S15C-3CT IO-Link 3-Phase Current Monitoring Sensor Product Manual

Original Instructions
p/n: 256302 Rev. A
05-Jun-26
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Contents

Chapter 1 Features 3
Models 3

Chapter 2 Installing the Current Transformers 4
Wire the Current Transformer 5

Chapter 3 Converter Wiring 6

Chapter 4 IO-Link Data Reference Guide 7
Communication Parameters 7
IO-Link Process Data In (Device to Master) 7
Process Data Mode (1): Fast Profile (FP) Imperial Units 7
Process Data Mode (2): Fast Profile (FP) Imperial Units 9
IO-Link Process Data Out (Master to Device) 10
Parameters Set Using IO-Link 11
IO-Link Events 12

Chapter 5 Status Indicators 13

Chapter 6 Specifications 14
FCC Part 15 Class B for Unintentional Radiators 14
Industry Canada ICES-003(B) 15
Dimensions 15

Chapter 7 Accessories 17
Cordsets 17
Molded Junction Block 18
Bracket 18

Chapter 8 Product Support and Maintenance 19
Clean with Mild Detergent and Warm Water 19
Repairs and Translations (No Field-Replaceable Parts) 19
Contact Us 21
Banner Engineering Corp Limited Warranty 21

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Chapter Contents

Models 3

Chapter 1 Features



(20 amp current transformers shown)

- Connects to the three included current transformers and outputs the values to IO-Link process data
- Monitors AC current for various devices using current transformers
- Converts a high-voltage input to a proportional low-voltage, low-current signal for measuring and monitoring

Models

Model Name	Function	Current Transformers	Communication	Connector
S15C-3CT20A-KQ-1	Converter	QTY: Three 20 A current transformers	IO-Link	Integral male/female 4-pin M12 quick-disconnect connector
S15C-3CT150A-KQ-1		QTY: Three 150 A current transformers		
S15C-3CT600A-KQ-1		QTY: Three 600 A current transformers		

Split-core current transformers are used to monitor AC current for various devices. The current transformer input takes a high-voltage current input and produces a proportional low-voltage, low-current signal for measuring and monitoring. Split-core current transformers are ideal for installing onto existing electrical wiring because they can snap around the individual conductors without disconnecting any cables.

NOTE: Users can use any size current transformer rated up to a 655 A max rating, as long as the current transformer has a 333 mV AC output.

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Chapter Contents

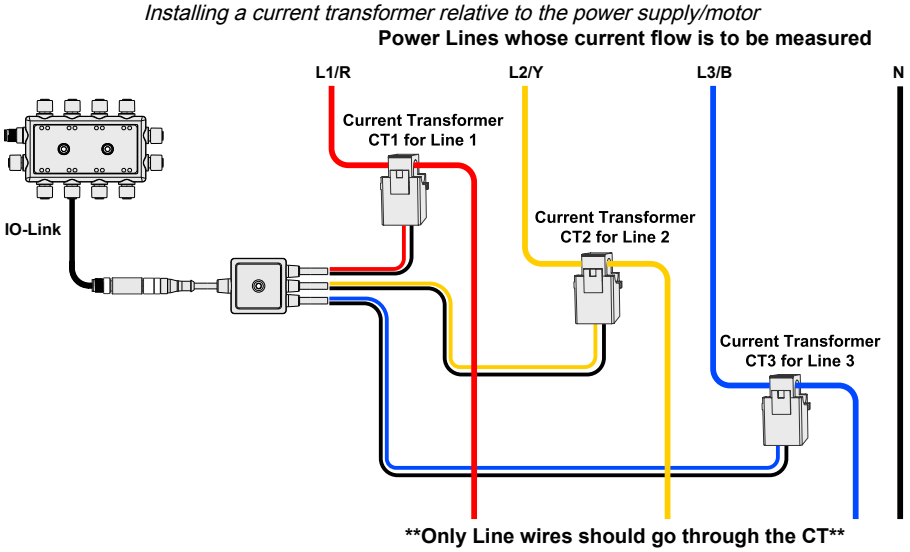
Wire the Current Transformer..... 5

Chapter 2 Installing the Current Transformers

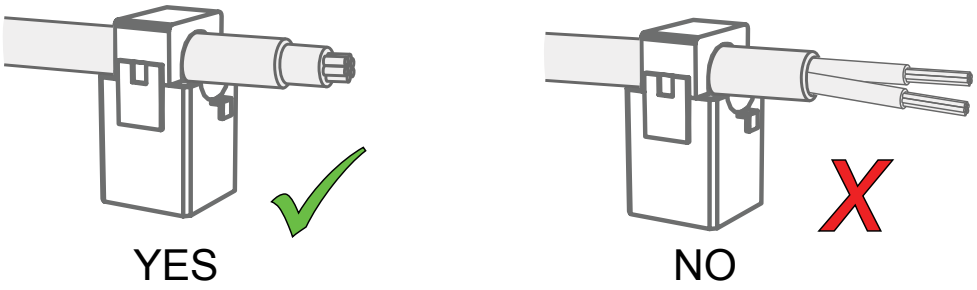
Observe the polarity when installing current transformers. Banner's current transformers indicate **k (S1)** as the source side and **l (S2)** as the load side, where source refers to the incoming power feed side to the device and the load side is the device side.

Banner's CTs have an etched arrow to indicate the directionality for installation (k (S1) → l (S2)). As shown in Installing a current transformer relative to the power supply/motor, the source is the AC power supply and the load is the Motor. The CT direction arrow must point toward the load. Banner's current transformers can be installed on any conductor in a 2- or 3-phase AC line. Current transformers should only be installed on a single conductor. For the correct installation, see Installing a single conductor on the current transformer.

Installing a current transformer relative to the power supply/motor



Installing a single conductor on the current transformer



The electrical power usage of a three-phase motor is calculated using the following formula:

$$P_{(KW)} = \frac{(\sqrt{3}) \times V_{RMS} \times I_{RMS} \times PF}{1000}$$

Where:

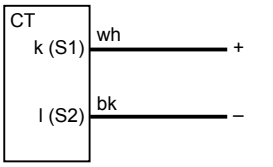
Voltage (V_{RMS}) = The RMS line-to-line voltage
Current (I_{RMS}) = The RMS line current, measured in amps
Power Factor (PF) = The efficiency of the power usage

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Wire the Current Transformer

For more information on wiring and installing the current transformer, refer to the Split Core Current Transformer datasheet (p/n 212463).

Current transformer wiring

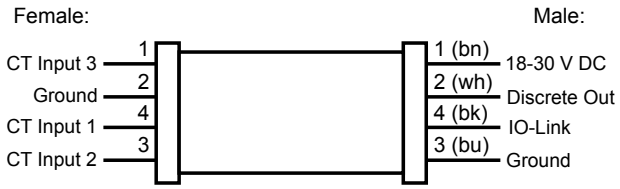


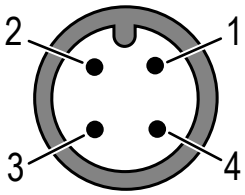
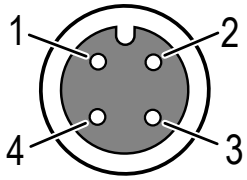
Wire Color	Description
White	Input from CT - k (S1)
Black	CT ground - l (S2)

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Chapter Contents

Chapter 3 Converter Wiring



Male (Gateway)	Female (Sensor)	Pin	Wire Color
		1	Brown
		2	White
		3	Blue
		4	Black

Female (Sensor)	Signal Description
Pin 1	CT Input
Pin 2	CT Ground
Pin 3	CT Input
Pin 4	CT Input

Male (IO-Link)	Signal Description
Pin 1	18 V DC to 30 V DC
Pin 2	Discrete out
Pin 3	Ground
Pin 4	IO-Link

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Chapter Contents

Communication Parameters 7
IO-Link Process Data In (Device to Master) 7
IO-Link Process Data Out (Master to Device) 10
Parameters Set Using IO-Link 11
IO-Link Events 12

Chapter 4 IO-Link Data Reference Guide

This document refers to the following IODD file: Banner_Engineering-S15C-3CT-KQ-20260113-IODD1.1.xml.

The IODD file and support files can be found on www.bannerengineering.com under the download section of the product family page.

Communication Parameters

The following communication parameters are used.

Parameter	Value
IO-Link revision	V1.1
Process Data In length	120 bit
Process Data Out length	N/A
Bit Rate	38400
Minimum cycle time	4 ms
Port class	A
SIO mode	No
Smart sensor profile	Yes
Block parameterization	Yes
Data Storage	Yes
Device ID	659486
ISDU Supported	Yes

IO-Link Process Data In (Device to Master)

Process Data Mode (1): Fast Profile (FP) Imperial Units

Subindex	Name	Number of Bits
1	CT1: Amps RMS Value	16
2	CT1: Amps RMS Scale	8
3	CT1: Amps RMS Under Threshold	1
4	CT1: Amps RMS Over Threshold	1
5	CT2: Amps RMS Value	16
6	CT2: Amps RMS Scale	8
7	CT2: Amps RMS Under Threshold	1
8	CT2: Amps RMS Over Threshold	1
9	CT3: Amps RMS Value	16
10	CT3: Amps RMS Scale	8

Continued on page 8

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Continued from page 7

Subindex	Name	Number of Bits
11	CT3: Amps RMS Under Threshold	1
12	CT3: Amps RMS Over Threshold	1

Octet 0								
Subindex	-	-	-	-	-	-	-	-
Bit Offset	111	110	109	108	107	106	105	104

Octet 1								
Subindex	-	-	-	-	-	-	-	-
Bit Offset	103	102	101	100	99	98	97	96

Octet 2								
Subindex	9	9	9	9	9	9	9	9
Bit Offset	95	94	93	92	91	90	89	88

Octet 3								
Subindex	9	9	9	9	9	9	9	9
Bit Offset	87	86	85	84	83	82	81	80

Octet 4								
Subindex	10	10	10	10	10	10	10	10
Bit Offset	79	78	77	76	75	74	73	72

Octet 5								
Subindex	-	-	-	-	-	-	11	12
Bit Offset	71	70	69	68	67	66	65	64

Octet 6								
Subindex	5	5	5	5	5	5	5	5
Bit Offset	63	62	61	60	59	58	57	56

Octet 7								
Subindex	5	5	5	5	5	5	5	5
Bit Offset	55	54	53	52	51	50	49	48

Octet 8								
Subindex	6	6	6	6	6	6	6	6
Bit Offset	47	46	45	44	43	42	41	40

Octet 9								
Subindex	-	-	-	-	-	-	7	8
Bit Offset	39	38	37	36	35	34	33	32

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Octet 10								
Subindex	1	1	1	1	1	1	1	1
Bit Offset	31	30	29	28	27	26	25	24

Octet 11								
Subindex	1	1	1	1	1	1	1	1
Bit Offset	23	22	21	20	19	18	17	16

Octet 12								
Subindex	2	2	2	2	2	2	2	2
Bit Offset	15	14	13	12	11	10	9	8

Octet 13								
Subindex	-	-	-	-	-	-	3	4
Bit Offset	7	6	5	4	3	2	1	0

Process Data Mode (2): Fast Profile (FP) Imperial Units

Subindex	Name	Number of Bits
1	CT1: Amps RMS Value	32
2	CT1: Amps RMS Scale	32
3	CT1: Amps RMS Under Threshold	32
4	CT1: Amps RMS Over Threshold	1
5	CT2: Amps RMS Value	1
6	CT2: Amps RMS Scale	1
7	CT2: Amps RMS Under Threshold	1
8	CT2: Amps RMS Over Threshold	1
9	CT3: Amps RMS Value	1

Octet 0								
Subindex	-	-	-	-	-	-	-	-
Bit Offset	111	110	109	108	107	106	105	104

Octet 1								
Subindex	-	-	9	8	7	6	5	4
Bit Offset	103	102	101	100	99	98	97	96

Octet 2								
Subindex	3	3	3	3	3	3	3	3
Bit Offset	95	94	93	92	91	90	89	88

Octet 3								
Subindex	3	3	3	3	3	3	3	3
Bit Offset	87	86	85	84	83	82	81	80

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Octet 4								
Subindex	3	3	3	3	3	3	3	3
Bit Offset	79	78	77	76	75	74	73	72

Octet 5								
Subindex	3	3	3	3	3	3	3	3
Bit Offset	71	70	69	68	67	66	65	64

Octet 6								
Subindex	2	2	2	2	2	2	2	2
Bit Offset	63	62	61	60	59	58	57	56

Octet 7								
Subindex	2	2	2	2	2	2	2	2
Bit Offset	55	54	53	52	51	50	49	48

Octet 8								
Subindex	2	2	2	2	2	2	2	2
Bit Offset	47	46	45	44	43	42	41	40

Octet 9								
Subindex	2	2	2	2	2	2	2	2
Bit Offset	39	38	37	36	35	34	33	32

Octet 10								
Subindex	1	1	1	1	1	1	1	1
Bit Offset	31	30	29	28	27	26	25	24

Octet 11								
Subindex	1	1	1	1	1	1	1	1
Bit Offset	23	22	21	20	19	18	17	16

Octet 12								
Subindex	1	1	1	1	1	1	1	1
Bit Offset	15	14	13	12	11	10	9	8

Octet 13								
Subindex	1	1	1	1	1	1	1	1
Bit Offset	7	6	5	4	3	2	1	0

IO-Link Process Data Out (Master to Device)

Not applicable.

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Parameters Set Using IO-Link

These parameters can be read from and/or written to an IO-Link model of the S15C-3CTxxA-KQ-1. Also included is information about whether the variable in question is saved during Data Storage and whether the variable came from the IO-Link Smart Sensor Profile. Unlike Process Data In, which is transmitted from the IO-Link device to the IO-Link master cyclically, these parameters are read or written acyclically as needed.

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
0	1-16	Direct Parameter Page 1 (incl. Vendor ID & Device ID)				RO		
2		System Command		126 = Locator Start 127 = Locator Stop 129 = Application Reset 131 = Back to Box		WO		Y
16		Vendor Name string		Banner Engineering Corporation		RO		
17		Vendor Text string		More Sensors. More Solutions.		RO		
18		Product Name string		S15C-3CTxxA-KQ-1		RO		
19		Product ID string		S15C-3CTxxA-KQ-1		RO		
20		Product Text string		S15C-3CTxxA-KQ-1		RO		Y
21		Serial Number				RO		
22		Hardware Version				RO		
23		Firmware Version				RO		Y
24		App Specific Tag (user-defined)		More Sensors. More Solutions.		RW	Y	Y
25		Function Tag		More Sensors. More Solutions.		RW	Y	Y
26		Location Tag		More Sensors. More Solutions.		RW	Y	Y
32		Error Count	16-bit Uinteger			RO		
36		Device Status	8-bit Uinteger	0 = Device is OK 1 = Maintenance required 2 = Out of specification 3 = Functional check 4 = Failure 5..255 Reserved		RO		
37		Detailed Device Status	Array[4] of 3-octet			RO		
69		**All-Time Run Time**						
69	1	Run counter (0.25hr)	32-bit Uinteger	0..2147483647		RO	Y	
70		**Resettable Run Time**						
70	1	Run counter (0.25hr)	32-bit Uinteger	0..2147483647	0	RW		
71		**Alarm Configuration**						
71	1	CT1: Amps RMS Low Threshold	Float32		0	RW	Y	
71	2	CT1: Amps RMS High Threshold	Float32		600	RW	Y	

Continued on page 12

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Continued from page 11

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
71	3	CT1: Amps RMS On Delay	Float32		0	RW	Y	
71	4	CT1: Amps RMS Off Delay	Float32		0	RW	Y	
71	5	CT2: Amps RMS Low Threshold	Float32		0	RW	Y	
71	6	CT2: Amps RMS High Threshold	Float32		600	RW	Y	
71	7	CT2: Amps RMS On Delay	Float32		0	RW	Y	
71	8	CT2: Amps RMS Off Delay	Float32		0	RW	Y	
71	9	CT3: Amps RMS Low Threshold	Float32		0	RW	Y	
71	10	CT3: Amps RMS High Threshold	Float32		600	RW	Y	
71	11	CT3: Amps RMS On Delay	Float32		0	RW	Y	
71	12	CT3: Amps RMS Off Delay	Float32		0	RW	Y	
72		**Alarm Counter**						
72	1	CT1: Amps RMS Low Counter	16-bit UInteger		0	RW	Y	
72	2	CT1: Amps RMS High Counter	16-bit UInteger		0	RW	Y	
72	3	CT2: Amps RMS Low Counter	16-bit UInteger		0	RW	Y	
72	4	CT2: Amps RMS High Counter	16-bit UInteger		0	RW	Y	
72	5	CT3: Amps RMS Low Counter	16-bit UInteger		0	RW	Y	
72	6	CT3: Amps RMS High Counter	16-bit UInteger		0	RW	Y	
80		**Process Data Mode**						
80	1	Defines the formatting of the Process Data	8-bit Uinteger	1 = Smart Sensor Profile, 2 = Floating Point Profile	1	RW	Y	
81		**Wire Mode**						
81	1	Output Configuration	8-bit Uinteger	0 = BannerBus 1 = NPN Discrete Output 2 = PNP Discrete Output	0	RW	Y	
82		**Device Configuration**						
82	1	Sample Rate (10ms)	32-bit Record			RW	Y	
82	2	Frequency (Hz)	8-bit Record	1 = 60 Hz, 2 = 50 Hz		RW	Y	
82	3	CT Rating (Amps)	16-bit Record			RW	Y	

IO-Link Events

Events are acyclic transmissions from the IO-Link device to the IO-Link master. Events can be error messages and/or warning or maintenance data.

Code	Type	Name	Description
0 (0x0000)	Notification	No Malfunction	-
20480 (0x5000)	Error	Device hardware fault	Device Exchange

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Chapter Contents

Chapter 5 Status Indicators

Power LED Indicator (Green)

- Solid Green = Power On
- Off = Power Off

IO-Link Communication LED Indicator (Amber)

- Flashing Amber = IO-Link communications are active
- Off = IO-Link communications are not present

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Chapter Contents

FCC Part 15 Class B for Unintentional Radiators 14
Industry Canada ICES-003(B) 15
Dimensions 15

Chapter 6 Specifications

Supply Voltage
18 V DC to 30 V DC at 50 mA maximum

Power Pass-Through Current
4 A maximum

Supply Protection Circuitry
Protected against reverse polarity and transient voltages

Leakage Current Immunity
400 µA

Resolution
12-bits

Current Transformer
Electrical:

Rated Input: 0-20 A (CT20A), 0-150 A (CT150A), or 0-600 A (CT600A), depending on the model
Rated Output: 0.333 V AC
Ratio: ≤ ± 1.0%
Phase Angle: ≤ ± 60 min
Dielectric Strength: 2.5 kV/1 mA/1 min
Insulation Resistance: DC 500 V/100 MΩ min

Mechanical:

Case: PA / UL94-V0
Bobbin: PBT
Core: Silicon Steel
–25 °C to +75 °C (–13 °F to +167 °F)
≤ 85% maximum relative humidity (non-condensing)

For more information, refer to the Split Core Current Transformer datasheet (p/n 212463)

Required Overcurrent Protection

WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to www.bannerengineering.com.

Indicators
Green power
Amber IO-Link communications

Connections
Integral male/female 4-pin M12 quick-disconnect connector

Construction
Coupling Material: Nickel-plated brass
Connector Body: PVC translucent black

Vibration and Mechanical Shock
Meets IEC 60068-2-6 requirements (Vibration: 10 Hz to 55 Hz, 0.5 mm amplitude, 5 minutes sweep, 30 minutes dwell)
Meets IEC 60068-2-27 requirements (Shock: 15G 11 ms duration, half sine wave)

Environmental Rating
IP65, IP67, IP68
UL Type 1

Operating Conditions
Temperature: –40 °C to +70 °C (–40 °F to +158 °F)
90% at +70 °C maximum relative humidity (non-condensing)
Storage Temperature: –40 °C to +80 °C (–40 °F to +176 °F)

Product Identification

SNAP SIGNAL

Supply Wiring (AWG)	Required Overcurrent Protection (A)	Supply Wiring (AWG)	Required Overcurrent Protection (A)
20	5.0	26	1.0
22	3.0	28	0.8
24	2.0	30	0.5

Certifications

Banner Engineering BV
Park Lane, Culliganlaan 2F bus 3
1831 Diegem, BELGIUM

Turck Banner LTD Blenheim House
Blenheim Court
Wickford, Essex SS11 8YT
GREAT BRITAIN

c UL us LISTED

FCC Part 15 Class B for Unintentional Radiators

(Part 15.105(b)) This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

(Part 15.21) Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Industry Canada ICES-003(B)

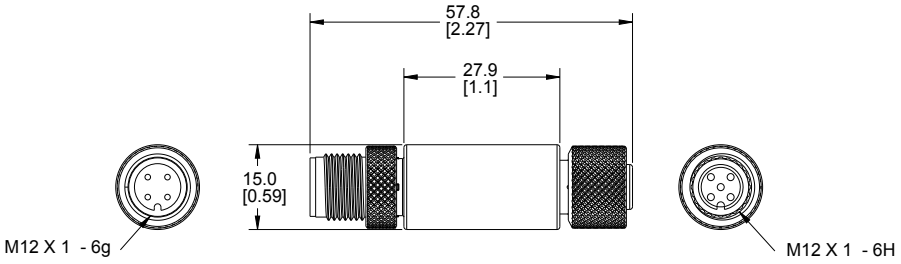
This device complies with CAN ICES-3 (B)/NMB-3(B). Operation is subject to the following two conditions: 1) This device may not cause harmful interference; and 2) This device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme à la norme NMB-3(B). Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas occasionner d'interférences, et (2) il doit tolérer toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité du dispositif.

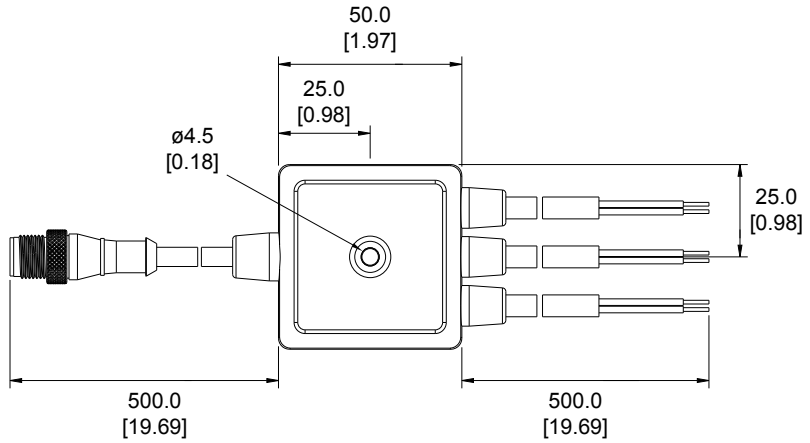
Dimensions

All measurements are listed in millimeters [inches], unless noted otherwise. The measurements provided are subject to change.

Converter Dimensions

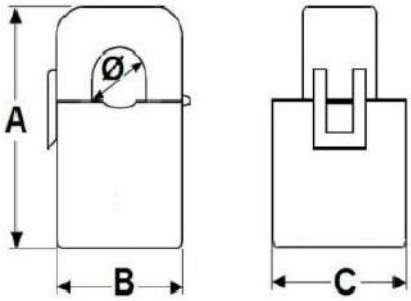


Molded Junction Block Dimensions



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Current Transformer Dimensions



Model	Diameter	A	B	C
CT20A	10 mm (0.39 in)	41 mm (1.61 in)	24 mm (0.94 in)	26.5 mm (1.04 in)
CT150A	16 mm (0.63 in)	45.5 mm (1.79 in)	29 mm (1.14 in)	31.5 mm (1.24 in)
CT600A	34.6 mm (1.36 in)	99.2 mm (3.91 in)	68.7 mm (2.7 in)	42 mm (1.65 in)

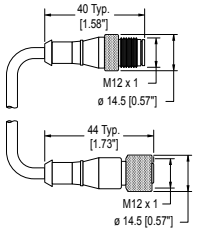
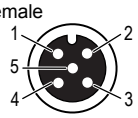
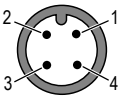
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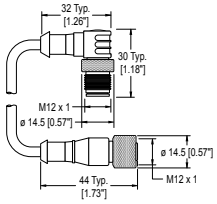
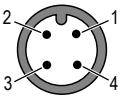
Chapter Contents

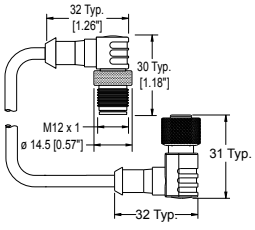
Cordsets 17
Molded Junction Block 18
Bracket 18

Chapter 7 Accessories

Cordsets

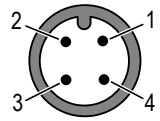
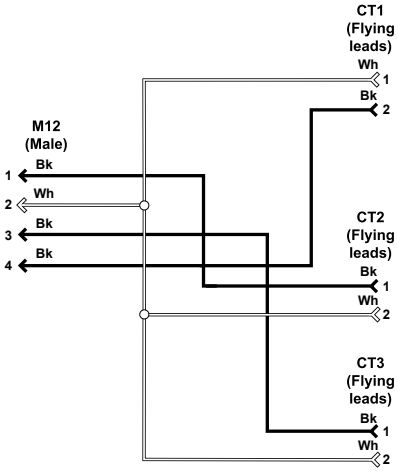
4-pin A-Code Double-Ended M12 Female to M12 Male Cordsets (datasheet p/n 236186)				
Model	**Length**	**Dimensions (mm)**	**Pinouts**	
BC-M12F4-M12M4-22-1	1 m (3.28 ft)		Female  Male 	1 = Brown 2 = White 3 = Blue 4 = Black 5 = Unused c UL us LISTED
BC-M12F4-M12M4-22-2	2 m (6.56 ft)			
BC-M12F4-M12M4-22-3	3 m (9.84 ft)			
BC-M12F4-M12M4-22-4	4 m (13.12 ft)			
BC-M12F4-M12M4-22-5	5 m (16.4 ft)			
BC-M12F4-M12M4-22-10	10 m (30.81 ft)			
BC-M12F4-M12M4-22-15	15 m (49.2 ft)			

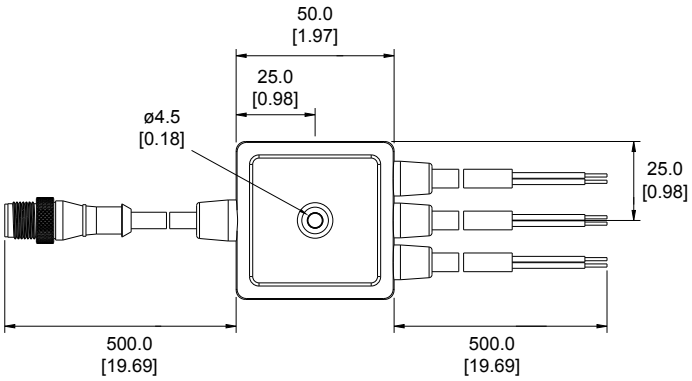
4-pin A-Code Double-Ended M12 Female to M12 Male Right-Angle Cordsets (datasheet p/n 236186)				
Model	**Length**	**Dimensions (mm)**	**Pinouts**	
BC-M12F4-M12M4A-22-1	1 m (3.28 ft)		Female  Male 	1 = Brown 2 = White 3 = Blue 4 = Black 5 = Unused c UL us LISTED
BC-M12F4-M12M4A-22-2	2 m (6.56 ft)			
BC-M12F4-M12M4A-22-5	5 m (16.4 ft)			
BC-M12F4-M12M4A-22-8	8 m (26.25 ft)			
BC-M12F4-M12M4A-22-10	10 m (30.81 ft)			
BC-M12F4-M12M4A-22-15	15 m (49.2 ft)			

4-pin A-Code Double-Ended M12 Female Right-Angle to M12 Male Right-Angle Cordsets (datasheet p/n 236186)				
Model	**Length**	**Dimensions (mm)**	**Pinouts**	
BC-M12F4A-M12M4A-22-0.3	0.3 m (1 ft)		Female  Male 	1 = Brown 2 = White 3 = Blue 4 = Black 5 = Unused c UL us LISTED
BC-M12F4A-M12M4A-22-1	1 m (3.28 ft)			
BC-M12F4A-M12M4A-22-2	2 m (6.56 ft)			
BC-M12F4A-M12M4A-22-5	5 m (16.4 ft)			
BC-M12F4A-M12M4A-22-8	8 m (26.25 ft)			
BC-M12F4A-M12M4A-22-10	10 m (30.81 ft)			
BC-M12F4A-M12M4A-22-15	15 m (49.2 ft)			

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Molded Junction Block

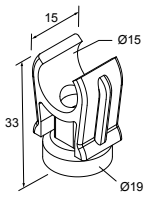
4-Pin M12 Male to Three-Cable Exit Molded Junction Block				
Model	**Trunk (Male)**	**Branches (Female)**	**Pinout (Male)**	**Wiring**
R50-M12M4-0.5-3X0.5-3CT	500 mm (19.69 in)	3 × 500 mm (19.69 in)		



Bracket

LMBS15MAG

- Attaches to S15 housing
- White polypropylene
- 11.8 kg (26 lb) pull force
- One piece
- CAD Files: DXF, PDF, IGS, STP



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