Instruction Manual

for

Gaumer Process Self Regulating Heat Trace System

"Controlled Document, changes require authorization from the certification agency"

Gaumer Process

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- **Heating Cable Model Names:**

Model Name	Max. continuous operating temperature (Power on or off)	Max. intermittent temperature (power off)
GHT*-1/2CR	150°F (65°C)	185°F (85°C)
GHT*-1/2CT	150°F (65°C)	185°F (85°C)
GHU**-1/2CT	250°F (120°C)	392°F (200°C)
GHK**-1/2CT	300°F (150°C)	482°F (250°C)

**Power output per unit length*

3: Nominal Power Output 3W/ft (10W/m) @50°F (10°C) on metal pipe

5: Nominal Power Output 5W/ft (16W/m) @50°F (10°C) on metal pipe

8: Nominal Power Output 8W/ft (26W/m) @50°F (10°C) on metal pipe

10: Nominal Power Output 10W/ft (33W/m) @50°F (10°C) on metal pipe

12: Nominal Power Output 12W/ft (40W/m) @50°F (10°C) on metal pipe

[Note] 12W/ft Only available in Supply Voltage: 2 (200 – 277V)

***Power output per unit length*

5: Nominal Power Output 5W/ft (16W/m) @50°F (10°C) on metal pipe

10: Nominal Power Output 10W/ft (33W/m) @50°F (10°C) on metal pipe

15: Nominal Power Output 15W/ft (49W/m) @50°F (10°C) on metal pipe

20: Nominal Power Output 20W/ft (66W/m) @50°F (10°C) on metal pipe

- **Associated International Standards:**

US Standards; FM 3600: 2022, ANSI/UL 50E:2020, ANSI/UL 60079-0:2020, ANSI/UL 60079-7:2021, ANSI/UL 60079-30-1:2017, ANSI/UL 60079-31:2015

CA Standards; CSA C22.2 No. 94.2:2020, CSA C22.2 No. 60079-0:2019, CSA C22.2 No. 60079-7:2018, CSA C22.2 No. 60079-30-1:2017, CSA C22.2 No. 60079-31:2015, CSA C22.2 No. 60529:2016

ATEX: EN IEC 60079-0: 2018
EN IEC 60079-7:2015+A1:2018, EN 60079-30-1:2017, EN 60079-31:2014

IECEx: IEC 60079-0:2017
IEC 60079-30-1:2022, IEC 60079-7:2017, IEC 60079-30-1:2015

- **Approvals**

  FM Certificate Number **(PR469718)**:

  FM US: FM24US0113X

  Class I, Division 2, Groups A, B, C and D T*

  Class II/III, Division 2, Groups E, F and G T*

  Class I, Zone 1, AEx eb IIC Gb;

  Zone 21, AEx tb IIIC T* °C Db;

  Type 4X, IP66

  Ta = -40°C to +55°C

  FM CANADA: FM24CA0042X

  Class I, Division 2, Groups A, B, C and D T*

  Class II/III, Division 2, Groups E, F and G T*

  Class I, Zone 1, Ex eb IIC Gb;

  Zone 21, Ex tb IIIC T* °C Db;

  Type 4X, IP66

  Ta = -40°C to +55°C

  ATEX Certificate Number: FM24ATEX0018X

  II 2 G Ex 60079-30-1 IIC T6…T2 Gb

  II 2 D Ex 60079-30-1 IIIC T85°C… T300°C Db

  II 2 G Ex eb IIC Gb and II 2 D Ex tb IIIC Db with Ingress Protection IP66

  IECEx Certificate Number: IECEx FMG 24.0017X

  Ex 60079-30-1 IIC T6…T2 Gb

  Ex 60079-30-1 IIIC T85°C… T300°C Db

  Ex eb IIC Gb and Ex tb IIIC Db with Ingress Protection IP66

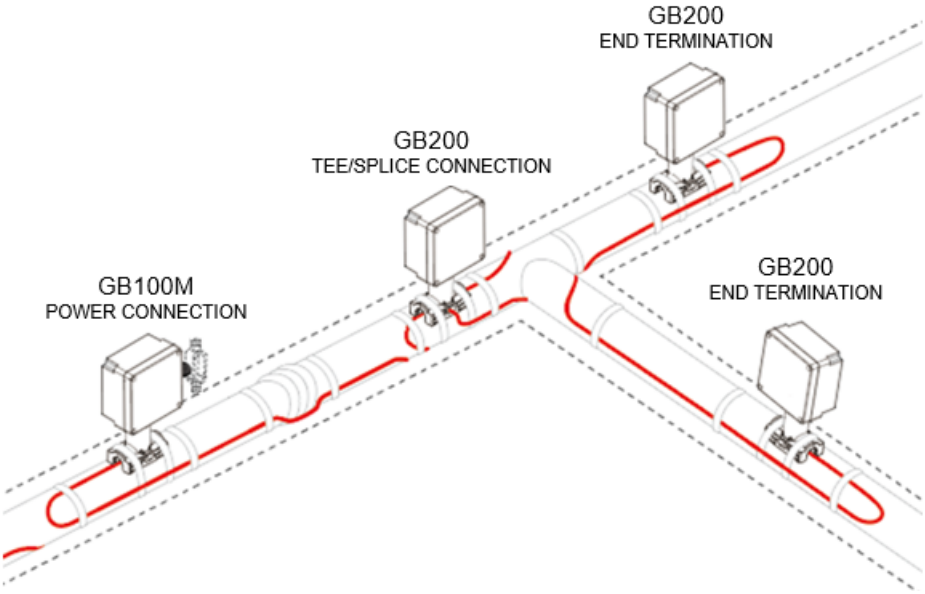
• Revision History

Rev	Date	Revised
A	29 MAY 2024	Initial release version
B	5 AUGUST 2024	Revision B
C	22 OCTOBER 2024	Revision C

Contents

1.0 Gaumer Process Heat Tracing System Overview

1.1 System Diagram

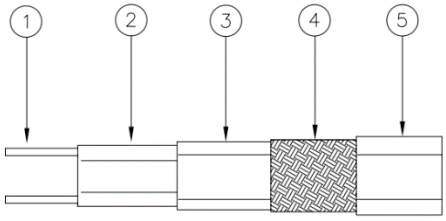


Heating Cables	**GHT-CR, GHT-CT** 3, 5, 8, 10, 12 W/ft @50°F on pipe (10, 16, 26, 33, 39W/m @10°C on pipe) *[Note] 12W/ft (39W/m) Only available in Supply Voltage: 2 (200 – 277V)* **GHU-CT** 5, 10, 15, 20 W/ft @50°F on pipe (16, 33, 49, 66W/m @10°C on pipe) **GHK-CT** 5, 10, 15, 20 W/ft @50°F on pipe (16, 33, 49, 66W/m @10°C on pipe)
Kits	**GB100M** SINGLE OR MULTI POWER/TEE/SPLICE Connection using terminal blocks; Glass reinforced plastic box + PPS compression cap + PPS pipe stand **GB200** TEE/SPLICE Connection and End Termination using hard-wiring with screw cap; Glass reinforced plastic box + PPS compression cap + PPS pipe stand

2.0 GHT-CR/CT Self-Regulating Heating Cable

Electrical freeze protection and temperature maintenance for ordinary and hazardous locations

2.1 Basic Construction



① Bus Wires (Nickel Plated Copper)

② Conductive Core (Heating Matrix)

③ Insulation (Modified Polyolefin)

④ Metallic Braid (Tinned Copper)

⑤ Outer Jacket (CR: Modified Polyolefin, CT: Fluoropolymer)

2.2 Technical Specification

Max. Intermittent Exposure Temp. (Heating device de-energized)	185°F (85°C)
Max. Maintain or Continuous Exposure Temp. (Heating device energized or de-energized)	150°F (65°C)
Supply Voltage	100 – 120V, 200 – 277V
Output Wattage	3, 5, 8, 10, 12* W/ft @50°F on pipe (10, 16, 26, 33, 39*W/m @10°C on pipe) (*12W/ft (39W/m) only available in supply voltage of 200 – 277V)
Bus wire	16 AWG
Min. Bending Radius	0.5” @68°F (13mm @20°C), 1.6” @-58°F (40mm @-50°C)
Min. Installation Temperature	-58°F (-50°C)
Min. Start-up Temperature	-40°F (-40°C)
Outer Jacket Color	GHT-CR: Dark Gray / GHT-CT: Black
Heating Cable Dimensions (Nominal)	GHT-CR: 0.49 in x 0.25 in (12.5mm x 6.0mm) GHT-CT: 0.46 in x 0.21 in (11.8mm x 5.0mm)
Temperature Classification	T6 / T85°C
Protection	NEMA 4X, Type 4X
Material	Insulation: Modified Polyolefin Outer jacket: CR (Modified Polyolefin), CT (Fluoropolymer)

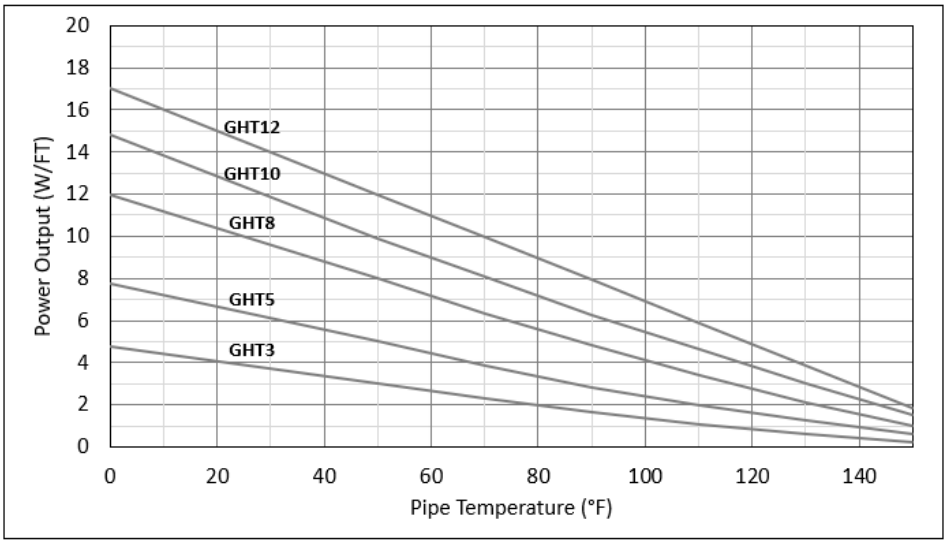
2.3 Heating Cable Catalog Number

GHT	10	-	2	CR
Model Name	Rated Output [Watts/ft]		Voltage	Outer Jacket
	3, 5, 8, 10, 12 on 50°F (10°C) Pipe		1= 100-120 V 2= 200-277 V	CR: Modified Polyolefin CT: Fluoropolymer

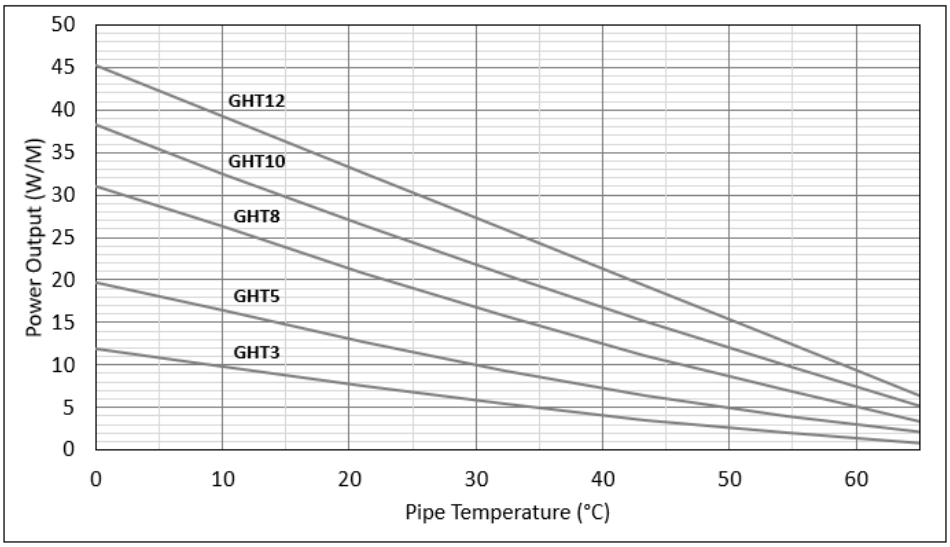
[Note] 12W/ft Only available in Supply Voltage: 2 (200 – 277V)

2.4 Nominal Power Output Rating on Metal Pipes at 120V / 240V

- North American Standard (Imperial Units: feet)



- European Standard (Metric Units: meters)



2.5 Circuit Length Adjustment Factor

Voltage	GHT3-2	GHT5-2	GHT8-2	GHT10-2	GHT12-2
208V	0.969	0.957	0.925	0.920	0.915
240V	1.000	1.000	1.000	1.000	1.000
277V	1.054	1.065	1.088	1.120	1.130

2.6 Power Adjustment Factor

Voltage	GHT3-2	GHT5-2	GHT8-2	GHT10-2	GHT12-2
208V	0.800	0.820	0.880	0.910	0.943
240V	1.000	1.000	1.000	1.000	1.000
277V	1.190	1.170	1.120	1.100	1.071

2.7 Maximum Circuit Lengths Based on Circuit Breaker Sizes

- North American Standard (Imperial Units: feet)

		Maximum Circuit Length per Circuit Breaker, feet							
	Start-Up Temperature	120V				240V			
Catalog Number	°F (°C)	15A	20A	30A	40A	15A	20A	30A	40A
GHT3	50 (10)	327	377	377	377	654	732	732	732
	0 (-18)	200	266	377	377	400	533	732	732
	-20 (-29)	173	231	346	377	346	461	692	732
	-40 (-40)	152	203	305	377	305	406	610	732
GHT5	50 (10)	200	267	302	302	400	533	604	604
	0 (-18)	126	168	252	302	252	336	504	604
	-20 (-29)	110	146	220	293	220	293	439	586
	-40 (-40)	97	130	195	259	195	259	389	519
GHT8	50 (10)	154	205	243	243	307	409	482	482
	0 (-18)	104	138	207	243	207	276	415	482
	-20 (-29)	92	122	184	243	184	245	367	482
	-40 (-40)	82	110	165	219	165	219	329	439
GHT10	50 (10)	125	167	207	207	250	334	410	410
	0 (-18)	90	120	179	207	179	239	359	410
	-20 (-29)	81	107	161	207	161	215	322	410
	-40 (-40)	73	97	146	195	146	195	292	390
GHT12	50 (10)					222	295	322	322
	0 (-18)					156	209	313	322
	-20 (-29)					140	187	280	322
	-40 (-40)					127	169	253	322

- European Standard (Metric Units: meters)

Catalog Number	Start-Up Temperature (°C)	Maximum Circuit Length per Circuit Breaker, meters 230V			
		16A	25A	32A	40A
GHT3	10	219	223	223	223
	-20	134	212	223	223
	-30	116	195	223	223
	-40	102	172	223	223
GHT5	10	134	184	184	184
	-20	85	142	184	184
	-30	74	124	174	183
	-40	65	110	154	163
GHT8	10	103	147	147	147
	-20	70	117	147	147
	-30	62	103	145	147
	-40	55	93	130	140
GHT10	10	84	123	125	125
	-20	60	101	125	125
	-30	54	91	125	125
	-40	49	82	116	125
GHT12	10	74	86	98	98
	-20	58	73	88	88
	-30	55	71	86	86
	-40	52	68	84	84

2.8 Specific Conditions of Use – ATEX / IECEx Only

- The GHT Series Heating Cables must be installed using Gaumer Process GB100M and GB200 Series Connection Kits.
- Refer to the installation instructions to reduce the potential of an electrostatic charging hazard on the enclosures of the connection kits.
- The end-user shall mount the equipment per Gaumer Process instructions.

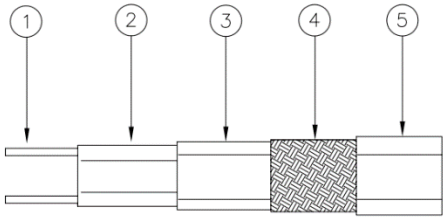
2.9 Schedule of Limitations

- The maximum intermittent exposure temperature (Heating device de-energized) is 185°F (85°C).
- The maximum continuous exposure temperature (heating device energized or de-energized) is 150°F (65°C).
- The maximum supply voltage is 100 – 120V, for the (-1) models and 200 – 277V for the (-2) models.
- The minimum installation temperature is -58°F (-50°C).
- The minimum bend radius is 40mm at -58°F (-50°C).
- T-code ratings for the GHT-CR and GHT-CT is T6.

3.0 GHU-CT Self-regulating Heating

Electrical freeze protection and Temperature maintenance for ordinary and hazardous locations

3.1 Cable Basic Construction



① Bus Wires (Nickel Plated Copper)
② Conductive Core (Heating Matrix)
③ Insulation (Fluoropolymer)
④ Metallic Braid (Tinned Copper)
⑤ Outer Jacket (Fluoropolymer)

3.2 Technical Specification

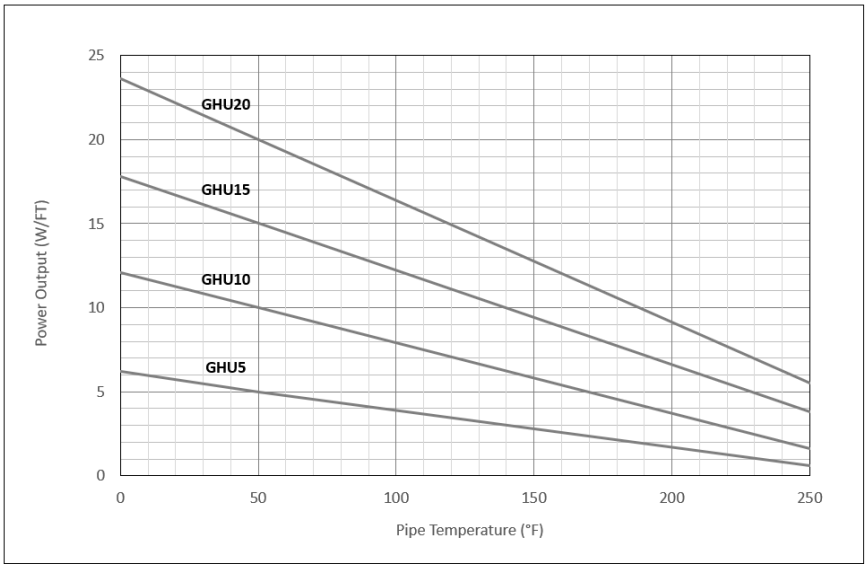
Max. Intermittent Exposure Temp. (Heating device de-energized)	392°F (200°C)
Max. Maintain or Continuous Exposure Temp. (Power on or off)	250°F (120°C)
Supply Voltage	100 – 120V, 200 – 277V
Output Wattage	5, 10, 15, 20 W/ft @50°F on pipe (16, 33, 49, 66W/m @10°C on pipe)
Bus wire	16 AWG
Min. Bending Radius	0.8” @70°F (20mm @20°C), 1.8” @-76°F (45mm @-60°C)
Min. Installation Temperature	-76°F (-60°C)
Min. Start-up Temperature	-40°F (-40°C)
Outer Jacket Color	Yellow
Heating Cable Dimensions (Nominal)	0.43 in x 0.20 in (11.0mm x 5.0mm)
Temperature Classification	T3 / T200°C
Protection	NEMA 4X, Type 4X
Material	Insulation: Fluoropolymer Outer jacket: Fluoropolymer

3.3 Heating Cable Catalog Number

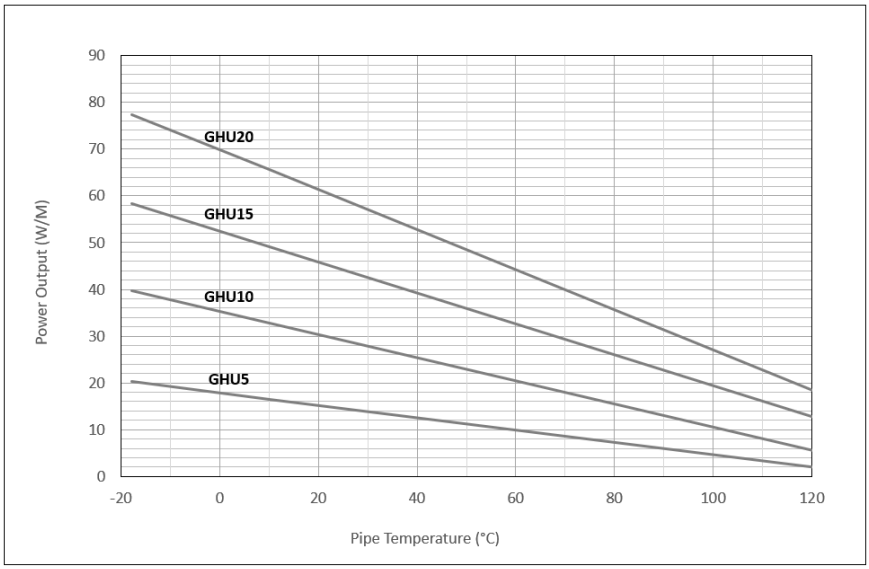
GHU	20	-	2	CT
Model Name	Rated Output [Watts/ft] 5, 10, 15, 20 on 50°F (10°C) Pipe		Voltage 1= 100-120 V 2= 200-277 V	Outer Jacket CT: Fluoropolymer

3.4 Nominal Power Output Rating on Metal Pipes at 120V / 240V

- **North American Standard (Imperial Units: feet)**



- **European Standard (Metric Units: meters)**



3.5 Circuit Length Adjustment Factor

Voltage	GHU5-2	GHU10-2	GHU15-2	GHU20-2
208V	0.94	0.94	0.93	0.94
240V	1.00	1.00	1.00	1.00
277V	1.09	1.09	1.11	1.11

3.6 Power Adjustment Factor

Voltage	GHU5-2	GHU10-2	GHU15-2	GHU20-2
208V	0.88	0.89	0.90	0.91
240V	1.00	1.00	1.00	1.00
277V	1.06	1.07	1.07	1.06

3.7 Maximum Circuit Lengths Based on Circuit Breaker Sizes

- **North American Standard (Imperial Units: feet)**

	Start-Up Temperature	Maximum Circuit Length per Circuit Breaker, feet									
		120V					240V				
Catalog Number	°F (°C)	15A	20A	30A	40A	50A	15A	20A	30A	40A	50A
GHU5-CT	50 (10)	180	240	358	358	358	360	480	709	709	709
	0 (-18)	141	187	281	358	358	281	375	562	709	709
	-20 (-29)	129	172	258	345	358	258	345	517	689	709
	-40 (-40)	120	159	239	319	358	239	319	478	638	709
GHU10-CT	50 (10)	107	142	213	253	253	213	284	427	502	502
	0 (-18)	87	116	174	232	253	174	232	348	464	502
	-20 (-29)	81	108	162	216	253	162	216	324	432	502
	-40 (-40)	76	101	152	202	253	152	202	303	404	502
GHU15-CT	50 (10)	78	104	156	203	203	156	208	312	400	400
	0 (-18)	65	87	130	174	203	130	174	261	347	400
	-20 (-29)	61	82	122	163	203	122	163	245	326	400
	-40 (-40)	58	77	115	154	192	115	154	230	307	384
GHU20-CT	50 (10)	58	78	117	155	174	117	155	233	311	348
	0 (-18)	50	67	100	134	167	100	134	200	267	334
	-20 (-29)	47	63	95	126	158	95	126	190	253	316
	-40 (-40)	45	60	90	120	150	90	120	180	240	300

- **European Standard (Metric Units: meters)**

Catalog Number	Start-Up Temperature (°C)	Maximum Circuit Length per Circuit Breaker, meters 230V			
		16A	25A	32A	40A
GHU5	10	143	216	216	216
	-20	113	173	216	216
	-30	105	160	202	211
	-40	98	149	187	195
GHU10	10	85	130	153	153
	-20	70	107	136	141
	-30	66	100	126	134
	-40	62	94	118	125
GHU15	10	62	95	122	122
	-20	52	80	102	107
	-30	50	76	95	100
	-40	47	72	90	95
GHU20	10	46	71	91	95
	-20	40	61	78	81
	-30	38	59	74	78
	-40	37	56	70	75

3.9 Specific Conditions of Use– ATEX / IECEx Only

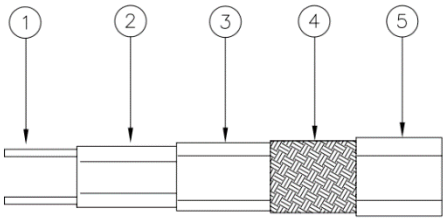
- The GHU Series Heating Cables must be installed using Gaumer Process GB100M and GB200 Series Connection Kits.
- Refer to the installation instructions to reduce the potential of an electrostatic charging hazard on the enclosures of the connection kits.
- The end-user shall mount the equipment per Gaumer Process instructions.

3.8 Schedule of Limitation

- The maximum intermittent exposure temperature (Heating device de-energized) is 392°F (200°C).
- The maximum continuous exposure temperature (heating device energized or de-energized) is 250°F (120°C).
- The maximum supply voltage is 100 – 120V, for the (-1) models and 200 – 277V for the (-2) models.
- The minimum installation temperature is -76°F (-60°C).
- The minimum bend radius is 45mm at -76°F (-60°C).
- T-code ratings is T3.

4.0 GHK-CT Self-regulating Heating Cable

4.1 Basic Construction



① Bus Wires (Nickel Plated Copper)
② Conductive Core (Heating Matrix)
③ Insulation (Fluoropolymer)
④ Metallic Braid (Tinned Copper)
⑤ Outer Jacket (Fluoropolymer)

4.2 Technical Specification

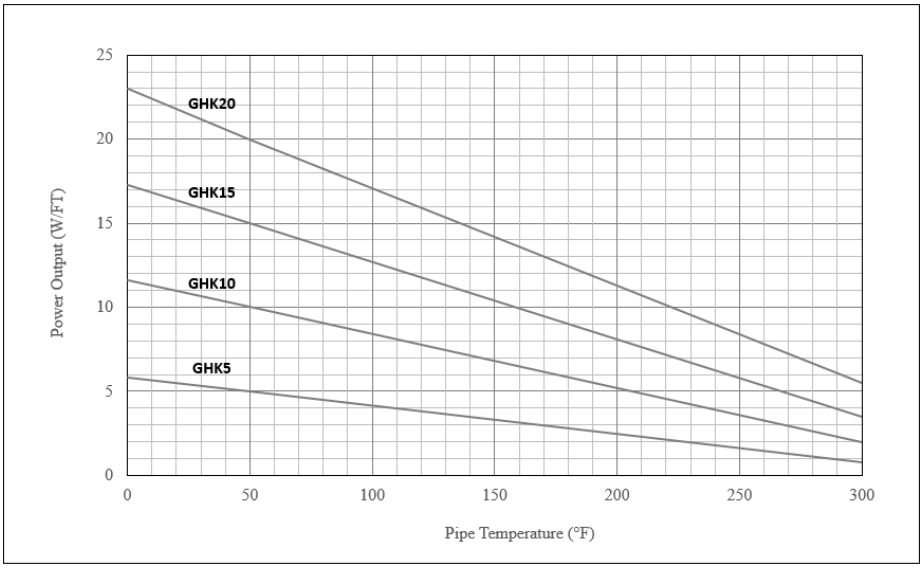
Max. Intermittent Exposure Temp. (Heating device de-energized)	482°F (250°C)
Max. Maintain or Continuous Exposure Temp. (Power on or off)	300°F (150°C)
Supply Voltage	100 – 120V, 200 – 277V
Output Wattage	5, 10, 15, 20 W/ft @50°F on pipe (16, 33, 49, 66W/m @10°C on pipe)
Bus wire	16 AWG
Min. Bending Radius	0.8” 70°F (20mm @20°C), 1.8” @-76°F (45mm @-60°C)
Min. Installation Temperature	-76°F (-60°C)
Min. Start-up Temperature	-40°F (-40°C)
Outer Jacket Color	Red
Heating Cable Dimensions (Nominal)	0.50 in x 0.20 in (13.0mm x 5.0mm)
Temperature Classification	US and Canada: T3/T200°C: GHK5, GHK10, GHK15 T2D/T215°C: GHK20 ATEX and IECEx: T3/T200°C: GHK5, GHK10, GHK15 T2D/T300°C: GHK20
Protection	NEMA 4X, Type 4X
Material	Insulation: Fluoropolymer Outer jacket: Fluoropolymer

4.3 Heating Cable Catalog Number

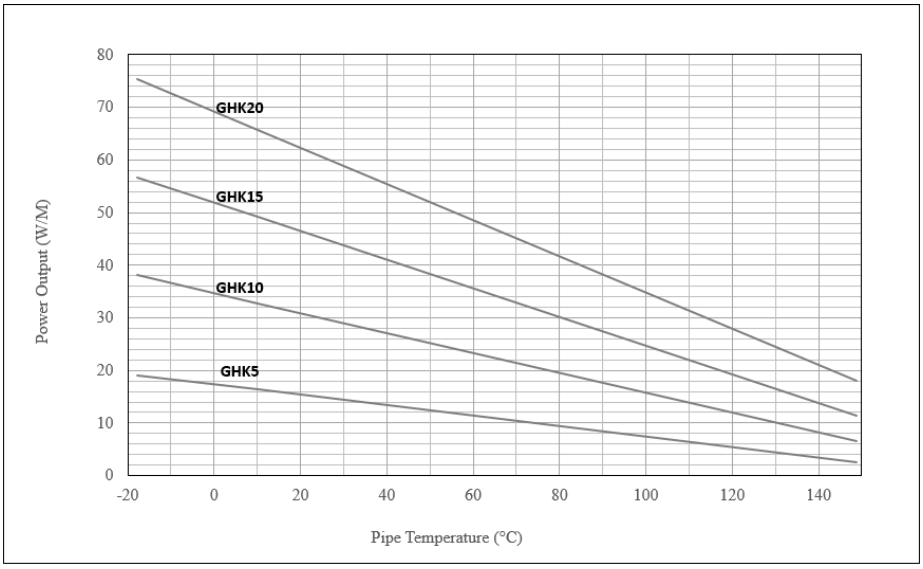
GHK	20	-	2	CT
Model Name	Rated Output [Watts/m]		Voltage	Outer Jacket
	5, 10, 15, 20 Pipe 50°F (10°C)		1= 100-120 V 2= 200-277 V	CT: Fluoropolymer

4.4 Nominal Power Output Rating on Metal Pipes at 120V / 240V

- North American Standard (Imperial Units: feet)



- European Standard (Metric Units: meters)



4.5 Circuit Length Adjustment Factor

Voltage	GHK5-2	GHK10-2	GHK15-2	GHK20-2
208V	0.93	0.94	0.94	0.94
240V0	1.00	1.00	1.00	1.00
277V	1.10	1.10	1.11	1.11

4.6 Power Adjustment Factor

Voltage	GHK5-2	GHK10-2	GHK15-2	GHK20-2
208V	0.93	0.94	0.94	0.94
240V	1.00	1.00	1.00	1.00
277V	1.10	1.10	1.11	1.11

4.7 Maximum Circuit Lengths Based on Circuit Breaker Sizes

- **North American Standard (Imperial Units: feet)**

	Start-Up Temperature	Maximum Circuit Length per Circuit Breaker, feet									
		120V					240V				
Catalog Number	°F (°C)	15A	20A	30A	40A	50A	15A	20A	30A	40A	50A
GHK5-CT	50 (10)	180	240	358	358	358	360	480	709	709	709
	0 (-18)	141	187	281	358	358	281	375	562	709	709
	-20 (-29)	129	172	258	345	358	258	345	517	689	709
	-40 (-40)	120	159	239	319	358	239	319	478	638	709
GHK10-CT	50 (10)	107	142	213	253	253	213	284	427	502	502
	0 (-18)	87	116	174	232	253	174	232	348	464	502
	-20 (-29)	81	108	162	216	253	162	216	324	432	502
	-40 (-40)	76	101	152	202	253	152	202	303	404	502
GHK15-CT	50 (10)	78	104	156	203	203	156	208	312	400	400
	0 (-18)	65	87	130	174	203	130	174	261	347	400
	-20 (-29)	61	82	122	163	203	122	163	245	326	400
	-40 (-40)	58	77	115	154	192	115	154	230	307	384
GHK20-CT	50 (10)	58	78	117	155	174	117	155	233	311	348
	0 (-18)	50	67	100	134	167	100	134	200	267	334
	-20 (-29)	47	63	95	126	158	95	126	190	253	316
	-40 (-40)	45	60	90	120	150	90	120	180	240	300

- European Standard (Metric Units: meters)

Catalog Number	Start-Up Temperature (°C)	Maximum Circuit Length per Circuit Breaker, meters 230V			
		16A	25A	32A	40A
GHK5	10	143	216	216	216
	-20	113	173	216	216
	-30	105	160	202	211
	-40	98	149	187	195
GHK10	10	85	130	153	153
	-20	70	107	136	141
	-30	66	100	126	134
	-40	62	94	118	125
GHK15	10	62	95	122	122
	-20	52	80	102	107
	-30	50	76	95	100
	-40	47	72	90	95
GHK20	10	46	71	91	95
	-20	40	61	78	81
	-30	38	59	74	78
	-40	37	56	70	75

4.8 Specific Conditions of Use– ATEX / IECEx Only

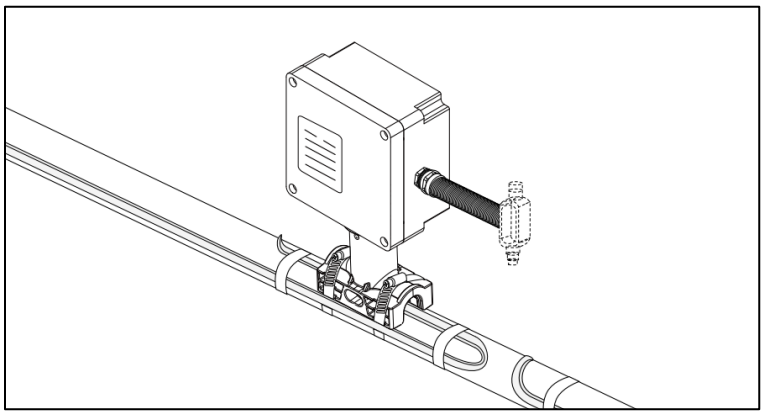
- The GHK Series Heating Cables must be installed using Gaumer Process GB100M and GB200 Series Connection Kits.
- Refer to the installation instructions to reduce the potential of an electrostatic charging hazard on the enclosures of the connection kits.
- The end-user shall mount the equipment per Gaumer Process instructions.

4.8 Schedule of Limitation

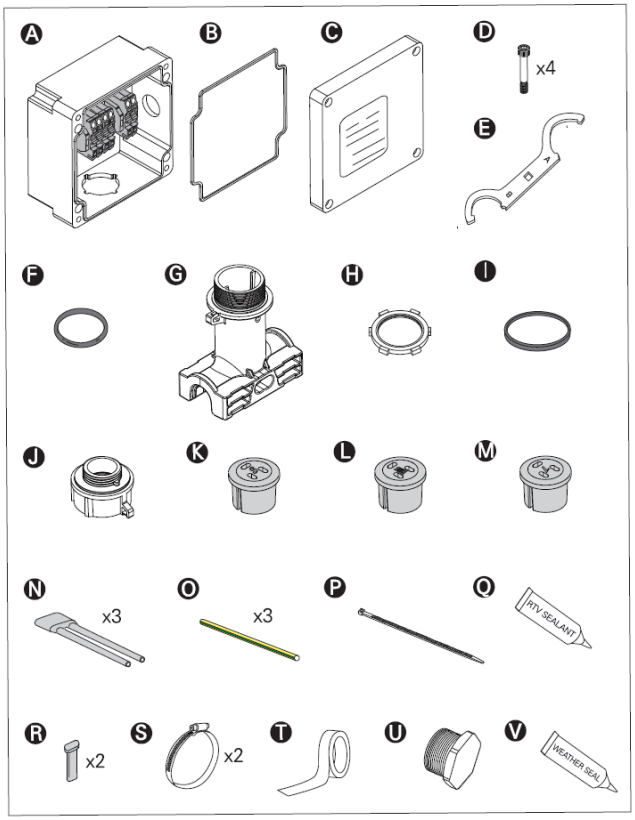
- The maximum intermittent exposure temperature (Heating device de-energized) is 482°F (250°C).
- The maximum continuous exposure temperature (heating device energized or de-energized) is 300°F (150°C).
- The maximum supply voltage is 100 – 120V for the (-1) models and 200 – 277V for the (-2) models.
- The minimum installation temperature is -76°F (-60°C).
- The minimum bend radius is 45mm at -76°F (-60°C).
- T-code ratings for the (5, 10, 15 W/ft) is T3 and T2D for the 20 W/ft.

5.0 Power Connection Kit, GB100M

Power connection kit for use with GHT-CR, GHT-CT, GHU-CT, and GHK-CT industrial self-regulating heating cables. This kit can be used to connect one, two, or three heating cables. The GB100M can also be used as splice, Tee, and end termination if the power entry through hole is blocked with a certified plug.



5.1 Kit Contents

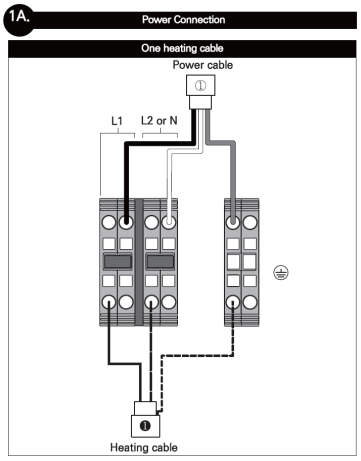


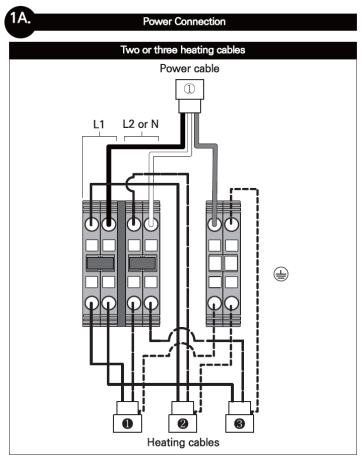
Item	Description	Qty.
A	Junction Box with terminal blocks	1
B	Box Gasket	1
C	Junction Box Lid	1
D	M6 Bolt	4
E	Wrench	1
F	Stand O-ring	1
G	Junction Box Stand	1
H	Lock Nut	1
I	Square-Ring for Compression Cap	1
J	Compression Cap	1
K	GHU-CT/GHT-CT Grommet (3 holes)	1
L	GHT-CR Grommet (3 holes)	1
M	GHK-CT Grommet (3 holes)	1
N	Core Sealer	3
O	Insulation Tube(Y/G)	3
P	Cable Tie	1
Q	RTV Adhesive	1
R	Grommet plug (for GHT-CR & CT only)	2
S	Pipe Strap (Sold Separately)	2
T	Fixing Tape (Sold Separately)	1
U	Certified Plug (Sold Separately)	1
V	Weather Seal (Sold Separately)	1

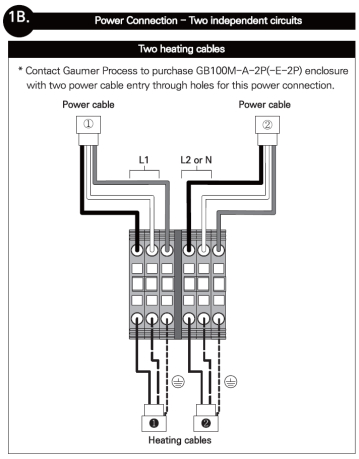
5.2 Specifications

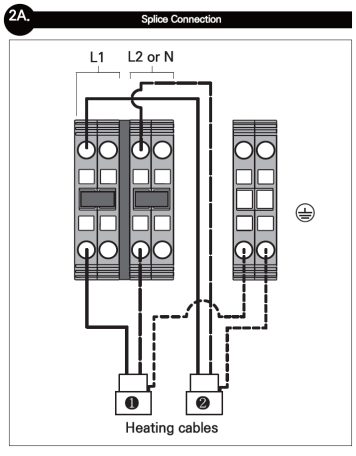
	GB100M-A	GB100M-E
Heating cable capability	GHT-CR, GHT-CT, GHU-CT, GHK-CT	
Supply Voltage	100 - 277V	100 - 277V
Ingress protection	NEMA Type 4X, IP66	IP66
Ambient Temperature Range	-40°F to +131°F	-40°C to +55°C
Min. Installation Temperature	-40°F	-40°C
Through hole for conduit	3/4" NPT	M25
Max. Conductor Size	8AWG (6AWG optional)	10mm² (16mm² optional)
Max. Circuit Breaker Size	50A	40A
Installation Accessories (Sold separately)	Conduit and fittings, Box plug, Pipe strap, Fiberglass tape, Aluminum tape	

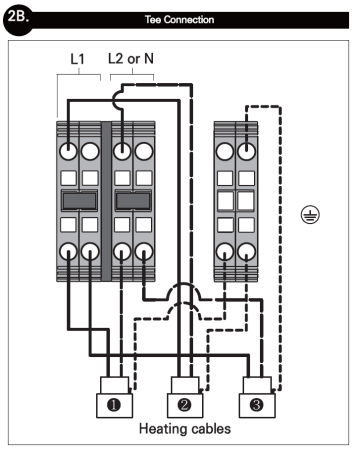
5.3 Wire Diagram

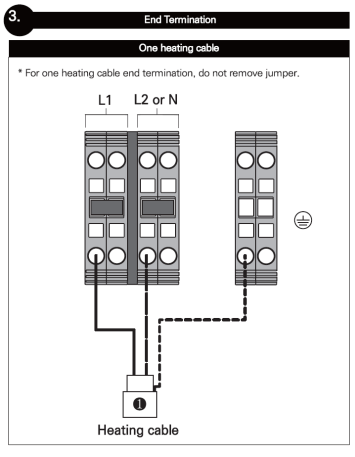


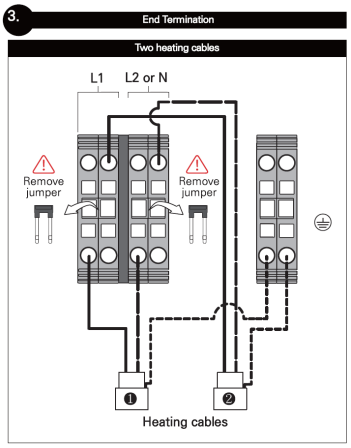










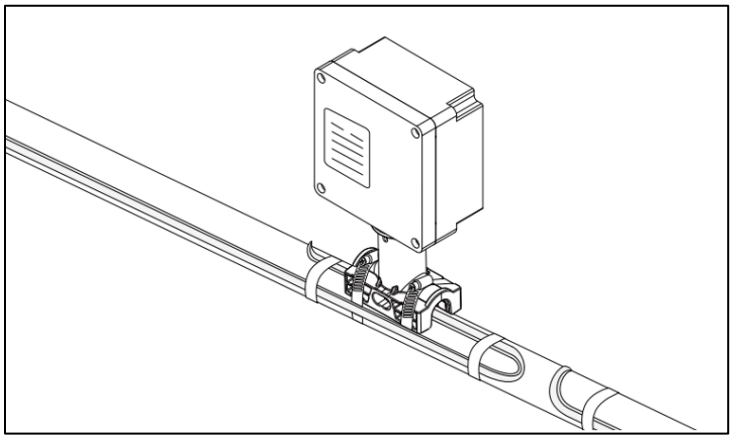


5.4 Specific Conditions of Use– ATEX / IECEx Only

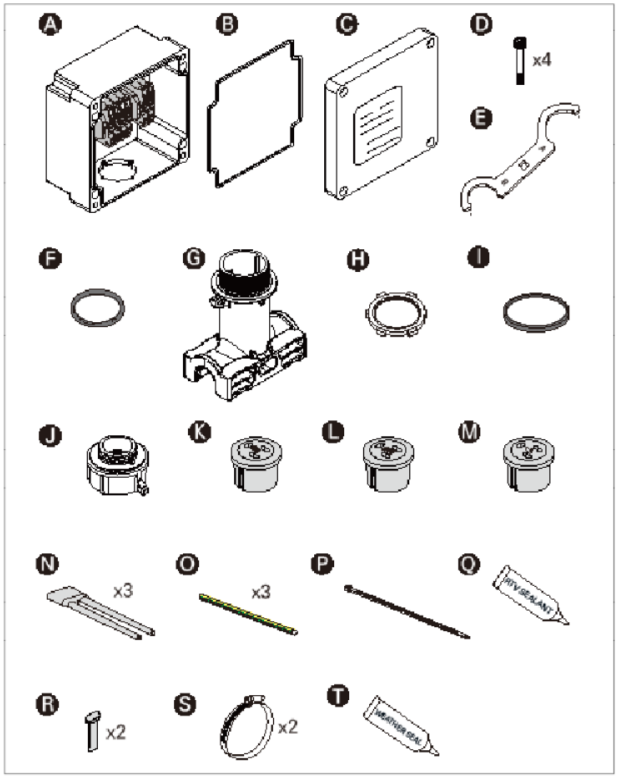
- GB100M and GB200 Series Connection Kits must be installed using Gaumer Process GHT, GHU, and GHK Series Heating Cables.
- Refer to the installation instructions to reduce the potential of an electrostatic charging hazard on the enclosures of the connection kits.
- The end-user shall mount the equipment per Gaumer Process instructions.
- To use GB100M kit for splice, Tee, and end termination, the power entry through hole must be blocked with a certified plug.

6.0 Tee/Splice Connection & End Termination Kit, GB200

Tee/Splice connection and End Termination kit for use with GHT-CR, GHT-CT, GHU-CT, and GHK-CT industrial self-regulating heating cables.



6.1 Kit Contents



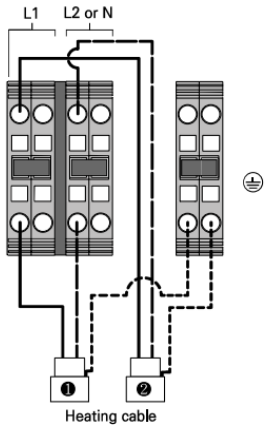
Item	Description	Qty.
A	Junction Box with terminal blocks	1
B	Box Gasket	1
C	Junction Box Lid	1
D	M6 Bolt	4
E	Wrench	1
F	Stand O-ring	1
G	Junction Box Stand	1
H	Lock Nut	1
I	Square-Ring for Compression Cap	1
J	Compression Cap	1
K	GHU-CT/GHT-CT Grommet (3 holes)	1
L	GHT-CR Grommet (3 holes)	1
M	GHK-CT Grommet (3 holes)	1
N	Core Sealer	3
O	Insulation Tube(Y/G)	3
P	Cable Tie	1
Q	RTV Adhesive	1
R	Grommet plug (for GHT-CR & CT only)	2
S	Pipe Strap (Sold Separately)	2
T	Weather Seal (Sold Separately)	1

6.2 Specifications

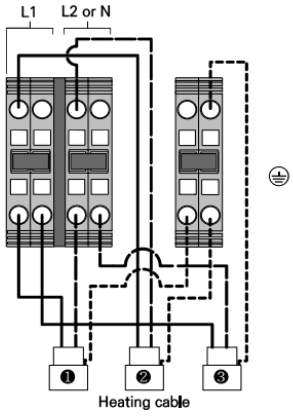
	GB200
Heating cable capability	GHT-CR, GHT-CT, GHU-CT, GHK-CT
Supply Voltage	277 Vac
Ingress protection	NEMA Type 4X, IP66
Ambient Temperature Range	-40°F (-40°C) to +131°F (+55°C)
Min. Installation Temperature	-40°F (-40°C)
Maximum conductor sizes	8AWG (10mm²), 6AWG (16mm²) optional
Max. Circuit Breaker Size	50A (40A for ATEX and IECEx)
Installation Accessories (Sold separately)	Conduit and fittings, Box plug, Pipe strap, Fiberglass tape, Aluminum tape

6.3 Wire Diagram

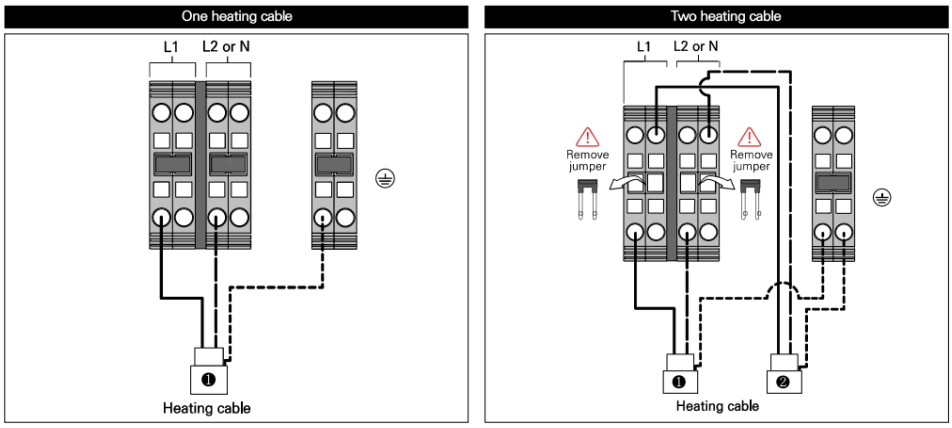
Splice Connection



Tee Connection



End Termination



6.4 Specific Conditions of Use– ATEX / IECEx Only

- GB100M and GB200 Series Connection Kits must be installed using Gaumer Process GHT, GHU, and GHK Series Heating Cables.
- Refer to the installation instructions to reduce the potential of an electrostatic charging hazard on the enclosures of the connection kits.
- The end-user shall mount the equipment per Gaumer Process instructions.

Appendix 1. Caution Label

- To be posted at appropriate locations and/or at frequent intervals along the circuit. One label for every 10 feet (3 m) of pipe, alternating on either side of the pipe, to be attached to the outside of the thermal insulation weather barrier.
- Also install at equipment requiring periodic maintenance (valves, pumps, instruments, etc.)
- Materials: Polyester laminated silver polyester sheet, adhesive type.

Appendix 2. Installation Instruction of Heating Cables

General Information

IMPORTANT: In order to maintain validity of warranty coverage of the electric trace heating cable systems, follow the steps in this manual including instructions, tests and required documentation of the installation/test report.

WARNING: heat-tracing systems must be installed correctly to ensure proper operation and to prevent shock and fire. Read these important warnings and carefully follow all the installation instructions.

To minimize the danger of fire from sustained electrical arcing if the heating cable is damaged or improperly installed, and to comply with Gaumer Process requirements, agency certifications, national electrical codes, ground-fault equipment protection must be used on each heating cable branch circuit. Arcing may not be stopped by conventional circuit breakers.

- Approvals and performance of the heat-tracing systems are based on the use of Gaumer Process specified parts only. Do not substitute parts or use vinyl electrical tape.
- Bus wires will short if they contact each other. Keep bus wires separated.
- The black heating cable cores are conductive and can cause electrical shortage. They must be properly insulated and kept dry.
- Damaged bus wires can overheat or short. Do not break bus wire strands when preparing the cable for connection.
- Damaged heating cable can cause electrical arcing or fire. Do not use metal attachments such as pipe straps or tie wire. Use only Gaumer Process approved fixing tapes and cable ties to secure the cable to the pipe.
- Do not attempt to repair or energize damaged cable. Remove damaged cable at once and replace with a new length using the appropriate Gaumer Process splice kit. Replace damaged components.
- Re-use of the grommets, or use of the wrong grommet, can cause leaks, cracked components, shock, or fire. Be sure the type of grommet is correct for the heating cable being installed. Use a new grommet whenever the cable has been pulled out of the component.
- Use only fire-resistant insulation which is compatible with the application and the maximum exposure temperature of the system to be traced.
- To prevent fire or explosion in hazardous locations, verify that the maximum sheath temperature of the heating cable (or T-Rating) is below the auto-ignition temperature of the gases in the classified hazardous area. For further information, see the design documentation.
- The minimum installation temperature for GHT-CR, GHT-CT self-regulating heating cables: –58°F (–50°C)
- The minimum installation temperature for GHU-CT, GHK-CT self-regulating heating cables: –76°F (–60°C)
- The minimum start-up temperature for GHT-CR, GHT-CT, GHU-CT, and GHK-CT self-regulating heating cables: –40°F (–40°C)
- The connection method, the temperature class and the requirements made on the qualification of the staff putting the installation regulations into practice have to be defined in the final certification of the respective heat tracing system.
- The documentation requirements according to EN 60079-30-1:2017, sections 7.2, 7.3, 7.4, 7.5 and 7.6 need to be considered for the certification of the final heat tracing system.

- CAUTION: In case the additional mechanical protection being supplied to the heating cables, the mechanical covering shall not be removed, and the heating cables shall not be operated without the mechanical covering being in place.
- GHT-CR, GHT-CT, GHU-CT, and GHK-CT self-regulating heating cables are intended for both indoor and outdoor applications.
- Ground fault equipment protection is required for each circuit.
- De-energize circuits before installation or servicing.
- Keep ends of GHT-CR, GHT-CT, GHU-CT, and GHK-CT self-regulating heating cables and kit components dry before and during installation.
- The electrically conductive covering of GHT-CR, GHT-CT, GHU-CT, and GHK-CT self-regulating heating cables shall be connected to a suitable earthing terminal.
- The presence of GHT-CR, GHT-CT, GHU-CT, and GHK-CT self-regulating heating cables shall be made evident by the posting of caution labels at appropriate locations and/or at frequent intervals along the circuit.
- The insulation resistance of the heating cable shall be measured and recorded after installation and shall not be less than 50 MΩ under 500 Vdc.
- Persons involved in the installation and testing of electric trace heating systems shall be suitably trained in all special techniques required. Installation shall be carried out under the supervision of a qualified person.
- GHT-CR, GHT-CT self-regulating heating cables' minimum bend radius: 0.5" @68°F (13mm @20°C), 1.6" @-58°F (40mm @-50°C)
- GHU-CT, GHK-CT self-regulating heating cables' minimum bend radius: 0.8" 70°F (20mm @20°C), 1.8" @-76°F (45mm @-60°C)
- GHT-CR, GHT-CT, GHU-CT, and GHK-CT self-regulating heating cables allow for multiple overlapping of the heating cables. Heating cable does not bend easily in the flat plane. Do not force such a bend, as the heating cable may be damaged.

Notes

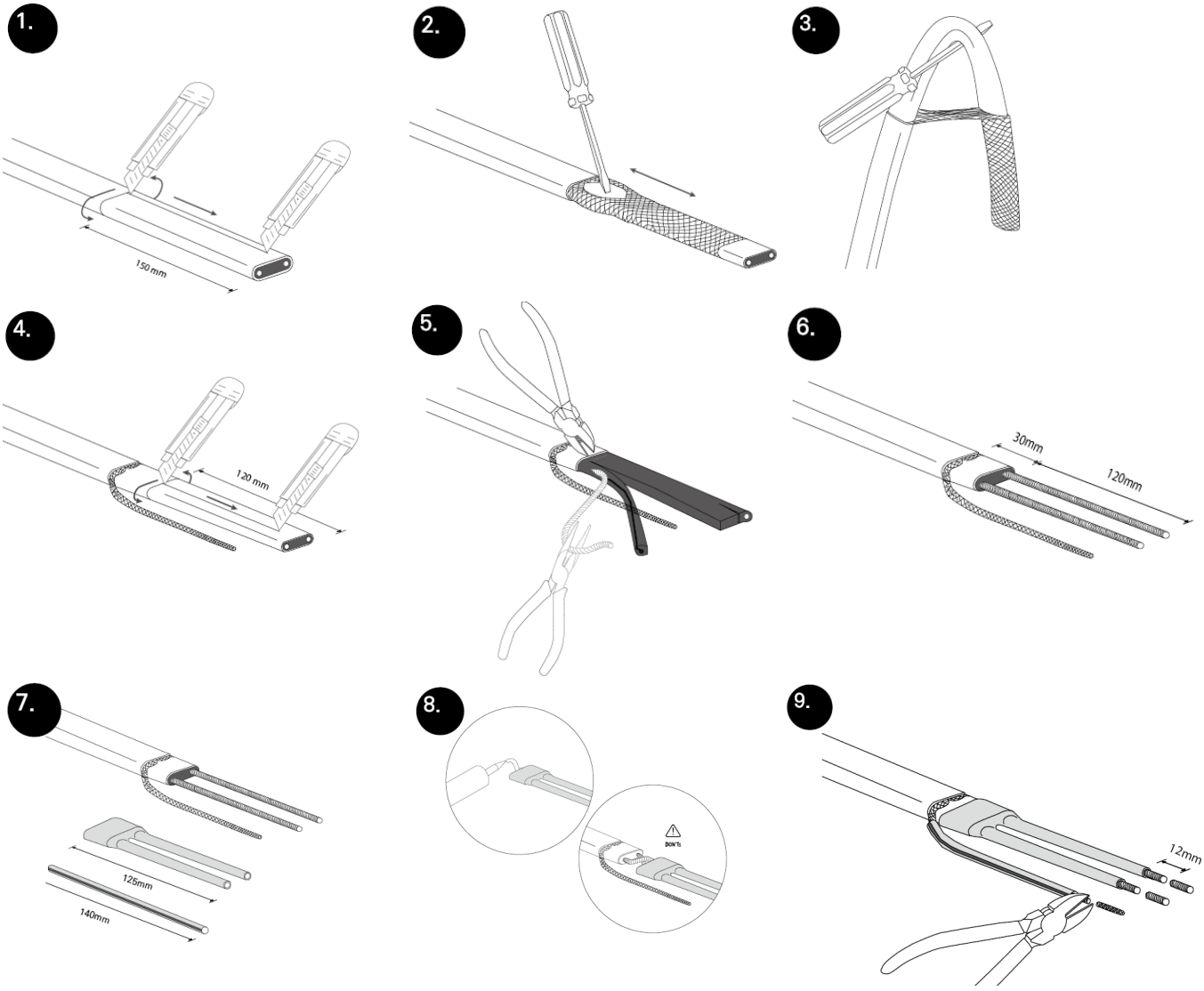
1. Connection kits must be used with correctly installed certified enclosures that are suitable for the application. When connecting certified terminals using associated accessories, the required creepage distances and clearances shall be observed.

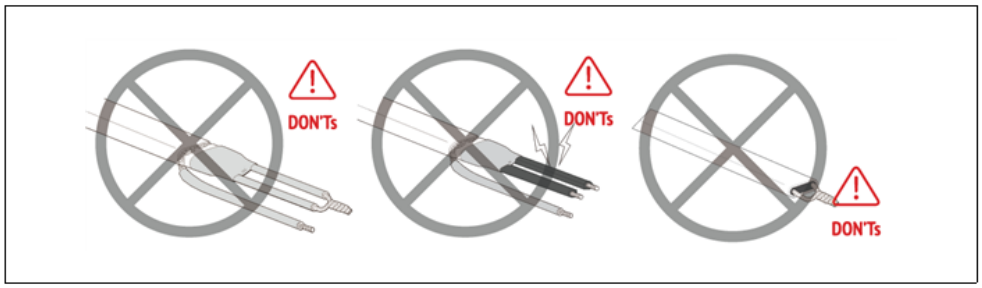
2. Temperature control is recommended for all freeze-protection and temperature-maintenance trace heating applications.

3. All heat-traced lines must be thermally insulated.

How to Strip

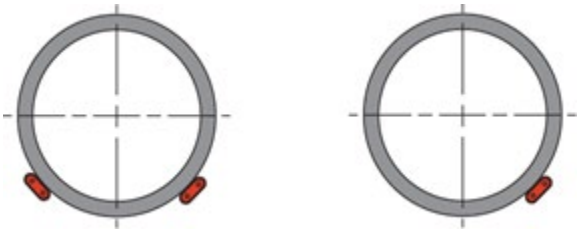
How to prepare heating cable with core sealer

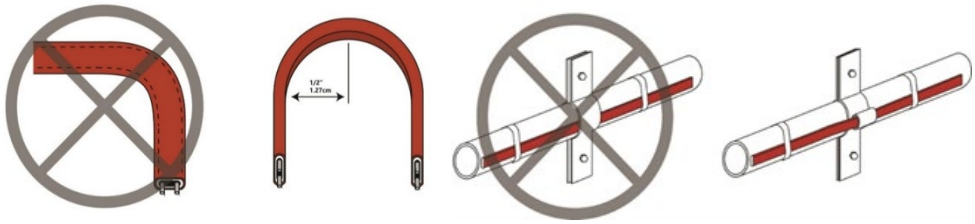




Typical heating cable arrangement

Heat trace cable usually is arranged at 4 and/or 8 o'clock side on the pipe



Caution - Be careful not to press the cable and bending


* To minimize the danger of fire from sustained electrical arcing if the heating cable is damaged or improperly installed, and to comply with national electrical codes, ground-fault equipment protection for each heating cable circuit must be designed and installed. Only qualified persons, shall design and install ground fault equipment, circuit breaker, thermal insulation, and provide supervision, service and maintenance.

Field Installation

1 Setting and pulling cable

1.1 Handling the heating cable

- Use a stable holding device for unwinding the heating cable from the spool or reel.
- Remove the heating cable in a straight line from the spool or reel.
- Do not bend or pinch the heating cable, or pull it over sharp edges.
- Do not tread on or drive over the heating cable; do not use it as a loop for stepping on.
- The ends of the heating cable are always fitted with a protective cap.

1.2 Tapes

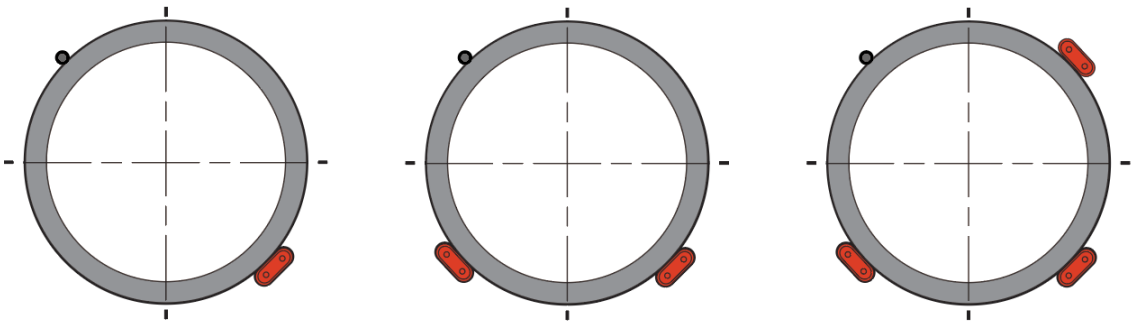
- Use recommended attachment tapes to secure the heating cable on the pipe: fiberglass tape, or aluminum tape.

2 Installation on pipes

2.1 Straight tracing

2.1.1 Initial heating cable installation

- Begin installing the heating cable at the proposed end-of-circuit location, following the guidance in the isometric system diagrams (if provided).
- Lay out the heating cable on the pipe, at the 4 or 8 o'clock position (Illustration on page 17), securing it tightly against the pipe with attachment tape. Wrap bands of tape around the heating cable and pipe at intervals of 12" (30 cm) or less, keeping the heating cable in close contact with the pipe.



- If accessibility is a problem, the heating cable may be installed at the 10 or 2 o'clock position.
- Refer to below table to estimate the number of rolls of attachment tape required, based on the pipe length and diameter. The table below details the coverage length of a single attachment tape roll for installation purposes. The tape roll is 96 feet in length, and the attachment tape is applied at 1 foot (30 cm) intervals along the pipe.

Installation length per 96-feet-long attachment tape																
Pipe diameter in inches	½"-1"	1¼"	1½"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"
Pipe length installed	115'	102'	97'	84'	66'	57'	44'	35'	31'	26'	23'	20'	18'	16'	14'	11'

- A continuous covering of aluminum foil tape may also be required under special circumstances, including:
  - where spray or foam thermal insulation will be applied (curing temperature to be verified),
  - where nonmetallic piping is used, or
  - design requirements dictate the use of aluminum tape.
- Allow extra length of heating cable for power connections, splices, and any in-line heat sinks, such as valves, flanges, and supports. See page 7 through page 12 for details on how to properly install the heating cable at these sites and the allowance of heating cable required.
- Install temperature sensors at least 90° away from heating cable locations as indicated as the black dot in the diagram above.

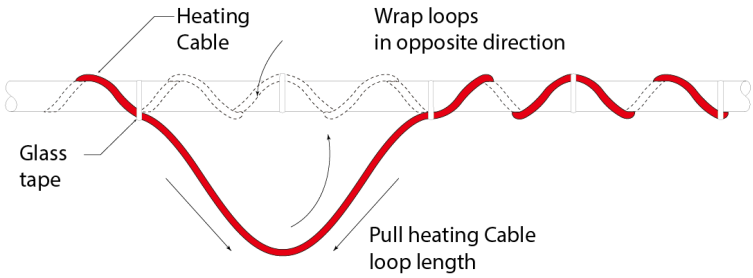
WARNING: Fire and Shock Hazard. Do not use metal attachments such as pipe straps or tie wire. Do not use vinyl-based electrical or duct tape.

CAUTION: Do not exceed the heating cable's specified minimum bend radius. Refer to product's specification sheets for the minimum bend radius of a specific heating cable type.

2.2 Multiple tracing and spiraling

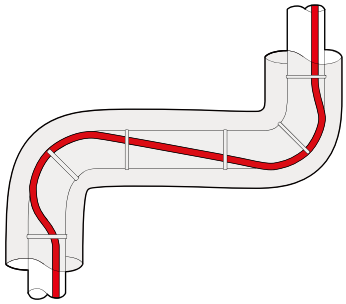
- Redundant heat-tracing runs are used in situations where a backup is required. Each run should be installed per the design specifications.
- Double or multiple heat-tracing runs are used when a single heat-tracing run alone cannot compensate for larger heat losses. Double heat-tracing runs should have extra heating cable installed at heat sinks, as called out in the design. It is recommended to supply the extra heating cable at heat sinks alternately from both runs in order to balance out both circuit lengths.
- When the design calls for spiraling, begin by suspending a loop at every 10-foot (3 meters) pipe section.

To determine the loop length, obtain a spiral factor from the design and multiply by 10. For example, if the spiral factor of 1.3 is called for, leave a 13-foot (4 meters) loop of heating cable at every 10-foot (3 meters) section of pipe. Attach the loop to the pipe at each interval using the appropriate.

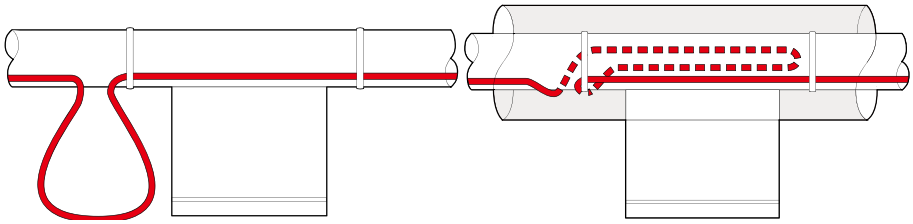


2.3 Heat Sinks

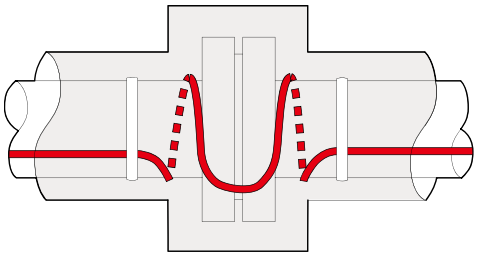
- Elbow: Locate the heating cable on the outside radius of the elbow. Secure the heating cable to the pipe with attachment tape on each side of the elbow.



- Support: For uninsulated pipe supports, allow twice the length of the support, plus an additional 16” (40 cm) of heating cable. Install the heating cable in a loop, following as a guide. Insulated pipe supports do not require additional length of heating cable.



- Flange: Loop the heating cable around the pipe on each side of, and adjacent to, the flange. Be sure to keep the heating cable in close contact with the flange throughout the length of the bend.



3 Installation on Valves and Pumps

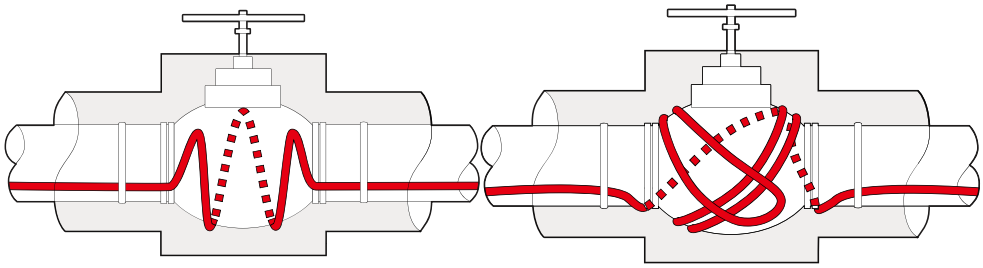
• Valves, pumps, and other miscellaneous equipment require additional passes of heating cable to offset the increased heat loss that occurs at these sites.

• Refer to the isometric system drawings, provided by Gaumer Process Engineering, for allowances specific to each line and circuit.

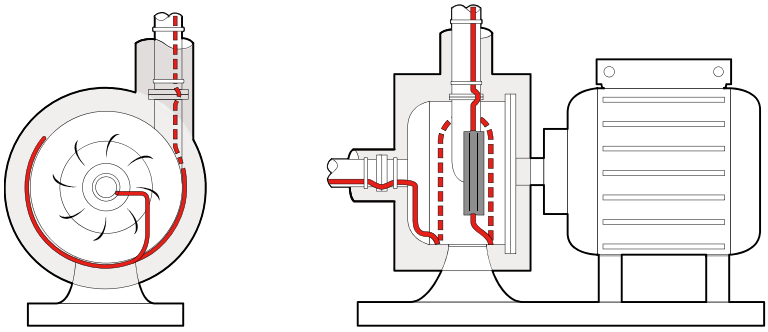
• Install the heating cable using a looping technique, using Illustrations below as a guide, such that the valve or pump may be removed for required service and maintenance.

• Keep the heating cable in close contact with the pipe and heat sink areas, to compensate for additional heat loss.

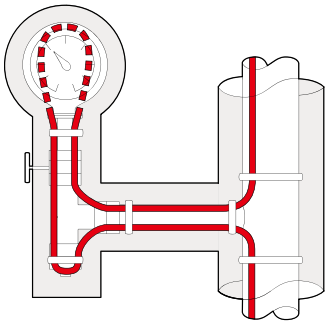
- Valve



- Pump



- Gauge



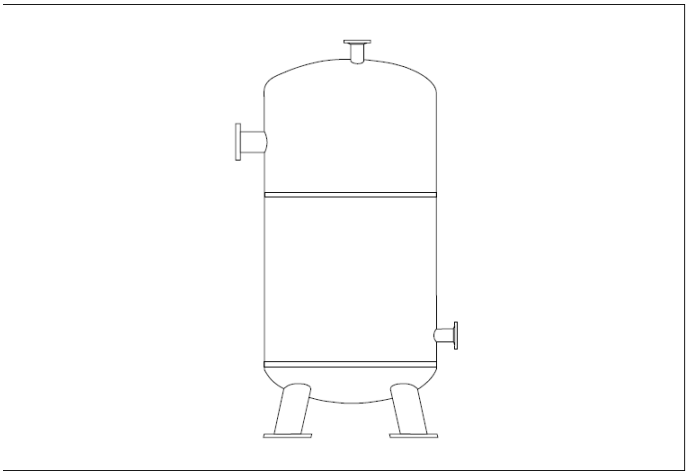
3.1 Completing the Heating cable Installation

- Secure the end-of-circuit termination kit and work back toward the power supply.
- Keep the heating cable in secure contact with the pipe, using bands of attachment tape at least every 12” (30 cm).
- Secure any required temperature sensors to the pipe using attachment tape.
- Complete any required splice connections in accordance with the installation instructions provided with the splice kit.
- Install any power connection kits in accordance with the detailed installation instructions provided with the kit.
- Connect the metallic braid of the heating cable to a suitable earthing/ground terminal.
- Before completing the power connections, perform an Insulation Resistance (IR) Test and record the values in the “Installation and Inspection Records” (refer to Appendix 3). The recorded value shall not be less than 50 MΩ under 500 Vdc.
- Record the line number and all other associated circuit information in the Installation and Inspection Records.

4 Installation on Tanks and Vessels

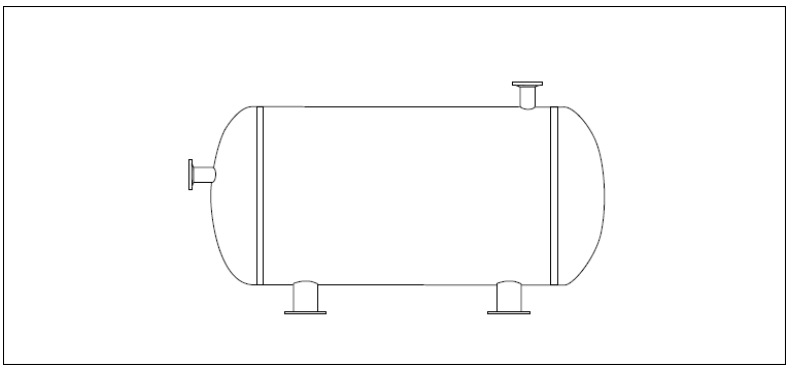
4.1 Upright tank

For tank diameters of up to 6.6 ft (2 m) the heating cable is fastened with a clamping ring. This is mounted on the tank using a clamping tool. To fasten the heating cable prefix a polyester clamping ring with slight tension both to the upper position of the surface to be heated and just over the lower base using a turnbuckle.



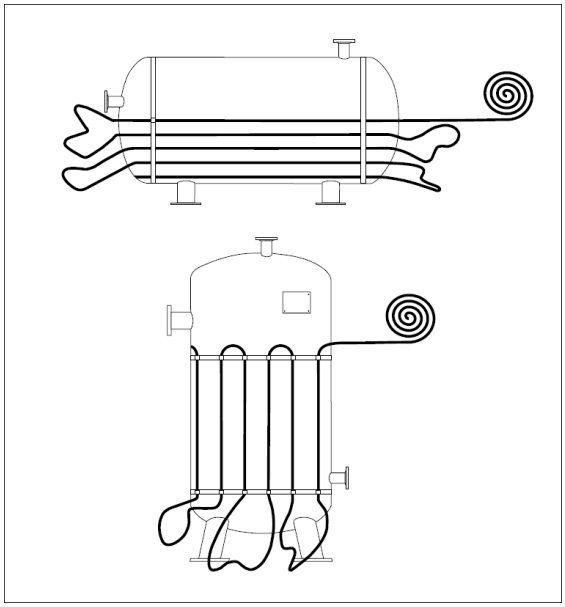
4.2 Horizontal tank

Using a turnbuckle fasten a clamping ring with slight tension both at the beginning and end of the tank, just near the base.



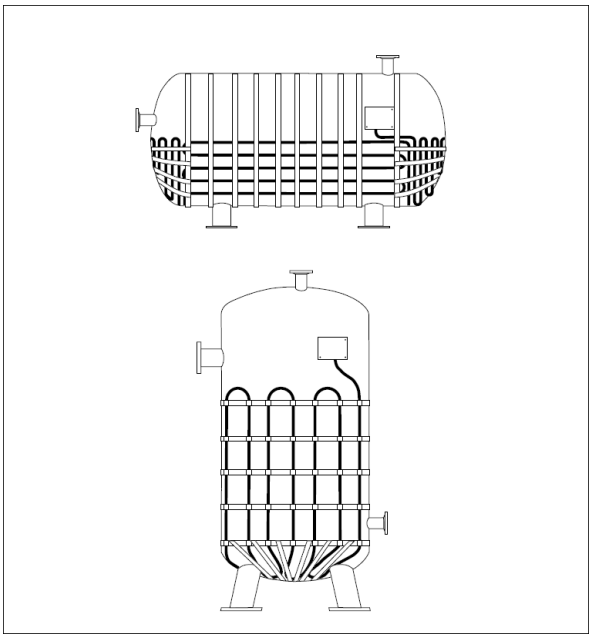
4.3 Installing the heating cable

Install the heating cable, beginning at the supply point, and fix it at the distances specified in the project planning documentation with the aid of the pre-mounted clamping rings. Please also allow for material addition for the base (bases).



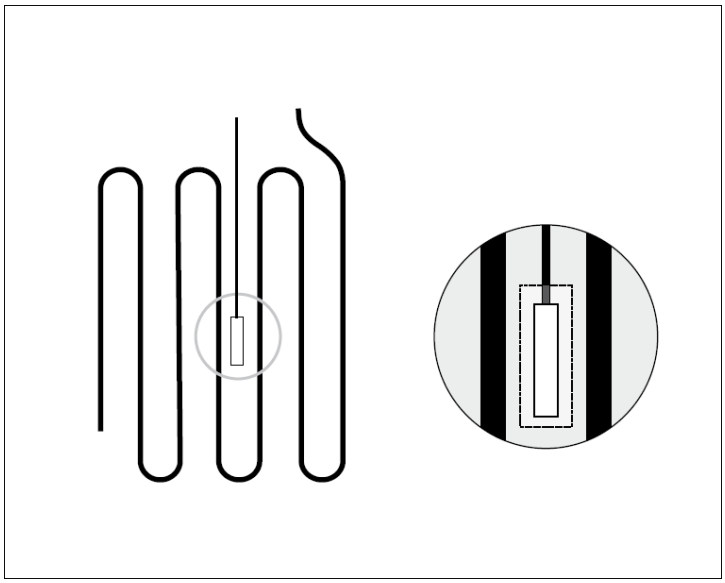
After installing the heating tape, this is then aligned exactly according to the project planning specifications and fixed firmly to the bases and the cylinder using the clamping rings provided. In doing so care should be taken that the clamping rings are not tightened too firmly so as not to damage the heating tape. It should be possible to move the heating tape slightly under the clamping ring.

The distances between the clamping ring fixture should not exceed 10” (25.4 cm). If necessary, the distances should be reduced.

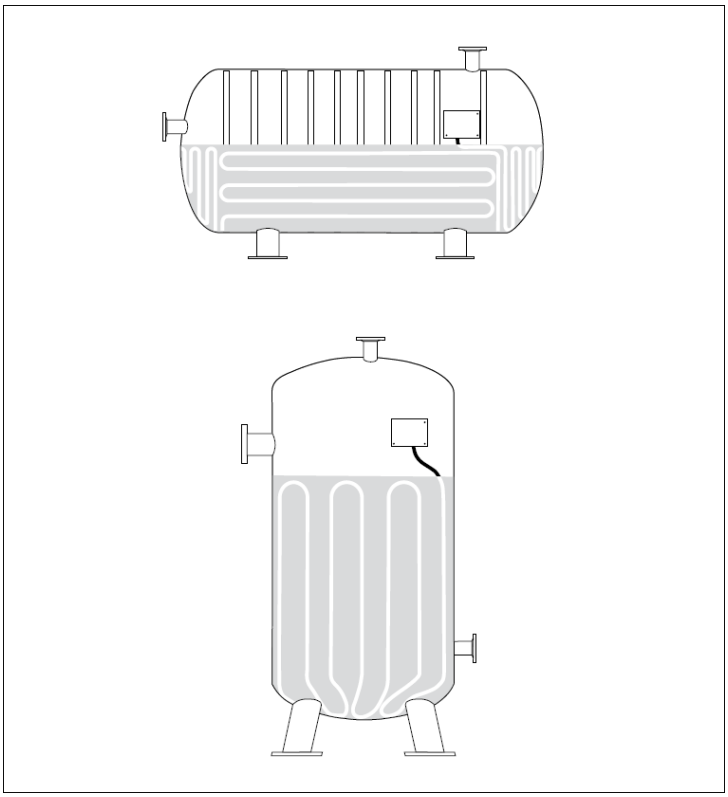


4.4 Sensor position

The sensors of the capillary tube thermostats or the PT100 temperature sensor should be fitted closely onto the surfaces to be heated. All sensors must be fitted centrally between the heating cables and glued over with aluminum self-adhesive cable.



After completing installation of the heating cable, glued over with aluminum self-adhesive tape or the tank is wrapped in aluminum foil. In this way heat transmission is improved and at the same time penetration of insulating material between the heating cable and tank wall is prevented.



5 Insulation

5.1 Pre-Insulation Checks

Visually inspect the heating cable and components for correct installation and damage. Damaged cable must be replaced. Perform insulation resistance testing, known as a Megger test, prior to covering the pipe with thermal insulation.

5.2 Installing Thermal Insulation

- Properly installed and well-maintained thermal insulation is critical to the performance of the heat tracing system. Without proper insulation, heat losses are generally too high to be offset by a conventional heat tracing system.
- Properly insulate all heat sinks, including pipe supports, hangers, flanges, and in most cases, valve bonnets.
- Install a protective vapor barrier over the insulation, regardless of the type or thickness of insulation used. The vapor barrier protects the insulation from moisture intrusion and physical damage and ensures the proper performance of the trace heating system.
- Seal all any openings such as gaps, cracks, holes etc. around the vapor barrier.
- After ensuring that the insulation is weather-tight, document the completion of the insulation in the After Installation of Thermal Insulation section of the “Installation and inspection Record”.

5.3 After Installing Thermal Insulation

The presence of heating cable shall be made evident by posting of caution labels at appropriate locations and/or at frequent intervals along the circuit.

- Apply the provided peel-and-stick “Electric Heat Tracing - Caution” labels along the pipe, on the outermost surface of the thermal insulation or vapor barrier, at intervals of 10 feet (32 meters) or less.
- Apply the caution labels at any other appropriate locations, such as valves.

5.4 Post-Insulation Testing

After the insulation is complete, perform an insulation resistance test on each circuit to confirm that the cable has not been damaged.

WARNING: Use only fire-resistant insulation, such as fiberglass, mineral wool, or calcium silicate.

Tests

Following test requirements shall be performed in the field and the test results shall be recorded in the "Installation and Inspection Records" (refer to Appendix 3).

1 Visual inspection

- Visually inspect the pipe, insulation, and connections to the heating cable for physical damage. Check that no moisture is present, electrical connections are tight and grounded, insulation is dry and sealed, and control and monitoring systems are operational and properly set. Damaged heating cable must be replaced.
- Check inside heating cable components for proper installation, overheating, corrosion, moisture, and loose connections.
- Check the electrical connections to ensure that ground and bus wires are insulated over their full length.
- Check for damaged or wet thermal insulation; damaged, missing or cracked lagging and weather-proofing.
- Check that end seals, splices, and tees are properly labeled on insulation cladding.
- Check control and monitoring system for moisture, corrosion, set point, switch operation and capillary damage.

2 Insulation Resistance

Progressive tests on the trace heating system during installation and operation serve to avoid additional costs, the following test sections should be strictly observed.

a) Preliminary test

Shortly before beginning installation of the heating cable on the construction site

b) Acceptance test

Following complete installation of the heating circuit or fitting of the thermal insulation

c) Final inspection

Immediately after completion of work on the thermal insulation

d) Commissioning

Before switching on the installation

e) Maintenance

As part of the regular system inspection and after any maintenance or repair work

2.1 Procedure

① De-energize the circuit.

② Disconnect the thermostat or controller if installed.

③ Disconnect bus wires from terminal block, if installed.

④ Set test voltage at 0 Vdc.

⑤ Connect the negative (–) lead to the heating cable metallic braid.

⑥ Connect the positive (+) lead to both heating cable bus wires simultaneously.

⑦ Turn on the mega-ohmmeter and set the voltage to 500 Vdc; apply the voltage for 1 minute. The meter needle should stop moving. Rapid deflection indicates a short. Record the insulation resistance value in the Installation and Inspection Reports.

⑧ Turn off the mega-ohmmeter.

⑨ If the mega-ohmmeter does not self-discharge, discharge phase connection to ground with a suitable grounding rod. Disconnect the mega-ohmmeter.

⑩ Repeat this test between braid and pipe.

⑪ Reconnect bus wires to terminal block.

⑫ Reconnect the thermostat.

3 Ground-fault test

Test all ground-fault breakers per manufacturer's instructions.

4 Final Inspection

- After installing the thermal insulation and vapor barrier BUT BEFORE ENERGIZING THE CIRCUIT, repeat the IR test to verify that the heating cable has not been damaged during installation. Record the IR value in the Installation and Inspection Records (refer to Appendix 3).
- Ensure that all junction boxes, temperature controllers, cable glands, etc., are properly secured.
- Refer to 5 Power check section to energize the cable, record measurement results under the Section of Power check in Appendix 3 – Installation and Inspection Records.
- If a control device is used, verify its settings to ensure that the maximum surface temperature does not exceed the system T-rating, in accordance with EN 60079-30-1.

5 Power check

The heating cable power per foot (meter) is calculated by dividing the total wattage by the total length of a circuit. The current, voltage, operation temperature, and length must be known. Circuit length can be determined from "as built" drawings, meter marks on cable.

The watts per foot (meter) can be compared to the heating cable output indicated on the product data sheet at the temperature of operation. This gives a good indication of heating cable performance.

- Power the heating cable and allow it to stabilize for 10 minutes, then measure current and voltage at the junction box. If a thermostat or controller is used, refer to details below.
- Check the pipe temperature under the thermal insulation at several locations.
- Calculate the power (watts/ft) of the heating cable by multiplying the current by the input voltage and dividing by the actual circuit length.

  Power (w/ft or m) = Volts (Vac) x Current (A) / Length (ft or m)

Appendix 3. Installation and Inspection Records

Appendix 3. Installation and Inspection Records						
1. Please enter the the information to your best knowledge. 2. All applicable tests or checks below must be performed at installation or at any time the cable is cut, damaged, or reinstalled.						
Part I: General Information						
Facility						
Circuit Number						
Circuit Lengh						
Circuit Breaker Number						
Drawing Number						
Heating Cable Model						
Connection Accessories						
Date (When Part I is Recorded)						
Part II: Visual Checks	**Date/Initial**	**Date/Initial**	**Date/Initial**	**Date/Initial**	**Date/Initial**	**Date/Initial**
Any Physical Damages, Moisture, Liquids, Corrosion Cables?						
Any Moisture, Liquids, Corrosion, Damage inside Junction Boxes or End Seal?						
Are Bus Wires and Braid Connected properly inside Junction Boxes?						
Are the Junction Box Lock Nut and Lid Water Tight?						
Is the Thermal Insulation Wet or Damaged?						
Is the Thermal Insulation Complete and Waterproof?						
Are Caution Labels Fixed on Outside of Thermal Insulation (Every 10ft or 3m or Less)?						
Part III: Thermal Insulation Checks						
Meggar Test (500Vdc, bypass Controls) - Test A: Bus to Braid (MΩ)						
Meggar Test (500Vdc, bypass Controls) - Test B: Braid to Pipe (MΩ)						
Are Connection Kits Outside of Thermal Insulation and Visible?						
Part IV: Electrical and Power Check						
Circuit Voltage (V)						
Voltage at the End of Circuit (V)						
Circuit Amperage (A) after 30 min and Ambient Temperature (°F)						
Pipe Temperature (°F)						
Part V: Control Checks						
Is Temperature Control Set Properly?						
Is the Sensor Located and Fixed on Pipe Properly?						
Is the Sensor Protected and Undamaged?						
Part VI: Other **(List any other tests or inspection results)**						

Contact Information

Full name of Manufacturer	Gaumer Process
Address	13616 Hempstead Road, Houston, TX 77040 U.S.A
Contact person for Follow up	
Contact person's phone number	
Contact person's fax number	
Contact person's email address	