



HighLine

Measuring lengths up to 50 m, rugged design - the heavy-duty wire draw encoder

WIRE DRAW ENCODERS

SICK
Sensor Intelligence.



Technical data overview

Sub product family	BTF / PRF (depending on type)
Measuring range	0 m ... 50 m (depending on type)
Resolution	0.0008 mm ... 0.2 mm (depending on type)
Communication interface	IO-Link / IO-Link V1.1 / COM3 (230,4 kBaud) CANopen SSI PROFINET EtherCAT® EtherNet/IP™ PROFIBUS DP DeviceNet™ Analog / Current / 4...20 mA Analog / Voltage / 0...10 V Incremental / TTL / RS-422 Incremental / HTL / Push pull Incremental / TTL / HTL

Product description

With wire draw lengths from 2 to 50 m, the HighLine series of wire draw encoders have enormous range. Thanks to guide rollers, the HighLine series enables flexible measurement paths - even around obstacles. Their rugged housing and dirt-resistant brush assemblies allow the encoder to be used in the toughest of environments, including dust, shock and vibration, which ensure a long service lifetime.

At a glance

- Measuring lengths: 2 m ... 50 m
- Modular measuring system with a wide selection of interfaces/measuring lengths
- Very rugged system (dirt scraper, integrated brushes)
- High-quality winding mechanism and wire input
- High enclosure rating
- High shock and vibration resistance
- Extremely high resolution possible
- Expandable using external accessories

Your benefits

- Reliable solution for use in harsh ambient conditions
- Long service life due to rugged industrial housing
- Quick and easy installation without the need for precise linear guidance
- Low integration and maintenance costs
- Customization option reduces storage costs
- Analog interface speeds up commissioning and cost-effective interface card can be used

Fields of application

- Positioning of rack operation equipment
- Positioning grippers and trolleys with cranes
- Automated guided systems
- Elevators
- Lifting platforms
- Presses

Ordering information

Other models and accessories → www.sick.com/HighLine

- **Measuring range:** 0 m ... 2 m
- **Mounted mechanic:** MRA-F080-102D2, 6028625

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Type	Part no.
Analog / Current / 4...20 mA	Male connector, M12, 5-pin, radial	0.02 mm ^{1) 2)}	ACM60, ACM60B-S1KE13X06, 6045312	BTF08-K1EM02PP	1060964
Analog / Voltage / 0...10 V	Male connector, M12, 5-pin, radial	0.02 mm ^{1) 2)}	ACM60, ACM60B-S1LE13X06, 6045313	BTF08-L1EM02PP	1060965
CANopen	Connection adapter for CANopen ³⁾	0.02 mm ^{1) 2)}	ATM60 CANopen, ATM60-C1H13X13, 1030025	BTF08-C1HM0241	1034317
	Male connector, M12, 5-pin, universal	0.01 mm ^{1) 2)}	AHM36 CANopen, AHM36A-S3C-C014X12, 1065999	BTF08-C1QM0282	1068885
DeviceNet™	Connection adapter for DeviceNet ³⁾	0.02 mm ^{1) 2)}	ATM60 DeviceNet, ATM60-D1H13X13, 1030018	BTF08-D1HM0241	1034311
EtherCAT®	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.0008 mm ^{1) 2)}	AFM60 EtherCAT®, AFM60A-S1E-B018X12, 1059061	BTF08-E1BM0299	1060969
EtherNet/IP™		0.0008 mm ^{1) 2)}	AFM60 EtherNet/IP, AFM60A-S1B018X12, 1055331	BTF08-I1BM0299	1060968
IO-Link / IO-Link V1.1 / COM3 (230,4 kBaud)	Male connector, M12, 4-pin, universal	0.01 mm ^{1) 2)}	AHM36 IO-Link Advanced, AHM36A-S3QC014X12, 1101532	BTF08-Q1RM0262	1110592
		0.05 mm ^{1) 2)}	AHM36 IO-Link Basic, AHM36B-S3QC012X12, 1092014	BTF08-Q1RM0261	1097307
Incremental / HTL / Push pull	Male connector, M23, 12-pin, radial	0.02 mm ^{1) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF08-E1AM0240	1034335
Incremental / TTL / RS-422	Cable, 8-wire, universal, 5 m	0.1 mm ^{1) 4)}	DFS60, DFS60E-S1CK02000, 1084353	PRF08-C1KM0240	1084449
	Male connector, M23, 12-pin, radial	0.02 mm ^{1) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF08-A1AM0240	1034323
				PRF08-C1AM0240	1034329
PROFIBUS DP	Connection adapter for PROFIBUS ³⁾	0.02 mm ^{1) 2)}	ATM60 PROFIBUS, ATM60-P1H13X13, 1030014	BTF08-P1HM0241	1034305
	Male connector, 2x, M12, 5-pin, axial Female connector, 1x, M12, 5-pin, axial	0.02 mm ^{1) 2)}	A3M60 PROFIBUS, A3M60B-S1P-B013X13, 1051018	BTF08-P1BM0241	1060966
PROFINET	Male connector, 1x, M12, 4-pin, axial	0.0008 mm ^{1) 2)}	AFM60 PROFINET, AFM60A-S1N-B018X12, 1059040	BTF08-N1BM0299	1060967

¹⁾ The values shown have been rounded.

²⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

³⁾ Please order the bus adaptor separately.

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Type	Part no.
	Female connector, 2x, M12, 4-pin, axial				
SSI	Male connector, M12, 8-pin, universal	0.02 mm ^{1) 2)}	AHM36 SSI, AHM36A-S3PC013X12, 1068330	BTF08-A1NM0241	1068884
	Male connector, M23, 12-pin, radial	0.02 mm ^{1) 2)}	ATM60 SSI, ATM60-A1A0-K18, 1034293	BTF08-A1AM0240	1034299

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²⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

³⁾ Please order the bus adaptor separately.

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

- **Measuring range:** 0 m ... 3 m
- **Mounted mechanic:** MRA-F080-103D2, 6030125

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Type	Part no.
Analog / Current / 4...20 mA	Male connector, M12, 5-pin, radial	0.04 mm ^{1) 2)}	ACM60, ACM60B-S1KE13X06, 6045312	BTF08-K1EM03PP	1060970
Analog / Voltage / 0...10 V	Male connector, M12, 5-pin, radial	0.04 mm ^{1) 2)}	ACM60, ACM60B-S1LE13X06, 6045313	BTF08-L1EM03PP	1060973
CANopen	Connection adapter for CANopen ³⁾	0.04 mm ^{1) 2)}	ATM60 CANopen, ATM60-C1H13X13, 1030025	BTF08-C1HM0341	1034895
	Male connector, M12, 5-pin, universal	0.02 mm ^{1) 2)}	AHM36 CANopen, AHM36A-S3C-C014X12, 1065999	BTF08-C1QM0382	1068887
DeviceNet™	Connection adapter for DeviceNet ³⁾	0.04 mm ^{1) 2)}	ATM60 DeviceNet, ATM60-D1H13X13, 1030018	BTF08-D1HM0341	1034894
EtherCAT®	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.001 mm ^{1) 2)}	AFM60 EtherCAT®, AFM60A-S1E-B018X12, 1059061	BTF08-E1BM0399	1060980
EtherNet/IP™		0.001 mm ^{1) 2)}	AFM60 EtherNet/IP, AFM60A-S1B018X12, 1055331	BTF08-I1BM0399	1060978
IO-Link / IO-Link V1.1 / COM3 (230,4 kBaud)	Male connector, M12, 4-pin, universal	0.01 mm ^{1) 2)}	AHM36 IO-Link Advanced, AHM36A-S3QC014X12, 1101532	BTF08-Q1RM0362	1110594
		0.05 mm ^{1) 2)}	AHM36 IO-Link Basic, AHM36B-S3QC012X12, 1092014	BTF08-Q1RM0361	1097316
Incremental / HTL / Push pull	Male connector, M23, 12-pin, radial	0.03 mm ^{1) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF08-E1AM0340	1034898

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²⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

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⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Type	Part no.
Incremental / TTL / HTL	Male connector, M12, 8-pin, radial	0.03 mm ^{1) 4)}	DFS60, DFS60B-S1PC10000, 1036756	PRF08-P1CM0340	1100153
Incremental / TTL / RS-422	Male connector, M23, 12-pin, radial	0.03 mm ^{1) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF08-A1AM0340	1034896
				PRF08-C1AM0340	1034897
PROFIBUS DP	Connection adapter for PROFIBUS ³⁾	0.04 mm ^{1) 2)}	ATM60 PROFIBUS, ATM60-P1H13X13, 1030014	BTF08-P1HM0341	1034893
	Male connector, 2x, M12, 5-pin, axial Female connector, 1x, M12, 5-pin, axial	0.04 mm ^{1) 2)}	A3M60 PROFIBUS, A3M60B-S1P-B013X13, 1051018	BTF08-P1BM0341	1060975
PROFINET	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.001 mm ^{1) 2)}	AFM60 PROFINET, AFM60A-S1N-B018X12, 1059040	BTF08-N1BM0399	1060976
SSI	Cable, 8-wire, universal, 5 m	0.04 mm ^{1) 2)}	AHM36 SSI, AHM36A-S3P-M013X12, 1097369	BTF08-A1MM0341	1097808
	Male connector, M12, 8-pin, universal	0.04 mm ^{1) 2)}	AHM36 SSI, AHM36A-S3PC013X12, 1068330	BTF08-A1NM0341	1068886
	Male connector, M23, 12-pin, radial	0.04 mm ^{1) 2)}	ATM60 SSI, ATM60-A1A0-K18, 1034293	BTF08-A1AM0340	1034892

¹⁾ The values shown have been rounded.

²⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

³⁾ Please order the bus adaptor separately.

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

- **Measuring range:** 0 m ... 5 m
- **Mounted mechanic:** MRA-F130-105D2, 6028626

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Type	Part no.
Analog / Current / 4...20 mA	Male connector, M12, 5-pin, radial	0.04 mm ^{1) 2)}	ACM60, ACM60B-S1KE13X06, 6045312	BTF13-K1EM05PP	1060982
Analog / Voltage / 0...10 V	Male connector, M12, 5-pin, radial	0.04 mm ^{1) 2)}	ACM60, ACM60B-S1LE13X06, 6045313	BTF13-L1EM05PP	1060983
CANopen	Connection adapter for CANopen ³⁾	0.04 mm ^{1) 2)}	ATM60 CANopen, ATM60-C1H13X13, 1030025	BTF13-C1HM0525	1034318
	Male connector, M12, 5-pin, universal	0.02 mm ^{1) 2)}	AHM36 CANopen, AHM36A-S3C-C014X12, 1065999	BTF13-C1QM0549	1068889

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³⁾ Please order the bus adaptor separately.

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Type	Part no.
DeviceNet™	Connection adapter for DeviceNet ³⁾	0.04 mm ^{1) 2)}	ATM60 DeviceNet, ATM60-D1H13X13, 1030018	BTF13-D1HM0525	1034312
EtherCAT®	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.001 mm ^{1) 2)}	AFM60 EtherCAT®, AFM60A-S1E-B018X12, 1059061	BTF13-E1BM0599	1060988
EtherNet/IP™		0.001 mm ^{1) 2)}	AFM60 EtherNet/IP, AFM60A-S1B018X12, 1055331	BTF13-I1BM0599	1060987
IO-Link / IO-Link V1.1 / COM3 (230,4 kBaud)	Male connector, M12, 4-pin, universal	0.02 mm ^{1) 2)}	AHM36 IO-Link Advanced, AHM36A-S3QC014X12, 1101532	BTF13-Q1RM0562	1110595
		0.08 mm ^{1) 2)}	AHM36 IO-Link Basic, AHM36B-S3QC012X12, 1092014	BTF13-Q1RM0561	1097317
Incremental / HTL / Push pull	Male connector, M23, 12-pin, radial	0.03 mm ^{1) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF13-E1AM0520	1034336
Incremental / TTL / RS-422	Cable, 8-wire, universal, 1.5 m	0.2 mm ^{1) 4)}	DFS60, DFS60B-S1CK01670, 1084354	PRF13-C1KM0520	1084425
	Male connector, M23, 12-pin, radial	0.03 mm ^{1) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF13-A1AM0520	1034324
				PRF13-C1AM0520	1034330
PROFIBUS DP	Connection adapter for PROFIBUS ³⁾	0.04 mm ^{1) 2)}	ATM60 PROFIBUS, ATM60-P1H13X13, 1030014	BTF13-P1HM0525	1034306
	Male connector, 2x, M12, 5-pin, axial Female connector, 1x, M12, 5-pin, axial	0.04 mm ^{1) 2)}	A3M60 PROFIBUS, A3M60B-S1P-B013X13, 1051018	BTF13-P1BM0525	1060985
PROFINET	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.001 mm ^{1) 2)}	AFM60 PROFINET, AFM60A-S1N-B018X12, 1059040	BTF13-N1BM0599	1060986
SSI	Cable, 8-wire, universal, 5 m	0.04 mm ^{1) 2)}	AHM36 SSI, AHM36A-S3P-M013X12, 1097369	BTF13-A1MM0524	1097422
	Male connector, M12, 8-pin, universal	0.04 mm ^{1) 2)}	AHM36 SSI, AHM36A-S3PC013X12, 1068330	BTF13-A1NM0524	1068888
	Male connector, M23, 12-pin, radial	0.04 mm ^{1) 2)}	ATM60 SSI, ATM60-A1A0-K19, 1034294	BTF13-A1AM0520	1034300

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²⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

³⁾ Please order the bus adaptor separately.

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

• **Measuring range:** 0 m ... 10 m

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Mounted mechanic	Type	Part no.
Analog / Current / 4...20 mA	Male connector, M12, 5-pin, radial	0.04 mm ^{1) 2)}	ACM60, ACM60B-S1KE13X06, 6045312	MRA-F130-110D2, 6028627	BTF13-K1EM10PP	1060989
Analog / Voltage / 0...10 V	Male connector, M12, 5-pin, radial	0.04 mm ^{1) 2)}	ACM60, ACM60B-S1LE13X06, 6045313	MRA-F130-110D2, 6028627	BTF13-L1EM10PP	1060990
CANopen	Connection adapter for CANopen ³⁾	0.04 mm ^{1) 2)}	ATM60 CANopen, ATM60-C1H13X13, 1030025	MRA-F130-110D2, 6028627	BTF13-C1HM1025	1034319
	Male connector, M12, 5-pin, universal	0.02 mm ^{1) 2)}	AHM36 CANopen, AHM36A-S3C-C014X12, 1065999	MRA-F130-110D2, 6028627	BTF13-C1QM1049	1068891
DeviceNet™	Connection adapter for DeviceNet ³⁾	0.04 mm ^{1) 2)}	ATM60 DeviceNet, ATM60-D1H13X13, 1030018	MRA-F130-110D2, 6028627	BTF13-D1HM1025	1034313
EtherCAT®	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.001 mm ^{1) 2)}	AFM60 EtherCAT®, AFM60A-S1EB018X12, 1059061	MRA-F130-110D2, 6028627	BTF13-E1BM1099	1060994
EtherNet/IP™		0.001 mm ^{1) 2)}	AFM60 EtherNet/IP, AFM60A-S1IB018X12, 1055331	MRA-F130-110D2, 6028627	BTF13-I1BM1099	1060993
IO-Link / IO-Link V1.1 / COM3 (230,4 kBaud)	Male connector, M12, 4-pin, universal	0.02 mm ^{1) 2)}	AHM36 IO-Link Advanced, AHM36A-S3QC014X12, 1101532	MRA-F130-110D2, 6028627	BTF13-Q1RM1062	1110596
				MRA-F130-115D2, 6072738	BTF13-Q1RM1562	1110597
		0.08 mm ^{1) 2)}	AHM36 IO-Link Basic, AHM36B-S3QC012X12, 1092014	MRA-F130-110D2, 6028627	BTF13-Q1RM1061	1097318
Incremental / HTL / Push pull	Male connector, M23, 12-pin, radial	0.03 mm ^{1) 4)}	DFS60, DFS60B-S1MA10000, 1056866	MRA-F130-110D2, 6028627	PRF13-E1AM1020	1034337
Incremental / TTL / RS-422	Male connector, M23, 12-pin, radial	0.03 mm ^{1) 4)}	DFS60, DFS60B-S1MA10000, 1056866	MRA-F130-110D2, 6028627	PRF13-A1AM1020	1034325
					PRF13-C1AM1020	1034331
PROFIBUS DP	Connection adapter for PROFIBUS ³⁾	0.04 mm ^{1) 2)}	ATM60 PROFIBUS, ATM60-P1H13X13, 1030014	MRA-F130-110D2, 6028627	BTF13-P1HM1025	1034307
	Male connector, 2x, M12, 5-pin, axial	0.04 mm ^{1) 2)}	A3M60 PROFIBUS, A3M60B-S1P-B013X13, 1051018	MRA-F130-110D2, 6028627	BTF13-P1BM1025	1060991

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²⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

³⁾ Please order the bus adaptor separately.

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Mounted mechanic	Type	Part no.
	Female connector, 1x, M12, 5-pin, axial					
PROFINET	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.001 mm ^{1) 2)}	AFM60 PROFINET, AFM60A-S1N-B018X12, 1059040	MRA-F130-110D2, 6028627	BTF13-N1BM1099	1060992
SSI	Male connector, M12, 8-pin, universal	0.04 mm ^{1) 2)}	AHM36 SSI, AHM36A-S3PC013X12, 1068330	MRA-F130-110D2, 6028627	BTF13-A1NM1024	1068890
	Male connector, M23, 12-pin, radial	0.04 mm ^{1) 2)}	ATM60 SSI, ATM60-A1A0-K19, 1034294	MRA-F130-110D2, 6028627	BTF13-A1AM1020	1034301

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²⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

³⁾ Please order the bus adaptor separately.

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

- **Measuring range:** 0 m ... 20 m
- **Mounted mechanic:** MRA-F130-120D1, 6028628

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Type	Part no.
Analog / Current / 4...20 mA	Male connector, M12, 5-pin, radial	0.04 mm ^{1) 2)}	ACM60, ACM60B-S1KE13X06, 6045312	BTF13-K1EM20PP	1060995
Analog / Voltage / 0...10 V	Male connector, M12, 5-pin, radial	0.04 mm ^{1) 2)}	ACM60, ACM60B-S1LE13X06, 6045313	BTF13-L1EM20PP	1060996
CANopen	Connection adapter for CANopen ³⁾	0.04 mm ^{1) 2)}	ATM60 CANopen, ATM60-C1H13X13, 1030025	BTF13-C1HM2025	1034320
	Male connector, M12, 5-pin, universal	0.02 mm ^{1) 2)}	AHM36 CANopen, AHM36A-S3C-C014X12, 1065999	BTF13-C1QM2049	1068893
DeviceNet™	Connection adapter for DeviceNet ³⁾	0.04 mm ^{1) 2)}	ATM60 DeviceNet, ATM60-D1H13X13, 1030018	BTF13-D1HM2025	1034314
EtherCAT®	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.001 mm ^{1) 2)}	AFM60 EtherCAT®, AFM60A-S1E-B018X12, 1059061	BTF13-E1BM2099	1061000
EtherNet/IP™		0.001 mm ^{1) 2)}	AFM60 EtherNet/IP, AFM60A-S1IB018X12, 1055331	BTF13-I1BM2099	1060999

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²⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

³⁾ Please order the bus adaptor separately.

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Type	Part no.
IO-Link / IO-Link V1.1 / COM3 (230,4 kBaud)	Male connector, M12, 4-pin, universal	0.02 mm ^{1) 2)}	AHM36 IO-Link Advanced, AH-M36A-S3QC014X12, 1101532	BTF13-Q1RM2062	1110599
		0.08 mm ^{1) 2)}	AHM36 IO-Link Basic, AHM36B-S3QC012X12, 1092014	BTF13-Q1RM2061	1097319
Incremental / HTL / Push pull	Male connector, M23, 12-pin, radial	0.03 mm ^{1) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF13-E1AM2020	1034338
Incremental / TTL / RS-422	Male connector, M23, 12-pin, radial	0.03 mm ^{1) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF13-A1AM2020	1034326
				PRF13-C1AM2020	1034332
PROFIBUS DP	Connection adapter for PROFIBUS ³⁾	0.04 mm ^{1) 2)}	ATM60 PROFIBUS, ATM60-P1H13X13, 1030014	BTF13-P1HM2025	1034308
	Male connector, 2x, M12, 5-pin, axial Female connector, 1x, M12, 5-pin, axial	0.04 mm ^{1) 2)}	A3M60 PROFIBUS, A3M60B-S1P-B013X13, 1051018	BTF13-P1BM2025	1060997
PROFINET	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.001 mm ^{1) 2)}	AFM60 PROFINET, AFM60A-S1N-B018X12, 1059040	BTF13-N1BM2099	1060998
SSI	Male connector, M12, 8-pin, universal	0.04 mm ^{1) 2)}	AHM36 SSI, AH-M36A-S3PC013X12, 1068330	BTF13-A1NM2025	1068892
	Male connector, M23, 12-pin, radial	0.05 mm ^{1) 2)}	ATM60 SSI, ATM60-A1A0-K20, 1034295	BTF13-A1AM2020	1034302

¹⁾ The values shown have been rounded.

²⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

³⁾ Please order the bus adaptor separately.

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

- **Measuring range:** 0 m ... 30 m
- **Mounted mechanic:** MRA-F130-130D1, 6028629

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Type	Part no.
CANopen	Connection adapter for CANopen ¹⁾	0.04 mm ^{2) 3)}	ATM60 CANopen, ATM60-C1H13X13, 1030025	BTF13-C1HM3025	1034321
	Male connector, M12, 5-pin, universal	0.02 mm ^{2) 3)}	AHM36 CANopen, AHM36A-S3C-C014X12, 1065999	BTF13-C1QM3049	1068896
DeviceNet™	Connection adapter for DeviceNet ¹⁾	0.04 mm ^{2) 3)}	ATM60 DeviceNet, ATM60-D1H13X13, 1030018	BTF13-D1HM3025	1034315

¹⁾ Please order the bus adaptor separately.

²⁾ The values shown have been rounded.

³⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Type	Part no.
EtherCAT®	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.001 mm ^{2) 3)}	AFM60 EtherCAT®, AFM60A-S1E-B018X12, 1059061	BTF13-E1BM3099	1061006
EtherNet/IP™		0.001 mm ^{2) 3)}	AFM60 EtherNet/IP, AFM60A-S1IB018X12, 1055331	BTF13-I1BM3099	1061005
IO-Link / IO-Link V1.1 / COM3 (230,4 kBaud)	Male connector, M12, 4-pin, universal	0.02 mm ^{2) 3)}	AHM36 IO-Link Advanced, AHM36A-S3QC014X12, 1101532	BTF13-Q1RM3062	1110601
		0.08 mm ^{2) 3)}	AHM36 IO-Link Basic, AHM36B-S3QC012X12, 1092014	BTF13-Q1RM3061	1097320
Incremental / HTL / Push pull	Male connector, M23, 12-pin, radial	0.03 mm ^{2) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF13-E1AM3020	1034339
Incremental / TTL / RS-422	Male connector, M23, 12-pin, radial	0.03 mm ^{2) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF13-A1AM3020	1034327
				PRF13-C1AM3020	1034333
PROFIBUS DP	Connection adapter for PROFIBUS ¹⁾	0.04 mm ^{2) 3)}	ATM60 PROFIBUS, ATM60-P1H13X13, 1030014	BTF13-P1HM3025	1034309
	Male connector, 2x, M12, 5-pin, axial Female connector, 1x, M12, 5-pin, axial	0.04 mm ^{2) 3)}	A3M60 PROFIBUS, A3M60B-S1P-B013X13, 1051018	BTF13-P1BM3025	1061003
PROFINET	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.001 mm ^{2) 3)}	AFM60 PROFINET, AFM60A-S1N-B018X12, 1059040	BTF13-N1BM3099	1061004
SSI	Male connector, M12, 8-pin, universal	0.04 mm ^{2) 3)}	AHM36 SSI, AHM36A-S3PC013X12, 1068330	BTF13-A1NM3025	1068894
	Male connector, M23, 12-pin, radial	0.04 mm ^{2) 3)}	ATM60 SSI, ATM60-A1A0-K20, 1034295	BTF13-A1AM3020	1034303

¹⁾ Please order the bus adaptor separately.

²⁾ The values shown have been rounded.

³⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

- **Measuring range:** 0 m ... 50 m
- **Mounted mechanic:** MRA-F190-150D2, 6028630

Communication interface	Connection type	Resolution (wire draw + encoder)	Mounted encoder	Type	Part no.
CANopen	Connection adapter for CANopen ¹⁾	0.06 mm ^{2) 3)}	ATM60 CANopen, ATM60-C1H13X13, 1030025	BTF19-C1HM5017	1034322
	Male connector, M12, 5-pin, universal	0.03 mm ^{2) 3)}	AHM36 CANopen, AHM36A-S3C-C014X12, 1065999	BTF19-C1QM5033	1068898
DeviceNet™	Connection adapter for DeviceNet ¹⁾	0.06 mm ^{2) 3)}	ATM60 DeviceNet, ATM60-D1H13X13, 1030018	BTF19-D1HM5017	1034316
EtherCAT®	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.002 mm ^{2) 3)}	AFM60 EtherCAT®, AFM60A-S1E-B018X12, 1059061	BTF19-E1BM5099	1061012
EtherNet/IP™		0.002 mm ^{2) 3)}	AFM60 EtherNet/IP, AFM60A-S1IB018X12, 1055331	BTF19-I1BM5099	1061011
IO-Link / IO-Link V1.1 / COM3 (230,4 kBaud)	Male connector, M12, 4-pin, universal	0.03 mm ^{2) 3)}	AHM36 IO-Link Advanced, AHM36A-S3QC014X12, 1101532	BTF19-Q1RM5062	1110602
		0.12 mm ^{2) 3)}	AHM36 IO-Link Basic, AHM36B-S3QC012X12, 1092014	BTF19-Q1RM5061	1097321
Incremental / HTL / Push pull	Male connector, M23, 12-pin, radial	0.05 mm ^{2) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF19-E1AM5010	1034340
Incremental / TTL / RS-422	Male connector, M23, 12-pin, radial	0.05 mm ^{2) 4)}	DFS60, DFS60B-S1MA10000, 1056866	PRF19-A1AM5010	1034328
				PRF19-C1AM5010	1034334
PROFIBUS DP	Connection adapter for PROFIBUS ¹⁾	0.06 mm ^{2) 3)}	ATM60 PROFIBUS, ATM60-P1H13X13, 1030014	BTF19-P1HM5017	1034310
	Male connector, 2x, M12, 5-pin, axial Female connector, 1x, M12, 5-pin, axial	0.06 mm ^{2) 3)}	A3M60 PROFIBUS, A3M60B-S1P-B013X13, 1051018	BTF19-P1BM5017	1061009
PROFINET	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial	0.002 mm ^{2) 3)}	AFM60 PROFINET, AFM60A-S1N-B018X12, 1059040	BTF19-N1BM5099	1061010
SSI	Male connector, M12, 8-pin, universal	0.06 mm ^{2) 3)}	AHM36 SSI, AHM36A-S3PC013X12, 1068330	BTF19-A1NM5017	1068897
	Male connector, M23, 12-pin, radial	0.06 mm ^{2) 3)}	ATM60 SSI, ATM60-A1A0-K21, 1034296	BTF19-A1AM5010	1034304

¹⁾ Please order the bus adaptor separately.

²⁾ The values shown have been rounded.

³⁾ Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

⁴⁾ Example calculation based on the PRF08 with HTL Push Pull: 200 mm (wire draw length per revolution - see Mechanical data): 2,000 (pulses per revolution) = 0.1 mm (resolution of wire draw + encoder combination).

- **Measuring range:** 0 m ... 15 m
- **Connection type:** male connector, 1x, M12, 4-pin, axial, Female connector, 2x, M12, 4-pin, axial
- **Resolution (wire draw + encoder):** 0.001 mm (The values shown have been rounded.) (Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).)
- **Mounted mechanic:** MRA-F130-115D2, 6072738

Communication interface	Mounted encoder	Type	Part no.
EtherCAT®	AFM60 EtherCAT®, AFM60A-S1EB018X12, 1059061	BTF13-E1BM1599	1112107
EtherNet/IP™	AFM60 EtherNet/IP, AFM60A-S1IB018X12, 1055331	BTF13-I1BM1599	1105976

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