Room Temperature Sensors (with Rotary Dials)
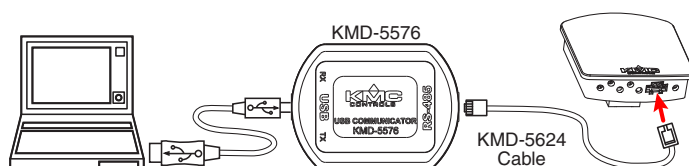
STE-6014/6017/6018/6019/6020

Application Guide

STE-6014   STE-6017/6019   STE-6018/6020

Contents

NOTE: For more product information, see the **STE-6000 Series Room Temperature Sensors/Transmitters Data Sheet** on the KMC Controls web site.

NOTE: For mounting and wiring information, see the **STE-6014/6017/6018/6019/6020 Installation Guide**.

Models

Model Number	Interface Features		Cable Connections		
	Override Button	LED Status Indicator	Screw Clamp Terminals	RJ-45 Connector	EIA-485 Data Port
STE-6014-10				X	X
STE-6017-10	X			X	X
STE-6019-10	X		X		
STE-6018-10	X	X		X	X
STE-6020-10	X	X	X		

PC Port Network Connection

KMD-5576

KMD-5624 Cable

At the bottom of the STE-6014/6017/6018 case is an EIA-485 (formerly RS-485) computer port. This port provides a temporary connection to the digital network for network setup or troubleshooting.

To use the port to connect to a computer, a means of converting the EIA-485 signal to a USB or EIA-232 (formerly RS-232) signal will be needed. The exact connection depends on the computer and the operator workstation software. (See also the instructions included with those devices and software.)

• For **USB** (to WinControl or BACstage), use a KMD-5576 USB Communicator (see the illustration above).

• For **EIA-232 to BACstage**, use a third-party interface.

• For **EIA-232 to WinControl**, use a KMD-5559 CommTalk and KMD-5624 cable (or equivalent interface).

To access the network through the STE's sensor:

1. Connect the keyed, flat end of the KMD-5624 interface cable (included with the KMD-5576 but not the KMD-5559) to the port on the sensor.
2. Connect the other end of the cable to the interface device that converts the EIA-485 signal into an EIA-232 or USB signal.
3. Connect the suitable cable from the interface device to the computer's serial or USB port. Install any required software and configure the port as necessary.

Controller Configuration

Overview

Ensure that the corresponding 10,000 ohm pull-up resistors on the controller are selected (switched On). Consult the controller's setup instructions for information on switching on the pull-up resistors.

Controller configuration instructions are given for both WinControl and BACstage. See the relevant software section.

BACstage Software

Thermistor Input

1. In the BACstage software main menu, select *Objects > Inputs*.

2. Click *Edit*.

3. Type in a name in the appropriate *Description* field (up to 32 characters) and/or *Name* field (up to 16 characters).

NOTE: No two labels or descriptions in a controller can be identical.

4. Select *Object Type: Analog* if it is not the default.

5. Select *Device Type: KMC10K Type II*.

6. Select *Units: °F* or *°C*.

7. Optionally, change the *Filter Weight* (under *More*) to the desired number of thermistor readings averaged before displaying the result. If the (STE-6017/6018/6019/6020) override is being used, *Filter Weight* may need to be reduced down toward *1* to ensure reliable recognition of the button press, depending on the controller.

NOTE: The button needs to be pressed and held for at least a half a second to be reliably recognized for override mode.

8. Click *End Edit*.

9. Click *Yes* for "Send Update Notification Now?"

10. In the BACstage software main menu, select *Device > Device Tables > KMC10K Type II Table*.

11. Click *Edit*.

12. Click *Defaults* (values will fill in).

13. Click *End Edit*.

14. Click *Yes* for "Send Update Notification Now?"

15. Click *OK*.

Setpoint Input

NOTE: The Custom Input property or Control Basic can be used as easier but less linear (less accurate) alternatives to tables. Download the **STE-6014/17/18/19/20 Setpoint Dial Ranging Tech Tips Tech Tips** file from the web site.

1. In the BACstage software main menu, select *Objects > Inputs*.

2. Click *Edit*.

3. Type in a name in the appropriate *Description* field and/or *Name* field.

4. Select *Object Type: Analog* if it is not the default.

5. Select *Device Type > Table x (4 or 5)*.

6. Select *Units: °F* or *°C*.

7. Click *End Edit*.

8. Click *Yes* for "Send Update Notification Now?"

9. In the BACstage software main menu, select *Device > Device Tables > Table x*.

10. Click *Edit*.

11. Enter the following values in Table x:

NOTE: **Instead of typing in the values from the table below, you can use a text editor and the table on page 5 of the Adobe Acrobat PDF file of this document to copy and paste the 128 lines into the appropriate section of the BACstage *.BAC panel file. See the instructions on page 4.**

Index	°F Value	°C Value
1	54.0	12.2
2	54.3	12.4
3	54.6	12.6
4	54.9	12.7
5	55.2	12.9
6	55.5	13.1
7	55.8	13.2
8	56.1	13.4
9	56.4	13.6
10	56.7	13.7
11	57.1	13.9
12	57.4	14.1
13	57.7	14.3
14	58.1	14.5
15	58.4	14.7

16	*58.8*	14.9		56	*81.1*	27.3		96	*90.0*	32.2
17	*59.1*	15.1		57	*82.0*	27.8		97	*90.0*	32.2
18	*59.5*	15.3		58	*82.9*	28.3		98	*90.0*	32.2
19	*59.9*	15.5		59	*83.8*	28.8		99	*90.0*	32.2
20	*60.3*	15.7		60	*84.8*	29.3		100	*90.0*	32.2
21	*60.7*	15.9		61	*85.8*	29.9		101	*90.0*	32.2
22	*61.1*	16.2		62	*86.8*	30.4		102	*90.0*	32.2
23	*61.5*	16.4		63	*87.8*	31.0		103	*90.0*	32.2
24	*61.9*	16.6		64	*88.9*	31.6		104	*90.0*	32.2
25	*62.3*	16.8		65	*90.0*	32.2		105	*90.0*	32.2
26	*62.7*	17.1		66	*90.0*	32.2		106	*90.0*	32.2
27	*63.2*	17.3		67	*90.0*	32.2		107	*90.0*	32.2
28	*63.6*	17.6		68	*90.0*	32.2		108	*90.0*	32.2
29	*64.1*	17.8		69	*90.0*	32.2		109	*90.0*	32.2
30	*64.5*	18.1		70	*90.0*	32.2		110	*90.0*	32.2
31	*65.0*	18.3		71	*90.0*	32.2		111	*90.0*	32.2
32	*65.5*	18.6		72	*90.0*	32.2		112	*90.0*	32.2
33	*66.0*	18.9		73	*90.0*	32.2		113	*90.0*	32.2
34	*66.5*	19.2		74	*90.0*	32.2		114	*90.0*	32.2
35	*67.0*	19.4		75	*90.0*	32.2		115	*90.0*	32.2
36	*67.5*	19.7		76	*90.0*	32.2		116	*90.0*	32.2
37	*68.1*	20.1		77	*90.0*	32.2		117	*90.0*	32.2
38	*68.6*	20.3		78	*90.0*	32.2		118	*90.0*	32.2
39	*69.2*	20.7		79	*90.0*	32.2		119	*90.0*	32.2
40	*69.8*	21.0		80	*90.0*	32.2		120	*90.0*	32.2
41	*70.4*	21.3		81	*90.0*	32.2		121	*90.0*	32.2
42	*71.0*	21.7		82	*90.0*	32.2		122	*90.0*	32.2
43	*71.6*	22.0		83	*90.0*	32.2		123	*90.0*	32.2
44	*72.2*	22.3		84	*90.0*	32.2		124	*90.0*	32.2
45	*72.9*	22.7		85	*90.0*	32.2		125	*90.0*	32.2
46	*73.5*	23.1		86	*90.0*	32.2		126	*90.0*	32.2
47	*74.2*	23.4		87	*90.0*	32.2		127	*90.0*	32.2
48	*74.9*	23.8		88	*90.0*	32.2		128	*90.0*	32.2
49	*75.6*	24.2		89	*90.0*	32.2				
50	*76.3*	24.6		90	*90.0*	32.2				
51	*77.1*	25.1		91	*90.0*	32.2				
52	*77.8*	25.4		92	*90.0*	32.2				
53	*78.6*	25.9		93	*90.0*	32.2				
54	*79.4*	26.3		94	*90.0*	32.2				
55	*80.3*	26.8		95	*90.0*	32.2				

12. Click *End Edit*.

13. Click *Yes* for "Send Update Notification Now?"

14. Click *OK*.

NOTE: These tables are different from the ones used in the STE-6012/6016!

Setpoint Tables to Copy into BACstage Panel File

NOTE: Instead of manually entering all the setpoint table values, you can copy them from the PDF file of this document.

1. In the BACstage software main menu, select *Device > Backup Device*.

2. Enter a file name for the BAC backup file, and click *Save*.

3. Make a copy of the BAC backup file, open the copied BAC file with a text editor, and find the Table (previously chosen) 4 or 5 listing (scroll about half-way down).

4. Open the PDF file of this document and copy the appropriate table below.

5. Replace the appropriate BAC table data with the PDF table data and save the file.

6. In the BACstage software main menu, select *Device > Restore Device*.

7. Select the edited copy of the BAC file and click *Open*.

8. Click *Select None*, select the appropriate table from the list, and click *Restore*.

9. Click *Yes* for "Send Update Notification Now?"

Fahrenheit Values

X1=54.0	X44=72.2	X87=90.0
X2=54.3	X45=72.9	X88=90.0
X3=54.6	X46=73.5	X89=90.0
X4=54.9	X47=74.2	X90=90.0
X5=55.2	X48=74.9	X91=90.0
X6=55.5	X49=75.6	X92=90.0
X7=55.8	X50=76.3	X93=90.0
X8=56.1	X51=77.1	X94=90.0
X9=56.4	X52=77.8	X95=90.0
X10=56.7	X53=78.6	X96=90.0
X11=57.1	X54=79.4	X97=90.0
X12=57.4	X55=80.3	X98=90.0
X13=57.7	X56=81.1	X99=90.0
X14=58.1	X57=82.0	X100=90.0
X15=58.4	X58=82.9	X101=90.0
X16=58.8	X59=83.8	X102=90.0
X17=59.1	X60=84.8	X103=90.0
X18=59.5	X61=85.8	X104=90.0
X19=59.9	X62=86.8	X105=90.0
X20=60.3	X63=87.8	X106=90.0
X21=60.7	X64=88.9	X107=90.0
X22=61.1	X65=90.0	X108=90.0
X23=61.5	X66=90.0	X109=90.0
X24=61.9	X67=90.0	X110=90.0
X25=62.3	X68=90.0	X111=90.0
X26=62.7	X69=90.0	X112=90.0
X27=63.2	X70=90.0	X113=90.0
X28=63.6	X71=90.0	X114=90.0
X29=64.1	X72=90.0	X115=90.0
X30=64.5	X73=90.0	X116=90.0
X31=65.0	X74=90.0	X117=90.0
X32=65.5	X75=90.0	X118=90.0
X33=66.0	X76=90.0	X119=90.0
X34=66.5	X77=90.0	X120=90.0
X35=67.0	X78=90.0	X121=90.0
X36=67.5	X79=90.0	X122=90.0
X37=68.1	X80=90.0	X123=90.0
X38=68.6	X81=90.0	X124=90.0
X39=69.2	X82=90.0	X125=90.0
X40=69.8	X83=90.0	X126=90.0
X41=70.4	X84=90.0	X127=90.0
X42=71.0	X85=90.0	X128=90.0
X43=71.6	X86=90.0	

Celsius Values

X1=12.2	X44=22.3	X87=32.2
X2=12.4	X45=22.7	X88=32.2
X3=12.6	X46=23.1	X89=32.2
X4=12.7	X47=23.4	X90=32.2
X5=12.9	X48=23.8	X91=32.2
X6=13.1	X49=24.2	X92=32.2
X7=13.2	X50=24.6	X93=32.2
X8=13.4	X51=25.1	X94=32.2
X9=13.6	X52=25.4	X95=32.2
X10=13.7	X53=25.9	X96=32.2
X11=13.9	X54=26.3	X97=32.2
X12=14.1	X55=26.8	X98=32.2
X13=14.3	X56=27.3	X99=32.2
X14=14.5	X57=27.8	X100=32.2
X15=14.7	X58=28.3	X101=32.2
X16=14.9	X59=28.8	X102=32.2
X17=15.1	X60=29.3	X103=32.2
X18=15.3	X61=29.9	X104=32.2
X19=15.5	X62=30.4	X105=32.2
X20=15.7	X63=31.0	X106=32.2
X21=15.9	X64=31.6	X107=32.2
X22=16.2	X65=32.2	X108=32.2
X23=16.4	X66=32.2	X109=32.2
X24=16.6	X67=32.2	X110=32.2
X25=16.8	X68=32.2	X111=32.2
X26=17.1	X69=32.2	X112=32.2
X27=17.3	X70=32.2	X113=32.2
X28=17.6	X71=32.2	X114=32.2
X29=17.8	X72=32.2	X115=32.2
X30=18.1	X73=32.2	X116=32.2
X31=18.3	X74=32.2	X117=32.2
X32=18.6	X75=32.2	X118=32.2
X33=18.9	X76=32.2	X119=32.2
X34=19.2	X77=32.2	X120=32.2
X35=19.4	X78=32.2	X121=32.2
X36=19.7	X79=32.2	X122=32.2
X37=20.1	X80=32.2	X123=32.2
X38=20.3	X81=32.2	X124=32.2
X39=20.7	X82=32.2	X125=32.2
X40=21.0	X83=32.2	X126=32.2
X41=21.3	X84=32.2	X127=32.2
X42=21.7	X85=32.2	X128=32.2
X43=22.0	X86=32.2	

Setpoint Variable

1. In the BACstage software main menu, select *Objects > Analog Values*.

2. Click *Edit*.

3. Type in a name in the appropriate *Description* field and/or *Name* field.

4. Click in the *Units* column and select *°F* (Fahrenheit) or *°C* (Celsius).

5. Click *End Edit*.

6. Click *Yes* for "Send Update Notification Now?"

7. Click *OK*.

Override (STE-6017/6018/6019/6020 Only)

1. In the BACstage software main menu, select *Objects > **Binary** Values*.

2. Click *Edit*.

3. Type in a name in the appropriate *Description* field and/or *Name* field.

4. Click in the *Units* column and select *Off/On* (or *No/Yes*, *Stop/Start*, *Disabled/Enabled*, *Inactive/Active* according to preference).

5. Click *End Edit*.

6. Click *Yes* for "Send Update Notification Now?"

7. Click *OK*.

8. In the BACstage software main menu, select *Objects > BASIC Programs*.

9. Click *Edit*.

10. Type in a name in the *Description* field and/or *Name* field.

11. Click *Autorun*.

12. Click *End Edit*.

13. Click *Yes* for "Send Update Notification Now?"

14. Click once in the # column.

15. Type in program lines (see the following example).

NOTE: This is only an example. Details need to fit the controller configuration.

```
10 REM ** AI3 IS STE-6017/18/19/20
   TEMPERATURE SENSOR INPUT **

20 REM ** BV3 IS OCCUPIED/UNOCCUPIED
   (ON/OFF) MODE **

30 REM ** PUSH BUTTON ON SENSOR TO
   START OVERRIDE MODE (BV2) **

40 IF+ SENSORON( AI3 ) AND NOT BV3 THEN
   START BV2

50 REM ** CHANGE DEFAULT TIMEON TO
   DESIRED AMOUNT OF OVERRIDE TIME **

60 IF TIMEON( BV2 ) > 02:00:00 THEN
   STOP BV2

70 REM ** AO7 IS SUPPLY VOLTAGE FOR
   STE-6018/6020 LED **

80 IF BV2 THEN AO7 = 10 ELSE AO7 = 0

90 END
```

16. Click *Send*.

17. Click *OK*.

18. Click *Yes* for "Execute Program Now?"

19. Click *Close*.

20. Click *OK*.

BAC-A1616BC BACnet Building Controller

Tables and Pull-Up Resistors

Select the 10K ohm pull-up resistor jumper position for the corresponding inputs. (See the Installation section of the BAC-A1616ABC Building Controller Installation and Operation Guide for the correct jumper position.)

Because the Building Controller has a 0–12 VDC total input range, different tables are required than in other (0–5 VDC) KMC controllers. **Download the sensor tables (CSV) file from the KMC Controls Partners web site and import the needed tables as described in the Tables section of the BAC-A1616ABC Building Controller Installation and Operation Guide. (You must log into the Partners site to see the zipped tables file on the Building Controller product page downloads.)**

Thermistor Input

1. In the desired Analog Input setup screen of the web page interface, select KMC Type II Degree Fahrenheit or KMC Type II Degree Celsius.
2. Select the Lookup Table for the Type II Thermistor.
3. For the Fahrenheit scale, the multiplier is 1.8 and the offset is 32. For Celsius, the multiplier is 1 and the offset is 0.
4. Click *Save*.

Setpoint Input

1. In the desired Analog Input setup screen of the web page interface, select No Device and the Lookup Table for the STE-6014 Rotary BBC table.
2. For the Fahrenheit scale, the multiplier is 1.8 and the offset is 32. For Celsius, the multiplier is 1 and the offset is 0.
3. Click *Save*.

Override Control Basic

See the BACnet example under *Override (STE-6017/6018/6019/6020 Only) on page 5*.

TotalControl Software

NOTE: Follow the relevant hardware instructions in the BACstage Software section or KMDigital Software section. Then see the TotalControl Help information for the equivalent software configuration in TotalControl.

WinControl Software

Thermistor Input

1. In the WinControl software main menu, select *Control > Inputs*.

2. Click *Edit*.

3. Type in a name in the appropriate *Description* field (up to 20 characters) and/or *Label* field (up to 8 characters).

NOTE: No two labels or descriptions in a controller can be identical.

4. Click *Units* (which opens the Configure Inputs screen).

5. Select *Type: Analog* if it is not the default.

6. Select *Deg F* (or *C*) *KMC10K Type II*.

8. Optionally, change *Format* from 0 to the desired number of temperature decimal places.

9. Optionally, change the *Average* to the desired number of thermistor readings averaged before displaying the result. If the Override Input is being used, *Average* may need to be reduced down toward *1* to ensure reliable recognition of the button press, depending on the controller.

NOTE: The up and down buttons need to be held down for at least a half a second to be reliably recognized for override mode.

10. Click *OK*.

11. Click *End Edit*.

12. Click *OK*.

Setpoint Input

1. In the WinControl software main menu, select *Control > Inputs*.

2. Click *Edit*.

3. Type in a name in the appropriate *Description* field and/or *Label* field.

4. Click *Units* (which opens the Configure Inputs screen).

5. Select *Type: Analog* if it is not the default.

6. Select *Table*.

7. Click *OK*.

8. Click *End Edit*.

9. Click *OK*.

10. In the WinControl software main menu, select *Control > Tables*.

11. Click *Unused* in the first available column.

12. Select *Deg. F*. (**or Deg. C**)

13. Click *OK*.

14. Enter the following values under Table x and Deg. F **(or C)**:

	Table x [1 or next available number]	*Deg. F*	*Deg. C*
1	0.00	54	12.2
2	0.32	58	14.4
3	0.77	62	16.7
4	1.14	66	18.9
5	1.47	70	21.1
6	1.74	74	23.3
7	1.97	78	25.6
8	2.16	82	27.8
9	2.31	86	30.0
10	2.42	90	32.2
11	5.00	90	32.2

15. Click *OK*.

Setpoint Variable

1. In the WinControl software main menu, select *Control > Setpoint/Variables*.

2. Click *Edit*.

3. Type in a name in the appropriate *Description* field and/or *Label* field.

4. Click *Units* (which opens the Configure Variables screen).

5. Select *Type: Analog* if it is not the default.

6. Select *Degrees Fahrenheit* (or *Celsius*).

7. Set *Format* to 0.

8. Click *OK*.

9. Click *End Edit*.

10. Click *OK*.

Override Input (STE-6017/6018/6019/6020 Only)

1. In the WinControl software main menu, select *Control > Setpoint/Variables*.

2. Click *Edit*.

3. Type in a name in the appropriate *Description* field and/or *Label* field.

4. Click *Units* (which opens the Configure Variables screen).

5. Select *Type: Digital*.

6. Select *Off/On* (or *No/Yes*, *Stop/Start*, *Dis/Enabled* according to preference).

7. Click *OK*.

8. Click *End Edit*.

9. Click *OK*.

10. In the WinControl software main menu, select *Control > Control Basic*.

11. Click *Edit*.

12. Type in a name in the *Description* field and/or *Label* field.

13. Place an x in the *On* column.

14. Click *End Edit*.

15. Click once in the # column.

16. Type in program lines (see the following example).

NOTE: This is only an example. Details need to fit the controller configuration.

```
10 REM ** STE-6017/18/19/20 OVERRIDE **
20 REM ** VAR5 IS OCCUPIED/UNOCCUPIED
   (ON/OFF) MODE **
30 IF NOT VAR5 THEN GOSUB 50
40 END
50 REM ** IN3 IS ROOM TEMP VOLTAGE FROM
   SENSOR (FROM INPUT SCREEN) **
60 REM ** VAR4 IS OVERRIDE (FROM
   SETPOINTS/VARIABLES SCREEN)**
70 REM ** USE BUTTON ON SENSOR TO START
   OVERRIDE (VAR4) **
80 IF+ SENSOR-ON( IN3 ) THEN START VAR4
90 REM ** OUT7 IS SUPPLY VOLTAGE FOR
   STE-6018/6020 LED **
100 IF VAR4 THEN OUT7 = 10 ELSE OUT7 =
    0
110 REM ** CHANGE DEFAULT TIME-ON TO
    DESIRED AMOUNT OF OVERRIDE TIME **
120 IF TIME-ON( VAR4 ) > 02:00:00 THEN
    STOP VAR4
130 RETURN
```

NOTE: For an additional sample application of programming override timers, adapt the information in the Application Note AN0504F Programming Override Timers section of the the Digital Designer's Guide (SP-022).

Mounting Considerations

Sensors must **NOT** be:

- Mounted on an exterior wall.
- Mounted on or near a large thermal mass (e.g., concrete block wall).
- Blocked from normal air circulation by obstructions.
- Exposed to heat sources (e.g., lights, computers, copiers, or coffee makers) or to sunlight (at **any** time of the day).
- Exposed to drafts from windows, diffusers, or returns.
- Exposed to air flow through the conduit (from leaks in plenum ducts)—put plumber's putty or similar material inside the conduit to block air flow.

Troubleshooting

- Be sure the 10,000 ohm pull-up resistors on the controller board are turned **ON**.
- Check wiring. To prevent excessive voltage drop, use a conductor size that is adequate for the wiring length!
- Check sensor configuration and tables in the controller.
- Check voltage from the controller.
- Check that the sensor is **NOT** mounted on an exterior wall, mounted on or near a large thermal mass, blocked from normal air circulation by obstructions, exposed to heat sources or to sunlight, exposed to drafts from windows or air vents, or exposed to air flow through the conduit from leaks in plenum ducts. (See the Mounting Considerations section above.)

Accessories

HMO-6036	Universal Backplate, Almond
HMO-6036W	Universal Backplate, White
KMD-569**x**	STE-6010/6014/6015/6016/6017/6018 to Controller Cable with RJ-45 to RJ-11 Connectors (-569**3** = 25 ft.; -569**4** = 50 ft.; -569**5** = 75 ft.)
KMD-5624	PC Data Port (EIA-485) Cable
KMD-5576	EIA-485 to USB Communicator
SP-001	Flat Blade and Hex End Screwdriver

Specifications

Connections	Clamp (screw-type) terminals or modular RJ-45 jack (see *Models on page 1*)
Material	Flame-retardant plastic, light almond or white
Weight	Approx. 1.25 oz. (35 grams)

Sensor

Type	Type II thermistor
Accuracy	± 0.36° F (± 0.20° C)
Resistance	10,000 ohms @ 77° F (25° C)
NTC	4.37%/° C @ 25° C
Dissipation Constant	2 mW/° C
Temp. Reading	Thermistor resistance
Rotary Setpoint Pot.	0–10K ohms ±20% (54–90° F or 12–32° C) linear
Optional Button	One momentary push button, shunts temperature sensor to signal override condition
Optional LED	Power requirements, **10 VDC** (12 VDC max); 5 mA max. current draw at 12 VDC

Environmental Limits

Operating	34° to 125° F (1.1° to 51.6° C)
Shipping	–40° to 140° F (–40° to 60° C)
Humidity	0 to 95% RH non-condensing

Important Notices

The material in this document is for information purposes only. **The contents and the product it describes are subject to change without notice.** KMC Controls, Inc. makes no representations or warranties with respect to this document. In no event shall KMC Controls, Inc. be liable for any damages, direct or incidental, arising out of or related to the use of this document.