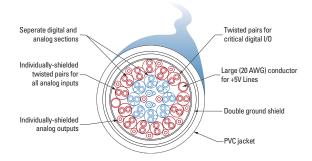
Multifunction DAQ Cable and Accessory Selection Guides

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:



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 189.



Platform	Shielding	Connect to	Cable	Adapter	Accessory
PCI/PXI/USB/FireWir	е				
	Shielded	SCC portable signal	SH68-68-EP	-	SC-2345 and modules, page 251
		conditioning per channel			
	Shielded	SCXI high-performance	SCXI-1349	-	SCXI Chassis and Modules, page 270
		signal conditioning			
	Shielded	Screw terminals 1	SH68-68-EP or SH68-68R1-EP	-	SCB-68
	Shielded	BNC terminal block	SH68-68-EP	-	BNC-2110, BNC-2120, BNC-2090
	Shielded	50-pin connector	SH6850	-	CB50, custom or 3rd party
	Shielded	Configurable connectivity box	SH68-68-EP	-	CA-1000, page 351
	Unshielded	Screw terminals 1	R6868		TBX-68, CB-68LP, CB-68LPR,
					DAQ signal accessory
	Unshielded	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
	Shielded	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
	Unshielded	50-pin connector	RC68-68	68M-50F MIO	CB50, custom or 3rd party

Table 1. Cable Connection Specifications for 16-Channel E Series Devices and Basic Multifunction DAQ (except NI 6025E, which is on the next page)

Multifunction DAQ Cable and Accessory Selection Guides

AI 0-	34	68	AI 0+					
AI 1+	33	67	AI 0 GND	¹ No connects for boards that do not support AO				
AI 1 GND	32	66	AI 1-	or use an external reference with the SH1006868 cable				
AI 2-	31	65	AI 2+	AI 8	34	68	AI 0	
AI 3+	30	64	AI 2 GND	Al 1	33	67	AI GND	
AI 3 GND	29	63	AI 3-	AI GND	32	66	AI 9	
NC	28	62	NC	AI 10	31	65	AI 2	
NC	27	61	NC	Al 3	30	64	AI GND	
NC	26	60	NC	AI GND	29	63	AI 11	
NC	25	59	NC	AI 4	28	62	AI SENSE	
NC	24	58	NC	AI GND	27	61	AI 12	
NC.	23	57	NC	ACH13 ACH6	26 25	59	AI 5	
A0 0	22	56	NC	AGND	25	58	AI GND AI 14	
A0 0	21	55	AO GND	ACH15	23	57	Al 14 Al 7	
FXT RFF			AO GND	AO 01	23	56	AI GND	
	20	54	D GND	A0 0	21	55	AO GND	
P0.4	19	53		EXT REF ¹	20	54	AO GND	
D GND	18	52	P0.0	P0.4	19	53	D GND	
P0.1	17	51	P0.5	D GND	18	52	P0.0	
P0.6	16	50	D GND	P0.1	17	51	P0.5	
D GND	15	49	P0.2	P0.6	16	50	D GND	
+5 V	14	48	P0.7	D GND	15	49	P0.2	
D GND	13	47	P0.3	+5 V	14	48	P0.7	
D GND	12	46	AI HOLD	D GND	13	47	P0.3	
PFI 0/AI START	11	45	EXT STROBE	D GND	12	46	AI HOLD	
PFI 1/REF TRIG	10	44	D GND	PFI 0/AI START	11	45	EXT STROBE	
D GND	9	43	PFI 2/AI CONV	PFI 1/REF TRIG	10	44	D GND	
+5 V	8	42	PFI 3/CTR 1 SRC	D GND	9	43	PFI 2/AI CONV	
D GND	7	41	PFI 4/CTR1 GATE	+5 V	8	42 41	PFI 3/AI CTR 1 SRC	
PFI 5/A0 SAMP	6	40	CTR 1 OUT	D GND	7	40	PFI 4/AI CTR 1 GATE	
PFI 6/AO START	5	39	D GND	PFI 5/A0 SAMP	6 5	39	CTR 1 OUT	
D GND	4	38	PFI 7/AI SAMP	PFI 6/AO START DGND	4	38	D GND	
FI 9/CTR 0 GATE	3	37	PFI 8/CTR 0 SRC	PFI 9/CTR 0 GATE	3	37	PFI 7/AI SAMP PFI 8/CTR 0 SRC	
			D GND	CTR 0 OUT	2	36	D GND	
CTR 0 OUT	2	36		FOUT	1	35	D GND D GND	
F OUT	1	35	D GND	1 001	,		טאט ט	

Figure 3. I/O Connector for 16-Channel
E Series and Basic Multifunction DAG
Devices, except NI 6025E

AI GND	- 1	51	AI 16
AI GND	2	52	AI 24
AI 0	3	53	AI 17
AI 8	4	54	AI 25
Al 1	5	55	AI 18
AI 9	6	56	AI 26
Al 2	7	57	Al 19
AI 10	8	58	AI 27
Al 3	9	59	AI 20
AI 11	10	60	AI 28
Al 4	11	61	AI 21
AI 12	12	62	AI 29
AI 5	13	63	AI 22
AI 13	14	64	AI 30
Al 6	15	65	AI 23
AI 14	16	66	Al 31
Al 7	17	67	AI 32
AI 15	18	68	AI 40
AI SENSE	19	69	AI 33
A0 0	20	70	Al 41
A0 1	21	71	AI 34
EXT REF	22	72	AI 42
A0 GND	23	73	AI 35
D GND	24	74	AI 43
P0.0	25	75	AI SENSE 2
P0.4	26	76	AI GND
P0.1	27	77	Al 36
P0.5	28	78	AI 44
P0.2	29	79	AI 37
P0.6	30	80	AI 45
P0.3	31	81	AI 38
P0.7	32	82	AI 46
D GND	33	83	Al 39
+5 V	34	84	AI 47
+5 V	35	85	AI 48
AI HOLD	36	86	AI 56
EXT STROBE	37	87	AI 49
FI 0/AI START	38	88	AI 57
FI 1/REF TRIG	39	89	AI 50
PFI 2/AI CONV	40	90	AI 58
13/CTR 1 SRC	41	91	AI 51
4/CTR 1 GATE	42	92	AI 59
CTR 1 OUT	43	93	AI 52
I 5/A0 SAMP	44	94	AI 60
16/A0 START	45	95	AI 53
FI 7/AI SAMP	46	96	AI 61
18/CTR 0 SRC	47	97	AI 54
9/CTR 0 GATE	48	98	AI 62
CTR 0 OUT	49	99	AI 55
F OUT	50	100	AI 63

Figure 4. I/O Connector for 64-Channel E Series Devices

AI GND	- 1	51	P2.7
AI GND	2	52	GND
AI 0	3	53	P2.6
AI 8	4	54	GND
Al 1	5	55	P2.5
Al 9	6	56	GND
Al 2	7	57	P2.4
AI 10	8	58	GND
Al 3	9	59	P2.3
AI 11	10	60	GND
Al 4	11	61	P2.2
AI 12	12	62	GND
Al 5	13	63	P2.1
AI 13	14	64	GND
Al 6	15	65	P2.0
AI 14	16	66	GND
Al 7	17	67	P1.7
AI 15	18	68	GND
AI SENSE	19	69	P1.6
A0 0	20	70	GND
A0 1	21	71	P1.5
NC	22	72	GND
AO GND	23	73	P1.4
D GND	24	74	GND
P0.0	25	75	P1.3
P0.4	26	76	GND
P0.1	27	77	P1.2
P0.5	28	78	GND
P0.2	29	79	P1.1
P0.6	30	80	GND
P0.3	31	81	P1.0
P0.7	32	82	GND
D GND	33	83	P0.7
+5 V	34	84	GND
+5 V	35	85	P0.6
AI HOLD	36	86	GND
EXT STROBE	37	87	P0.5
PFI 0/AI START	38	88	GND
PFI 1/REF TRIG	39	89	P0.4
PFI 2/AI CONV	40	90	GND
PFI 3/CTR 1 SRC	41	91	P0.3
PFI 4/CTR 1 GATE	42	92	GND
CTR 1 OUT	43	93	P0.2
PFI 5/A0 SAMP	44	94	GND
PFI 6/A0 START	45	95	P0.1
PFI 7/AI SAMP	46	96	GND
PFI 8/CTR 0 SRC	47	97	P0.0
PFI 9/CTR 0 GATE	48	98	GND
CTR 0 OUT	49	99	+5 V
F OUT	50	100	GND

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

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

Figure 2. S Series Devices Connector

Platform	Shielding	Connect to	Cable	Cable Leg	Adapter	Accessory
PCI, PXI					·	
	Shielded	Screw terminals	SH100100	-	-	SCB-100
	Shielded	Screw terminals	SH1006868	MIO:	-	SCB-68
	Shielded		SH1006868	Extended:	-	SCB-68
	Shielded	Screw terminals ¹	SH1006868	MIO:	-	TBX-68, CB-68LP, CB-68LPR,
						DAQ signal accessory
	Shielded	Screw terminals ¹	SH1006868	Extended:	-	TBX-68, CB-68LP, CB-68LPR
	Shielded	BNC terminal block	SH1006868	MIO:		BNC-2110, BNC-2120, BNC-2090
	Shielded		SH1006868	Extended:	_	BNC-2115
	Shielded	50-pin connectors	SH1006868	MIO:	68M-50F MIO	Custom or 3rd party
	Shielded		SH1006868	Extended:	68M-50F Extended	Custom or 3rd party
	Unshielded	50-pin connector	R1005050	MIO:		Custom or 3rd party
	Unshielded		R1005050	Extended:	-	Custom or 3rd party

Table 2. Cable Connection Specifications for 64-Channel E Series Devices and the NI 6025E



Figure 1. SCC Portable, Modular Signal Conditioning



Figure 2. SCXI High-Performance Signal Conditioning



Figure 3. BNC-2100 Series Connector Blocks



Figure 4. SC-2075 Breadboard Connector Block

SCC — Portable Modular Signal Conditioning for Low-Channel-Count Applications (See Figure 1)

SCC is a portable modular signal conditioning system consisting of 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, IEPE-compatible accelerometers, accelerators, analog inputs requiring isolation, high voltage (up to 100 V), current (0 to 20 mA), and optically isolated digital I/O. Lowpass filtering and breadboard modules are also available.

See page 251 for details on SCC Signal Conditioning.

SCXI — High-Performance Modular Signal Conditioning (See Figure 2)

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, IEPE-compatible accelerometers/microphones, thermistors, millivolt inputs, voltage inputs up to 1000 V, current inputs (0 to 20 mA), frequency inputs or dynamic signals.

See page 270 for details on SCXI 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 output devices. The BNC-2110 and BNC-2120 work with all E Series and Basic multifunction DAQ 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 Basic multifunction 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.

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.

Dimensions – 48.3 by 4.4 by 18.8 cm (19.0 by 1.7 by 7.4 in.)



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.

CA-1000.....(See page 351)

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

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

The TB-2705 is a screw terminal block for your PXI E Series or S 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.

TB-2705778241-01

Dimensions – 8.43 by 10.41 by 2.03 cm (3.32 by 4.1 by 0.8 in.)

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 lownoise signal termination for connecting to 68-pin or 100-pin E Series DAQ devices, respectively. Silk-screened component locations provide an 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.

SCB-68776844-01

Dimensions – 19.5 by 15.2 by 4.5 cm (7.7 by 6.0 by 1.8 in.)

Dimensions – 19.5 by 15.2 by 4.5 cm (7.7 by 6.0 by 1.8 in.)

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.)



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



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-EP Shielded Cable

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 or Basic multifunction 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 351).

CB-68LP	777145-01
Dimensions – 14.35 by 10.74 cm (5.65 by 4.23 in.)	
CB-68LPR	777145-02
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. 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

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.

- 1	m	1070	1 1	Λ1	i
- 1	[1]	. 10/1	101-	-111	

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	

Figure 15. SH100100 Shielded Cable

Figure 16. 68M-50F Cable Adapters

68M-50F 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 213 for accessories compatible with each 68-pin connector.

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



These cables connect PCMCIA 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 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, S Series, or Basic multifunction DAQ product to a third 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	776784-01
2 m	776784-02



Figure 17. SH1006868 Shielded Cable



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



Figure 19. SH6850 Shielded Cable



Figure 20. R6868 Ribbon Cable



Figure 21. RC68-68 Ribbon Cable



Figure 22. R1005050 Ribbon Cable



Figure 23. R6850 Ribbon Cable Kit

Ribbon I/O Cables **R6868 Ribbon Cable for E Series or Basic Multifunction 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 or Basic multifunction DAQ device to 68-pin accessories.

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 m			187252-0R25
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 third party or custom connectors.

1 m	.182762-01
2 m	

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 Basic multifunction DAQ product to a third-party or custom 50-pin accessory.

Custom Connectivity Components

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.

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 DAQCards.





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



Figure 25. PCB Mounting Connectors for Custom Accessories



Figure 26. PCMCIA Strain-Relief Accessory