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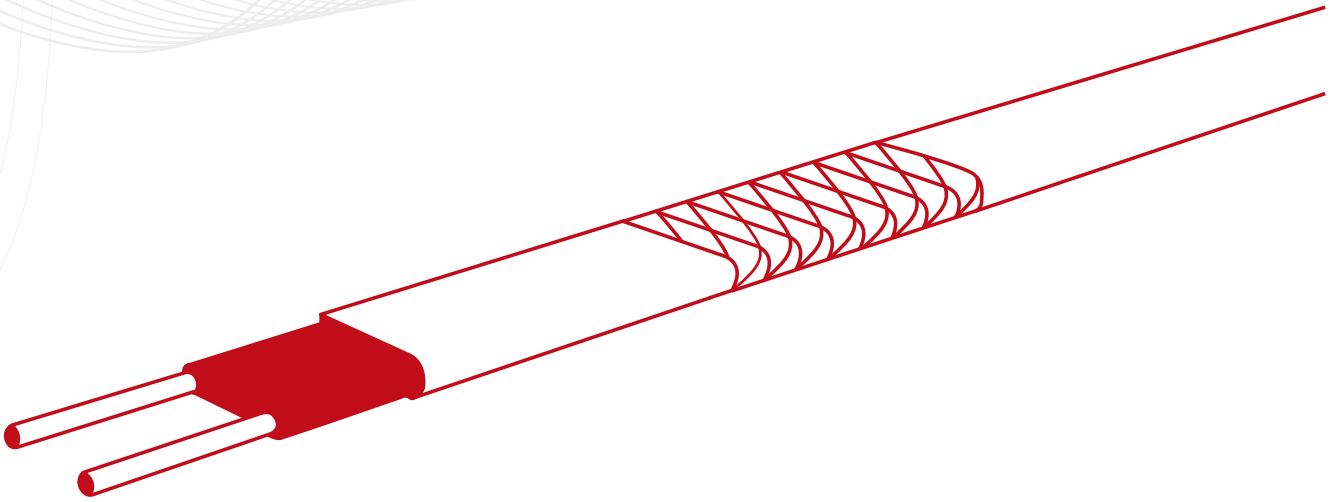
OPERATION MANUAL



Heat Tracing System
ELSR-HA, ELSR-NA & ELSR-SH+

Self-regulating heat tracers and their associated system components for North America

eltherm Canada Inc.
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QAA-085-A
Revision 5
0080081

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CONTENT

Reservation

Subject to technical changes. Changes, errors and misprints do not constitute grounds for claims for damages.
For safety components and systems, the assembly instructions as well as the relevant and currently valid standards and regulations must be observed.

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Document: 864304BA2XXXX **QAA-085-A**		**OPERATION MANUAL Heat Tracing System ELSR-HA, ELSR-NA and ELSR-SH+**	
Author:	Peter Schmidt	Date:	13.12.2018
Revision: **5**	Julian Engel	Date:	05.04.2024

INTRODUCTION

The Heat Tracing System ELSR-… is suitable for industrial use on piping, vessels, instrumentation and related equipment in non-classified (ordinary) areas, in outdoor exposed areas, in wet areas and in areas where combustible gasses, dust or fibers may be present. Due to the self-regulating behaviour of the system, ELSR-… can be operated within the associated T-Class without additional temperature limitation. All electrical connections must be made to a suitable junction box approved for use in the above listed areas. The use of applicable eltherm power connection and termination kits is required.

For proper and safe use of the trace heating system ELSR-HA, ELSR-NA and ELSR-SH+, please follow these instructions. Please keep these instructions for future reference (e.g. in the system documentation).

General display conventions

Particularly important points in these instructions are indicated by the following symbols:

DANGER

indicates an extremely dangerous situation.
If it is not avoided, there is a danger to life or at least a high risk of serious injury.

ATTENTION

indicates a potentially dangerous situation.
If not avoided, there is a risk of damage or malfunction.

WARNING

indicates a potentially dangerous situation.
If it is not avoided, there is a risk of injury or at least a high risk of damage.

NOTE

important information and instructions for safe, effective and environmentally sound use.

RECEIPT OF GOODS

After receipt of goods, check the trace heater and all supplied accessories and compare with the data on the delivery note to ensure that the correct material was supplied. Verify the integrity of the electrical insulation as described under "TEST AND COMMISSIONING". If the trace heater is to be stored for installation at a later date, it is recommended that the exposed wires and braid are trimmed and that the end is sealed against possible ingress of water.

Class I Div 1 installations: also verify the continuity of the braid of the trace heater. Visually examine heater and accessories for possible shipping and handling damage.

STORAGE

NOTE

The goods have to be stored in a dry environment at an ambient temperature of -49°F…+140°F (-45°C … +60°C). If a dry storage is impossible, the trace heater must be closed with an end termination set. This is also necessary if a heating circuit cannot be finished at the end of a shift..

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SYSTEM COMPONENTS

The Heat Tracing System ELSR-… comprises the following components:

Component	Voltage in VAC	Nominal Power / max. current
Trace heater ELSR-NA-…-1-AO	120	3W/ft, 5W/ft, 7W/ft
Trace heater ELSR-NA-…-1-BO	120	3W/ft, 5W/ft, 7W/ft
Trace heater ELSR-NA-…-1-BOT	120	3W/ft, 5W/ft, 7W/ft
Trace heater ELSR-NA-…-2-AO	240 / 277	4W/ft, 6W/ft, 8W/ft, 10W/ft
Trace heater ELSR-NA-…-2-BO	240 / 277	4W/ft, 6W/ft, 8W/ft, 10W/ft
Trace heater ELSR-NA-…-2-BOT	240 / 277	4W/ft, 6W/ft, 8W/ft, 10W/ft
Trace heater ELSR-HA-…-1-BOT	120	3W/ft, 7W/ft, 10W/ft, 15W/ft, 20W/ft
Trace heater ELSR-HA-…-2-BOT	240 / 277	3W/ft, 7W/ft, 10W/ft, 15W/ft, 20W/ft
Trace heater ELSR-SH+-…-1-BOT	120	5W/ft, 10W/ft, 20W/ft
Trace heater ELSR-SH+-…-2-BOT	240 / 277	5W/ft, 10W/ft, 20W/ft, 30W/ft
Splice Kit EL-SPN-16	300	max. 15A
End Termination Kit EL-ECN-Ex	277	max. 40A
End Termination Kit EL-ECSH-Ex	277	max. 40A
Power Termination Kit Ex ELVB-SREx-20 BR HT	277	max. 40A
Power Termination Kit Ex ELVB-SREx-¾" BR HT	277	max. 40A
Power Termination Kit Ex ELVB-SREx-SH+-20	277	max. 40A
Power Termination Kit Ex ELVB-SREx-SH+-½"	277	max. 40A
Power Termination Kit Ex ELVB-SREx-SH+-¾"	277	max. 40A
Power Termination Kit ELVB-SRAH-¾ ST	277	max. 40A
Power Termination Kit ELVB-SRAN-¾ ST	277	max. 40A
Heater Entry Kit EL-HAZELECT (Class I Div 1)	277	max. 40A

RATING OF TRACE HEATER

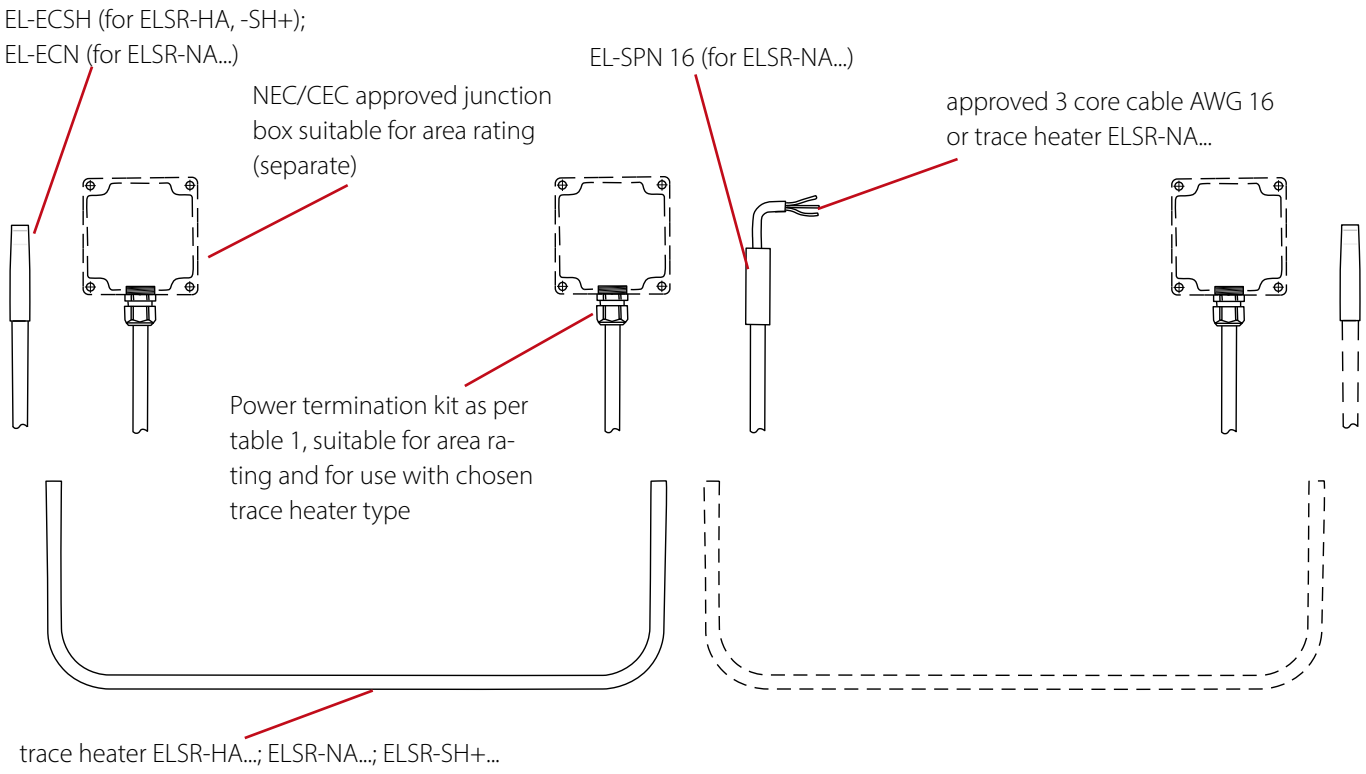
ELSR-NA-…: -WS
ELSR-HA-…: -WS
ELSR-SH+-…: -WS

POSSIBLE COMBINATIONS

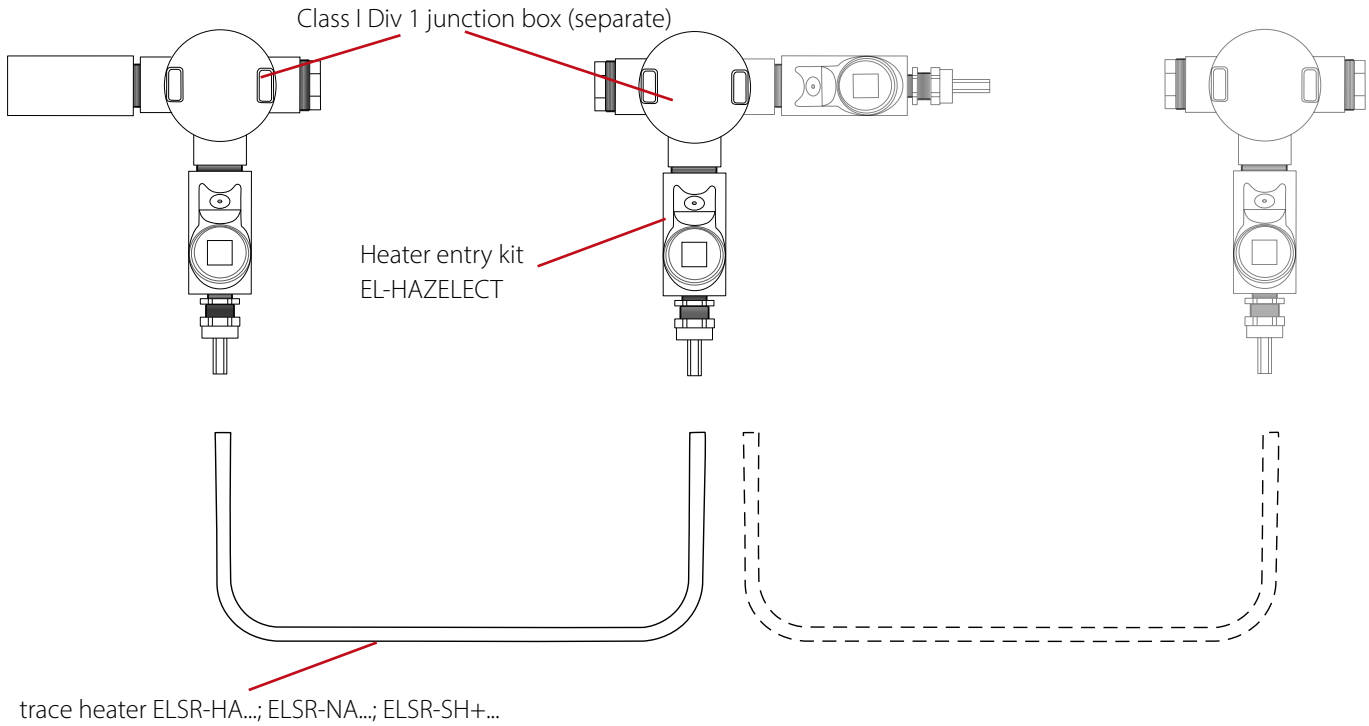
Area / Trace heater	unclassified	Ex Zone 1	Class I Div 2 Grp ABCD Class II Div 2 Grp EFG Class III	Class I Div 1 Grp ABCD Class II Div 1 Grp EFG Class III
ELSR-NA	End Termination Kit EL-ECN-Ex	End Termination Kit EL-ECN-Ex	End Termination Kit EL-ECN-Ex	Heater Entry Kit EL-HAZELECT
	Power Termination Kit Ex ELVB-SREx-20 BR HT	Power Termination Kit Ex ELVB-SREx-20 BR HT	Power Termination Kit Ex ELVB-SREx-20 BR HT	
	Power Termination Kit Ex ELVB-SREx-¾ BR HT	Power Termination Kit Ex ELVB-SREx-¾ BR HT	Power Termination Kit Ex ELVB-SREx-¾ BR HT	
	Splice Kit EL-SPN 16	Splice Kit EL-SPN 16	Splice Kit EL-SPN 16	
	Power Termination Kit ELVB-SRAN-¾ ST			
ELSR-HA	End Termination Kit EL-ECSH-Ex	End Termination Kit EL-ECSH-Ex	End Termination Kit EL-ECSH-Ex	Heater Entry Kit EL-HAZELECT
	Power Termination Kit Ex ELVB-SREx-20 BR HT	Power Termination Kit Ex ELVB-SREx-20 BR HT	Power Termination Kit Ex ELVB-SREx-20 BR HT	
	Power Termination Kit Ex ELVB-SREx-¾ BR HT	Power Termination Kit Ex ELVB-SREx-¾ BR HT	Power Termination Kit Ex ELVB-SREx-¾ BR HT	
	Power Termination Kit ELVB-SRAH-¾ ST			
ELSR-SH+	End Termination Kit EL-ECSH-Ex	End Termination Kit EL-ECSH-Ex	End Termination Kit EL-ECSH-Ex	Heater Entry Kit EL-HAZELECT
	Power Termination Kit Ex ELVB-SREx-SH+-20	Power Termination Kit Ex ELVB-SREx-SH+-20	Power Termination Kit Ex ELVB-SREx-SH+-20	
	Power Termination Kit Ex ELVB-SREx-SH+-¾	Power Termination Kit Ex ELVB-SREx-SH+-¾	Power Termination Kit Ex ELVB-SREx-SH+-¾	
	Power Termination Kit Ex ELVB-SREx-SH+-½	Power Termination Kit Ex ELVB-SREx-SH+-½	Power Termination Kit Ex ELVB-SREx-SH+-½	

Table 1: Possible combinations of Trace heater and Kit

POSSIBLE TRACE HEATER SETS (OTHER THAN Class I Div. 1)



POSSIBLE TRACE HEATER SETS (Class I Div. 1)



APPLICABLE TEMPERATURE RANGE

The minimum start up temperature for Trace heater ELSR-NA…, -HA... and -SH+… is -22°F (-30°C).
The minimum installation temperature is:

Product	°F	°C
ELSR-NA-…AO, …BO, …BOT	-76	-60
ELSR-HA-…BOT	-76	-60
ELSR-SH+-…BOT	-76	-60
EL-ECSH-Ex	-76	-60
EL-ECN-Ex	-76	-60
ELVB-SRA… ST	-49	-45
ELVB-SREx… HT	-76	-60
ELVB-SREx... IT	-76	-60
EL-SPN 16	-13	-25
EL-HAZELECT	40	4

Table 2: minimum installation temperatures

The maximum operating temperature for trace heater ELSR-NA and integral components (termination kit EL-ECN-Ex, splice kit EL-SPN-16) is 140°F / 60°C (energized) and 176°F / 80°C (de-energized).

The maximum operating temperature for trace heater ELSR-HA and integral components (termination kit EL-ECSH) is 248°F / 120°C (energized) and 356°F / 180°C (de-energized).

The maximum operating temperature for trace heater ELSR-SH+ and integral components (termination kit EL-ECSH) is 365°F / 185°C (energized) and 482°F / 250°C (de-energized).

RESTRICTIONS ON PERMISSIBLE THICKNESS AND MATERIAL OF THERMAL INSULATION

Flexible (soft) materials: no restrictions
Rigid materials: groove to be provided to accommodate trace heater

MARKING OF HEAT TRACING SYSTEM ELSR-…

Trace heaters ELSR-… are marked as follows:

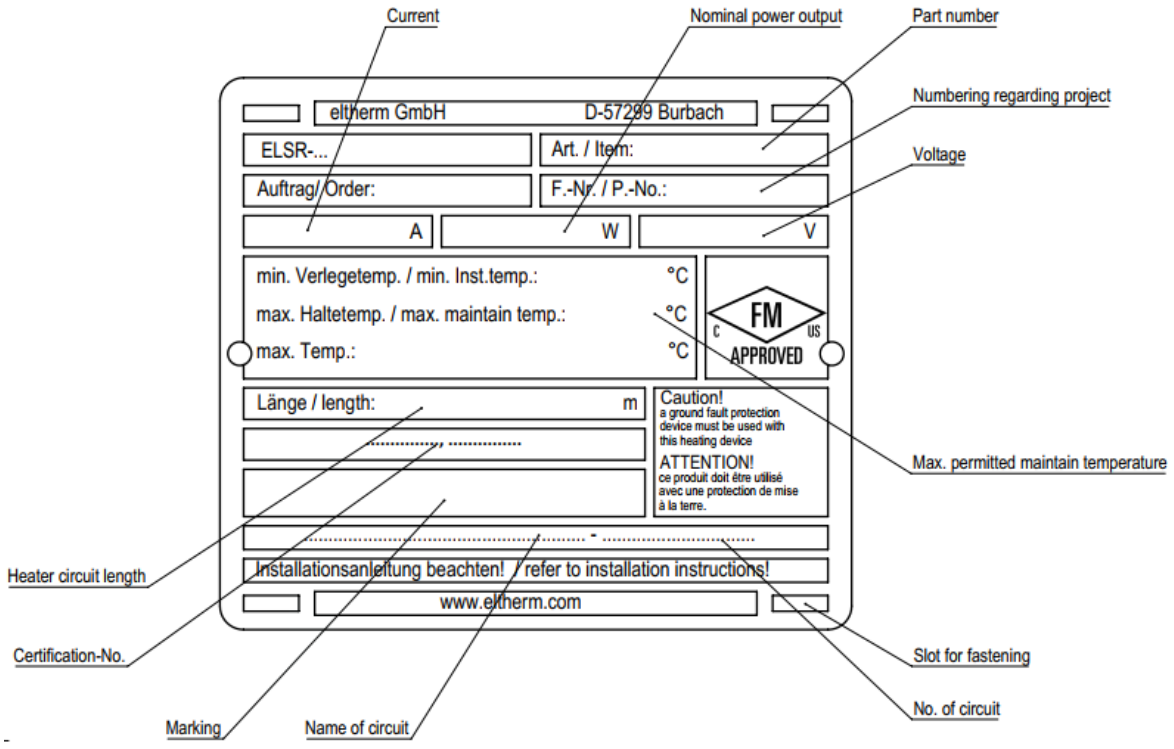
eltherm GmbH <type> <power> W/ft @ <temperature> Parallel-WS Trace Heater 40 A <voltage> VAC <min. installation temp> <= Tp <= <max. maintain temp.> Tmax = <max. exposure temp.>
<hazardous area marking Canada / US> <lot-No.> <continuous length marking>

Example ELSR-NA-7-1-BO:
eltherm GmbH ELSR-NA-7-2-BO 7 W/ft @ 5°C (41°F) Parallel-WS Trace Heater 40A
120VAC -60°C (-76°F) <= Tp <= 60°C (140°F) Tmax = 80°C (176°F) HAZ LOC Class I Div 1 Grp A,B,C,D (Canada only) / Class I Div 2 Grp A,B,C,D Class II Div 2 Grp E,F,G Class III T6
Class I Zone 1 AEx / Ex 60079-30-1 IIC T6 Gb B1346 0158m

Example ELSR-HA-15-2-BOT:
eltherm GmbH ELSR-HA-15-2-BOT 15 W/ft @ 240VAC/10°C (50°F) Parallel-WS Trace Heater 40A
277VAC -60°C (-76°F) <= Tp <= 120°C (248°F) Tmax = 180°C (356°F) HAZ LOC Class I Div 1 Grp A,B,C,D / Class I Div 2 Grp A,B,C,D Class II Div 2 Grp E,F,G Class III T2D
Class I Zone 1 AEx / Ex 60079-30-1 IIC T3 Gb B1350 0169m

Example ELSR-SH+-10-1-BOT:
eltherm GmbH ELSR-SH+-10-1-BOT 10 W/ft @ 120VAC/10°C (50°F) Parallel-WS Trace Heater 40A
-60°C (-76°F) <= Tp <= 185°C (365°F) Tmax = 250°C (482°F) HAZ LOC Class I Div 1 Grp A,B,C,D / Class I Div 2 Grp A,B,C,D Class II Div 2 Grp E,F,G Class III T2C (T2D…T6)
Class I Zone 1 AEx / Ex 60079-30-1 IIC T2C (T2D…T6) Gb B2226 0177m

The entire installed system is marked by separate label as follows:



T-CLASS DETERMINATION (HAZARDOUS AREA APPLICANTIONS ONLY)

Heater	Nominal Voltage (VAC)	T-Class without specific heating circuit design	Possible T-Classes as per controlled or stabilized design of heating circuit by eltherm or by tool eltherm designer V2.0x
ELSR-NA-...-1-... (all types / power ratings)	120	T6	n.a.
ELSR-NA-...-2-... (all types / power ratings)	277	T6	n.a.
ELSR-HA-...-1- (power ratings 10 and lower)	120	T3	T3A, T3B, T3C, T4, T4A, T5, T6
ELSR-HA-...-1- (power ratings 15 and higher)	120	T2D	T3, T3A, T3B, T3C, T4, T4A, T5, T6
ELSR-HA-...-2- (power ratings 10 and lower)	277	T3	T3A, T3B, T3C, T4, T4A, T5, T6
ELSR-HA-...-2- (power ratings 15 and higher)	277	T2D	T3, T3A, T3B, T3C, T4, T4A, T5, T6
ELSR-SH+-5-1-BOT	120	T3	T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-10-1-BOT	120	T2C	T2D, T3, T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-20-1-BOT	120	T2B	T2C, T2D, T3, T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-5-2-BOT	240	T3	T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-5-2-BOT	277	T2C	T2D, T3, T3A, T3B, T3C, T4, T4A, T5, T6
ELSR-SH+-10-2-BOT	240	T3	T3A, T3B, T3C, T4, T4A, T5, T6
ELSR-SH+-10-2-BOT	277	T2C	T2D, T3, T3A, T3B, T3C, T4, T4A, T5, T6
ELSR-SH+-20-2-BOT	240, 277	n.a.	T2B, T2C, T2D, T3, T3A, T3B, T3C, T4, T4A, T5, T6
ELSR-SH+-30-2-BOT	240, 277	n.a.	T2B, T2C, T2D, T3, T3A, T3B, T3C, T4, T4A, T5, T6

Table 3: T-Classes of System ELSR-...

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MAXIMUM LENGTH OF HEATING CIRCUIT ELSR-NA

Start up temp.	Nominal CB rating	120 VAC			240 VAC				277 VAC			
		Heating circuit length [ft]			Heating circuit length [ft]				Heating circuit length [ft]			
[°F]	[A]	ELSR-NA-3-1	ELSR-NA-5-1	ELSR-NA-7-1	ELSR-NA-4-2	ELSR-NA-6-2	ELSR-NA-8-2	ELSR-NA-10-2	ELSR-NA-4-2	ELSR-NA-6-2	ELSR-NA-8-2	ELSR-NA-10-2
50 °F (10 °C)	10	164	125	82	253	151	109	79	218	125	105	71
	15	246	187	123	380	227	164	118	327	188	158	107
	20	328	249	164	507	303	219	157	436	251	212	142
	25	337	274	205	597	378	273	197	514	313	264	178
	30	337	274	222	597	454	328	236	514	376	317	213
	35	337	274	222	597	470	383	275	514	389	370	248
	40	337	274	222	597	470	422	315	514	389	408	284
32 °F (0 °C)	10	147	112	75	227	137	100	73	195	114	97	66
	15	221	168	113	341	205	150	110	294	170	145	99
	20	295	224	151	455	273	200	147	392	226	193	133
	25	337	274	188	568	342	250	183	489	283	242	165
	30	337	274	222	597	410	300	220	514	340	290	199
	35	337	274	222	597	470	350	257	514	389	338	232
	40	337	274	222	597	470	400	293	514	389	386	265
14 °F (-10 °C)	10	134	102	69	206	125	93	68	177	104	90	61
	15	201	153	104	309	188	139	102	266	156	134	92
	20	268	204	139	412	251	185	136	355	208	179	123
	25	335	255	173	515	313	232	170	443	259	224	154
	30	337	274	208	597	376	278	204	514	312	269	184
	35	337	274	222	597	439	324	238	514	364	313	215
	40	337	274	222	597	470	371	272	514	389	358	246
-22 °F (-30 °C)	10	113	87	60	173	107	80	60	149	89	77	54
	15	170	130	90	260	160	120	90	224	133	116	81
	20	227	173	120	347	213	160	120	299	176	155	108
	25	283	217	150	433	267	200	150	373	221	193	135
	30	337	260	180	520	320	240	180	448	265	232	163
	35	337	274	210	597	373	280	210	514	309	271	190
	40	337	274	222	597	427	320	240	514	354	309	217

Heating circuit lengths on the following conditions

- Voltage 120 VAC (-1-) / 240 VAC (-2-) / 277 VAC (-2-)
- MCB type QO (100% utilisation)
- Voltage drop max. 10%
- Single heater fed from 1 end

MAXIMUM LENGTH OF HEATING CIRCUIT ELSR-HA

120 VAC

Start up temp. [°F]	Nominal CB rating [A]	Heating circuit length [ft] ELSR-HA-3-1	ELSR-HA-7-1	ELSR-HA-10-1	ELSR-HA-15-1	ELSR-HA-20-1
50 °F (10 °C)	10	209	112	92	58	42
	15	307	167	138	86	63
	20	307	223	185	116	85
	25	307	225	204	145	106
	30	307	225	204	160	127
	35	307	225	204	160	135
	40	307	225	204	160	135
32 °F (0 °C)	10	200	107	89	56	40
	15	300	161	133	83	60
	20	307	215	178	111	80
	25	307	225	204	139	100
	30	307	225	204	160	120
	35	307	225	204	160	135
	40	307	225	204	160	135
14 °F (-10 °C)	10	192	103	86	54	38
	15	288	155	128	81	58
	20	307	207	170	107	76
	25	307	225	204	134	95
	30	307	225	204	160	114
	35	307	225	204	160	134
	40	307	225	204	160	135
-22 °F (-30 °C)	10	178	97	79	50	34
	15	266	145	118	75	52
	20	307	194	158	100	70
	25	307	225	198	126	87
	30	307	225	204	150	104
	35	307	225	204	160	122
	40	307	225	204	160	135

240 VAC

Start up temp. [°F]	Nominal CB rating [A]	Heating circuit length [ft] ELSR-HA-3-2	ELSR-HA-7-2	ELSR-HA-10-2	ELSR-HA-15-2	ELSR-HA-20-2
50 °F (10 °C)	10	519	243	170	104	78
	15	697	365	255	156	117
	20	697	473	340	207	155
	25	697	473	391	259	194
	30	697	473	391	301	233
	35	697	473	391	301	259
	40	697	473	391	301	259
32 °F (0 °C)	10	488	229	161	99	74
	15	697	343	242	149	110
	20	697	457	322	198	147
	25	697	473	391	247	184
	30	697	473	391	297	221
	35	697	473	391	301	258
	40	697	473	391	301	259
14 °F (-10 °C)	10	461	216	153	94	70
	15	691	323	229	142	105
	20	697	431	306	189	140
	25	697	473	382	237	175
	30	697	473	391	284	210
	35	697	473	391	301	245
	40	697	473	391	301	259
-22 °F (-30 °C)	10	414	194	138	87	64
	15	622	291	208	130	95
	20	697	388	278	174	127
	25	697	473	347	217	159
	30	697	473	391	261	191
	35	697	473	391	301	222
	40	697	473	391	301	254

277 VAC

Start up temp. [°F]	Nominal CB rating [A]	Heating circuit length [ft] ELSR-HA-3-2	ELSR-HA-7-2	ELSR-HA-10-2	ELSR-HA-15-2	ELSR-HA-20-2
50 °F (10 °C)	10	571	298	185	120	102
	15	856	447	276	180	153
	20	1115	596	368	240	204
	25	1115	744	461	300	255
	30	1115	847	553	360	306
	35	1115	847	645	420	357
	40	1115	847	730	479	408
32 °F (0 °C)	10	537	280	174	114	97
	15	805	420	261	172	145
	20	1074	560	348	229	193
	25	1115	700	436	286	242
	30	1115	840	522	343	290
	35	1115	847	609	400	338
	40	1115	847	697	458	386

Start up temp. [°F]	Nominal CB rating [A]	Heating circuit length [ft] ELSR-HA-3-2	ELSR-HA-7-2	ELSR-HA-10-2	ELSR-HA-15-2	ELSR-HA-20-2
14 °F (-10 °C)	10	507	265	165	109	91
	15	760	396	248	164	138
	20	1014	528	330	219	184
	25	1115	661	413	274	230
	30	1115	793	496	329	275
	35	1115	847	578	384	321
	40	1115	847	661	438	368
-22 °F (-30 °C)	10	456	237	150	101	84
	15	684	357	224	151	125
	20	912	475	299	201	167
	25	1115	594	374	252	209
	30	1115	712	449	302	251
	35	1115	831	523	352	292
	40	1115	847	599	402	334

Heating circuit lengths on the following conditions

- Voltage 120 VAC (-1-) / 240 VAC (-2-) / 277 VAC (-2-)
- MCB type QO (100% utilisation)
- Voltage drop max. 10%
- Single heater fed from 1 end

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MAXIMUM LENGTH OF HEATING CIRCUIT ELSR-SH+

Start up temp. [°F]	Nominal CB rating [A]	120 VAC Heating circuit length [ft]			240 VAC Heating circuit length [ft]				277 VAC Heating circuit length [ft]			
		ELSR-SH+-5-1	ELSR-SH+-10-1	ELSR-SH+-20-1	ELSR-SH+-5-2	ELSR-SH+-10-2	ELSR-SH+-20-2	ELSR-SH+-30-2	ELSR-SH+-5-2	ELSR-SH+-10-2	ELSR-SH+-20-2	ELSR-SH+-30-2
50 °F (10 °C)	10	194	102	29	371	210	128,5	56	330	189	122	54
	15	272	147	47	564	320,5	198,5	89	501	298	188	86
	20	272	153	58	564	332	216	112	501	298	205	108
	25	272	161	73	564	346	237	139	501	311	225	134
	30	272	172,5	93	564	365,5	266	177	501	328	252	171
	35	272	186	117	564	389	301,5	223	501	350	286	216
	40	182	96	27	348	196	120	52	309	176	114	50
32 °F (0 °C)	10	272	145	43	554	313,5	193	85	493	282	183	82
	15	272	151	54	564	328,5	211	105	501	295	200	101
	20	272	159	68	564	342	231	131	501	307	219	127
	25	272	169	87	564	362,5	261,5	171	501	326	248	165
	30	272	181	109	564	382,5	291,5	210	501	344	276	203
	35	170	90,5	27	325	184,5	114	51	289	166	108	49
	40	271	144	43	522	296,5	183,5	82	464	266	174	79
14 °F (-10 °C)	10	272	150	53	564	327	208,5	102	501	294	198	98
	15	272	158	67	564	340	227,5	127	501	306	216	123
	20	272	168	85	564	359	256	164	501	323	243	159
	25	272	180	106	564	379	286	203	501	341	271	196
	30	143	76	23	292	167	104	48	259	150	98	46
	35	229	122	37	468	266,5	165,5	75	416	239	157	72
	40	272	147	47	564	323,5	203	95	501	291	192	92
-22 °F (-30 °C)	10	272	153	58	564	335,5	221,5	119	501	301	210	115
	15	272	162	74	564	352	246	151	501	316	233	146
	20	272	172,5	93	564	372	276	190	501	334	262	184
	25	194	102	29	371	209,5	128,5	56	330	188	122	54
	30	272	147	47	564	320,5	198,5	89	501	288	188	86
	35	272	153	58	564	332	216	112	501	298	205	108
	40	272	164,5	73	564	346	237	139	501	311	225	134

LOCATION OF TEMPERATURE SENSORS

Temperature controllers

Temperature sensors may be used either as ambient sensing devices or attached directly to the equipment/device that is to be heated.

In case of ambient sensing, place the sensor in the coldest expected spot of the area where the heated equipment is located. This is typically a shaded place (e.g. on the northern side of buildings) on low ground. However, ambient sensing is recommended only for frost protection applications and when the permissible temperature band of the equipment to be heated and its contents is considerably wide (approx. 50K / 122°F). Please consult the eltherm project department if further assistance is required.

In cases where sensors are directly attached to the heated equipment/device, two different applications need to be considered:

- **heated pipes**
  Place the sensor on the anticipated coldest section of the pipe. Avoid direct contact between sensor and trace heater. Branched piping systems may require more than one heating circuit (with a sensor each) or implementation of the "dead leg" technique depending on the flow pattern of the piping system. If help is required, please consult the eltherm project department for further assistance.

- **heated vessels**
  Place the heating on surfaces that always have contact to the contents of the vessel (typically the bottom of the vessel and/or lower section). Then place the temperature sensor in the heated area. Avoid direct contact between sensor and trace heater. Large vessels may require more than one heating circuit, especially when they need to be heated up to various fill levels. If help is required, please consult the eltherm project department for further assistance.

Be aware of the fact that temperature sensors mounted on the surface of the heated equipment never provide readings of the exact temperatures of the medium inside the device that is being heated. Therefore, temperature settings may need to be determined in an empirical way when exact temperatures are crucial for the process.

Temperature limiters

Due to the self limiting behaviour of ELSR-… trace heater, temperature limiters are not required for most applications. However, when temperature limiters are used, the associated sensors are to be installed in the anticipated hottest areas of the equipment that is to be heated. Avoid direct contact between sensor and trace heater. A temperature offset between the equipment and trace heater sheath needs to be considered for the temperature settings. Please consult the eltherm project department if further assistance is required.

Further documents

In addition to this manual, the following documents apply:

- Data sheet trace heater ELSR-HA, -NA, -SH+

- Documents provided with the kits listed under "SYSTEM COMPONENTS"

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SUMMARY OF SPECIFIC CONDITIONS OF USE

ELSR-SH+ self-regulating trace heaters

Specific Conditions of Use:

1. Power Connections shall only be made using NRTL Listed Junction Box with minimum Approval rating compatible for the connection of the trace heater.
2. Minimum installation temperature is -60 °C.
3. Minimum start up temperature is -30 °C.
4. Maximum maintain temperature is 185 °C.
5. Maximum exposure temperature is 250 °C.
6. The end cap to be used for connection is the EL-ECSH model.
7. The only power termination kits suitable for Class I, Division 1 classified locations is the EL-HAZELECT.
8. The power termination kits suitable for classified locations are the Ex ELVB-SREx-SH+ M20, Ex ELVB-SREx-SH+ ½", Ex ELVB-SREx-SH+ ¾" and EL-HAZELECT.
9. A ground fault protection device must be used with this heating device.
10. The respective temperature Classes for each heater system shall be listed in the table below.

Heater	T-Class as per "product classification"	T-Class as per "system approach" (controlled or stabilized design of heating circuit required by eltherm or by tool eltherm designer V2.0x)
ELSR-SH+-5-1-BOT	T3	T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-10-1-BOT	T2C	T2D, T3, T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-20-1-BOT	T2B	T2C, T2D, T3, T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-5-2-BOT	T3	T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-5-2-BOT	T2C	T2D, T3, T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-10-2-BOT	T3	T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-10-2-BOT	T2C	T2D, T3, T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-20-2-BOT	n.a.	T2B, T2C, T2D, T3, T3A, T3B, T3C T4, T4A, T5, T6
ELSR-SH+-30-2-BOT	n.a.	T2B, T2C, T2D, T3, T3A, T3B, T3C T4, T4A, T5, T6

ELVB-SREx-SH+ M20, ELVB-SREx-SH+ ½", ELVB-SREx-SH+ ¾" , Power Termination Kits

Specific Conditions of Use:

1. Minimum installation temperature is -60 °C.
2. Maximum exposure temperature is 90 °C.

The Power Termination Kits are to be used with ELSR-SH+ heater systems only.

INSTALLATION OF THE EX HEAT TRACING SYSTEM ELSR-…

Protective Measures

› the use of a ground fault protection device (30mA, or 30mA above the inherent fault current level of the installation) for each heating circuit is mandatory.

› the metallic braid or screen of the trace heater has to be connected to the potential earth (ground).

› de-energize all circuits prior to installation or maintenance of heating components

› all work has to be carried out in compliance with all effective codes and regulations

Installation Instructions

› **Class I Div 1 installations:** only to be done by personnel that is trained, qualified and knowledgeable in Class I Div 1 trace heating systems

› remove any sharp objects on the surface to be heated

› clean and degrease the surface

› the installation of a heating circuit has to be carried out using original eltherm accessories according to eltherm installation instructions.

› Maintain minimum bend radius of 25mm with all trace heaters.

› to fasten the trace heater to a pipe, self adhesive glass tape or pre-punched (stainless) steel fastening strips are recommended.

NOTE

In case of ELSR-NA…, plastic cable ties may also be used

ATTENTION

Do not use adhesive tape with emollients (i.e. PVC)!

› An overlapping or contacting installation of the trace heater does not damage the heaters, due to the self-regulating characteristic except ELSR-SH+-20-2-BOT and ELSR-SH+-30-2-BOT. However, when used as per Table 3 column 4, overlapping or contacting between heater sections needs to be considered for sheath temperature determination.

› the trace heater should be fully covered (the entire length) with aluminum foil in order to prevent insulation material from slipping between the trace heater and surface to be heated. If the insulation is covered with metal cladding, an insulation entry kit has to be used to avoid mechanical damage of the trace heater.

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ATTENTION

- The connection and end termination of a heating circuit has to be carried out using eltherm kits. Required air gaps and creeping distances need to be observed (see eltherm termination instructions).
- Make sure to attach the trace heater – especially the area adjacent to the power connection and / or to the cable entry of the junction box - properly and avoid pulling stress and tension of the electrical connections.

ATTENTION

- To avoid short circuit, do not connect the two bus wires of the trace heater to each other. Under all circumstances observe the termination and maintenance instructions for the connection and termination of the trace heaters.
- Make sure that trace heater type **ELSR-HA-**… is kept at a minimum distance of 1' (approx. 300 mm) from combustible material

› upon completion of the installation, the heating circuit needs to be marked by fitting an appropriate label to the associated junction box or to the trace heater close to the junction box. The label shall be weatherproof and bear relevant information of all used components

› identification: electrically heated parts have to be identified in reasonable distances with warning labels "Electrical Heating" on the thermal insulation (approx. 5 m / 15ft distance between each label on pipelines or at least 1 warning label per pipe-branch respectively).

TEST AND COMMISSIONING

After completion of a heating circuit but prior to the associated wiring and the installation of the thermal insulation (and prior to the pouring of seals in Class I Div 1 applications), the following steps shall be taken:

› perform visual inspection of the trace heater for possible mechanical damage or improper installation.

› measure the insulation resistance of each heating circuit between each single bus wire and the metal braid or screen. To do this, expose braid and bus wires as shown in the termination instructions of the power termination kits, then connect both bus wires to the same pole of the tester and the braid to the other pole.

test voltage: min 500 VDC, preferably 2500 VDC

ATTENTION

Regardless of heating circuit length, the insulation resistance must not be lower than 20 MOhm (the measured values are to be documented). In case of a lower insulation resistance, the source of defect has to be determined and eliminated.

› check the operation of the heating circuit (only in connection with the required temperature controller and/or limiter)

› in case of damage, replace or repair trace heater immediately. With short heating circuits, the trace heater may be replaced completely. With longer heating circuits, the defective portion may be removed by cutting out the damaged part and replacing it with a new piece of trace heater according to the termination instructions.

› repeat the tests after the thermal insulation has been applied. The insulation resistance must not now be lower than 5 MOhm. **In Class 1 Div 1** applications, also measure the insulation resistance of braid vs. workpiece to verify integrity of the outer jacket.

OPERATION AND MAINTENANCE

› follow local codes and regulations for the use of electrical trace heaters

› the permissible operating specifications stated in the data sheets (i.e. voltage, amperage, exposure temp., operating temp., IP rating) are to be followed accordingly

› the permissible temperatures provided in section "APPLICABLE TEMPERATURE RANGE" must not be exceeded

› the use of temperature controllers may be desired (e.g. to conserve energy) or required (e.g. to maintain accurate temperature control). Contact eltherm project engineering department for assistance.

› if trace heater ELSR-HA or ELSR-SH+ are used in temperature class different from Table 3 column "T-class without specific heating circuit desgin", its surface temperature needs to be limited by controlled or stabilized design in compliance with applicable standards

› self regulating trace heaters are generally maintenance free. However, it is recommended that the trace heaters be checked by qualified personnel in regular intervals for damage and insulation resistance.

› disconnect any power supply to the heating system prior to opening of any controllers, junction boxes and terminations. Access is only permitted when heating system is de-energized.

› protect installed trace heater against damage which may occur during repair work on heated components

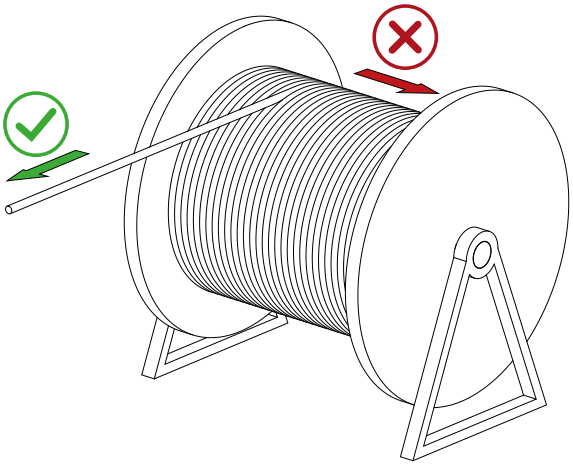
› after completion of the repair, test heating circuit.

› do NOT operate damaged heating circuits.

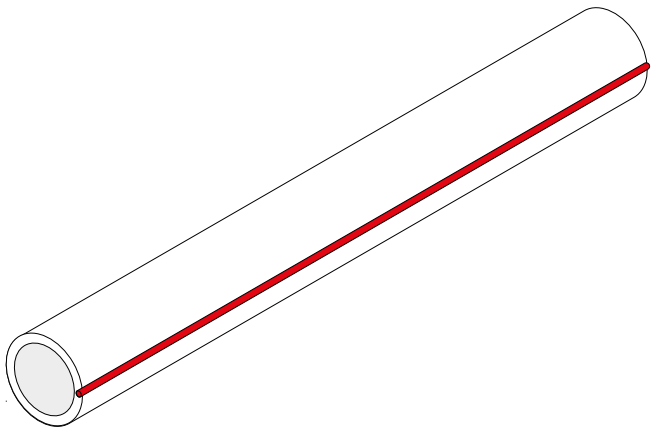
› check temperature control units and control devices annually by trained workers or authorized personnel.

INSTALLATION OF TRACE HEATERS

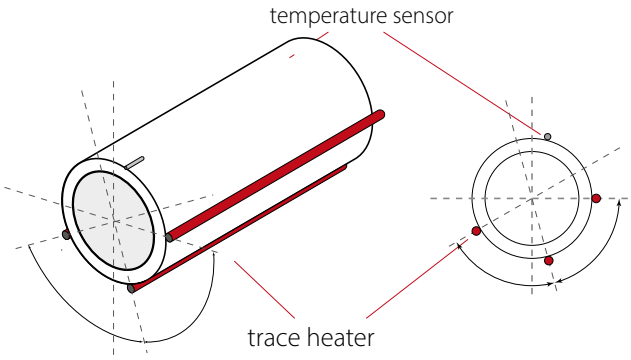
INSTALLATION OF TRACE HEATERS ON PIPES



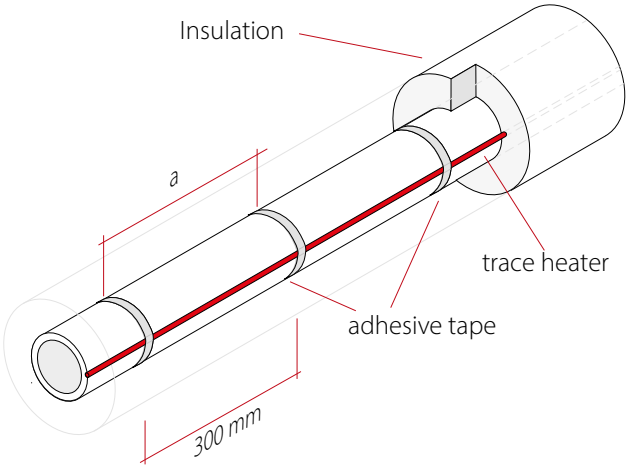
- Use a stable holder to unwind the trace heater.
- Ensure that the unwinding device runs smoothly to prevent damage to the trace heater due to excessive tensile force.
- Unroll the trace heater straight over the edge of the drum, not off to the side.



- Normally the trace heater is laid streched out along the pipe. Lay trace heaters in a spiral pattern only if the projects planning explicity calls for it.



- Do not lay the trace heater on the lowest point of the horizontal pipeline.
- Laying the trace heater on the top half of a horizontal pipeline is unfavourable for reasons of heat distribution and should only be done if the project planning calls for it.



The heater is traced and fixed parallel to the pipe axis.

Hazardous area:

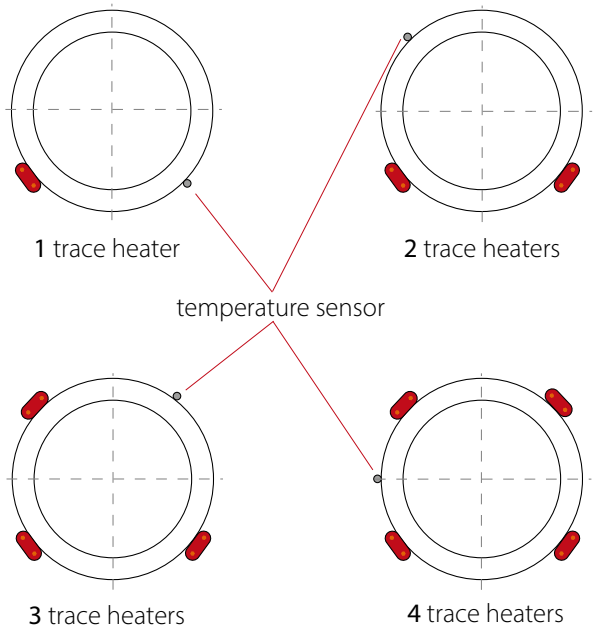
a = max. 300 mm / 1'

- Use only fastening materials that have been defined as suitable accessories by the manufacturer and that were selected in the design documents.
- Make certain that the selected materials meet the requirements (for temperature, mechanical and chemical resistance).
- Check whether the use of other elements (such as aluminium adhesive tape for better heat transfer) is required in the design documents.

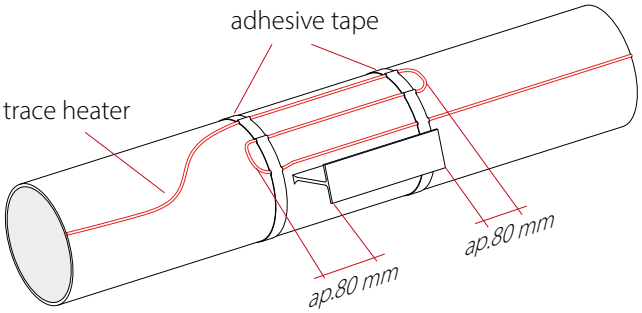
NOTE

- We recommend covering the entire surface of the trace heater on plastic containers or pipes (PE/PP/PVC/GRP/GRP or similar) with aluminium foil.
- To save energy and to keep process temperatures constant, the application of superior control units are recommended. Please ask our project engineers when in doubt.

- When installing several trace heaters on one pipe please refer to the following sketch.



Installation of trace heaters on pipe supports

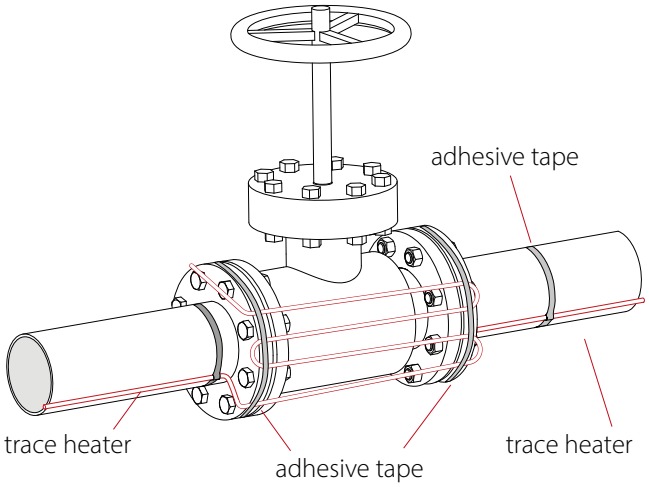


- In areas of pipe supports, trace heaters must be laid in a looped manner in order to be able to provide sufficient power at this point.

ATTENTION

- Observe the specified length allowances in project planing or design (for example in eltherm Designer).

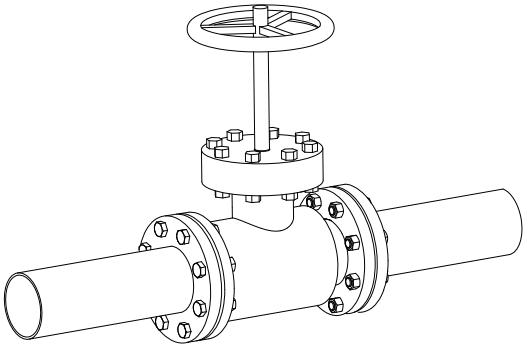
INSTALLATION OF TRACE HEATERS ON VALVES

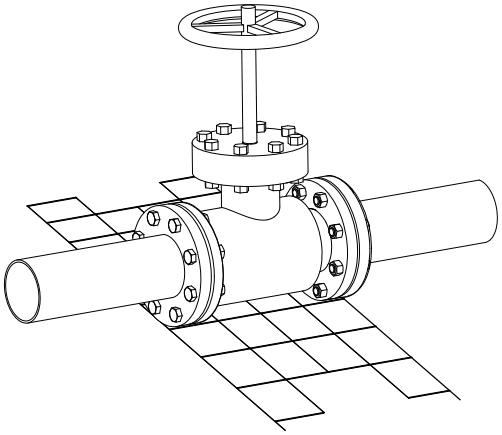


- In areas with large pipe diameters, trace heaters must be laid in a loop.
- A Special mounting variant consists of fastening the trace heater onto wire guard. This variant is used mainly for heating geometrically complex shapes. This variant is also used if fittings (such as valves and pumps) have to be heated and easy access to the fittings is especially important (for maintenance purpose, etc.) This ensures that the wire guard will be easy to open and close again without having to remove the trace heater first.

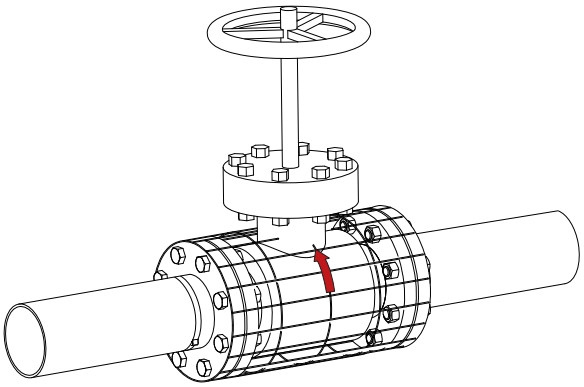
⚠ ATTENTION

- Make certain the wire guard has the best possible contact with the surface of the fitting.
- Only fasten the trace heater with the fastening material provided by the manufacturer and follow the recomendations for fastenings.

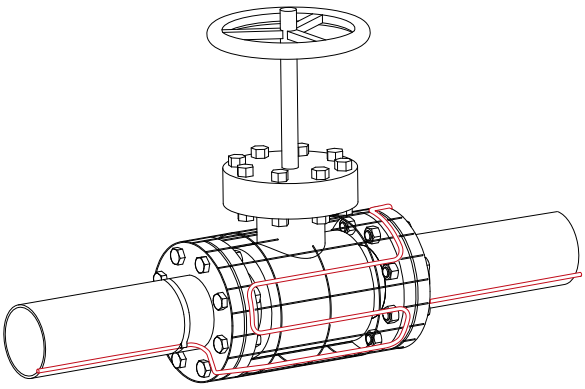




- Cut the wire guard to size so that it fits exactly



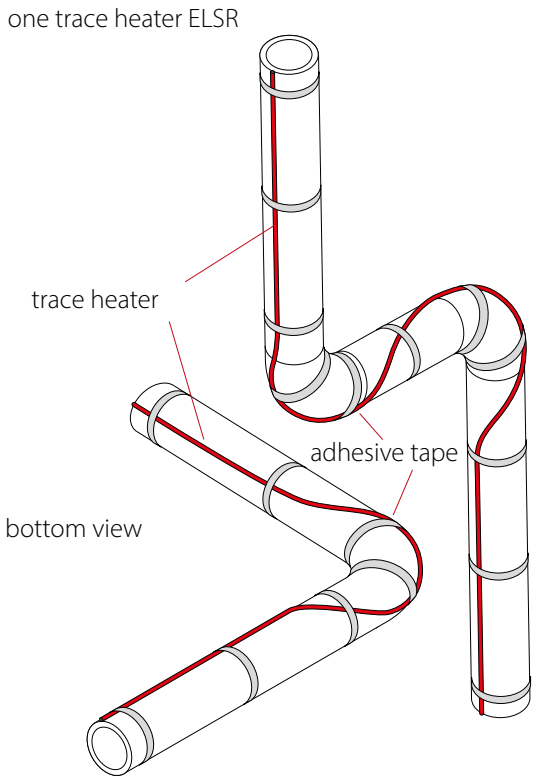
- Fasten the wire guard onto the fitting



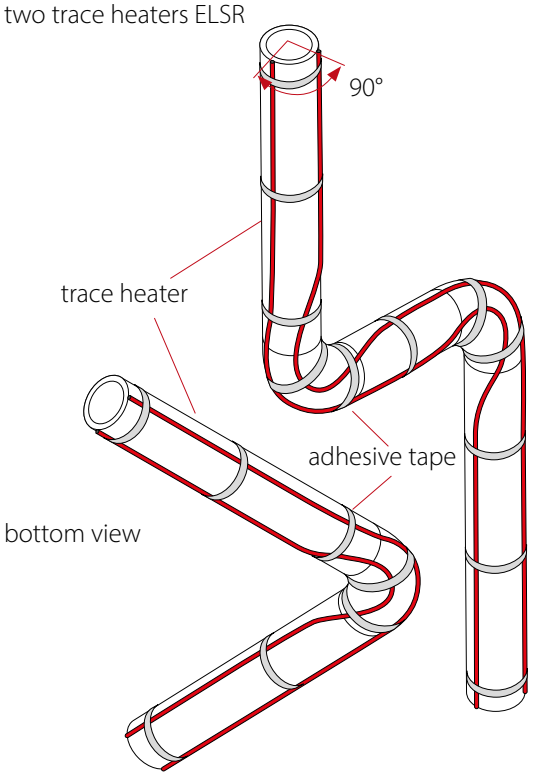
- Fasten the trace heater onto the wire guard

INSTALLATION OF TRACE HEATERS ON ELBOWS

one trace heater ELSR

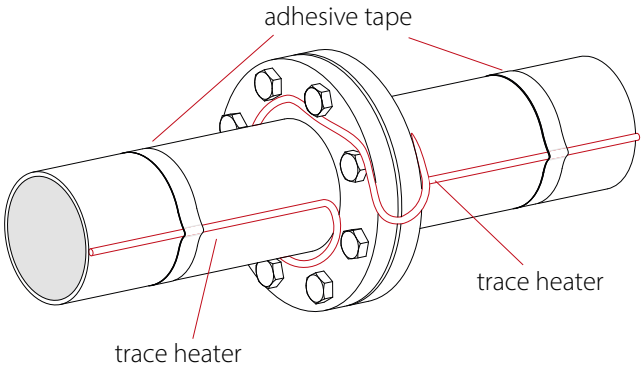


two trace heaters ELSR



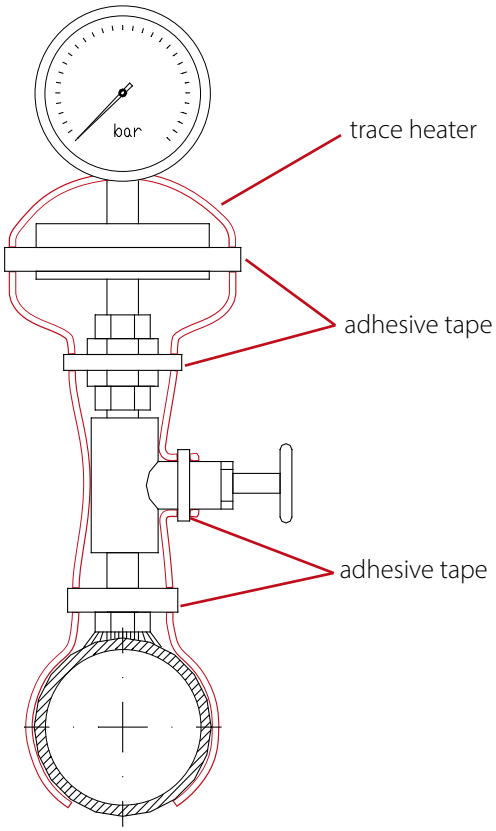
- When laying a trace heater around a pipe bend, the trace heater must be laid on the outside of the pipe bend. If it is laid on the inside, the flow medium may be deposited in the pipe due to the lower heat input to the pipe.

INSTALLATION OF TRACE HEATERS ON FLANGES

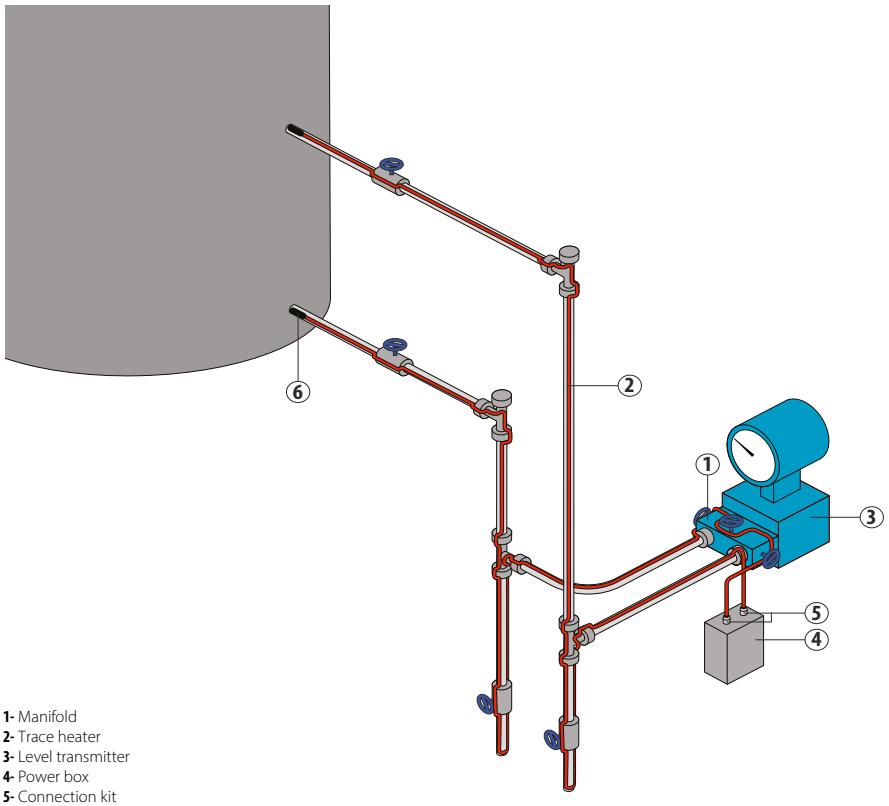


- When laying a trace heater around a flange connection, it must be ensured that the trace heater is laid once around the pipe directly in front of the flange connection. More power must be applied to the pipe at this point due to higher thermal expansion.

INSTALLATION OF TRACE HEATERS ON FITTINGS



INSTALLATION OF TRACE HEATERS ON LEVEL INDICATORS



1- Manifold
2- Trace heater
3- Level transmitter
4- Power box
5- Connection kit
6- End seal

⚠ ATTENTION

Fittings and level indicators must be installed all round to ensure uniform thermal expansion.

DOWNLOADS

You can find helpful downloads for this or other products under the following link:

https://eltherm.com/downloads

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