, Modular Signal Conditioning



Figure 3. BNC-2100 Series Connector Blocks -BNC-2120. BNC-2110. BNC-2115



Figure 4. SC-2075 Breadboard Connector Block



Figure 5. BNC-2090 Shielded BNC Adapter Chassis



Figure 6. CA-1000 Configurable Signal Conditioning Enclosure



Figure 7. TB-2705 Terminal Block



Figure 8. SCB-68 and SCB-100 Shielded I/O Connector Blocks



Figure 9. TBX-68 I/O Connector Block

BNC-2090 Shielded BNC Adapter Chassis (see Figure 5)

The BNC-2090 is a shielded, rack-mountable adapter with signal-labeled BNC connectors, spring terminal blocks, and component locations for passive signal conditioning. Consists of 22 BNC connectors and 28 spring terminals to simplify connection to your analog, digital, trigger and counter/timer signals. The BNC-2090 has silk-screened component locations that you use to develop simple signal conditioning circuits. For added flexibility, you can connect any E Series DAQ device to the BNC-2090 from the front or rear through dual 68-pin connectors.

BNC-2090777270-01 Dimensions – 48.3 by 4.4 by 18.8 cm (19.0 by 1.7 by 7.4 in.)

CA-1000 Configurable Signal Conditioning Enclosure (see Figure 6)

The CA-1000 is a configurable enclosure that gives you maximum user-defined connectivity and flexibility through customized panelettes. Each enclosure can accommodate up to nine panelettes.

Dimensions - 30.7 by 25.4 by 4.3 cm (21.1 by 10 by 1.7 in.)

See page 352 for more information about the CA-1000.

TB-2705 Terminal Block for 68-pin PXI E Series Devices (see Figure 7)

The TB-2705 is a screw terminal block for PXI that works with your PXI E Series DAQ module. It latches to the front of your PXI module with locking screws and provides strain relief and easy access to your analog, digital, trigger and counter/timer signals through screw terminals.

SCB-68 and SCB-100 Shielded I/O Connector Blocks (see Figure 8)

The SCB-68 and SCB-100 are shielded I/O connector blocks for rugged, very low-noise signal termination for connecting to 68-pin or 100-pin E Series DAQ devices, respectively. Silk-screened component locations for easy addition of simple signal-conditioning circuitry for your analog input channels. They also include general-purpose breadboard areas (two on the SCB-68; three on the SCB-100) as well as an IC temperature sensor for cold-junction compensation in temperature measurements.

TBX-68 I/O Connector Block with DIN-Rail Mounting (see Figure 9)

The TBX-68 is a termination accessory with 68 screw terminals for easy connection of field I/O signals to 68-pin DAQ devices. It includes one 68-pin male connector for direct connection to 68-pin cables. The TBX-68 is mounted in a protective plastic base with hardware for mounting on a standard DIN rail.

Dimensions – 12.50 by 10.74 cm (4.92 by 4.23 in.)

CB-68LP and CB-68LPR I/O Connector Blocks (see Figure 10)

The CB-68LP and CB-68LPR are low-cost termination accessories with 68 screw terminals for easy connection of field I/O signals to 68-pin E Series DAQ devices. They include one 68-pin male connector for direct connection to 68-pin cables. The connector blocks include standoffs for use on a desktop or for mounting in a custom panel. The CB-68LP has a vertical-mounted 68-pin connector. The CB-68LPR has a right-angle mounted connector, and it is used with the CA-1000 (see page 352).

CB-68LP	-01
Dimensions – 14.35 by 10.74 cm (5.65 by 4.23 in.)	
CB-68LPR	.02
Dimensions - 7.62 by 16.19 cm (3.00 by 6.36 in.)	

DAQ Signal Accessory (see Figure 11)

The DAQ Signal Accessory demonstrates and tests the use of analog, digital, and counter/timer functions of DAQ devices. You can connect the DAQ Signal Accessory directly to your DAQ device. It features a built-in function generator, quadrature encoder, solid-state relay, IC temperature sensor, noise generator, microphone jack, thermocouple jack, four LEDs, and a digital trigger button. The DAQ Signal Accessory works with all E Series DAQ devices.

DAQ Signal Accessory	777382-01
Dimensions – 12.7 by 12.7 cm (5.0 by 5.0 in.)	

RTSI Bus Cables (see Figure 12)

Use RTSI bus cables to connect timing and synchronization signals among Measurement, Vision, Motion, and CAN boards for PCI, and FireWire DAQPad devices. For systems using long and short boards, order the extended RTSI cable.

2 boards	776249-02
3 boards	776249-03
4 boards	776249-04
5 boards	776249-05
Extended, 5 boards	777562-05
3 FireWire DAQPads	186464-01

Shielded I/O Cables SH68-68-EP Shielded Cable (see Figure 13)

The SH68-68-EP is a shielded 68-conductor cable terminated with two 68-pin female 0.050 series D-type connectors. It features individually-shielded analog twisted pairs for reduced crosstalk with high-speed devices. This cable connects to all 68-pin E Series devices (except DAQCards). If you need a right-angle connector, the SH68-68R1-EP shielded cable is electrically equivalent.

1 m	184749-01
2 m	184749-02
Please call for other length options.	

SH68-68R1-EP Shielded Cable (see Figure 14)

The SH68-68R1-EP is a shielded 68-conductor cable. One end terminates with a 68-pin female 0.050 series D-type connector and the other end terminates with a right-angle 68-pin female 0.050 series D-type connector.





Figure 10. CB-68LP and CB-68LPR I/O Connector Blocks



Figure 11. DAQ Signal Accessory

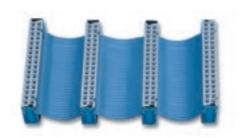


Figure 12. RTSI Bus Cable



Figure 13. SH68-68-EP Shielded Cable



Figure 14 SH68-68R1-FP Shielded Cable



Figure 15. SH100100 Shielded Cable



Figure 16. 68M-50F Cable Adapters



Figure 17. SH1006868 Shielded Cable



Figure 18. SHC68-68-EP and SHC68U-68-EP Shielded Cables



Figure 19. SH6850 Shielded Cable

SH100100 Shielded Cable (see Figure 15)

The SH100100 is a shielded 100-conductor cable terminated with 100-pin male 0.050 series D-type connectors. This cable connects the 100-pin E Series devices to 100-pin accessories.

1 m	182853-01
2 m	182853-02

68M-50F S Series Cable Adapters (see Figure 16)

The 68M-50F cable adapter connects a 68-pin NI cable to a standard 0.1 by 0.1 in. 50-pin connector on third-party or custom accessories. The 68M-50F MIO should be used with the SH68-68-EP, SHC68-68-EP, SHC68U-68-EP, or the MIO leg of the SH1006868. The 68M-50F Extended I/O cable adapter should be used for the extended I/O leg of the SH1006868.

68M-50F MIO	.184670-01
68M-50F Extended I/O	.184670-02

SH1006868 Shielded Cable (see Figure 17)

The SH1006868 is a shielded cable that connects to 100-pin E Series devices and terminates with two female 68-pin 0.050 series D-type connectors. See Table 2 on page 256 for accessories compatible with each 68-pin connector.

1 m	.182849-01
2 m	.182849-02

SHC68-68-EP and SHC68U-68-EP Shielded Cables for DAQCards (see Figure 18)

These cables connect DAQCards to standard 68-pin accessories. Latching screws secure the shielded connector to the PCMCIA DAQCard. The SHC68-68-EP is a shielded 68-conductor cable terminated with a VHDCI 68-pin male connector at one end and a 68-pin female 0.050 series D-type connector at the other. The SHC68U-68-EP is identical to the SHC68-68-EP except it uses an inverted VHDCI 68-pin male connector. Use the SHC68-68-EP cable with a DAQCard inserted in the lower PCMCIA slot in your laptop or when using only one DAQCard. Use the SH68U-68-EP for a DAQCard located in the upper PCMCIA slot in your laptop. When using two E Series DAQCard PCMCIA devices in adjacent slots, use one SHC68-68-EP and one SHC68U-68-EP.

SHC68-68-EP

0.5 m	186838-0R5
1 m	186838-01
SHC68U-68-EP	
0.5 m	187406-0R5
1 m	187406-01

SH6850 Shielded Cable (see Figure 19)

The SH6850 connects a standard 68-pin E Series or S Series product to a 3rd party or custom standard 50-pin accessory. The cable provides a screw-latching 68-pin female connector on one side and a standard 50-pin female connector on the other side.

1 m	n770	6784-01
2 m	n	6784-02

Ribbon I/O Cables

R6868 Ribbon Cable for E Series Devices (see Figure 20)

The R6868 is a 68-conductor flat ribbon cable terminated with two 68-pin connectors. Use this cable to connect a 68-pin E Series device to 68-pin accessories. 1 m182482-01

RC68-68 Ribbon Cable for DAQCards (see Figure 21)

The RC68-68 ribbon cable connects DAQCards directly to 68-pin accessories. Two RC68-68 cables can be used together in adjacent PCMCIA slots.

0.25 m1	87252-0R25
1 m	187252-01

R1005050 Ribbon Cable (see Figure 22)

This cable connects 100-pin E Series devices, including the NI 6071E, NI 6033E, NI 6031E, and NI 6025E to standard 50-pin 3rd party or custom connectors.

1 m	
2 m	182762-02

R6850 Ribbon Cable Kit (see Figure 23)

This cable kit combines a 68F-50M cable adapter and a standard 50-pin cable with female connectors on both ends. The cable kit is designed to adapt an E Series, S Series, or PCI-6013/6014 product to a third-party or custom 50-pin accessory.



68-Pin Custom Cable Connector/Backshell Kit (see Figure 24)

The 68-pin female mating connector and backshell kit is used to make custom cables. Solder-cup contacts are available for soldering cable wires to the connector.



Figure 20. R6868 Ribbon Cable



Figure 21. RC68-68 Ribbon Cable



Figure 22. R1005050 Ribbon Cable



Figure 23. R6850 Ribbon Cable Kit



Figure 24. 68-Pin Custom Cable Connector/Backshell Kit



Figure 25. PCB Mounting Connectors for Custom Accessories



Figure 26. PCMCIA Strain-Relief Accessory

PCB Mounting Connectors for Custom Accessories (see Figure 25)

PCB mounting connectors are used to build custom accessories that connect to 68-conductor or 100-conductor shielded and ribbon cables. Two connectors are available, one for right-angle and one for vertical mounting onto a PCB.

68-pin, male, right-angle mounting	777600-01
68-pin, male, vertical mounting	777601-01
100-pin, female, right-angle mounting	777778-01
100-pin, female, vertical mounting	777779-01

PCMCIA Strain-Relief Accessory (see Figure 26)

The PCMCIA Strain-Relief accessory attaches to the bottom of your notebook computer and provides adjustable strain relief for one or two PCMCIA cables attached to the installed PCMCIA card(s).



Figure 28. Use the interactive configuration tool in the NI online catalog to select and purchase multifunction DAQ solutions.

Use Interactive Online Catalog Configurator for Quick Product Selection

You can now easily configure NI multifunction data acquisition (DAQ) measurement systems using a new, interactive feature of our online catalog. The interactive online catalog offers a better, easier way to select and purchase measurement solutions from National Instruments. Based on user imput, the interactive online catalog suggests products and then lists the appropriate cables and accessories for those products. This new automated tool helps eliminate ordering mistakes and product-compatibility errors.

To take advantage of the online catalog for multifunction DAQ devices, visit *ni.com/catalog*

From the Products and Services menu, select Data Acquisition, then select Multifunction I/O. The online catalog prompts you with a series of questions regarding preferences for operating system, computer bus, number of channels, and maximum sampling rate. The online catalog then recommends several appropriate DAQ devices. You can then review specifications for each device and select your preferred product. Next, the catalog suggests the preferred accessory and cable solution designed to work with the selected DAQ device. You have the option of choosing the preferred configuration or choosing from a separate list of accessories and cables that also work with the selected DAQ device. You can purchase the selected items online.