



# **7360 INTELLIGENT SERVICES ACCESS MANAGER FX RELEASE 6.2**

## **ANSI Hardware Installation Manual**

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# Table of contents

<b>1</b>	<b>Preface .....</b>	<b>25</b>
1.1	Scope .....	25
1.2	Related documents.....	25
1.3	Audience.....	25
1.4	Assumed knowledge .....	26
1.5	Assistance and ordering phone numbers .....	26
1.6	Safety information.....	26
1.7	Documents .....	26
1.8	Conventions.....	26
1.9	Acronyms and initialisms .....	26
1.10	Special information .....	27
1.10.1	Procedures with options or substeps.....	27
1.11	Multiple PDF document search .....	28
<b>2</b>	<b>Overview .....</b>	<b>31</b>
2.1	Requirements .....	32
2.2	Installation environment requirements.....	34
2.2.1	General information on GR-3108-CORE Class 1 and Class 2 environments .....	34
2.2.2	GR-63-CORE indoor controlled environmental space.....	35
2.3	Equipment description .....	36
2.4	Initial site survey .....	57
2.5	Installation materials and tools .....	58
2.6	Installation procedures .....	59
<b>3</b>	<b>Floor preparation .....</b>	<b>61</b>
3.1	Overview.....	61
3.2	General.....	61
3.2.1	Rack footprints and dimensions .....	61
3.3	Parts list.....	63
3.4	Recommended tools.....	63
3.5	Procedures .....	63
<b>4</b>	<b>Installing racks .....</b>	<b>67</b>
4.1	Overview.....	67
4.2	Unpacking and inspection .....	67
4.2.1	Shelf units .....	67
4.2.2	Separate kits and parts.....	67
4.2.3	Parts list.....	68
4.2.4	Recommended tools.....	68
4.2.5	Transport brackets.....	70
4.3	Installing a rack.....	71
4.3.1	Parts list.....	72
4.3.2	Recommended tools.....	72

## 7360 ISAM FX-16 shelf installation

<b>5</b>	<b>Installing a 7360 ISAM FX-16 shelf .....</b>	<b>83</b>
5.1	Overview .....	83
5.2	Mounting the 7360 ISAM FX-16 shelf in a 23 in. rack .....	85
5.2.1	7360 ISAM FX-16 rack mounting configurations .....	85
5.2.2	Parts list .....	86
5.2.3	Recommended tools .....	87
5.2.4	Prerequisites .....	87
5.3	Installing a drip tray below a 7360 ISAM FX-16 shelf .....	91
5.4	Installing a 7360 ISAM FX-16 heat and fiber baffle kit .....	95
5.5	Installing or replacing the fan unit in a 7360 ISAM FX-16 shelf .....	100
<b>6</b>	<b>7360 ISAM FX-16 shelf cabling .....</b>	<b>105</b>
6.1	Overview .....	105
6.2	Safety precautions .....	106
6.3	Shelf grounding connection .....	107
6.3.1	Grounding cable type .....	107
6.3.2	Cable routing and connection .....	108
6.4	Rack grounding connection .....	109
6.5	Power cabling .....	111
6.5.1	General .....	111
6.5.1.1	DC mains battery return connection .....	111
6.5.1.2	Power distribution frame (PDF) .....	111
6.5.1.3	External ground .....	111
6.5.1.4	Cable routing .....	111
6.5.2	Power distribution unit .....	112
6.5.3	Power cables .....	113
6.5.3.1	Power cable type .....	113
6.5.3.2	Power cable routing and connection .....	113
6.6	CO external alarm connector .....	116
6.7	BITS interface connections .....	118
6.8	ToD/1 Hz connector .....	119
6.9	Remote craft port connector .....	120
6.10	Combo cable connector .....	120
6.10.1	Cable type .....	120
6.10.2	Connection/locking .....	121
6.10.3	Cabling .....	121
6.11	POTS and LINE MDF cable connector .....	122
6.11.1	MDF cable type .....	122
6.11.2	Prerequisites .....	123
6.12	Vectoring cable connector .....	125
6.12.1	VL cable .....	126
6.12.2	Prerequisites .....	126
<b>7</b>	<b>Installing cards in the 7360 ISAM FX-16 shelf .....</b>	<b>131</b>
7.1	Overview .....	131
7.2	Shelf areas and slot positions .....	131
7.3	Dummy front panels .....	132
7.3.1	NT dummy front panel .....	133
7.3.2	NTIO dummy front panel .....	133



---

7.3.3	Dummy front panel for optical LT cards.....	134
7.4	Recommended tools.....	135
7.5	Guideline for card installation .....	135
7.6	Installation procedures .....	136
7.6.1	General.....	136
7.6.2	Rules for handling cards.....	137
7.6.2.1	ESD sensitive cards .....	137
7.6.2.2	Cards with optical fiber connectors.....	139
<b>8</b>	<b>Fiber optic cable management in the 7360 ISAM FX-16 shelf .....</b>	<b>147</b>
8.1	Overview.....	147
8.2	Managing fiber optic cables.....	148
8.2.1	General safety and operations information.....	149
8.2.2	Optical modules.....	149
8.2.3	Fiber cables.....	150
8.2.4	Routing fiber optic cables in the rack.....	150
8.2.5	Fiber management kit.....	150
8.3	Routing fiber optic cables .....	151
<b>7360 ISAM FX-8 shelf installation</b>		
<b>9</b>	<b>Installing a 7360 ISAM FX-8 shelf .....</b>	<b>159</b>
9.1	Overview.....	159
9.2	Mounting the 7360 ISAM FX-8 shelf in a 19 in. rack .....	160
9.2.1	7360 ISAM FX-8 rack mounting configurations .....	161
9.2.2	Parts list.....	164
9.2.3	Recommended tools.....	164
9.3	Mounting the 7360 ISAM FX-8 shelf in a 23 in. rack .....	176
9.3.1	7360 ISAM FX-8 rack mounting configurations .....	176
9.3.2	Parts list.....	179
9.4	Installing or replacing a fan unit in a 7360 ISAM FX-8 shelf.....	188
<b>10</b>	<b>7360 ISAM FX-8 shelf cabling .....</b>	<b>195</b>
10.1	Overview.....	195
10.2	Safety precautions.....	196
10.3	Shelf grounding connection .....	196
10.3.1	Grounding cable type .....	197
10.3.2	Cable routing and connection.....	197
10.4	Rack grounding connection .....	199
10.5	Power cabling .....	200
10.5.1	General.....	201
10.5.1.1	Power distribution frame (PDF) .....	201
10.5.1.2	External ground .....	201
10.5.1.3	Cable routing .....	201
10.5.2	Power distribution unit .....	201
10.5.3	Power cables .....	202
10.5.3.1	Power cable type .....	202
10.5.3.2	Power cable routing and connection .....	202
10.6	CO alarm connector .....	205
10.7	BITS interface connections.....	206

10.8	ToD/PPS connector.....	207
10.9	Remote craft port connector.....	207
10.10	Combo cable connector.....	207
10.10.1	Cable type .....	208
10.10.2	Connection/locking .....	208
10.10.3	Cabling .....	208
10.11	POTS and LINE MDF cable connector.....	209
10.11.1	MDF cable type .....	209
10.11.2	Prerequisites.....	210
10.12	Vectoring cable connector .....	212
10.12.1	VL cable.....	213
10.12.2	Prerequisites.....	213
<b>11</b>	<b>Installing cards in the 7360 ISAM FX-8 shelf.....</b>	<b>219</b>
11.1	Overview.....	219
11.2	Shelf areas and slot positions.....	219
11.3	Dummy front panels .....	220
11.3.1	NT dummy front panel .....	220
11.3.2	NTIO dummy front panel .....	221
11.3.3	Dummy front panel for optical LT cards.....	222
11.4	Recommended tools.....	223
11.5	Guideline for card installation .....	223
11.6	Installation procedures .....	224
11.6.1	General.....	224
11.6.2	Rules for handling cards.....	225
11.6.2.1	ESD sensitive cards .....	225
11.6.2.2	Cards with optical fiber connectors.....	227
<b>12</b>	<b>Fiber optic cable management in the 7360 ISAM FX-8 shelf .....</b>	<b>237</b>
12.1	Overview.....	237
12.2	Managing fiber optic cables.....	238
12.2.1	General safety and operations information.....	239
12.2.2	Optical modules.....	239
12.2.3	Fiber cables.....	240
12.2.4	Fiber management kit.....	240
12.3	Routing fiber optic cables .....	240
<b>7360 ISAM FX-4 shelf installation</b>		
<b>13</b>	<b>Installing a 7360 ISAM FX-4 shelf .....</b>	<b>247</b>
13.1	Overview.....	247
13.2	Mounting the 7360 ISAM FX-4 shelf in a 19 in. rack .....	248
13.2.1	7360 ISAM FX-4 rack mounting configurations.....	249
13.2.2	Parts list.....	252
13.2.3	Recommended tools.....	252
13.3	Mounting the 7360 ISAM FX-4 shelf in a 23 in. rack .....	264
13.3.1	7360 ISAM FX-4 rack mounting configurations.....	264
13.3.2	Parts list.....	267
13.4	Installing or replacing a fan unit in a 7360 ISAM FX-4 shelf.....	275

---

<b>14</b>	<b>7360 ISAM FX-4 shelf cabling .....</b>	<b>281</b>
14.1	Overview.....	281
14.2	Safety precautions.....	282
14.3	Shelf grounding connection .....	282
14.3.1	Grounding cable type .....	283
14.3.2	Cable routing and connection.....	283
14.4	Rack grounding connection .....	285
14.5	Power cabling .....	286
14.5.1	General.....	287
14.5.1.1	Power distribution frame (PDF) .....	287
14.5.1.2	External ground .....	287
14.5.1.3	Cable routing .....	287
14.5.2	Power distribution unit .....	287
14.5.3	Power cables .....	288
14.5.3.1	Power cable type .....	288
14.5.3.2	Power cable routing and connection .....	289
14.6	CO external alarm connector.....	291
14.7	BITS interface connections.....	292
14.8	ToD/PPS connector.....	292
14.9	Remote craft port connector .....	293
14.10	Combo cable connector.....	293
14.10.1	Cable type .....	293
14.10.2	Connection/locking .....	294
14.10.3	Cabling .....	294
14.11	POTS and LINE MDF cable connector.....	295
14.11.1	MDF cable type .....	295
14.11.2	Prerequisites.....	296
14.12	Vectoring cable connector .....	298
14.12.1	VL cable.....	298
14.12.2	Prerequisites.....	298
<b>15</b>	<b>Installing cards in the 7360 ISAM FX-4 shelf.....</b>	<b>303</b>
15.1	Overview.....	303
15.2	Shelf areas and slot positions.....	303
15.3	Dummy front panels .....	304
15.3.1	NT dummy front panel .....	304
15.3.2	NTIO dummy front panel .....	305
15.3.3	Dummy front panel for optical LT cards.....	306
15.4	Recommended tools.....	307
15.5	Guideline for card installation .....	307
15.6	Installation procedures .....	308
15.6.1	General.....	308
15.6.2	Rules for handling cards.....	309
15.6.2.1	ESD sensitive cards .....	309
15.6.2.2	Cards with optical fiber connectors.....	311
<b>16</b>	<b>Fiber optic cable management in the 7360 ISAM FX-4 shelf .....</b>	<b>321</b>
16.1	Overview.....	321
16.2	Managing fiber optic cables.....	322

16.2.1	General safety and operations information.....	323
16.2.2	Optical modules.....	323
16.2.3	Fiber cables.....	324
16.2.4	Fiber management kit.....	324
16.3	Routing fiber optic cables.....	324

## **7360 ISAM Active WM shelf installation**

<b>17</b>	<b>Installing a 7360 ISAM Active WM shelf .....</b>	<b>331</b>
17.1	Overview.....	331
17.2	Installing a drip tray below a 7360 ISAM WM shelf .....	331
17.3	Mounting the 7360 ISAM WM shelf in a 23 in. rack.....	334
17.3.1	7360 ISAM WM rack mounting.....	334
17.3.1.1	7360 ISAM WM rack mounting configurations .....	334
17.3.2	Parts list.....	336
17.3.3	Recommended tools.....	337
17.3.4	Procedures .....	337
17.3.5	Prerequisites.....	337
<b>18</b>	<b>7360 ISAM Active WM shelf cabling.....</b>	<b>343</b>
18.1	Overview.....	343
18.2	Safety precautions.....	344
18.3	Shelf grounding connection .....	344
18.3.1	Grounding cable type .....	345
18.3.2	Cable routing and connection.....	345
18.4	Rack grounding connection .....	346
18.5	Power Cable .....	348
18.5.1	Power card and power cable routing .....	348
18.5.1.1	Power cable.....	349
18.5.1.2	Power cable routing and connection .....	349
18.6	Alarm cable.....	353
18.6.1	Alarm cable routing connection .....	354
<b>19</b>	<b>Installing cards in the 7360 ISAM Active WM shelf .....</b>	<b>357</b>
19.1	Overview.....	357
19.2	Shelf areas and slot positions.....	357
19.3	Dummy front panels .....	358
19.3.1	For 7360 ISAM WM power cards .....	359
19.3.2	For 7360 ISAM WM line cards.....	359
19.4	Recommended tools.....	359
19.5	Guideline for card installation .....	360
19.6	Installation procedures .....	360
19.6.1	General.....	361
19.6.2	Rules for handling cards.....	361
19.6.2.1	ESD sensitive cards .....	361
19.6.2.2	Cards with optical fiber connectors.....	363
<b>20</b>	<b>Fiber optic cable management in the 7360 ISAM Active WM shelf .....</b>	<b>369</b>
20.1	Overview.....	369
20.2	Managing fiber optic cables.....	370
20.2.1	General safety and operations information.....	370

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20.2.2	Optical modules .....	371
20.2.3	Fiber cables .....	371
20.2.4	Routing fiber optic cables in the rack.....	371
20.2.5	Fiber management kit.....	371
20.3	Routing fiber optic cables .....	372
<b>7360 ISAM Passive WM shelf installation</b>		
<b>21</b>	<b>Installing a 7360 ISAM Passive WM shelf .....</b>	<b>379</b>
21.1	Overview.....	379
21.2	Mounting the 7360 ISAM Passive WM in a 23 in. rack.....	380
21.2.1	Rack configurations .....	381
21.2.2	Parts list.....	383
21.2.3	Recommended tools.....	383
<b>22</b>	<b>Installing modules in the 7360 ISAM 7360 ISAM Passive WM shelf .....</b>	<b>385</b>
22.1	Introduction.....	385
22.2	Shelf areas and slot positions.....	385
22.3	Recommended tools.....	386
22.4	Guideline for module installation .....	386
22.5	Installation procedures .....	387
22.5.1	Rules on handling modules .....	387
22.5.1.1	Cards with optical fiber connectors.....	387
<b>23</b>	<b>Fiber optic cable management in the 7360 ISAM Passive WM shelf .....</b>	<b>391</b>
23.1	Introduction.....	391
23.2	Managing fiber optic cables .....	391
23.2.1	Fiber cable types .....	392
23.2.1.1	General.....	392
23.2.2	Routing fiber optic cables in the rack.....	392
23.3	Routing fiber optic cables .....	393
<b>WDM Subrack Installation</b>		
<b>24</b>	<b>Installing the WDM shelf .....</b>	<b>399</b>
24.1	Overview.....	399
24.2	Mounting the WDM shelf in combination with the 7360 ISAM FX-16 .....	399
24.2.1	Rack Configurations .....	399
24.2.2	Parts List.....	400
24.2.3	Recommended Tools .....	401
24.3	Mounting the WDM shelf in combination with the 7360 ISAM FX-8 .....	403
24.3.1	Rack Configurations .....	403
24.3.2	Parts List.....	405
24.3.3	Recommended Tools .....	405
24.4	Mounting the WDM shelf in combination with the 7360 ISAM FX-4 .....	407
24.4.1	Rack Configurations .....	407
24.4.2	Parts List.....	409
24.4.3	Recommended Tools .....	409

<b>25</b>	<b>Installing modules in the WDM shelf .....</b>	<b>411</b>
25.1	Introduction.....	411
25.2	WDM shelf slot positions .....	411
25.3	Dummy front panels .....	412
25.4	Recommended tools.....	412
25.5	Installing and removing a WDM-A module .....	412
<b>26</b>	<b>Fiber optic cable management in the WDM shelf .....</b>	<b>415</b>
26.1	Introduction.....	415
26.2	Managing fiber optic cables.....	415
26.2.1	Fiber cable types .....	416
26.2.1.1	General.....	416
26.2.1.2	Fiber fanout cable Type 1.....	416
26.2.1.3	Fiber fanout cable Type 2.....	417
26.2.1.4	Fiber fanout cable Type 3.....	417
26.2.2	Fiber management .....	418
26.2.3	Special tools .....	418
26.2.4	Routing fiber optic cables in the rack.....	419
26.3	Installing and routing fiber optic cables .....	419
<b>Appendices</b>		
<b>27</b>	<b>Connector pinning of the external interfaces .....</b>	<b>425</b>
27.1	Overview.....	425
27.2	BITS interface connections.....	425
27.3	ToD/1 Hz connector.....	426
27.4	Remote craft port connector .....	427
27.5	CO external alarm connector.....	427
27.6	MDF CHAMP100 cable connector .....	433
27.6.1	Cable colors.....	433
27.6.2	Line number.....	434
27.6.3	Connector pinning .....	434
<b>28</b>	<b>Connector pinning on NT card .....</b>	<b>437</b>
28.1	Overview.....	437
28.2	1PPS-TTL interface signal.....	437
28.3	10 MHz-GPS interface signal .....	437
28.4	ToD/PPS interface signal .....	438
28.5	Local craft interface .....	438
<b>29</b>	<b>Fiber optic handling and acceptance criteria .....</b>	<b>441</b>
29.1	Overview.....	441
29.2	Handling considerations .....	442
29.3	Acceptance criteria for fiber optic device inspections.....	443
29.3.1	Acceptance criteria .....	443
29.4	Fiber optic jumper cable care .....	446
29.5	Inspection of fiber optic devices .....	446

# List of figures

<b>2</b>	<b>Overview.....</b>	<b>31</b>
Figure 1	Vertical mount configuration for 7360 ISAM FX-16 in a 23 in. rack.....	40
Figure 2	Vertical mount position for 7360 ISAM FX-8 in a 19 in. rack.....	41
Figure 3	Vertical mount position for 7360 ISAM FX-8 in a 23 in. rack.....	42
Figure 4	Horizontal mount position for 7360 ISAM FX-8 in a 19 in. rack.....	43
Figure 5	Horizontal mount position for 7360 ISAM FX-8 in a 23 in. rack.....	44
Figure 6	Horizontal mount position for 7360 ISAM FX-4 in a 19 in. rack.....	45
Figure 7	Horizontal mount position for 7360 ISAM FX-4 in a 23 in. rack.....	46
Figure 8	Vertical mount position for 7360 ISAM FX-4 in a 19 in. rack.....	47
Figure 9	Vertical mount position for 7360 ISAM FX-4 in a 23 in. rack.....	48
Figure 10	Vertical mount position for 7360 ISAM WM in a 23 in. rack .....	49
Figure 11	WDM installed with a vertically mounted 7360 ISAM FX-16 in a 23 in. rack.....	50
Figure 12	WDM installed with a vertically mounted 7360 ISAM FX-8 in a 23 in. rack.....	50
Figure 13	WDM installed with a horizontally mounted 7360 ISAM FX-8 in a 23 in. rack.....	51
Figure 14	WDM installed with a vertically mounted 7360 ISAM FX-4 in a 23 in. rack.....	52
Figure 15	WDM installed with a horizontally mounted 7360 ISAM FX-4 in a 23 in. rack.....	53
Figure 16	WDM installed with a vertically mounted 7360 ISAM FX-8 in a 19 in. rack.....	54
Figure 17	WDM installed with a horizontally mounted 7360 ISAM FX-8 in a 19 in. rack.....	55
Figure 18	WDM installed with a vertically mounted 7360 ISAM FX-4 in a 19 in. rack.....	56
Figure 19	WDM installed with a horizontally mounted 7360 ISAM FX-4 in a 19 in. rack.....	57
<b>3</b>	<b>Floor preparation .....</b>	<b>61</b>
Figure 20	7360 ISAM FX ANSI 23 in. rack footprint and dimensions .....	62
Figure 21	7360 ISAM FX ANSI sample rack configuration floor plan .....	62
<b>4</b>	<b>Installing racks.....</b>	<b>67</b>
Figure 22	Transport brackets located on the rear of the rack.....	71
Figure 23	Securing the rack to the floor (non-seismic qualified installation).....	74
Figure 24	Rack connector plate for 7-ft rack.....	75
Figure 25	Bracing the rack to overhead (example).....	76
Figure 26	Securing the rack to the floor (seismic-qualified installation).....	78
Figure 27	Rack connector plate for 7-ft rack.....	79
Figure 28	Bracing the rack to overhead (example).....	80
<b>5</b>	<b>Installing a 7360 ISAM FX-16 shelf.....</b>	<b>83</b>
Figure 29	Rack mounting configuration 3FE 66742 AB for 7360 ISAM FX-16.....	86
Figure 30	Mounting locations for the 7360 ISAM FX-16.....	88
Figure 31	Mounting 7360 ISAM FX-16 lower shelf in a 23 in. rack.....	89

Figure 32	Mounting 7360 ISAM FX-16 upper shelf in a 23 in. rack .....	90
Figure 33	View of drip tray for 7360 ISAM FX-16 .....	91
Figure 34	Mounting 7360 ISAM FX-16 lower drip tray .....	92
Figure 35	Mounting 7360 ISAM FX-16 upper drip tray .....	94
Figure 36	Pre-assembled 7360 ISAM FX-16 heat and fiber baffle kit .....	97
Figure 37	Mounting 7360 ISAM FX-16 lower heat and fiber baffle kit .....	97
Figure 38	Mounting 7360 ISAM FX-16 upper heat and fiber baffle kit .....	98
Figure 39	Fiber management bracket .....	99
Figure 40	Fiber management bracket .....	100
Figure 41	Remove the fan cover .....	102
Figure 42	Fan unit handles .....	103
<b>6</b>	<b>7360 ISAM FX-16 shelf cabling .....</b>	<b>105</b>
Figure 43	Shelf grounding cable connector locations on 7360 ISAM FX-16 .....	108
Figure 44	External frame ground point rear view .....	110
Figure 45	Power distribution unit on 7360 ISAM FX-16 .....	112
Figure 46	Safety cover label .....	113
Figure 47	Power cable routing for 7360 ISAM FX-16 .....	114
Figure 48	Mounting of power cable shoes and safety cover on 7360 ISAM FX-16 .....	115
Figure 49	CO external alarm connector on 7360 ISAM FX-16 .....	117
Figure 50	BITS interface connections on 7360 ISAM FX-16 .....	118
Figure 51	ToD/1 Hz connector on 7360 ISAM FX-16 .....	119
Figure 52	Combo cable .....	121
Figure 53	Combo cable connection on 7360 ISAM FX-16 .....	122
Figure 54	MDF cable for 48-line cards .....	123
Figure 55	MDF cable LINE connection on 7360 ISAM FX-16 .....	124
Figure 56	MDF cable POTS connection on 7360 ISAM FX-16 .....	125
Figure 57	VL ports on the NDPS-B .....	128
Figure 58	Inserting the cable connector into a VL port on the NDPS-B card .....	129
Figure 59	VL cable exit areas .....	130
<b>7</b>	<b>Installing cards in the 7360 ISAM FX-16 shelf .....</b>	<b>131</b>
Figure 60	NT and LT slot positions in 7360 ISAM FX-16 .....	132
Figure 61	Dummy front panel for NT card .....	133
Figure 62	Universal dummy front panel for NTIO card .....	134
Figure 63	Dummy front panel for optical LT card .....	134
Figure 64	ESD awareness symbol .....	138
Figure 65	Label for earth bonding point .....	138
Figure 66	Laser classification label .....	139
Figure 67	NT card slots in 7360 ISAM FX-16 .....	140
Figure 68	NTIO slot .....	142
Figure 69	LT card slots in 7360 ISAM FX-16 .....	143
Figure 70	Ejector handles for LT cards .....	145
Figure 71	Ejector handles for LT cards .....	145
Figure 72	Ejector handles for NT cards .....	145
<b>8</b>	<b>Fiber optic cable management in the 7360 ISAM FX-16 shelf .....</b>	<b>147</b>
Figure 73	Fiber guiding elements of the 7360 ISAM FX-16 optical fiber management kit .....	148



Figure 74	Fiber management guide for 7360 ISAM FX-16 .....	151
Figure 75	Fiber routing with a fiber management guide for 7360 ISAM FX-16 .....	151
Figure 76	Fiber routing without a fiber management guide for 7360 ISAM FX-16.....	152
Figure 77	Alignment of 7360 ISAM FX-16 fiber management guide .....	153
Figure 78	Mount the 7360 ISAM FX-16 fiber management guide .....	153
<b>9</b>	<b>Installing a 7360 ISAM FX-8 shelf.....</b>	<b>159</b>
Figure 79	19 in. EIA standard rack upright channel direction for horizontal mount for 7360 ISAM FX-8.....	160
Figure 80	Horizontal mounting configuration for 7360 ISAM FX-8 in a 19 in. EIA standard rack.....	162
Figure 81	Vertical mounting configuration for 7360 ISAM FX-8 in a 19 in. EIA standard rack.....	163
Figure 82	Horizontal mounting locations in a 19 in. rack for 7360 ISAM FX-8 .....	166
Figure 83	Vertical mounting locations in a 19 in. rack for the 7360 ISAM FX-8 .....	168
Figure 84	Mounting the 7360 ISAM FX-8 pre-assembled shelf mounting bracket and air intake baffle/drip tray in a 19 in. rack.....	169
Figure 85	Location of 7360 ISAM FX-8 top mounting bracket.....	170
Figure 86	Mounting the 7360 ISAM FX-8 pre-assembled skirts and bracket .....	171
Figure 87	Mounting the 7360 ISAM FX-8 intumescent panel onto the skirt assembly .....	172
Figure 88	Mounting the 7360 ISAM FX-8 top baffle .....	173
Figure 89	Attaching the 7360 ISAM FX-8 bottom mounting bracket in a 19 in. rack.....	174
Figure 90	Mounting the 7360 ISAM FX-8 shelf assembly vertically in a 19 in. rack.....	175
Figure 91	Horizontal mounting configuration in a 23 in. rack for 7360 ISAM FX-8.....	177
Figure 92	Vertical mounting configuration for 7360 ISAM FX-8 in a 23 in. rack .....	179
Figure 93	Horizontal mounting locations for 7360 ISAM FX-8 in a 23 in. rack .....	181
Figure 94	Horizontal mounting installation for 7360 ISAM FX-8 in a 23 in. rack .....	182
Figure 95	Vertical mounting locations for 7360 ISAM FX-8 in a 23 in. rack .....	184
Figure 96	Mounting the 7360 ISAM FX-8 rack adapter brackets to a 23 in. rack.....	185
Figure 97	Mounting the 7360 ISAM FX-8 pre-assembled shelf mounting bracket and air intake baffle/drip tray in a 23 in. rack.....	186
Figure 98	Attaching the 7360 ISAM FX-8 bottom mounting bracket in a 23 in. rack.....	187
Figure 99	Mounting the 7360 ISAM FX-8 shelf assembly vertically in a 23 in. rack.....	188
Figure 100	Fan installation for 7360 ISAM FX-8.....	191
Figure 101	Fan filter installation for 7360 ISAM FX-8 shelf .....	193
<b>10</b>	<b>7360 ISAM FX-8 shelf cabling .....</b>	<b>195</b>
Figure 102	Grounding cable connection on 7360 ISAM FX-8 .....	198
Figure 103	External frame ground point rear view.....	200
Figure 104	Power cable routing for 7360 ISAM FX-8.....	203
Figure 105	Mounting of power cable shoes and safety cover on 7360 ISAM FX-8.....	204

Figure 106	External interfaces on 7360 ISAM FX-8 .....	205
Figure 107	CO external alarm cable for 7360 ISAM FX-8 .....	206
Figure 108	ToD/PPS connector location on NT card.....	207
Figure 109	Combo cable .....	208
Figure 110	Combo cable connection on 7360 ISAM FX-8 .....	209
Figure 111	MDF cable for 48-line cards .....	210
Figure 112	MDF cable LINE connection on 7360 ISAM FX-8 .....	211
Figure 113	MDF cable POTS connection on 7360 ISAM FX-8 .....	212
Figure 114	VL ports on the NDPS-B.....	215
Figure 115	Inserting the cable connector into a VL port on the NDPS-B card .....	216
Figure 116	VL cable exit areas .....	217
<b>11</b>	<b>Installing cards in the 7360 ISAM FX-8 shelf.....</b>	<b>219</b>
Figure 117	LT and NT slot positions on 7360 ISAM FX-8 .....	220
Figure 118	Dummy front panel for NT card .....	221
Figure 119	Universal dummy front panel for NTIO card .....	222
Figure 120	Dummy front panel for optical LT card .....	222
Figure 121	ESD awareness symbol .....	226
Figure 122	Label for earth bonding point.....	227
Figure 123	Laser classification label.....	228
Figure 124	NTIO slot .....	228
Figure 125	NT card slots in 7360 ISAM FX-8 .....	230
Figure 126	LT cards slots in 7360 ISAM FX-8.....	232
Figure 127	Ejector handles for LT cards.....	233
Figure 128	Ejector handles for LT cards.....	234
Figure 129	Ejector handles for NT cards .....	234
Figure 130	Remove safety cover and power cable shoes on 7360 ISAM FX-8 .....	235
Figure 131	Remove fixation screws for NGFC-H card .....	236
<b>12</b>	<b>Fiber optic cable management in the 7360 ISAM FX-8 shelf .....</b>	<b>237</b>
Figure 132	Fiber management kit for 7360 ISAM FX-8 .....	238
Figure 133	Baffle for 7360 ISAM FX-8 vertical rack mounting configurations .....	238
Figure 134	Mounting of 7360 ISAM FX-8 fiber management kit.....	241
Figure 135	Alignment of 7360 ISAM FX-8 fiber management guide .....	242
Figure 136	Mount the 7360 ISAM FX-8 fiber management guide .....	242
<b>13</b>	<b>Installing a 7360 ISAM FX-4 shelf.....</b>	<b>247</b>
Figure 137	19 in. EIA standard rack upright channel direction in horizontal mount for 7360 ISAM FX-4.....	248
Figure 138	Horizontal mounting configuration for 7360 ISAM FX-4 in a 19 in. EIA standard rack .....	250
Figure 139	Vertical mounting configuration for 7360 ISAM FX-4 in a 19 in. EIA standard rack.....	251
Figure 140	Horizontal mounting locations in a 19 in. rack for 7360 ISAM FX-4 .....	254
Figure 141	Vertical mounting locations for the 7360 ISAM FX-4 in a 19 in. rack .....	256
Figure 142	Mounting the 7360 ISAM FX-4 pre-assembled shelf mounting bracket and air intake baffle/drip tray in a 19 in. rack .....	257
Figure 143	Location of 7360 ISAM FX-4 top and bottom mounting brackets .....	258
Figure 144	Mounting the 7360 ISAM FX-4 pre-assembled skirts and bracket .....	259

Figure 145	Mounting the 7360 ISAM FX-4 intumescent panel onto the skirt assembly .....	260
Figure 146	Mounting the 7360 ISAM FX-4 top baffle .....	261
Figure 147	Attaching the 7360 ISAM FX-4 bottom mounting bracket in a 19 in. rack.....	262
Figure 148	Mounting the 7360 ISAM FX-4 shelf assembly vertically in a 19 in. rack.....	263
Figure 149	23 in. rack horizontal mounting configuration for 7360 ISAM FX-4 .....	265
Figure 150	Vertical mounting configuration for 7360 ISAM FX-4 in a 23 in. rack .....	266
Figure 151	Horizontal mounting locations for 7360 ISAM FX-4 in a 23 in. rack .....	268
Figure 152	Horizontal mounting installation for 7360 ISAM FX-4 in a 23 in. rack .....	269
Figure 153	Vertical mount locations for the 7360 ISAM FX-4 in a 23 in. rack .....	271
Figure 154	Mounting the 7360 ISAM FX-4 rack adapter brackets to a 23 in. rack.....	272
Figure 155	Mounting the 7360 ISAM FX-4 pre-assembled shelf mounting bracket and air intake baffle/drip tray in a 23 in. rack.....	273
Figure 156	Attaching the 7360 ISAM FX-4 bottom mounting bracket in a 23 in. rack.....	274
Figure 157	Mounting the 7360 ISAM FX-4 shelf assembly vertically in a 23 in. rack.....	275
Figure 158	Fan installation for 7360 ISAM FX-4 shelf .....	277
Figure 159	Fan filter installation for 7360 ISAM FX-4 shelf .....	279
<b>14</b>	<b>7360 ISAM FX-4 shelf cabling .....</b>	<b>281</b>
Figure 160	Grounding cable connection on 7360 ISAM FX-4 .....	284
Figure 161	External frame ground point rear view.....	286
Figure 162	Power distribution unit on 7360 ISAM FX-4.....	288
Figure 163	Power cable routing for 7360 ISAM FX-4.....	289
Figure 164	Mounting of power cable screws and safety cover on 7360 ISAM FX-4 .....	290
Figure 165	External interfaces on 7360 ISAM FX-4 .....	291
Figure 166	External CO alarm cable for 7360 ISAM FX-4.....	292
Figure 167	ToD/PPS connector location on NT card.....	293
Figure 168	Combo cable .....	294
Figure 169	Combo cable connection on 7360 ISAM FX-4 .....	295
Figure 170	MDF cable for 48-line cards .....	296
Figure 171	MDF cable LINE connection on 7360 ISAM FX-4 .....	297
Figure 172	MDF cable POTS connection on 7360 ISAM FX-4 .....	297
Figure 173	VL ports on the NDPS-B.....	300
Figure 174	Inserting the cable connector into a VL port on the NDPS-B card .....	301
Figure 175	VL cable exit areas .....	302
<b>15</b>	<b>Installing cards in the 7360 ISAM FX-4 shelf.....</b>	<b>303</b>
Figure 176	NT and LT slot positions in 7360 ISAM FX-4 .....	303
Figure 177	Dummy front panel for NT card .....	305
Figure 178	Universal dummy front panel for NTIO card .....	306
Figure 179	Dummy front panel for optical LT card .....	306
Figure 180	ESD awareness symbol .....	310
Figure 181	Label for earth bonding point.....	311

Figure 182	Laser classification label.....	312
Figure 183	NTIO slot .....	312
Figure 184	NT card slots in 7360 ISAM FX-4 .....	314
Figure 185	LT card slots in 7360 ISAM FX-4.....	316
Figure 186	Ejector handles for LT cards.....	317
Figure 187	Ejector handles for LT cards.....	318
Figure 188	Ejector handles for NT cards .....	318
Figure 189	Remove safety cover and power cable screws on 7360 ISAM FX-4.....	319
Figure 190	Remove fixation screws for NGFC-G card .....	319
<b>16</b>	<b>Fiber optic cable management in the 7360 ISAM FX-4 shelf .....</b>	<b>321</b>
Figure 191	Fiber management kit for 7360 ISAM FX-4 .....	322
Figure 192	Baffle for 7360 ISAM FX-4 vertical rack mounting configurations .....	322
Figure 193	Mounting of the 7360 ISAM FX-4 fiber management kit.....	325
Figure 194	Alignment of 7360 ISAM FX-4 fiber management guide .....	326
Figure 195	Mount the 7360 ISAM FX-4 fiber management guide .....	326
<b>17</b>	<b>Installing a 7360 ISAM Active WM shelf .....</b>	<b>331</b>
Figure 196	View of drip tray for 7360 ISAM WM .....	331
Figure 197	Mounting 7360 ISAM WM drip tray.....	333
Figure 198	23 in. rack vertical mounting configuration for 7360 ISAM WM.....	336
Figure 199	Mounting a 7360 ISAM WM in a 23 in. rack .....	339
Figure 200	Attaching the 7360 ISAM WM shelf to the rack.....	341
<b>18</b>	<b>7360 ISAM Active WM shelf cabling.....</b>	<b>343</b>
Figure 201	Shelf grounding cable connector location on 7360 ISAM WM .....	345
Figure 202	External frame ground point rear view.....	347
Figure 203	Power distribution on the 7360 ISAM WM shelf .....	348
Figure 204	7360 ISAM WM power cable .....	349
Figure 205	Power cable routing through the bottom of the 7360 ISAM FX-16 shelf .....	350
Figure 206	Power cable routing from the 7360 ISAM WM to the 7360 ISAM FX-16 shelf .....	351
Figure 207	Routing the power cable.....	352
Figure 208	Connecting the power cable .....	353
Figure 209	7360 ISAM WM alarm cable.....	354
Figure 210	CO external alarm connector on 7360 ISAM WM .....	355
<b>19</b>	<b>Installing cards in the 7360 ISAM Active WM shelf .....</b>	<b>357</b>
Figure 211	Card slot positions on 7360 ISAM WM.....	358
Figure 212	Dummy front panel for 7360 ISAM WM power card slots.....	359
Figure 213	Dummy front panel for 7360 ISAM WM line card slots.....	359
Figure 214	Dummy front panel with pre-cabling for 7360 ISAM WM line card slots .....	359
Figure 215	ESD awareness symbol .....	362
Figure 216	Label for earth bonding point.....	362
Figure 217	Laser caution label .....	363
Figure 218	7360 ISAM WM power card slots .....	364
Figure 219	Ejector handles for 7360 ISAM WM cards.....	364
Figure 220	7360 ISAM WM controller card slot.....	365

Figure 221	7360 ISAM WM line card slots .....	366
<b>20</b>	<b>Fiber optic cable management in the 7360 ISAM Active WM shelf .....</b>	<b>369</b>
Figure 222	Fiber guiding elements of the 7360 ISAM WM optical fiber management kit.....	370
Figure 223	Fiber management guide for 7360 ISAM WM .....	372
Figure 224	Fiber routing with a fiber management guide for the 7360 ISAM WM .....	373
Figure 225	Alignment of 7360 ISAM WM fiber management guide.....	373
Figure 226	Mount the 7360 ISAM WM fiber management guide.....	374
<b>21</b>	<b>Installing a 7360 ISAM Passive WM shelf .....</b>	<b>379</b>
Figure 227	7360 ISAM Passive WM with standard 19 in. brackets .....	379
Figure 228	7360 ISAM Passive WM with 21 in. brackets .....	380
Figure 229	7360 ISAM Passive WM with 23 in. brackets .....	380
Figure 230	7360 ISAM Passive WM rack configuration .....	382
Figure 231	Mounting a 7360 ISAM Passive WM shelf in a 23 in. rack .....	384
<b>22</b>	<b>Installing modules in the 7360 ISAM 7360 ISAM Passive WM shelf .....</b>	<b>385</b>
Figure 232	Slot positions in 7360 ISAM Passive WM.....	386
Figure 233	7360 ISAM Passive WM modules in 7360 ISAM Passive WM shelf .....	388
<b>23</b>	<b>Fiber optic cable management in the 7360 ISAM Passive WM shelf .....</b>	<b>391</b>
Figure 234	Fiber routing between FWLT-A or FWLT-B and 7360 ISAM Passive WM modules.....	394
Figure 235	7360 ISAM Passive WM fiber routing at the 7360 ISAM Passive WM modules (top view) .....	395
<b>24</b>	<b>Installing the WDM shelf .....</b>	<b>399</b>
Figure 236	WDMS-A installed above 7360 ISAM FX-16 .....	400
Figure 237	WDM cabling hook and brackets.....	401
Figure 238	Mounting a WDMS-A shelf above the 7360 ISAM FX-16.....	403
Figure 239	WDMS-A installed above vertically mounted 7360 ISAM FX-8 .....	404
Figure 240	WDMS-A installed above horizontal 7360 ISAM FX-8 .....	405
Figure 241	Mounting a WDMS-A shelf above the 7360 ISAM FX-8.....	407
Figure 242	WDMS-A installed above a vertically mounted 7360 ISAM FX-4 .....	408
Figure 243	WDMS-A installed above a horizontally mounted 7360 ISAM FX-4 .....	408
Figure 244	Mounting a WDMS-A shelf above the 7360 ISAM FX-4 .....	410
<b>25</b>	<b>Installing modules in the WDM shelf .....</b>	<b>411</b>
Figure 245	Module slot positions in WDMS-A - WDMM-A installed .....	411
Figure 246	WDMM-A modules ready for insertion in WDM shelf .....	413
<b>26</b>	<b>Fiber optic cable management in the WDM shelf .....</b>	<b>415</b>
Figure 247	View of fiber fanout cable - Type 1 .....	416
Figure 248	View of fiber fanout cable - Type 2 .....	417
Figure 249	View of fiber fanout cable - Type 3 .....	418
Figure 250	SC/UPC connectors .....	420
Figure 251	WDM shelf fanout fiber cable routing .....	421

---

<b>29</b>	<b>Fiber optic handling and acceptance criteria .....</b>	<b>441</b>
Figure 252	Parts of a fiber optic cable .....	442
Figure 253	Single-mode end-face zones.....	444
Figure 254	Preferred condition of fiber optic end-face.....	445

# List of tables

<b>1</b>	<b>Preface .....</b>	<b>25</b>
Table 1	7360 ISAM FX shelves .....	25
Table 2	Documentation conventions .....	26
<b>2</b>	<b>Overview .....</b>	<b>31</b>
Table 3	Class 1 controlled protected environments .....	34
Table 4	Maximum yearly levels of contamination — GR-63-CORE indoor controlled environments .....	35
Table 5	Supported rack configurations for 7360 ISAM FX .....	38
<b>5</b>	<b>Installing a 7360 ISAM FX-16 shelf .....</b>	<b>83</b>
Table 6	Rack mounting configurations for 7360 ISAM FX-16 shelf .....	85
<b>9</b>	<b>Installing a 7360 ISAM FX-8 shelf .....</b>	<b>159</b>
Table 7	Horizontal mounting configurations for 7360 ISAM FX-8 in a 19 in. rack .....	161
Table 8	Vertical mounting configurations for 7360 ISAM FX-8 in a 19 in. rack .....	162
Table 9	Horizontal mounting configuration supported in a 23 in. rack for 7360 ISAM FX-8 .....	176
Table 10	Vertical mounting configuration for 7360 ISAM FX-8 in a 23 in. rack .....	178
<b>13</b>	<b>Installing a 7360 ISAM FX-4 shelf .....</b>	<b>247</b>
Table 11	Horizontal mounting configurations for 7360 ISAM FX-4 in a 19 in. rack .....	249
Table 12	Vertical mounting configurations for 7360 ISAM FX-4 in a 19 in. rack .....	250
Table 13	23 in. rack horizontal mounting configuration for 7360 ISAM FX-4 .....	264
Table 14	Vertical mounting configuration for 7360 ISAM FX-4 23 in. rack .....	265
<b>17</b>	<b>Installing a 7360 ISAM Active WM shelf .....</b>	<b>331</b>
Table 15	Supported rack configuration with the 7360 ISAM WM shelf .....	335
<b>18</b>	<b>7360 ISAM Active WM shelf cabling .....</b>	<b>343</b>
Table 16	Supported 7360 ISAM WM power cable .....	349
<b>21</b>	<b>Installing a 7360 ISAM Passive WM shelf .....</b>	<b>379</b>
Table 17	Supported 23 in. rack configuration with 7360 ISAM Passive WM shelves .....	379
Table 18	Supported Rack Configurations with 7360 ISAM Passive WM shelves .....	381
Table 19	7360 ISAM Passive WM shelf mounting positions .....	383
<b>24</b>	<b>Installing the WDM shelf .....</b>	<b>399</b>
Table 20	Supported combinations — WDM shelf installed above a 7360 ISAM FX-16 shelf .....	400
Table 21	Supported combinations — WDM shelf installed above a 7360 ISAM FX-8 shelf .....	404

---

Table 22	Supported combinations — WDM shelf installed above a 7360 ISAM FX-4 shelf .....	407
<b>25</b>	<b>Installing modules in the WDM shelf .....</b>	<b>411</b>
Table 23	Supported WDM module .....	412
<b>27</b>	<b>Connector pinning of the external interfaces .....</b>	<b>425</b>
Table 24	BITS interface pinning for 7360 ISAM FX-4, 7360 ISAM FX-8, and 7360 ISAM FX 12 .....	426
Table 25	BITS interface pinning for 7360 ISAM FX-16 .....	426
Table 26	ToD/1 Hz pinning for the 7360 ISAM FX-16 .....	426
Table 27	Remote craft port pinning for 7360 ISAM FX shelves .....	427
Table 28	External Alarm Cable.....	428
Table 29	CO external alarm pinning for 7360 ISAM FX-16 .....	428
Table 30	CO external alarm pinning for 7360 ISAM WM .....	431
Table 31	Cable color designations .....	433
Table 32	Wiring list for CHAMP100 MDF cable .....	434
<b>28</b>	<b>Connector pinning on NT card .....</b>	<b>437</b>
Table 33	1PPS-TTL interface signal list .....	437
Table 34	10 MHz GPS interface signal list.....	438
Table 35	ToD/PPS signal list and pinning .....	438
Table 36	Local craft interface signal list and pinning.....	439
<b>29</b>	<b>Fiber optic handling and acceptance criteria .....</b>	<b>441</b>
Table 37	Single-mode end-face inspection acceptance criteria .....	444
Table 38	Acceptable and unacceptable conditions for fiber optic end-faces.....	445



# List of procedures

<b>1</b>	<b>Preface .....</b>	<b>25</b>
Procedure 1	Example of options in a procedure .....	27
Procedure 2	Example of required substeps in a procedure .....	28
Procedure 3	To search multiple PDF files for a common term .....	28
<b>3</b>	<b>Floor preparation .....</b>	<b>61</b>
Procedure 4	To mark the rack positions .....	63
Procedure 5	To drill floor for anchoring 23 in. rack .....	64
<b>4</b>	<b>Installing racks .....</b>	<b>67</b>
Procedure 6	To unpack equipment .....	68
Procedure 7	To inspect equipment .....	69
Procedure 8	To mount a rack to floor for non-seismic installation .....	73
Procedure 9	To mount a rack to floor for seismic installation .....	77
<b>5</b>	<b>Installing a 7360 ISAM FX-16 shelf .....</b>	<b>83</b>
Procedure 10	To mount the 7360 ISAM FX-16 shelf vertically in a 23 in. rack .....	87
Procedure 11	To install a drip tray below a 7360 ISAM FX-16 shelf .....	92
Procedure 12	To install a 7360 ISAM FX-16 heat and fiber baffle kit above a shelf .....	96
Procedure 13	To install or replace a fan unit .....	102
Procedure 14	To replace a fan filter .....	104
<b>6</b>	<b>7360 ISAM FX-16 shelf cabling .....</b>	<b>105</b>
Procedure 15	To connect the grounding cable .....	109
Procedure 16	To connect the rack ground .....	109
Procedure 17	To connect power cables .....	114
Procedure 18	To disconnect the power cables .....	116
Procedure 19	To connect MDF cabling for LT cards with integrated splitter .....	124
Procedure 20	To connect vectoring links .....	127
<b>7</b>	<b>Installing cards in the 7360 ISAM FX-16 shelf .....</b>	<b>131</b>
Procedure 21	Installing a dummy front panel .....	135
Procedure 22	To install NT cards .....	139
Procedure 23	To install NTIO cards .....	141
Procedure 24	To install LT cards .....	142
Procedure 25	To remove cards .....	144
<b>8</b>	<b>Fiber optic cable management in the 7360 ISAM FX-16 shelf .....</b>	<b>147</b>
Procedure 26	To mount the fiber management guide .....	152
Procedure 27	To route fiber cables to NT and LT cards .....	154
Procedure 28	Installing an optical module .....	155
<b>9</b>	<b>Installing a 7360 ISAM FX-8 shelf .....</b>	<b>159</b>
Procedure 29	To mount the 7360 ISAM FX-8 shelf horizontally in a 19 in. rack .....	165
Procedure 30	To mount the 7360 ISAM FX-8 shelf vertically in a 19 in. rack .....	167
Procedure 31	To mount the 7360 ISAM FX-8 shelf horizontally in a 23 in. rack .....	180
Procedure 32	To mount the 7360 ISAM FX-8 shelf vertically in a 23 in. rack .....	183
Procedure 33	To install or replace a fan unit .....	190

Procedure 34	To replace a fan filter.....	192
<b>10</b>	<b>7360 ISAM FX-8 shelf cabling .....</b>	<b>195</b>
Procedure 35	To connect the grounding cable .....	198
Procedure 36	To connect the rack ground.....	199
Procedure 37	To connect power cables.....	203
Procedure 38	To disconnect the power cables .....	205
Procedure 39	MDF cabling procedure for LT cards with integrated splitter .....	211
Procedure 40	To connect vectoring links .....	214
<b>11</b>	<b>Installing cards in the 7360 ISAM FX-8 shelf.....</b>	<b>219</b>
Procedure 41	Installing a dummy front panel.....	223
Procedure 42	To install NTIO cards.....	228
Procedure 43	To install NT cards.....	229
Procedure 44	To install LT cards .....	231
Procedure 45	To remove cards.....	233
Procedure 46	To change the NGFC-H card.....	234
<b>12</b>	<b>Fiber optic cable management in the 7360 ISAM FX-8 shelf .....</b>	<b>237</b>
Procedure 47	To mount the fiber management guide.....	242
Procedure 48	To route fiber cables to NT and LT cards .....	243
Procedure 49	Installing an optical module .....	244
<b>13</b>	<b>Installing a 7360 ISAM FX-4 shelf.....</b>	<b>247</b>
Procedure 50	To mount the 7360 ISAM FX-4 shelf horizontally in a 19 in. rack.....	253
Procedure 51	To mount the 7360 ISAM FX-4 shelf in vertically in a 19 in. rack.....	255
Procedure 52	To mount the 7360 ISAM FX-4 shelf horizontally in a 23 in. rack.....	268
Procedure 53	To mount the 7360 ISAM FX-4 shelf vertically in a 23 in. rack.....	270
Procedure 54	To install or replace a fan unit .....	276
Procedure 55	To replace a fan filter.....	278
<b>14</b>	<b>7360 ISAM FX-4 shelf cabling .....</b>	<b>281</b>
Procedure 56	To connect the grounding cable .....	284
Procedure 57	To connect the rack ground.....	285
Procedure 58	To connect power cables.....	289
Procedure 59	To disconnect the power cables .....	291
Procedure 60	MDF cabling procedure for LT cards with integrated splitter .....	297
Procedure 61	To connect vectoring links .....	299
<b>15</b>	<b>Installing cards in the 7360 ISAM FX-4 shelf.....</b>	<b>303</b>
Procedure 62	Installing a dummy front panel.....	307
Procedure 63	To install NTIO cards.....	312
Procedure 64	To install NT cards.....	313
Procedure 65	To install LT cards .....	315
Procedure 66	To remove cards.....	317
Procedure 67	To change the NGFC-G card .....	318
<b>16</b>	<b>Fiber optic cable management in the 7360 ISAM FX-4 shelf .....</b>	<b>321</b>
Procedure 68	To mount the fiber management guide.....	326
Procedure 69	To route fiber cables to NT and LT cards .....	327
Procedure 70	Installing an optical module .....	328

---

<b>17</b>	<b>Installing a 7360 ISAM Active WM shelf .....</b>	<b>331</b>
Procedure 71	To install a drip tray below a 7360 ISAM WM shelf .....	332
Procedure 72	Installing a 7360 ISAM WM shelf in a 23 in. rack .....	338
<b>18</b>	<b>7360 ISAM Active WM shelf cabling.....</b>	<b>343</b>
Procedure 73	To connect the grounding cable .....	346
Procedure 74	To connect the rack ground.....	346
Procedure 75	Connecting the power cables .....	352
<b>19</b>	<b>Installing cards in the 7360 ISAM Active WM shelf .....</b>	<b>357</b>
Procedure 76	Installing a card .....	360
Procedure 77	To install power cards.....	363
Procedure 78	To install controller cards.....	365
Procedure 79	To install line cards.....	366
Procedure 80	To remove cards.....	367
<b>20</b>	<b>Fiber optic cable management in the 7360 ISAM Active WM shelf .....</b>	<b>369</b>
Procedure 81	To mount the fiber management guide.....	373
Procedure 82	To route fiber cables to line cards .....	374
Procedure 83	Installing an optical module .....	375
<b>21</b>	<b>Installing a 7360 ISAM Passive WM shelf .....</b>	<b>379</b>
Procedure 84	Mounting the 7360 ISAM Passive WM shelf in a 23 in. rack .....	383
<b>22</b>	<b>Installing modules in the 7360 ISAM 7360 ISAM Passive WM shelf .....</b>	<b>385</b>
Procedure 85	Installing a 7360 ISAM Passive WM module.....	386
Procedure 86	Installing the 7360 ISAM Passive WM modules .....	388
Procedure 87	Removing modules.....	388
<b>23</b>	<b>Fiber optic cable management in the 7360 ISAM Passive WM shelf .....</b>	<b>391</b>
Procedure 88	Routing fiber cables to the 7360 ISAM Passive WM modules .....	393
<b>24</b>	<b>Installing the WDM shelf .....</b>	<b>399</b>
Procedure 89	Mounting the WDM shelf above a vertically mounted 7360 ISAM FX-16 shelf.....	402
Procedure 90	Mounting the WDM shelf above an already installed 7360 ISAM FX-8 shelf.....	406
Procedure 91	Mounting the WDM shelf above an already installed 7360 ISAM FX-4 shelf.....	409
<b>25</b>	<b>Installing modules in the WDM shelf .....</b>	<b>411</b>
Procedure 92	Installing a WDM-A module in the WDM-A shelf.....	413
Procedure 93	Removing a WDM-A module from the WDM-A.....	414
<b>26</b>	<b>Fiber optic cable management in the WDM shelf .....</b>	<b>415</b>
Procedure 94	Installing fanout fiber cables between LT cards and the WDM-A.....	420
<b>29</b>	<b>Fiber optic handling and acceptance criteria .....</b>	<b>441</b>
Procedure 95	Inspection of fiber optic devices .....	447
Procedure 96	Clean the fiber optic receptacles .....	448
Procedure 97	Clean the fiber optic cable connectors .....	449



# 1 Preface

This preface provides general information for the 7360 Intelligent Services Access Manager FX (7360 ISAM FX) for ANSI.

## 1.1 Scope

The *7360 ISAM FX Hardware Installation Manual* describes how to install the 7360 ISAM FX equipment that is listed in Table 1 for ANSI.

**Table 1** 7360 ISAM FX shelves

Shelf	Part number
7360 ISAM FX-16 shelf (NFXS-D)	3FE 65209 BA
7360 ISAM FX-8 shelf (NFXS-E)	3FE 64936 BA
7360 ISAM FX-4 shelf (NFXS-F)	3FE 64991 BA
7360 ISAM Active WM shelf (FWMS-I)	3FE 71568 AA
7360 ISAM Passive WM shelf (PWMS-A)	3FE 73554 AA
Wavelength Division Multiplexer shelf (WDMS-A)	3FE 75161 AA

## 1.2 Related documents

For more information about the 7360 ISAM FX, see:

- *7360 ISAM FX System Description*
- *7360 ISAM FX Product Information Guide*
- *7360 ISAM FX Safety Manual*
- unit data sheets

## 1.3 Audience

This manual is intended for installers with site drawings that show power sources, floor plans and rack locations.

## 1.4 Assumed knowledge

The reader must be a skilled installer of hardware equipment and have knowledge of general telecommunications principles.

## 1.5 Assistance and ordering phone numbers

For ordering information, contact your Nokia sales representative.

## 1.6 Safety information

Safety guidelines are provided in the *7360 ISAM FX Safety Manual*.

## 1.7 Documents

The documentation that is available for the 7360 ISAM FX is listed in the *7360 ISAM FX Product Information Guide*.

## 1.8 Conventions

Table 2 lists the documentation conventions used in this documentation set.

**Table 2** Documentation conventions

Convention	Description	Examples
Key name	Identifies a keyboard key.	Delete
Italics	Identifies a variable.	<i>hostname</i>
—	An em dash in a table cell indicates that there is no information or that the category is not applicable.	—

## 1.9 Acronyms and initialisms

See the *Glossary* for the expansion of acronyms and initialisms used in this documentation set.

---

## 1.10 Special information

The following are examples of how special information is presented in this document.



**Danger** — Danger indicates that the described activity or situation may result in serious personal injury or death; for example, high voltage or electric shock hazards.



**Warning** — Warning indicates that the described activity or situation may, or will, cause equipment damage or serious performance problems.



**Caution** — Caution indicates that the described activity or situation may, or will, cause service interruption.



**Note** — A note provides information that is, or may be, of special interest.

### 1.10.1 Procedures with options or substeps

When there are options in a procedure, they are identified by letters. When there are required substeps in a procedure, they are identified by Roman numerals.

#### Procedure 1 Example of options in a procedure

At step 1, you can choose option a or b. At step 2, you must do what the step indicates.

---

**1** This step offers two options. You must choose one of the following:

- a** This is one option.
- b** This is another option.

---

**2** You must perform this step.

---

---

**Procedure 2 Example of required substeps in a procedure**

At step 1, you must perform a series of substeps within a step. At step 2, you must do what the step indicates.

- 
- |     |   |
|-----|---|
| 1   | This step has a series of substeps that you must perform to complete the step. You must perform the following substeps: |
| i   | This is the first substep.  |
| ii  | This is the second substep.   |
| iii | This is the third substep.  |
- 
- |   |                             |
|---|-----------------------------|
| 2 | You must perform this step. |
|---|-----------------------------|
- 

## 1.11 Multiple PDF document search

You can use Adobe Reader Release 6.0 and later to search multiple PDF files for a common term. Adobe Reader displays the results in a single display panel. The results are grouped by PDF file, and you can expand the entry for each file.



**Note** — The PDF files in which you search must be in the same folder.

**Procedure 3 To search multiple PDF files for a common term**

- 
- |   |                            |
|---|----------------------------|
| 1 | Open Adobe Acrobat Reader. |
|---|----------------------------|
- 
- |   |   |
|---|---|
| 2 | Choose Edit→Search from the Acrobat Reader main menu. The Search PDF panel appears. |
|---|---|
- 
- |   |                            |
|---|----------------------------|
| 3 | Enter the search criteria. |
|---|----------------------------|
- 
- |   |   |
|---|---|
| 4 | Click on the All PDF Documents In radio button. |
|---|---|
- 
- |   |  |
|---|--|
| 5 | Select the folder in which to search using the drop-down menu. |
|---|--|
- 
- |   |                             |
|---|-----------------------------|
| 6 | Click on the Search button. |
|---|-----------------------------|
-



---

Acrobat Reader displays the search results. You can expand the entries for each document by clicking on the + symbol.

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## 2 Overview

### 2.1 Requirements

### 2.2 Installation environment requirements

### 2.3 Equipment description

### 2.4 Initial site survey

### 2.5 Installation materials and tools

### 2.6 Installation procedures

---

## 2.1 Requirements

Observe the following:



**Danger** — Safety requirements.

Follow the safety guidelines described in the Safety Manual.  
See *7360 ISAM FX Safety Manual* for more information.



**Danger** — The following rack installation guidelines should be considered before installing a rack mounted shelf.

- **Elevated operating ambient temperature**

If the shelf is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Consideration should be given to installing the shelf in an environment compatible with the maximum ambient temperature (T<sub>ma</sub>) specified for the shelf.

It is possible for a horizontally-mounted shelf to blow hot air into the air inlet of another horizontally mounted shelf in an adjacent rack. Proper deflectors should be used at the rack level to prevent heat accumulation.

- **Reduced air flow**

Installation of the shelf in a rack should be such that the amount of airflow required for safe operation of the shelf is not compromised. Consideration should be given to potential interference from fans that are external to the rack-mounted equipment, such as air conditioning units that might create airflow which is in opposition to the airflow created by fan of the rack-mounted shelf.

- **Mechanical loading**

Mounting of the shelf in the rack should be accomplished to avoid a hazardous condition due to uneven mechanical loading.

- **Circuit overloading**

Consider the connection of the shelf to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of shelf nameplate ratings should be used when addressing this concern.

- **Reliable earthing**

Reliable earthing of rack mounted shelves should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (for example, use of power strips).

- **Environmental requirements**

7360 ISAM FX shelves use forced air convection cooling and have service-accessible, replaceable fan filters. These shelves are designed to self-protect and therefore shut down when over-heating.

Reliable equipment operation is specified as operation within a protected environment, otherwise known as a Controlled Environment. For more information, please see [Section 2.2 Installation environment requirements](#).

The fan filters in FX shelves must be replaced regularly to avoid service interruptions caused by blocked, dust-laden filters.

Ensure that the technical details on environmental conditions specified in GR-63-CORE [32] and GR-3108-CORE [40] are met.



**Danger — EMC/ESD requirements.**

Ensure that the EMC/ESD conditions meet GR 1089 CORE [35], GR-499-CORE [37].

Follow the antistatic procedures when handling units.

Most 7360 ISAM FX plug-in units and powered equipment contain devices susceptible to electrostatic discharge (ESD) that can damage circuitry in unconnected conditions.

## 2.2 Installation environment requirements

It is necessary for 7360 ISAM FX, 7360 ISAM WM, and WDM shelves to be installed in GR-3108-CORE Class 1 Controlled Environments or Class 2 Protected Equipment Outside Environments, such as specific buildings or structures, to ensure reliable equipment operation.

### 2.2.1 General information on GR-3108-CORE Class 1 and Class 2 environments

Equipment placed in GR-3108-CORE Class 1 environments is designed to be protected from direct exposure to weather and environmental stresses.

A Class 1 environment location usually has the active means of controlling the temperature within its defined space, and to maintain a preset temperature range. This control may be achieved through thermostat-controlled fans, refrigeration units, heat exchangers, coolers, or heaters.

Table 3 shows examples of what would or would not qualify as a Class 1 controlled protected environment.

**Table 3      Class 1 controlled protected environments**

Correct example of a Class 1 controlled protected environment	Incorrect example of a Class 1 controlled protected environment
A weather-protected, flood-resistant roofed structure with closed, protective walls, and having active temperature and humidity control.	A roofed structure with open walls.

The 7360 ISAM FX, 7360 ISAM WM, and WDM equipment is designed to comply with GR-3108-CORE Class 2 operating, storage, humidity, altitude, and fire resistance requirements when installed in an OSP environment.

## 2.2.2 GR-63-CORE indoor controlled environmental space

GR-63-CORE indoor controlled environmental space requires:

- continuous, ambient operating temperature of 40°C measured at inlet air to shelf
- relative humidity of 5% to 85% non-condensing
- maximum altitude of 6 kft.

The 40°C operating temperature can be exceeded with a short-term, temporary temperature up to 55°C measured at the air inlet, provided that the increase lasts for a period of no more than 96 consecutive hours, and for a total of no more than 15 days a year, and that the environmental space does not exceed the maximum yearly levels of contamination identified in Table 4.



**Note 1** — “15 days a year” refers to a total of 360 hours in any given year, and no more than 15 individual occurrences during a year.

**Note 2** — A fan filter must be installed in the equipment and replaced on a preventive maintenance schedule.

**Table 4** Maximum yearly levels of contamination — GR-63-CORE indoor controlled environments

Contaminant or Oxide of Nitrogen	Concentration
Airborne particles (TSP-Dichot 15)	20 µg/m <sup>3(1)</sup>
Coarse particles	<10 µg/m <sup>3(1)</sup>
Fine particles	15 µg/m <sup>3(1)</sup>
Water soluble salts	10 µg/m <sup>3(1)</sup>
Sulfate	10 µg/m <sup>3(1)</sup>
Nitrites	5 µg/m <sup>3(1)</sup>
Volatile Organic Compounds	1200 ppb <sup>(2)</sup>
(boiling point >30°C)	5000 µg/m <sup>3(1)</sup>
Sulfur Dioxide	50 ppb <sup>(2)</sup>
Hydrogen Sulfide	40 ppb <sup>(2)</sup>
Ammonia	500 ppb <sup>(2)</sup>
NO	500 ppb <sup>(2)</sup>
NO <sub>2</sub>	200 ppb <sup>(2)</sup>
HNO <sub>3</sub>	15 ppb <sup>(2)</sup>
Ozone	125 ppb <sup>(2)</sup>
Gaseous Chlorine (HCl +Cl <sub>2</sub> )	5 ppb <sup>(2)</sup>

## Notes

- (1)  $\mu\text{g}/\text{m}^3$  = micrograms per cubic meter
- (2) ppb = parts per billion

## 2.3 Equipment description

The basic building block of the 7360 ISAM FX is the OLT shelf that houses the plug-in units. The following types of OLT shelves are supported:

- 7360 ISAM FX-16; shelf with 16 LT slots, 2 NT slots, and one NTIO slot
- 7360 ISAM FX-8; shelf with 8 LT slots, 2 NT slots, and one NTIO slot
- 7360 ISAM FX-4; shelf with 4 LT slots, 2 NT slots, and one NTIO slot

The following sized racks that can contain 7360 ISAM FX equipment are supported:

- seismic 19 in. rack with 17.5 in. wide shelf mounting space for FX-4 and FX-8 vertical mounting
- EIA standard 19 in. rack with 17.75 in. wide shelf mounting space for FX-4 and FX-8 horizontal and vertical mounting
- 23 in. standard rack with 21.5 in wide shelf mounting space for FX-4 and FX-8 horizontal and vertical mounting and FX-16 vertical mounting

The following types of OLT shelves are supported for use in combination with the 7360 ISAM WM:

- 7360 ISAM FX-16; shelf with 16 LT slots, 2 NT slots, and one NTIO slot

The following sized racks that can contain 7360 ISAM WM equipment are supported:

- 23 in. standard rack with 21.5 in wide shelf mounting space for FX-4 and FX-8 horizontal and vertical mounting and FX-16 vertical mounting

The following types of OLT shelves are supported for use in combination with the 7360 ISAM WDM:

- 7360 ISAM FX-16; shelf with 16 LT slots, 2 NT slots, and one NTIO slot
- 7360 ISAM FX-8; shelf with 8 LT slots, 2 NT slots, and one NTIO slot
- 7360 ISAM FX-4; shelf with 4 LT slots, 2 NT slots, and one NTIO slot

The following sized racks that can contain 7360 ISAM WDM equipment are supported:

- seismic 19 in. rack with 17.5 in. wide shelf mounting space for FX-4 and FX-8 vertical mounting
- EIA standard 19 in. rack with 17.75 in. wide shelf mounting space for FX-4 and FX-8 horizontal and vertical mounting
- 23 in. standard rack with 21.5 in wide shelf mounting space for FX-4 and FX-8 horizontal and vertical mounting and FX-16 vertical mounting



A shelf is installed in a rack in the central office (CO) or remotely in a controlled environment vault (CEV).

A fully configured 7360 ISAM FX system consists of one shelf in one rack, network termination (NT) cards, and line termination (LT) cards. Each shelf is considered a separate 7360 ISAM FX system. The 7360 ISAM WM consists of one shelf in one rack, with a controller card, power cards, and up to 12 line cards (LCs).

A fan module is required in each 7360 ISAM FX shelf to provide cooling for the equipment.

For the 7360 ISAM FX-16 vertical mount configurations, mounting kits are included with the shipment, and contain specific shelf mounting brackets that must be used. Drip trays are required below each installed 7360 ISAM FX shelf, including below the bottom shelf of a rack when mounted on combustible surfaces for safety purposes. A heat and fiber management baffle kit is required directly above each 7360 ISAM FX shelf in the rack for safety and optical fiber management purposes. And a fiber management kit is required for each shelf to support optical fiber management and proper bend radius.

The 7360 ISAM FX-16 pre-installed rack contains:

- one or two factory installed 7360 ISAM FX-16 shelves
- heat and fiber management baffle kit(s)
- drip tray(s)

For the 7360 ISAM FX-4 and 7360 ISAM FX-8 horizontal mount, specific shelf horizontal mounting kits are required, depending on the size of the rack.

For the 7360 ISAM FX-4 and the 7360 ISAM FX-8 vertical mount, specific vertical shelf mount kits are required, depending on the size of the rack. These kits must be used for installation in compliance with safety specifications. The following hardware is included in the kits:

- Pre-assembled horizontal mounting brackets and air intake baffles/drip trays are required below each vertically installed shelf, including below the bottom shelf of a rack when mounted on combustible surfaces to enhance the required airflow for safety purposes.
- Pre-assembled top cross brackets, rear skirts and front skirts are required to contain possible flame spread damage to the equipment.
- Intumescent panels are required for protection and increased air flow.
- Top baffles are required for correct air flow, heat, and fiber management purposes.



**Caution —** The vertical shelf mount kits must be used for the 7360 ISAM FX-4 and 7360 ISAM FX-8 in a vertical mount installation as the air intake baffle/drip tray and top baffle are required to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

Fiber management kits are recommended for each shelf to support optical fiber management and proper bend radius.

See *7360 ISAM FX Product Information Guide* for more information about mounting kits.

Power must be supplied to the A and B power source at startup (boot time) or the system will not initialize. This failure is because a FANALM alarm for fan 1 will be raised if the fan unit is missing A- or B-side power. An alarm for this reason puts the system in thermal shutdown mode. This mode ensures proper powering of the equipment to protect the system from a potential thermal event.

To meet heat dissipation requirements, equipment arrangements in racks higher than 7 ft are identical to those for a 7 ft rack. Depending on company operating practices, customer-provided ancillary equipment can be mounted above the 7-ft level in these racks.

Customers can provide their own equipment racks and order 7360 ISAM FX equipment from Nokia. The customer-provided rack must meet or exceed the rack specifications as specified in the relevant unit data sheet.

Table 5 describes the 7360 ISAM FX rack configurations showing the EIA standard required rack space, mounting options, and rack layout supported for each 7360 ISAM FX shelf (depending on company operational practices).



**Note** — The supported 7360 ISAM FX vertical mount rack configurations for FX-16, FX-8, and FX-4 meet NEBS compliance specifications.

See the *7360 ISAM FX Safety Manual* for shelf power consumption information.

**Table 5** Supported rack configurations for 7360 ISAM FX

Shelf	Rack configuration (7 ft rack)	EIA rack space	Mounting
7360 ISAM FX-16 <sup>(1)</sup>	Up to 2 shelves per rack	17 Ru high per shelf unit	Vertical mount in a 23 in. rack with 21.5 in. opening
7360 ISAM FX-8 <sup>(3)</sup>	Up to 2 shelves per rack	16 Ru high per shelf unit	Vertical mount in an EIA standard 19 in. rack with 17.75 in. opening Vertical mount in a seismic rack with 17.5 in. opening Vertical mount in a 23 in. rack with 21.5 in. opening
7360 ISAM FX-8 <sup>(2)</sup>	Up to 4 shelves per rack	8 Ru high per shelf unit	Horizontal mount in a 23 in. rack with 21.5 in. opening
7360 ISAM FX-8	Up to 4 shelves per rack	8 Ru high per shelf unit	Horizontal mount in a 19 in. rack with 17.75 in. opening

(1 of 2)

Shelf	Rack configuration (7 ft rack)	EIA rack space	Mounting
7360 ISAM FX-4 (3)	Up to 2 shelves per rack	16 Ru high per shelf unit	Vertical mount in an EIA standard 19 in. rack with 17.75 in. opening Vertical mount in a seismic rack with 17.5 in. opening Vertical mount in a 23 in. rack with 21.5 in. opening
7360 ISAM FX-4 (2)	Up to 7 shelves per rack	5 Ru high per shelf unit	Horizontal mount in a 23 in. rack with 21.5 in. opening
7360 ISAM FX-4	Up to 7 shelves per rack	5 Ru high per shelf unit	Horizontal mount in a 19 in. rack with 17.75 in. opening

**(2 of 2)****Notes**

- (1) Specific baffle mounting kit must be used. See the *7360 ISAM FX Product Information Guide* for ordering information.
- (2) Specific mounting bracket kits must be used. See the *7360 ISAM FX Product Information Guide* for ordering information.
- (3) Specific vertical mount kits must be used. See the *7360 ISAM FX Product Information Guide* for ordering information.

The following figures show the supported 7360 ISAM FX rack configurations:

- Figure 1 for 7360 ISAM FX-16
- Figures 2, 3, 4 and 5 for 7360 ISAM FX-8
- Figures 6, 7, 8 and 9 for 7360 ISAM FX-4

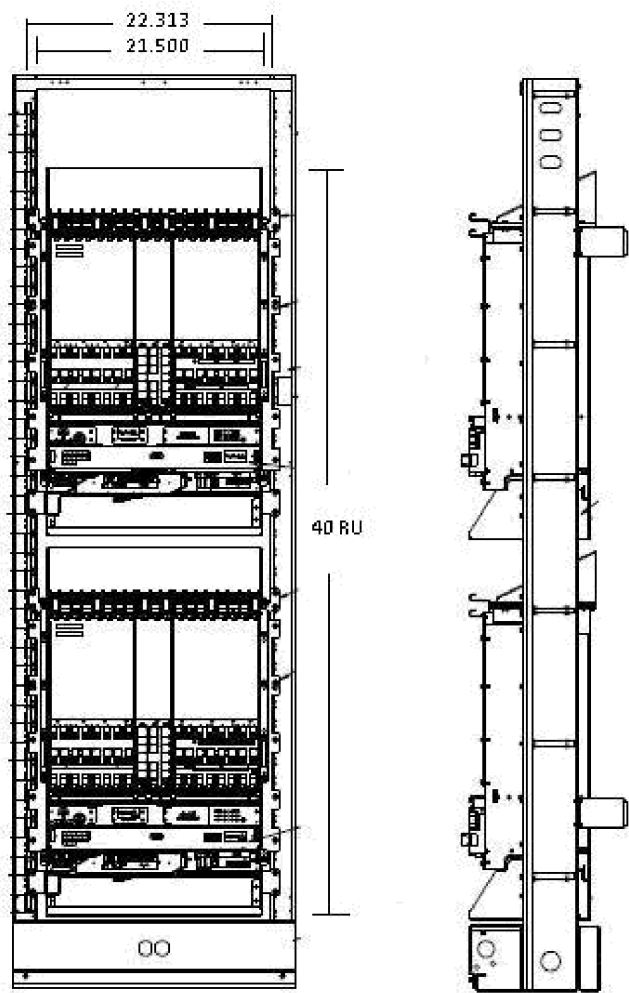
The following figure shows the supported 7360 ISAM WM rack configuration:

- Figure 10 for 7360 ISAM WM used in combination with the 7360 ISAM FX-16

The following figures show the supported WDM rack configurations:

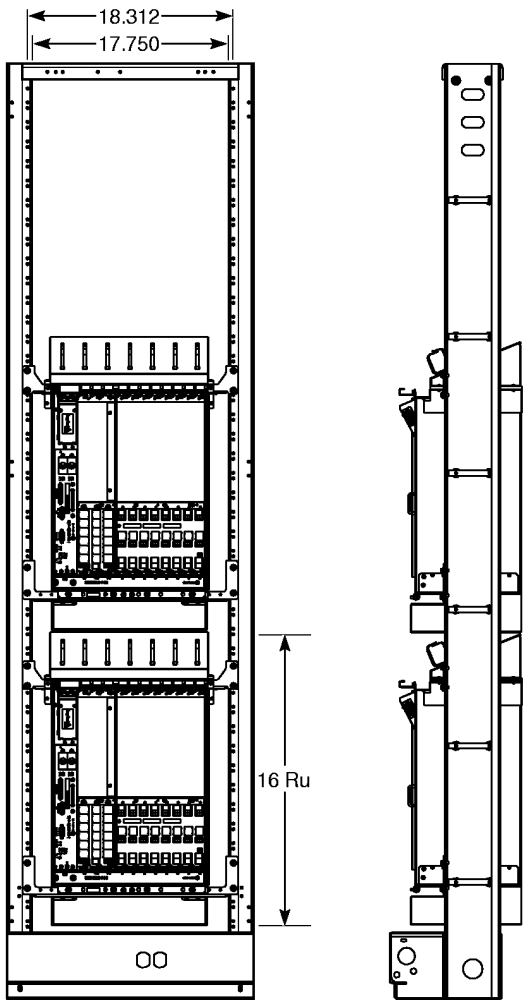
- Figure 11 for the WDMS-A used in combination with the 7360 ISAM FX-16
- Figures 12, 13, 16, and 17 for the WDMS-A used in combination with the 7360 ISAM FX-8
- Figures 14, 15, 18, and 19 for the WDMS-A used in combination with the 7360 ISAM FX-4

**Figure 1**      **Vertical mount configuration for 7360 ISAM FX-16 in a 23 in. rack**



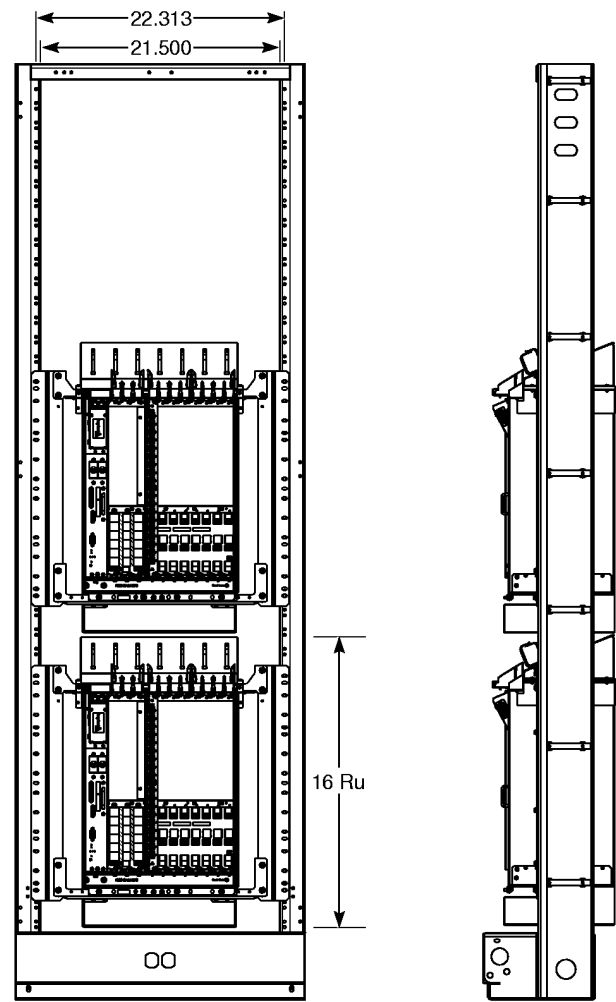
23921

**Figure 2**      **Vertical mount position for 7360 ISAM FX-8 in a 19 in. rack**



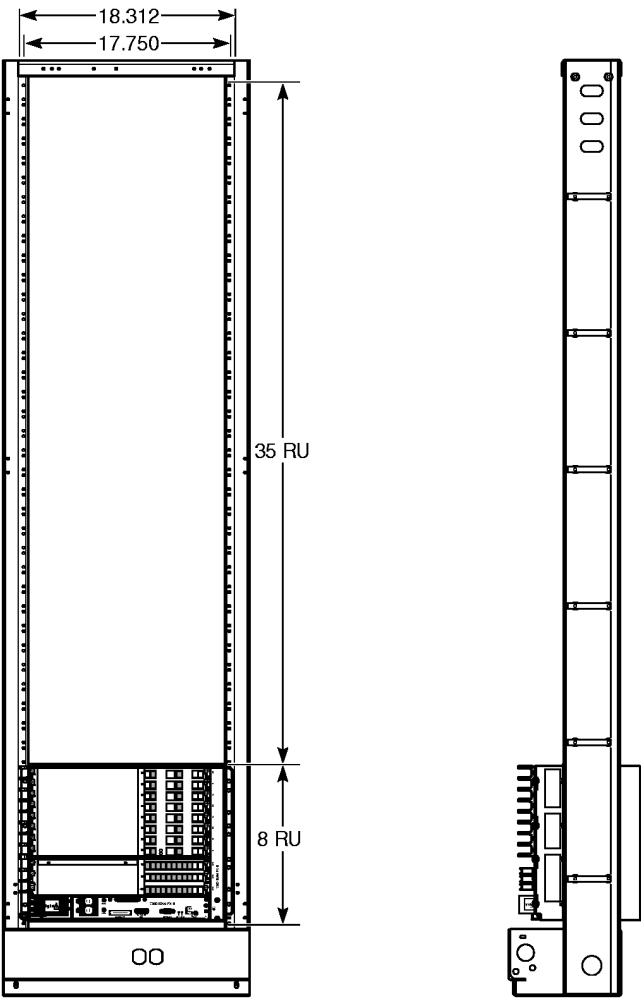
23367

**Figure 3** Vertical mount position for 7360 ISAM FX-8 in a 23 in. rack



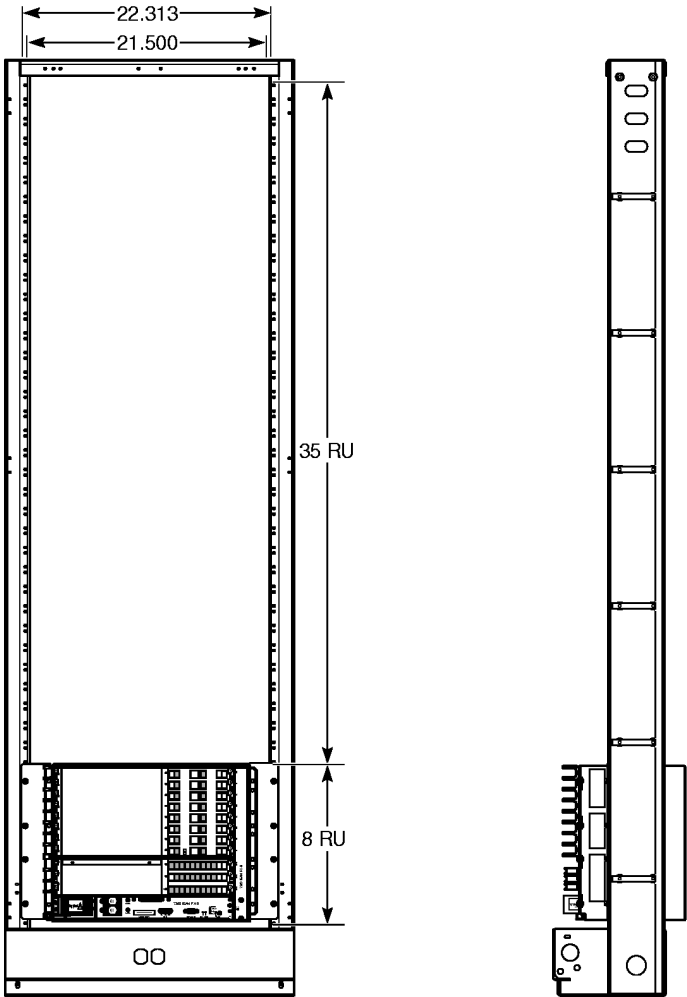
23366

**Figure 4**      **Horizontal mount position for 7360 ISAM FX-8 in a 19 in. rack**



22736

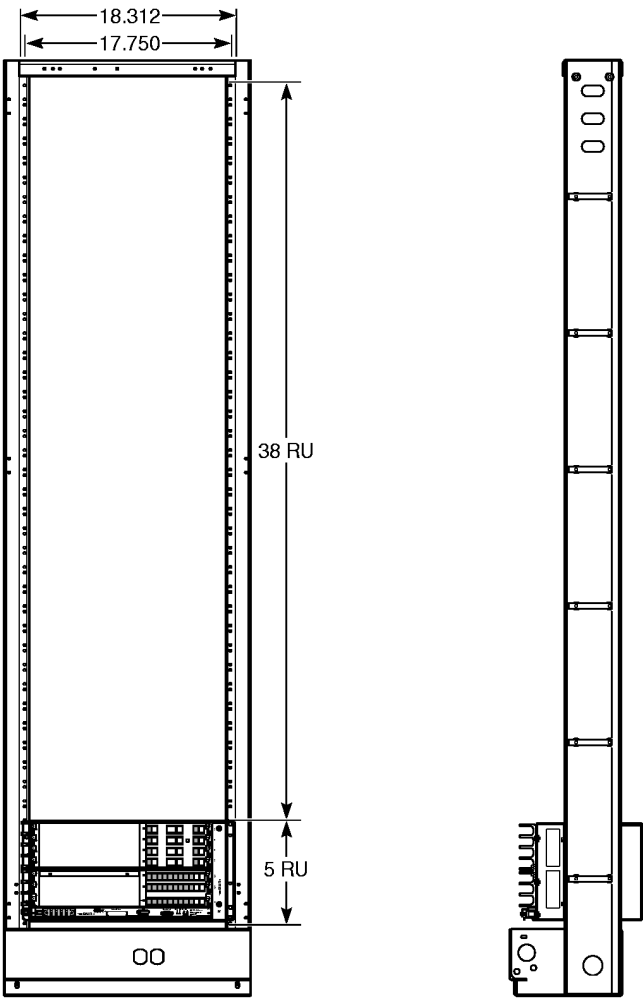
**Figure 5**      **Horizontal mount position for 7360 ISAM FX-8 in a 23 in. rack**



22734

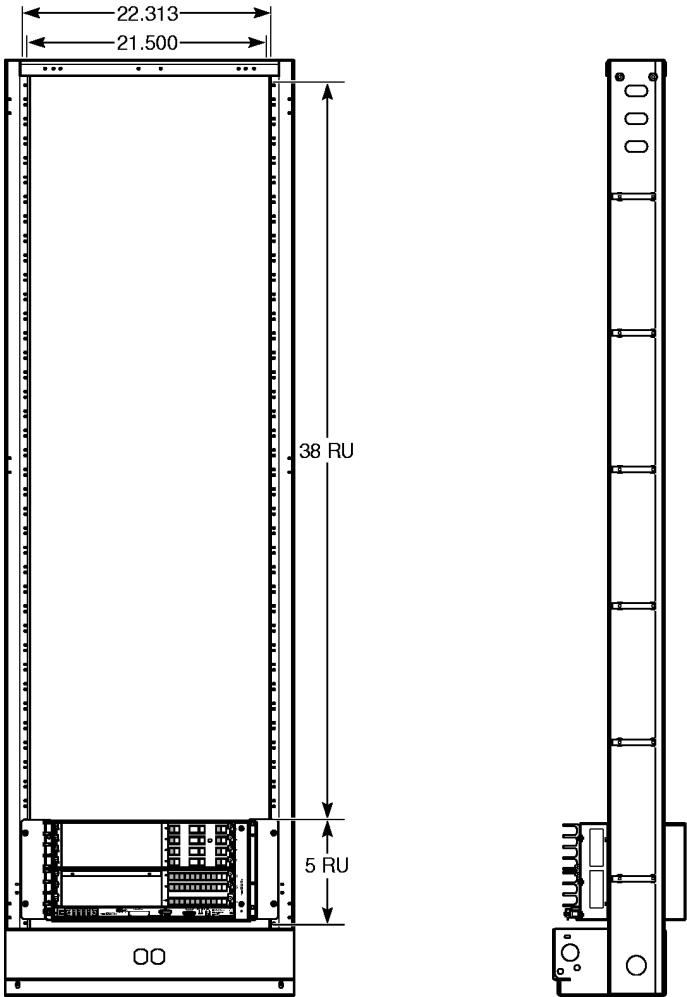


**Figure 6**      **Horizontal mount position for 7360 ISAM FX-4 in a 19 in. rack**



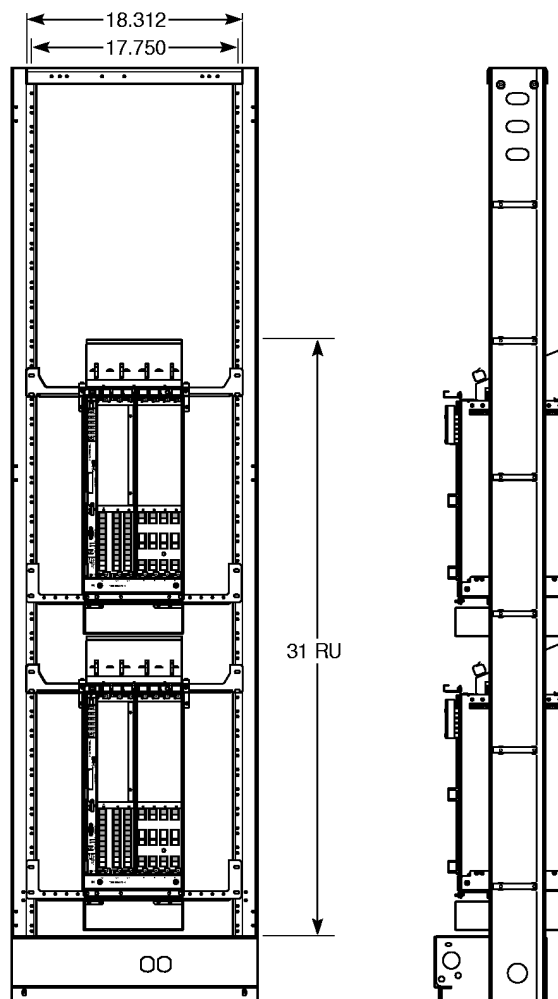
22740

**Figure 7**      **Horizontal mount position for 7360 ISAM FX-4 in a 23 in. rack**



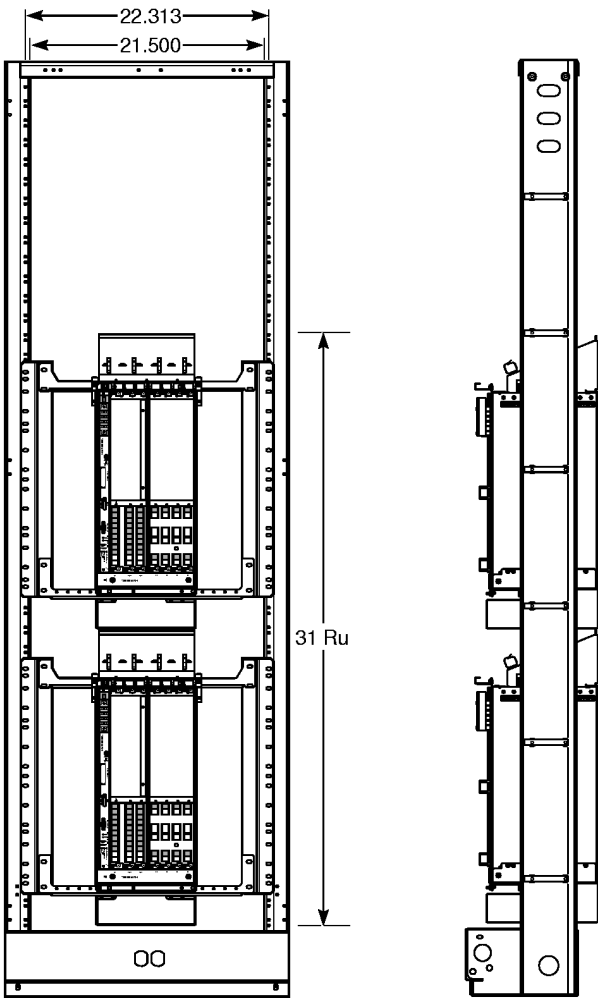
22738

**Figure 8** Vertical mount position for 7360 ISAM FX-4 in a 19 in. rack



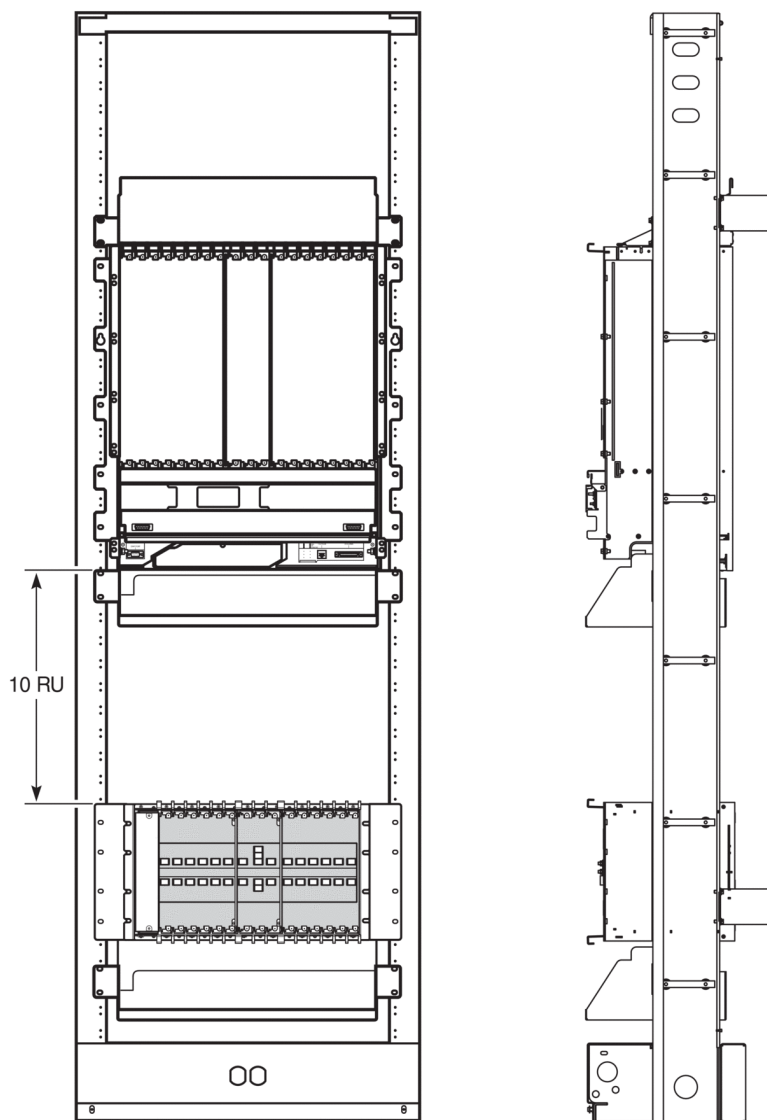
23567

**Figure 9**      **Vertical mount position for 7360 ISAM FX-4 in a 23 in. rack**



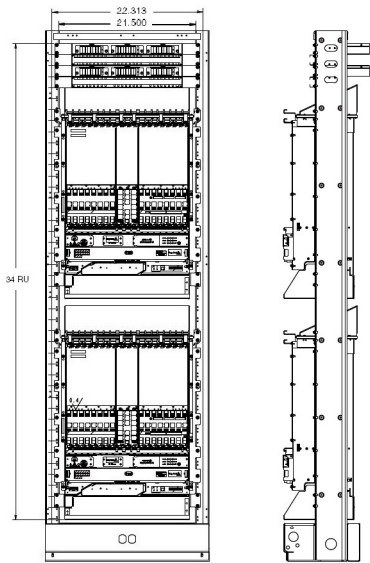
23568

**Figure 10** Vertical mount position for 7360 ISAM WM in a 23 in. rack

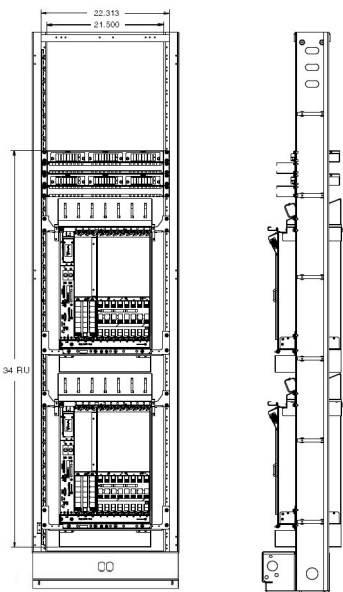


25785

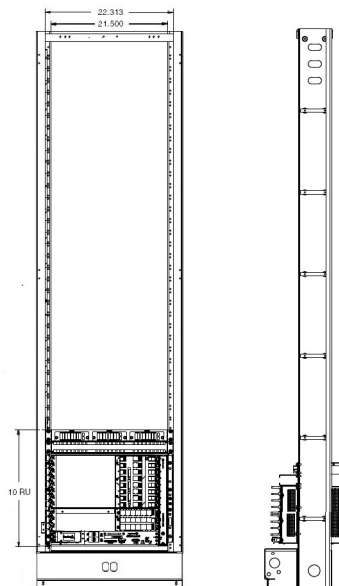
**Figure 11** WDM installed with a vertically mounted 7360 ISAM FX-16 in a 23 in. rack



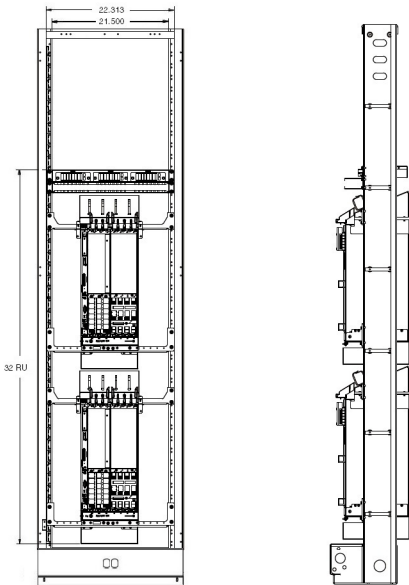
**Figure 12** WDM installed with a vertically mounted 7360 ISAM FX-8 in a 23 in. rack



**Figure 13** WDM installed with a horizontally mounted 7360 ISAM FX-8 in a 23 in. rack

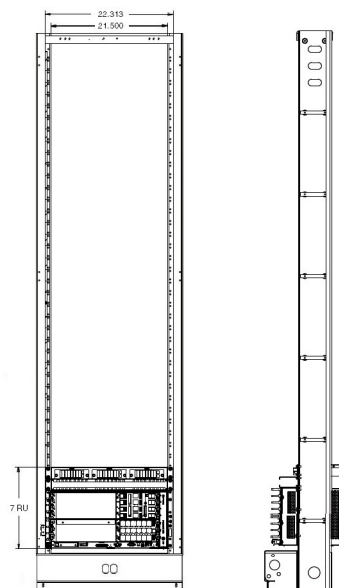


**Figure 14**     **WDM installed with a vertically mounted 7360 ISAM FX-4 in a 23 in. rack**

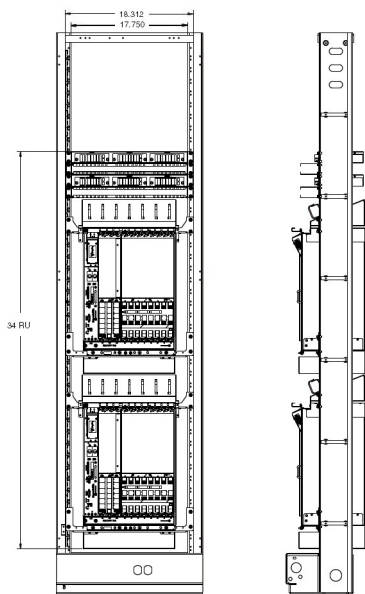




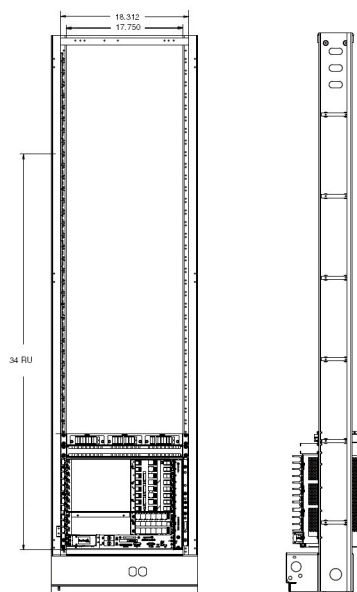
**Figure 15** WDM installed with a horizontally mounted 7360 ISAM FX-4 in a 23 in. rack



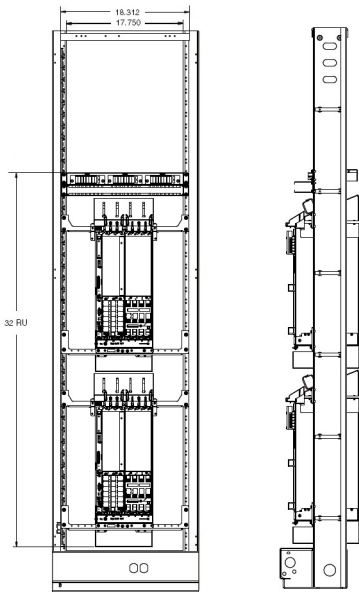
**Figure 16**      **WDM installed with a vertically mounted 7360 ISAM FX-8 in a 19 in. rack**



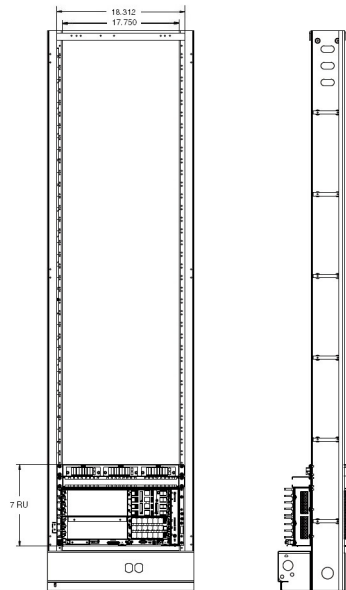
**Figure 17** WDM installed with a horizontally mounted 7360 ISAM FX-8 in a 19 in. rack



**Figure 18**     **WDM installed with a vertically mounted 7360 ISAM FX-4 in a 19 in. rack**



**Figure 19** WDM installed with a horizontally mounted 7360 ISAM FX-4 in a 19 in. rack



For more information about the 7360 ISAM FX, 7360 ISAM WM, and WDM, see the following documents:

- For ordering information about the fan units, baffles, and mounting installation kits required for each shelf, or any other equipment item, see the *7360 ISAM FX Product Information Guide*.
- For complete system description and unit descriptions (unit data sheets), see the *7360 ISAM FX System Description*.

## 2.4 Initial site survey

Nokia recommends that a site survey be conducted prior to ordering installation materials, to ensure a properly planned installation. During the site survey, at minimum, the following items should be determined:

- equipment rack locations (floor plan)
- rack mounting requirements (anchoring from ceiling or floor)
- required lengths for:
  - power cables from shelf to battery fused distribution panel (BFDP)
  - optical fiber cables (length of NT cable runs)
  - miscellaneous cables

- location of termination points and requirements for power and ground cables between 7360 ISAM FX racks and battery distribution feed card (BFDP) (customer provided).
- termination points and requirements for the 7360 ISAM FX rack connection to the office grounding architecture
- distribution frame termination block requirements (if not customer provided)
- cable rack, auxiliary framing, and overhead-rack bracing requirements
- length of NT cable runs and termination points
- cable loading considerations

This information must be communicated to Nokia.



**Danger** — Risk of dangerous or harmful situation if inappropriate materials are used.

This can cause death or serious physical harm to persons or damage to equipment.

The central office (CO) power cables, BAT A/B, battery return (BATRET), and frame ground (FG) must be constructed from the appropriate materials and must meet or exceed the standard CO specification.

## 2.5 Installation materials and tools

You need the following tools to install the 7360 ISAM FX system equipment. Other tools may be required to perform special procedures as specified in the instructions.



**Note** — All tools used on working equipment must be insulated.

- adjustable wrench, 12 in. (30.5 cm)
- anchor setting tool
- cable cutters
- camera
- carpenter claw hammer, 24 to 40 oz (0.68 to 1.13 kg)
- chalk line and chalk
- container for asbestos flooring drilling residue, if necessary
- crimping pliers
- diagonal cutters, 5 in. (12.7 cm)
- digital multimeter (volt-ohmmeter)
- extension cord, 50 ft (15 m)
- felt marking pens
- hex driver set with bits
- level, 3 ft (1 m)

- measuring tape
- needle-nose pliers
- open and box-end wrenches, 3/8 to 11/16 in. (9.5 to 17.5 mm)
- #2 Phillips and flathead screwdriver
- pinch bar
- rotary impact drill and associated drill bits
- safety glasses
- shears, common
- shims, 0.06 in., 0.09 in., and 0.12 in. (1.5 mm, 2.3 mm, and 3.1 mm)
- shop vacuum cleaner
- socket set, 3/8 in. drive with ratchet handle and extensions
- static protection accessories
- tin snips
- torque wrench
- wire stripper

## 2.6 Installation procedures

The installation procedures described in this document include the following:

- installation of pre-assembled rack
- installation of shelves into an existing rack
- installation of NT and LT cards in a 7360 ISAM FX shelf
- installation of power cards, controller cards, and line cards in a 7360 ISAM WM shelf
- installation of modules in a WDM shelf
- fiber optic cable management



**Note** — Each shelf installed in the rack, with plug-ins and accessory equipment, is a standalone system.





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## 3 Floor preparation

### 3.1 Overview

### 3.2 General

### 3.3 Parts list

### 3.4 Recommended tools

### 3.5 Procedures

## 3.1 Overview

This chapter provides the procedures to prepare the 7360 ISAM FX, 7360 ISAM WM, and WDM ANSI installation site in a central office (CO) and includes seismic and non-seismic qualified instructions.

## 3.2 General

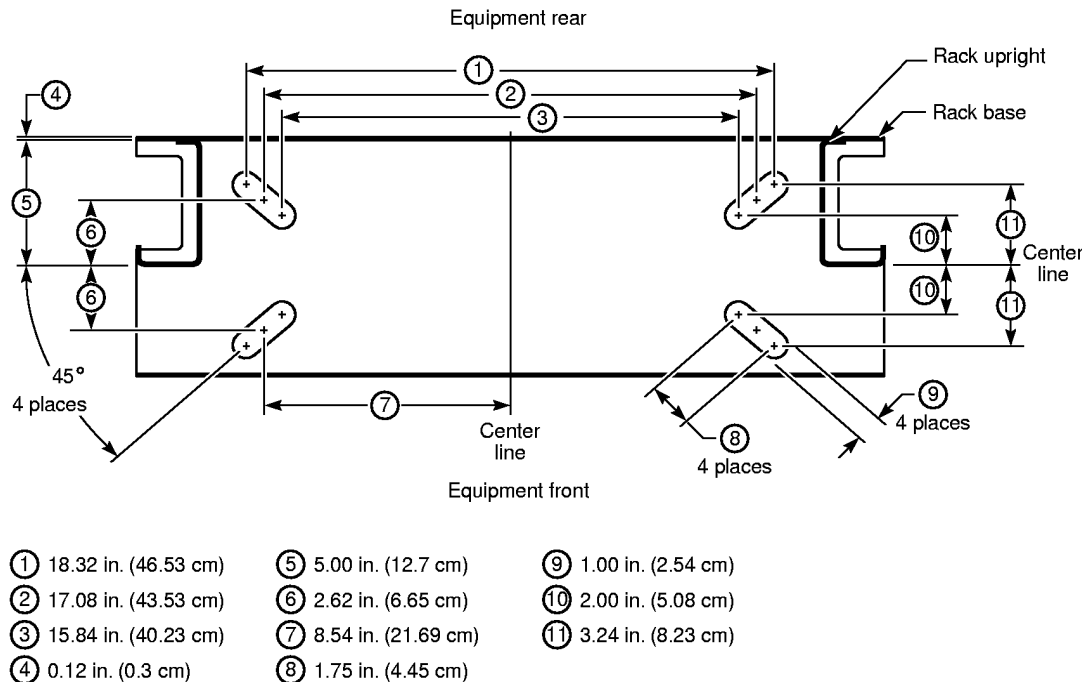
The floor preparations for the 7360 ISAM FX equipment using a 23 in. rack are included in this section.

A seismic qualified rack is designed to help resist load fluctuations due to motions and vibrations that can be caused by seismic events. In areas of high probability of earthquakes, seismic racks should be chosen and/or may be required by building codes and specifications. Seismic qualified racks are welded structures that are tested in compliance with NEBS GR-63-CORE safety standards. Seismic racks have a heavier base structure, deeper side channels and must be secured to the floor using heavy-duty anchors.

### 3.2.1 Rack footprints and dimensions

Figure 20 shows the 7360 ISAM FX ANSI 23 in. rack footprint with dimensions.

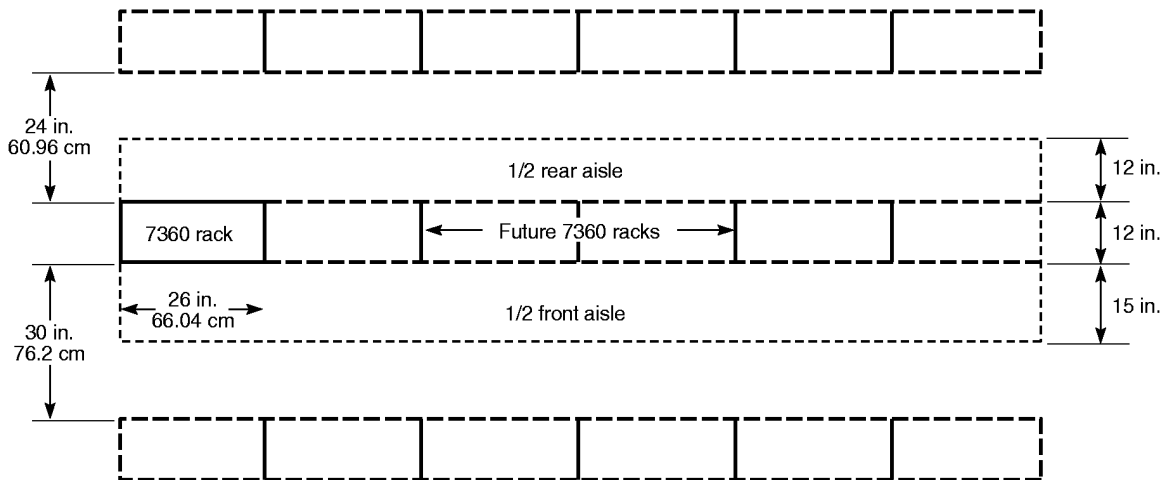
Figure 20 7360 ISAM FX ANSI 23 in. rack footprint and dimensions



22364

Figure 21 shows a sample floor plan of the 7360 ISAM FX rack configuration using the 7360 ISAM FX-16 shelf configuration.

Figure 21 7360 ISAM FX ANSI sample rack configuration floor plan



Note: Aisle spacing shown as typically used in NEBS environment: Other spacings may be used.

22363

---

The following applies for multiple rack configurations.

- Racks can be added from either left to right, or right to left. The order is not important.
- Cable areas on the left and the right of each rack allow you to route rack cables up to rack overhead guides.

### 3.3 Parts list

For racks and hardware mounting parts can be ordered from Nokia. See the *7360 ISAM FX Product Information Guide* for ordering information.

### 3.4 Recommended tools

The following tools are recommended:

- common shears
- level, 3 ft (1 m)
- chalk line and chalk
- felt marking pen
- measuring tape
- anchoring tool

### 3.5 Procedures

Use the following procedures to prepare the ANSI installation site.

#### Procedure 4 To mark the rack positions

- 
- 1 Verify the layout of floors, ceiling and walls is as shown in the applicable drawings and specifications provided by the site survey team.
- 
- 2 Verify that the area dimensions and the location of reference points correspond to the floor plan.
- 
- 3 Use a level to verify that the floor is level.



**Warning** — Risk of equipment damage when the floor is not level.

Do not try to mount a rack on a floor that is not level.

- 
- 4 Mark the references and the layout lines.

To avoid cumulative errors when laying out short dimensions in a straight line, first mark the total length, then divide it into shorter lengths leaving the measuring tape in place.

Where the layout lines intersect, extend the lines at least 6 in. (15.24 cm) beyond the point of intersection to check the equipment alignment.

- 
- 5 Mark the rack position on the floor with a chalk line, referring to the job floor plan. This position should provide an optimal space for cable routing.



**Note 1** — The maximum allowable horizontal alignment deviation of the joined ends of racks cannot be more than 1/16 in. (1.6 mm).

**Note 2** — In earthquake zones, place anchors as close to the four corners of the rack as possible.

- 
- 6 STOP. This procedure is complete.
- 

## Procedure 5 To drill floor for anchoring 23 in. rack

- 
- 1 Review the anchor points for each rack, using the rack base as a template.



**Note 1** — Precision spacing between racks is critical, because rack ends are not adjustable. Install the floor anchors for each rack only after the previous rack is mounted and attached.

**Note 2** — For non-seismic qualified installations, typically four anchors are used for concrete flooring, however sometimes two anchors may be used if the rack is also supported from overhead.

**Note 3** — For seismic qualified installations, always use four anchors placed as close to the four corners of the rack as possible.

- 
- 2 Cover the surrounding floor area with protective covering as required by local practice.

- 
- 3 Put on the safety glasses.



**Danger** — If drilling asbestos flooring, use only the approved tools and packing materials for debris removal.

- 
- 4 Is this a seismic qualified installation?
    - a If it is seismic qualified, go to step 5.
    - b If it is non-seismic qualified, go to step 8.



**Note —** Use the exact drill size for drilling anchor holes to achieve maximum anchor strength.

- 
- 5 Obtain the seismic anchor bolts, and the floor mounting hardware kit.
- 
- 6 Drill a 0.7 in. (18 mm) diameter anchor hole 4 in. (10 cm) deep at each of the four anchor positions. If the longer concrete anchor (M12/50) is being used, a deeper anchor hole (up to 1 in. or 2.5 cm deeper) may be required.
- 
- 7 Go to step 10.
- 
- 8 Obtain the floor mounting hardware kit and the anchor setting tool.
- 
- 9 Drill a 0.6 in. (16 mm) diameter anchor hole 2 in. (5 cm) deep at each of the anchor positions.
- 
- 10 Completely remove debris from the anchor hole and surrounding area with the shop vacuum (or approved hazardous waste removal method). Inspect the anchor hole for any concrete chips. The anchor holes must be completely clear to properly seat the anchor.
- 
- 11 Cover the anchor holes using plugs if the rack will not be installed immediately.
- 
- 12 STOP. This procedure is complete.
-



---

## 4 Installing racks

### 4.1 Overview

### 4.2 Unpacking and inspection

### 4.3 Installing a rack

## 4.1 Overview

This chapter provides the procedures to install 7360 ISAM FX, 7360 ISAM WM, and WDM ANSI racks using the adapter plate assembly, floor mounting hardware, and rack base guards for both seismic and non-seismic qualified installations.

## 4.2 Unpacking and inspection

In general, the rack is shipped in horizontal position. It includes the shelves, the baffles, and drip trays.

Plug-in cards, fans, and cables are shipped separately from the rack.



**Note** — Always transport plug-in cards in their original package. Never transport them while they are plugged into the shelf.

### 4.2.1 Shelf units

The shelf can be shipped either mounted in the rack for predefined configurations (see the *7360 ISAM FX Product Information Guide* for possible configurations), or as an individual item for customer expansion beyond initial configuration.

### 4.2.2 Separate kits and parts

When installing shelf units in existing rack configurations, the cables, mounting brackets, and heat/airflow fiber management baffles are shipped as separate kits or units.

---

### 4.2.3 Parts list

You need the shipping container with rack and accompanying parts for this procedure.

### 4.2.4 Recommended tools

The following tools are recommended:

- adjustable wrench, 12 in. (30.5 cm)
- carpenter's claw hammer
- pinch bar, nail puller, or ripping chisel
- safety glasses
- shears common, metal
- tin snips



**Danger** — The material-handling equipment necessary for safe handling includes a forklift truck, lifting sling or block and tackle, and dolly. To prevent injury to personnel when operating the material-handling equipment, use extreme care and follow standard safety precautions.



**Warning** — Exercise care when moving the equipment. Excessive shock or vibration can cause damage to the equipment.

### Procedure 6 To unpack equipment

- 
- 1 Inspect each shipping container for damage.
  - 2 If there is damage, notify the transportation carrier and Nokia immediately. Photograph all damaged containers. Keep all inspection and packing documents for reference.
  - 3 If there is no damage, place the container on a level floor as near to the final installation location as possible. This area must be free of moisture, dirt, and dust.
  - 4 Carefully open the top of the container. Take care not to damage the equipment.
  - 5 Remove the exterior packing or bracing material.
-



- 
- 6 Cut open the moisture vapor bag with the shears and remove packing or bracing material.
  - 7 STOP. This procedure is complete.
- 

## Procedure 7 To inspect equipment

- 
- 1 Check the equipment items against the packing list.
  - 2 Is the equipment packed in a container or a box?
    - a If in a container, go to step 3.
    - b If in a box, go to step 6.
  - 3 Before removing the equipment from the container, check inside the container for parts that may have become loose during shipment, and remove them.
- 



**Danger** — Possibility of personal injury. Lifting heavy equipment without the appropriate tools for material handling could result in physical harm and/or damage the equipment. When lifting the racks, apply appropriate pulleys or hoists and use the eye bolts.

- 
- 4 Remove the equipment from the container, then raise the rack to a vertical position.
  - 5 Remove the two transport brackets and eye bolts from the rack. Secure the rack to keep it from falling over.
  - 6 Check the equipment parts against the packing list.
  - 7 Inspect the equipment for damage. The exterior and interior of equipment and component parts must be free from grease, dirt, and corrosion.
- 



**Warning** — Do not install damaged or dirty equipment, since this can adversely affect the equipment.

- 
- 8 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all damaged equipment. Keep all inspection and packing documents for reference.
-

---

**9** If there is no damage, dispose of the shipping material according to local code.

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**10** STOP. This procedure is complete.

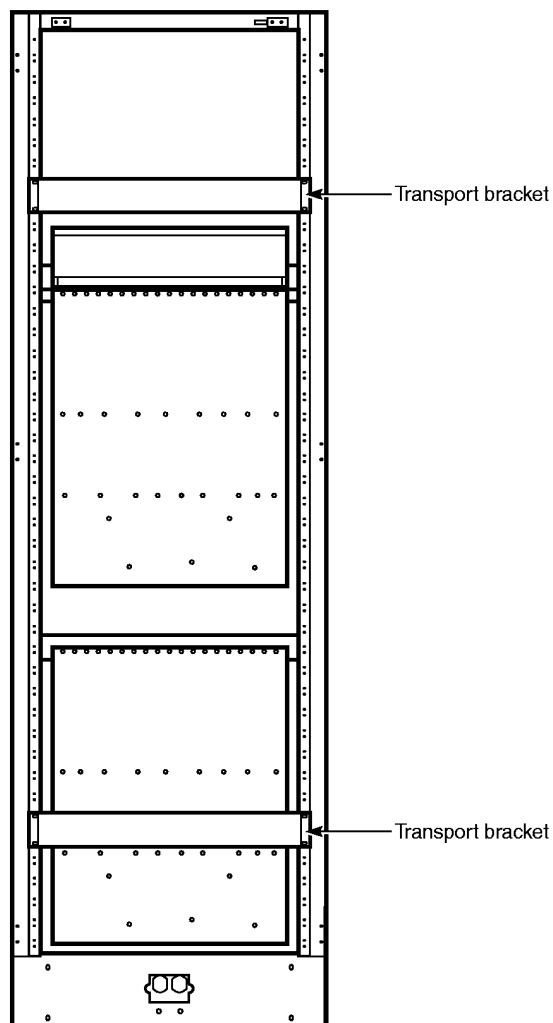
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## 4.2.5 Transport brackets

The transport brackets are mounted on the rack for easier transport and to protect the rack from damage during transport.

Figure [22](#) shows the location of the transport brackets on a rack.

**Figure 22** Transport brackets located on the rear of the rack



22369

The brackets must be removed on site.

## 4.3 Installing a rack

See the *7360 ISAM FX Product Information Guide* for part numbers and ordering information.

### 4.3.1 Parts list

General installation components include the following:

- 7360 ISAM FX supported rack
- 7360 ISAM WM supported rack
- WDM supported rack
- adapter plate assembly kit; one required per rack (not included with rack; order separately)
- concrete anchor setting tool; one required per installation site (not included with rack; order separately)

Seismic installation components include the following:

- seismic rack extender; one optional per rack (not included with rack; order separately). Order the height of seismic rack extender required to convert the 7-ft rack to the height of the CO where the product is being installed. This component extends the 7-ft rack, connecting to the CO overhead cable raceway rails only—it does *not* allow additional shelf installation.
- seismic anchor bolt, size M12/25 (12 mm diameter bolt with 25 mm grip), four required per rack (not included with rack; order separately)
- seismic anchor bolt, size M12/50 (12 mm diameter bolt with 50 mm grip), four required per rack (not included with rack; order separately)



**Note —** The standard anchor is M12/25. In applications where the floor is not level and requires shimming greater than 0.125 in. (3.175 mm), the longer anchor (M12/50) may be required. In all cases, make sure that the minimum embedment mark on the anchor is at or below the level of the concrete.

Non-seismic installation components include the following:

- floor mounting hardware kit; one kit required per rack (not included with rack; order separately)
- anchor bolt, size M12/25 (12 mm diameter bolt with 25 mm grip), two or four required per rack dependent on installation practice (not included with rack; order separately)

### 4.3.2 Recommended tools

The following tools are recommended:

- extension cord, 50 ft (15 m)
- flathead and #2 Phillips screwdrivers
- handling materials, tools, method, and packing material for hazardous waste material removal, if required
- level, 3 ft (1 m)
- rotary impact drill and associated drill bits

- safety glasses
- shop vacuum
- socket set, 3/8-in. drive with ratchet handle and extensions
- torque wrench



**Danger 1** — Do not use a shelf as a handhold (or foothold) when lifting the rack.

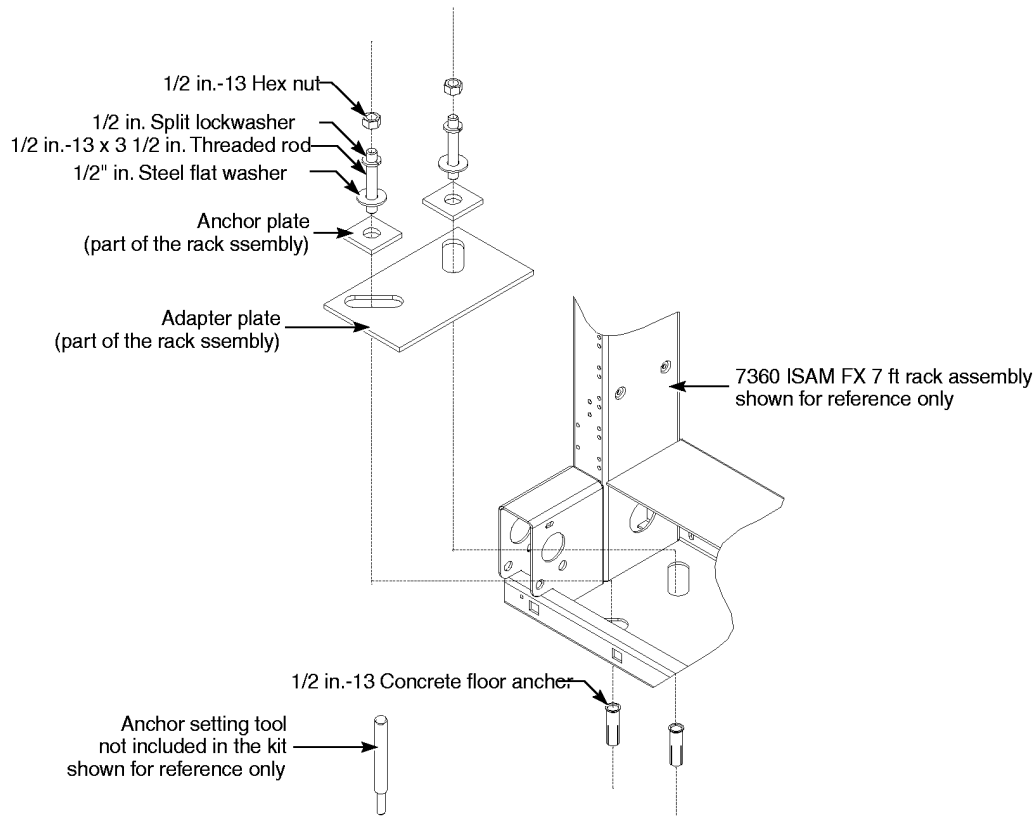
**Danger 2** — Brace the top of the rack during movement to prevent tipping, and avoid strains that might twist or otherwise damage the shelf backplane.



**Note** — For installation at sites prone to seismic shock, the rack installation is effective only on concrete flooring with a minimum thickness of 6.25 in. (15.88 cm), a minimum strength of 3000 psi (20 684 kPa), and with 0.5% steel rebar reinforcement. In cases where the longer concrete anchor (M12/50) is being used, the concrete should be a minimum of 7.25 in. (18.42 cm) thick.

## Procedure 8 To mount a rack to floor for non-seismic installation

- 1 Verify the rack is unpacked as described in [“Unpacking and inspection”](#) and make sure that the floor is properly prepared as described in Chapter 3.
- 2 Install a floor anchor in each hole and set with the setting tool; see Figure 23. The anchor is fully seated when the tool is flush with the top of the anchor.

**Figure 23** Securing the rack to the floor (non-seismic qualified installation)

22366

- 3 Position the rack over the hole pattern.
- 4 Install the threaded rod and other hardware; see Figure 23.
- 5 Use the level to check leveling and alignment of the rack at the base, top, and both sides. Tighten the hex nuts.



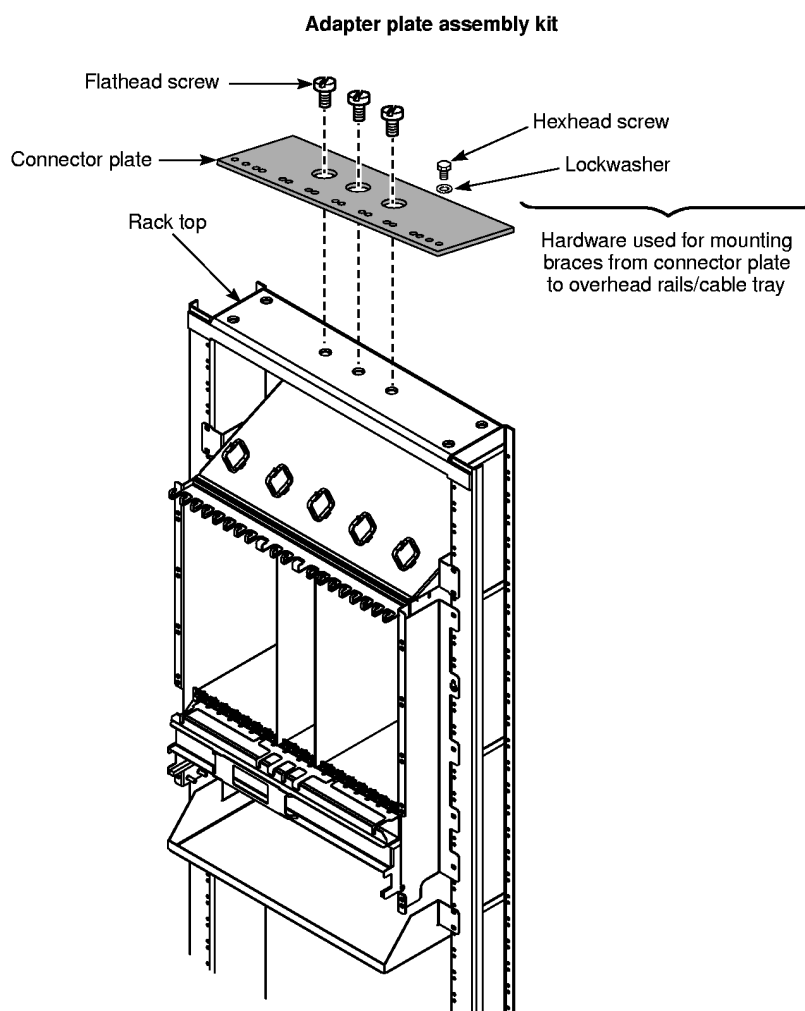
**Note —** The maximum shim height to achieve the allowable vertical deviation is 0.75 in. (19 mm).

- 6 Mount the connector plate to the top of the rack; see Figure 24.



**Note** — The connector adapter kit provides rack tie-down facilities per Telecordia specifications.

**Figure 24** Rack connector plate for 7-ft rack



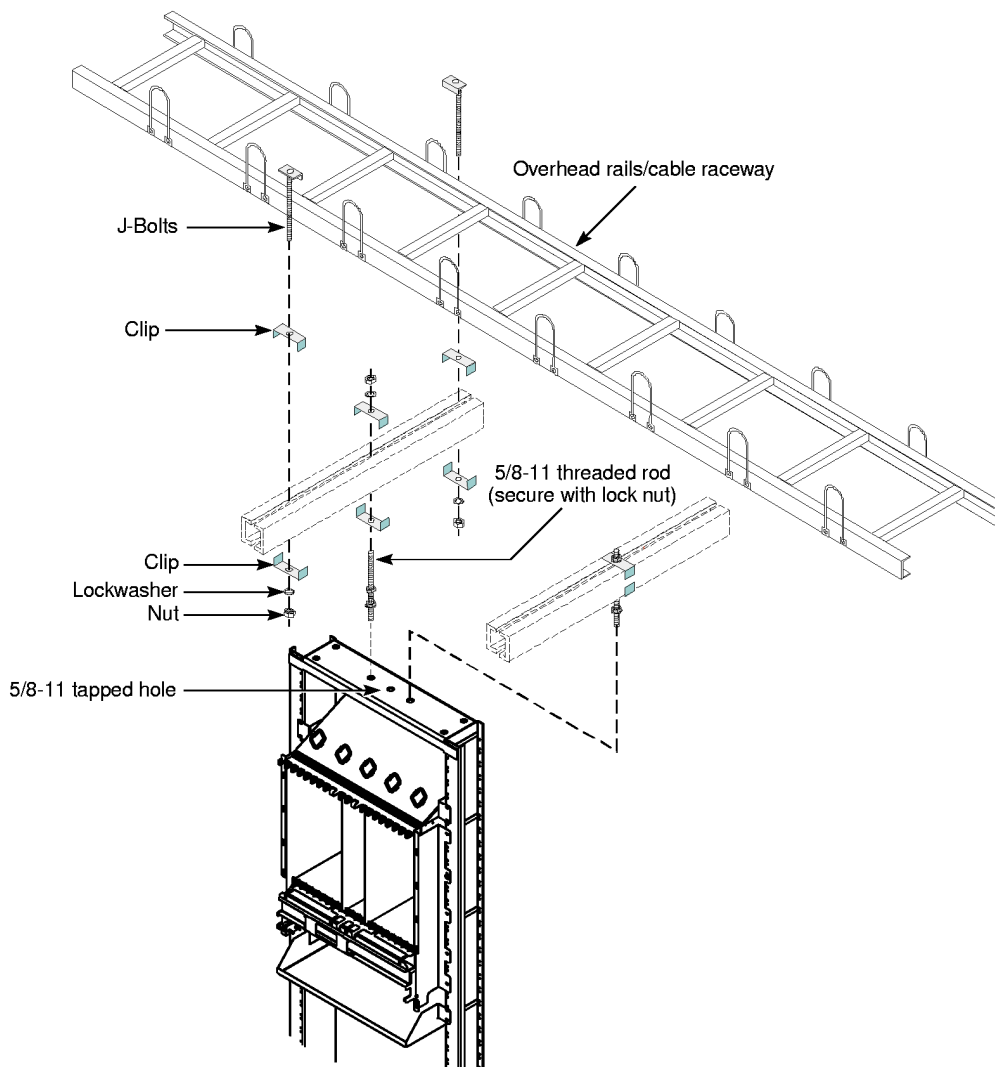
22368

- 7 Brace the rack per recommended office practice. Figure 25 provides an example of attaching the rack to overhead rails.



**Note** — To attach the rack to rails higher than 7-ft (213 cm), use a seismic rack extender. See Procedure 9 for the installation steps.

**Figure 25** Bracing the rack to overhead (example)



22367

- 8 Verify rack leveling and adjust as required.



- 
- 9 Tighten the top support hardware.
  - 10 Re-tighten the floor anchor bolts.
  - 11 STOP. This procedure is complete.
- 

## Procedure 9 To mount a rack to floor for seismic installation

- 
- 1 Verify the rack is unpacked as described in [“Unpacking and inspection”](#) and make sure that the floor is properly prepared as described in Chapter 3.
  - 2 Position the rack over the anchoring hole pattern.
  - 3 Position the two slotted adapter plates from the rack kit over the drilled holes.
    - a If the supplied adapter plate is 0.5 in. (12.7 mm) thick, install one over each slot in the adapter plate.
    - b If the supplied adapter plate is 0.25 in. (6.35 mm) thick, install two over each slot in the adapter plate.
- 

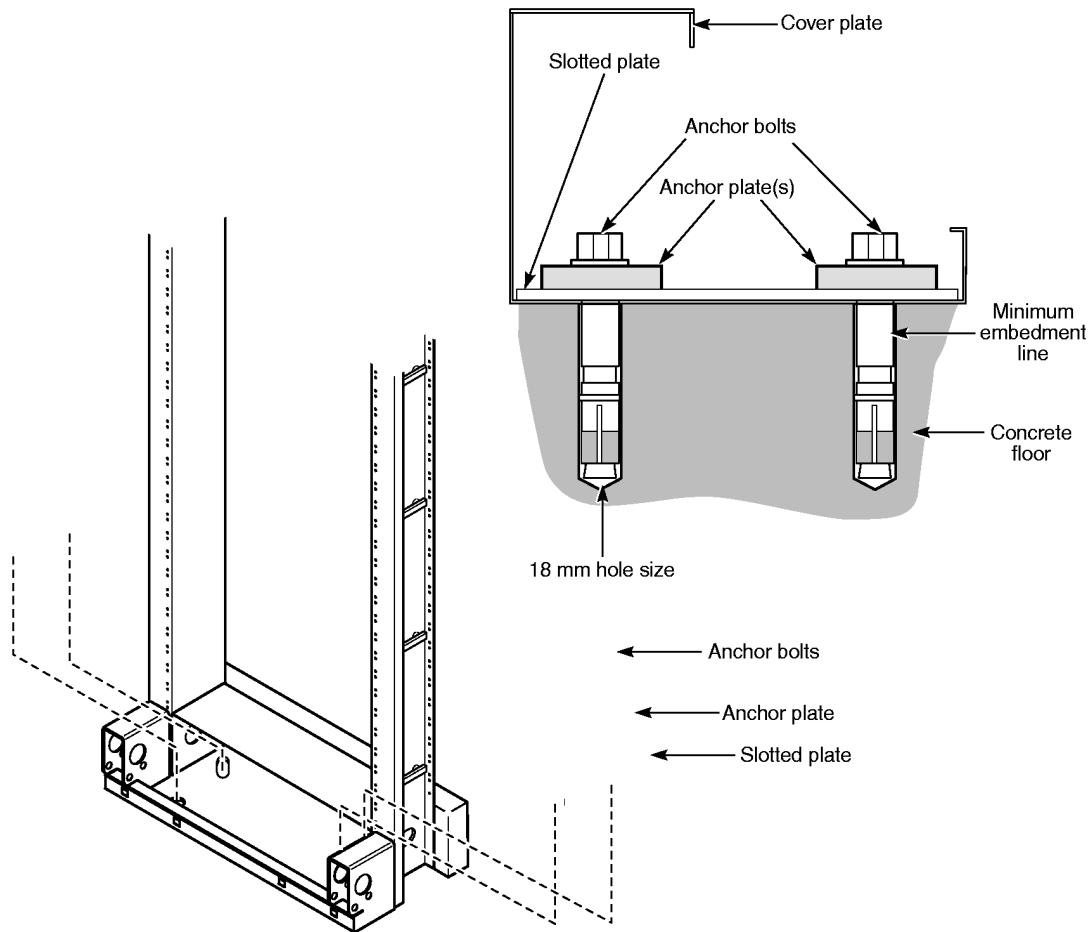


**Note —** One 0.25 in. (6.35 mm) thick adapter plate can be used to help set the minimum embedment mark on the anchor at or below the concrete surface.

- c Tap an assembled anchor bolt through the adapter plates into each of the four drilled anchoring holes; see Figure 26.



**Note —** The anchor bolt should be seated firmly against the adapter plates and the equipment rack. If the bolt protrudes or if the assembly is loose, re-drill to a greater depth and use the longer anchor bolts.

**Figure 26** Securing the rack to the floor (seismic-qualified installation)

22365

- 4 Line up the rack. Use the level to check leveling and alignment of the rack at the base, top, and both sides. If needed, insert a shim under the base to ensure correct leveling.



**Note** — The maximum shim height to achieve the allowable vertical deviation is 0.75 in. (19 mm).

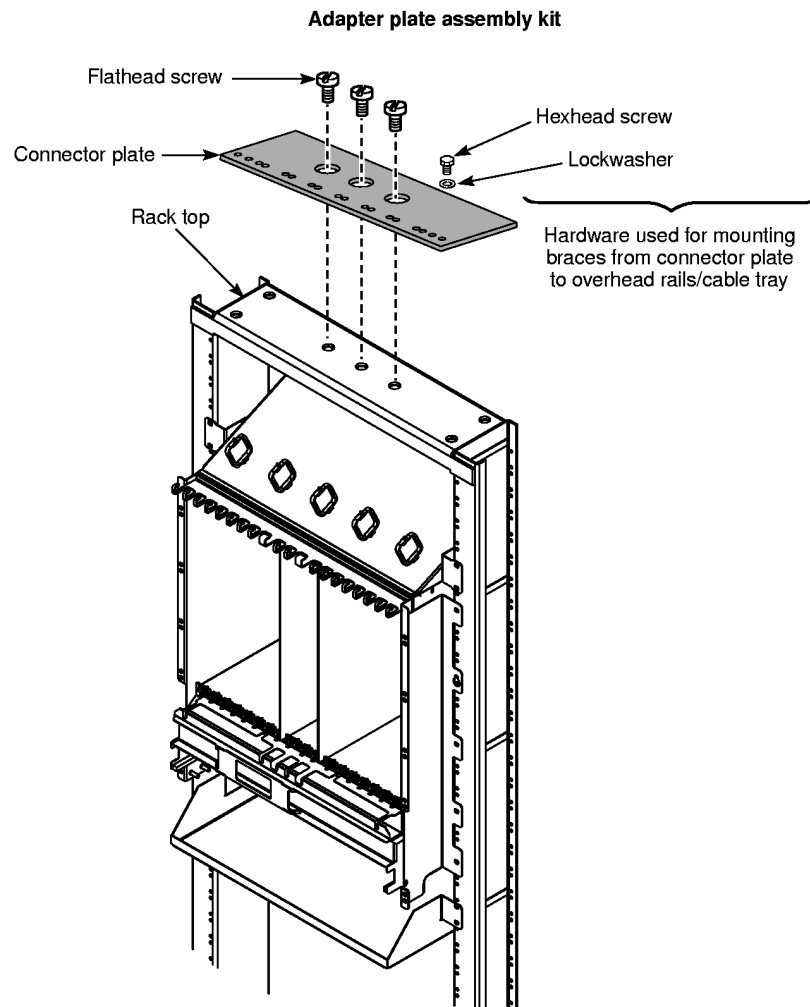
- 5 Apply torque to the red cap of each bolt until the retaining pins shear. Remove the cap to expose the green tabbed ring. The exposure of the green tabbed ring indicates proper installation.

- 6 Mount the seismic rack extender on the rack using the screws provided, then mount the connector plate at the top of the extender; see Figure 27.



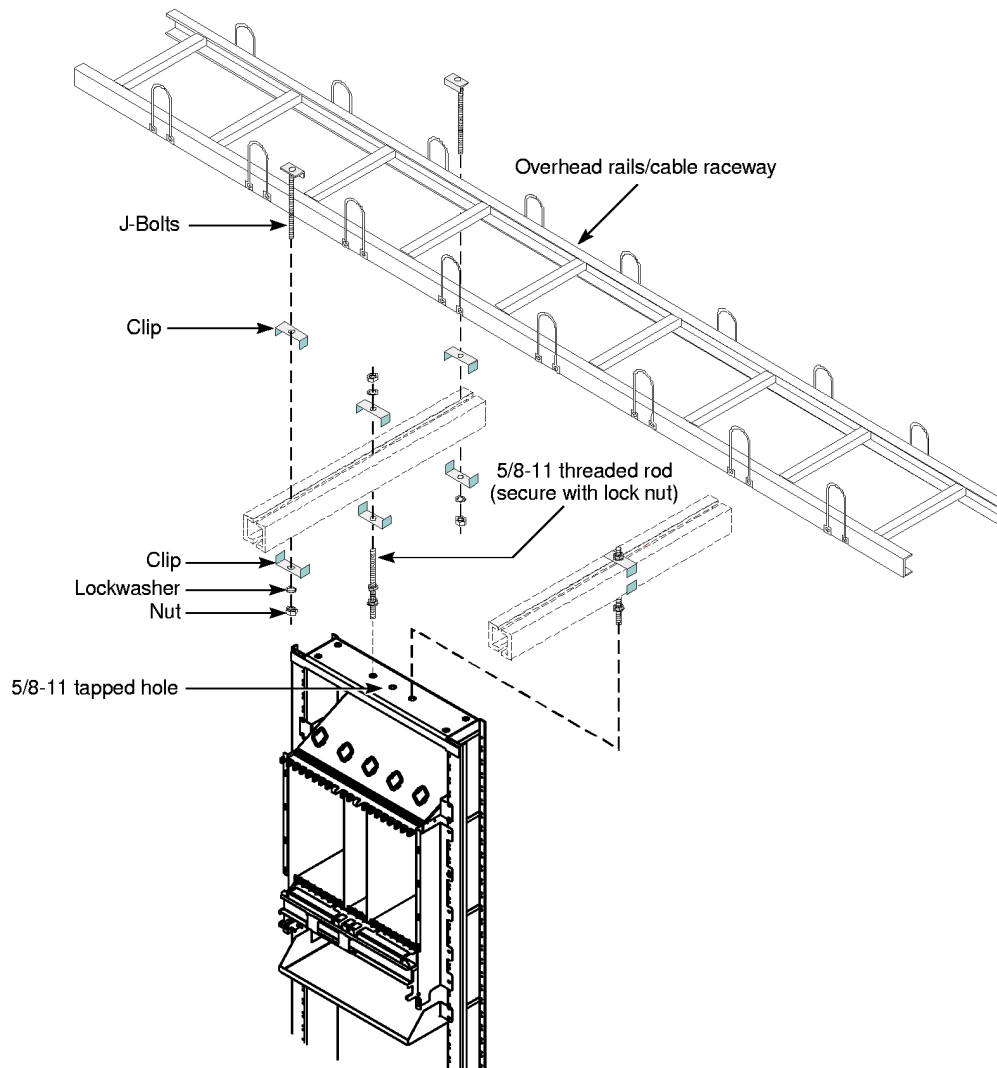
**Note** — The connector adapter kit provides rack tie-down facilities per Telecordia specifications.

**Figure 27** Rack connector plate for 7-ft rack



22368

- 7 Brace the rack per recommended office practice. Figure 28 provides an example of attaching the rack to overhead rails.

**Figure 28** Bracing the rack to overhead (example)

22367

- 8 Verify rack leveling and adjust as required.
- 9 Tighten the top support hardware.
- 10 STOP. This procedure is complete.

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# 7360 ISAM FX-16 shelf installation

**5 Installing a 7360 ISAM FX-16 shelf**

**6 7360 ISAM FX-16 shelf cabling**

**7 Installing cards in the 7360 ISAM FX-16 shelf**

**8 Fiber optic cable management in the 7360 ISAM FX-16 shelf**



## 5 Installing a 7360 ISAM FX-16 shelf

### 5.1 Overview

#### 5.2 Mounting the 7360 ISAM FX-16 shelf in a 23 in. rack

#### 5.3 Installing a drip tray below a 7360 ISAM FX-16 shelf

#### 5.4 Installing a 7360 ISAM FX-16 heat and fiber baffle kit

#### 5.5 Installing or replacing the fan unit in a 7360 ISAM FX-16 shelf

### 5.1 Overview

This chapter provides the steps to install a 7360 ISAM FX-16 shelf in a standard CO equipment racks, including procedures for:

- [Mounting the 7360 ISAM FX-16 shelf in a 23 in. rack](#)
- [Installing a drip tray below a 7360 ISAM FX-16 shelf](#)
- [Installing a 7360 ISAM FX-16 heat and fiber baffle kit](#)
- [Installing or replacing the fan unit in a 7360 ISAM FX-16 shelf](#)



**Warning** — The 7360 ISAM FX-16 is intended to be installed in a restricted access location (RAL) in accordance with the applicable requirements of NEC or CEC. The local authorities have jurisdiction. This unit is intended to be installed by qualified service personnel only. Observe the following.

- Connect to a reliably grounded –48 V dc SELV source that is grounded in the same building.
- Provide branch circuit overcurrent protection that is rated as 90 A with 2 AWG copper conductors.
- Incorporate a readily accessible disconnect device that is suitably approved and rated in the field wiring.

The 7360 ISAM FX-16 is suitable for the following:

- rack mounting on concrete floors or other non-combustible surfaces with the use of a drip tray
- use in an installation using an IBN or a CBN

- use in:
  - network telecommunication facilities
  - locations where the NEC applies
  - OSP



**Caution —** Due to the high heat dissipation for the 7360 ISAM FX-16, special equipment room cooling may be required, or aisle spacing may need to be increased.



## 5.2 Mounting the 7360 ISAM FX-16 shelf in a 23 in. rack

The 7360 ISAM FX-16 shelf can be mounted vertically in a standard 23 in. rack with a 21.5 in. opening.



**Caution** — The 7360 ISAM FX-16 heat and fiber baffle kit and drip tray must be used in a vertical mount installation to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

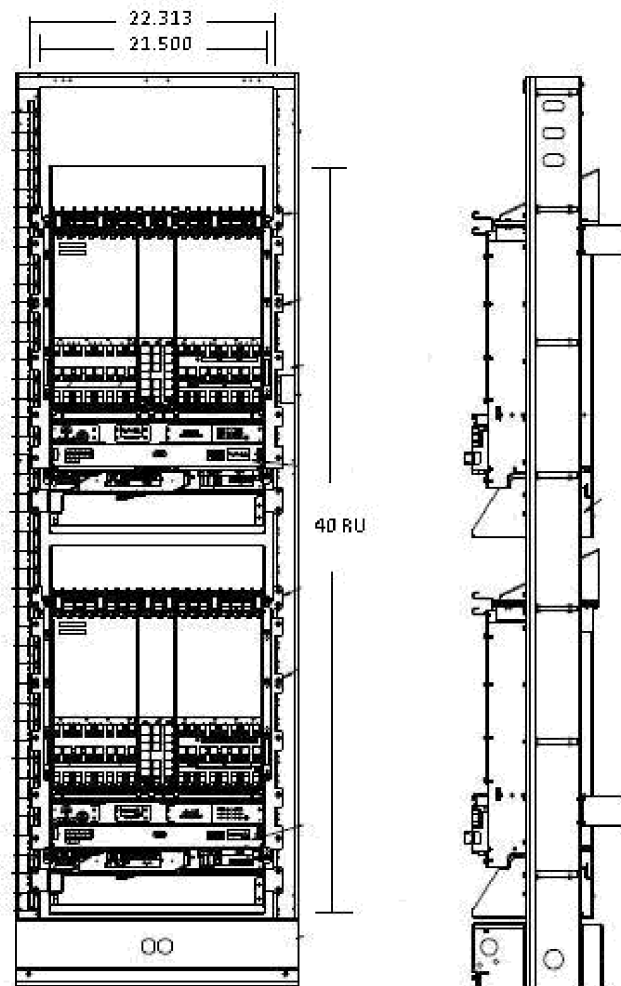
### 5.2.1 7360 ISAM FX-16 rack mounting configurations

Table 6 lists the rack mounting configurations with the 7360 ISAM FX-16 shelf.

**Table 6** Rack mounting configurations for 7360 ISAM FX-16 shelf

Rack unit	FEMA code	
	3FE 66742 AA	3FE 66742 AB
SR 1	NFXS-D	NFXS-D
	Heat and fiber baffle kit	Heat and fiber baffle kit
	Drip tray	Drip tray
Fan 1	BFAN-H (with fan filter)	BFAN-H (with fan filter)
SR 2	—	NFXS-D
	—	Heat and fiber baffle kit
	—	Drip tray
Fan 2	—	BFAN-H (with fan filter)

Figure 29 shows an example for the rack mounting configuration 3FE 66742 AB.

**Figure 29** Rack mounting configuration 3FE 66742 AB for 7360 ISAM FX-16

23921

## 5.2.2 Parts list

The following parts are required:

- one 7360 ISAM FX-16 shelf including: (if not factory installed in a rack)
  - 12 × 24 1/2in. (12 mm) hex screws (x 5 each side)
- one fan unit (BFAN-H)
- 2 AWG .25 mm dual-hole lug

- left and right mounting brackets including:
  - 12 × 24 1/2 in. (12.7 mm) hex screws (x 5 each side)
- heat and fiber management baffle kit including:
  - pre-assembled front and rear skirt, intumescent panel, and top baffle
  - M3 × 8 mm screws
  - M3 × 14 mm screws
  - required washers
  - fiber management bracket pre-assembly
  - 12 × 24 1/2 in. (12.7 mm) screws
- drip tray

### 5.2.3 Recommended tools

The following tools are recommended:

- torque wrench
- protective gloves
- hex driver

### 5.2.4 Prerequisites

Before starting the procedure to mount the 7360 ISAM FX-16 shelf, a drip tray must first be installed, see Procedure [11 “To install a drip tray below a 7360 ISAM FX-16 shelf”](#).

#### Procedure 10 To mount the 7360 ISAM FX-16 shelf vertically in a 23 in. rack

Use this procedure to mount a 7360 ISAM FX-16 shelf vertically in a 23 in. rack.



**Caution —** The heat and fiber baffle kit, and the drip tray kit must be used for 7360 ISAM FX-16 installation to meet preferred airflow specifications.

- 1 Unpack and visually inspect the shelf and shelf mount kits for physical damage.
- 2 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.

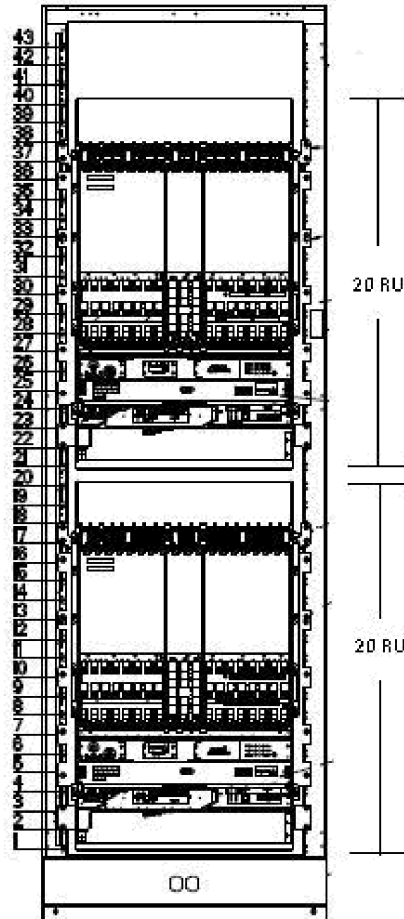


**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3 Put on the antistatic wrist strap and connect it to a grounding point.
  - 4 Verify the 7360 ISAM FX-16 shelf mounting positions as shown in Figure 30.
- 

**Figure 30** Mounting locations for the 7360 ISAM FX-16



23920

- 
- 5 Attach the left and right shelf mounting brackets to the 7360 ISAM FX-16 shelf using the ten 12 × 24 1/2 in. (12.7 mm) hex screws provided in the bag labeled 'Use these screws to mount left and right mounting brackets'.

- 
- 6 Ensure the drip tray is installed in the correct mounting position in the shelf.



**Note 1** — The drip tray must be installed prior to mounting the shelf in the rack. See [5.3 “Installing a drip tray below a 7360 ISAM FX-16 shelf”](#).

**Note 2** — Once the drip tray is installed, the 7360 ISAM FX-16 shelf must be lifted over the drip tray and then lowered into the correct mounting position to avoid interference between the shelf and the drip tray side walls.

- 
- 7 Mount the shelf in the first lower mounting position in the rack by lifting the shelf over the installed drip tray and then lowering it slowly into the correct mounting position. Attach the shelf using the ten 12 × 24 1/2 in. (12 mm) hex screws provided in the bag labeled ‘Use these screws to mount shelf to equipment rack’.

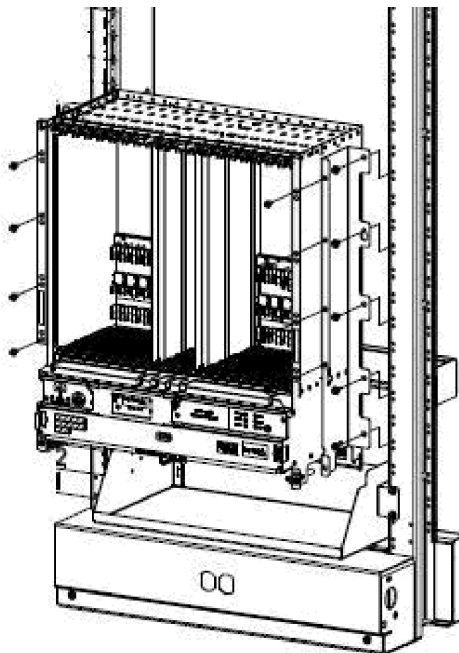


**Danger** — Risk of physical harm or damage when lifting shelf.

The shelf must be lifted by two persons. Pay attention to possible sharp edges, when handling. It is advisable to wear protective gloves.

Figure 31 shows the previously installed bottom drip tray, and then the mounting of a lower 7360 ISAM FX-16 shelf in a 23 in. rack.

**Figure 31** Mounting 7360 ISAM FX-16 lower shelf in a 23 in. rack



23914

- 8 Mount the shelf in the second upper mounting position in the rack by lifting the shelf over the installed drip tray and then lowering it slowly into the correct mounting position. Attach the shelf using the ten  $12 \times 24 \frac{1}{2}$  in. (12 mm) hex screws provided in the bag labeled 'Use these screws to mount shelf to equipment rack'.

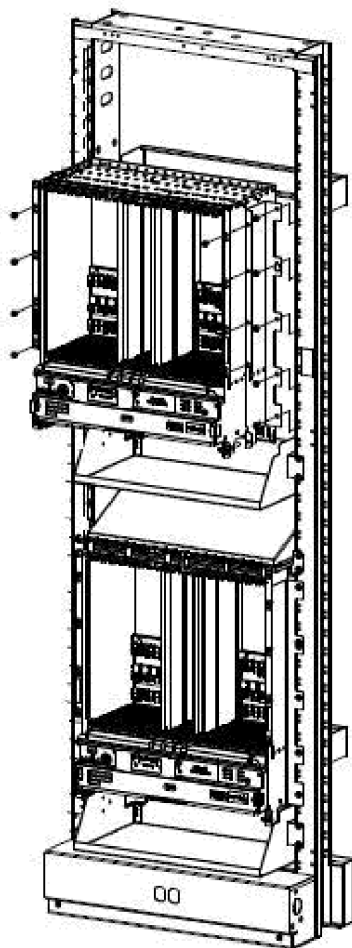


**Danger** — Risk of physical harm or damage when lifting shelf.

The shelf must be lifted by two persons. Pay attention to possible sharp edges, when handling. It is advisable to wear protective gloves.

Figure 32 shows the previously installed bottom drip tray, and then the mounting of a 7360 ISAM FX-16 shelf in a 23 in. rack.

**Figure 32** Mounting 7360 ISAM FX-16 upper shelf in a 23 in. rack



23915

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9 STOP. This procedure is complete.



**Note 1** — See Procedure 12 “To install a 7360 ISAM FX-16 heat and fiber baffle kit above a shelf”.

**Note 2** — See Chapter 6 “7360 ISAM FX-16 shelf cabling” for 7360 ISAM FX-16 shelf cabling information.

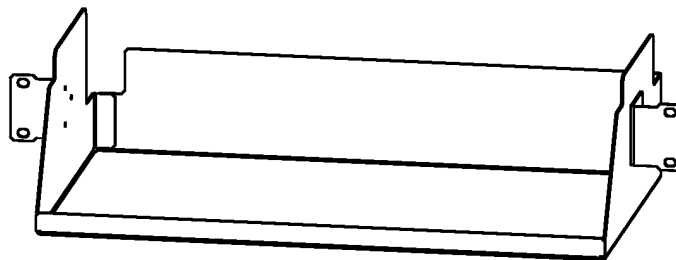
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## 5.3 Installing a drip tray below a 7360 ISAM FX-16 shelf

In compliance with safety standards, a drip tray must be installed below each 7360 ISAM FX-16 shelf for protection from heat and falling particles that may cause damage to the equipment.

Figure 33 shows a view of the 7360 ISAM FX-16 drip tray.

**Figure 33** View of drip tray for 7360 ISAM FX-16



23602

The drip tray can be shipped factory installed in the rack, but can also be ordered as a separate unit for installation or replacement on site.



**Caution 1** — For safety reasons, it is critical that the spacing between the shelf bracket and the drip tray bracket does not exceed a distance of 2.36 in. (60 mm).

**Caution 2** — Drip trays must be installed beneath each 7360 ISAM FX-16 shelf in a rack, including below the bottom shelf of a rack when mounted on combustible flooring surfaces. For example, carpet.

---

**Procedure 11 To install a drip tray below a 7360 ISAM FX-16 shelf**

Use this procedure to install a drip tray or to replace a drip tray below an existing 7360 ISAM FX-16 rack configuration.

- 
- 1 Verify the drip tray type is correct for the rack configuration. See Figure 30 to verify the correct installation position.

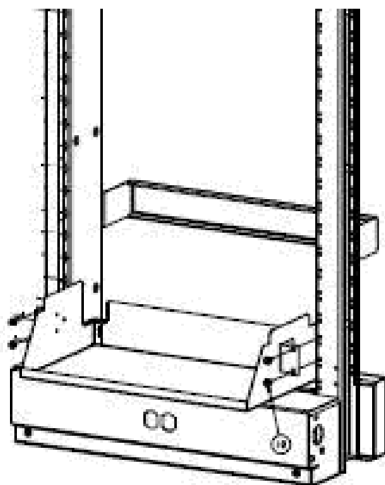
---

  - 2 Remove the drip tray unit from its shipping packaging and inspect the part for damage. If damaged, do not install the drip tray but notify the transportation carrier and Nokia immediately.

---

  - 3 Mount the drip tray in the lower mounting position, as shown in Figure 34. Attach the drip tray with screws to the rack uprights.

**Figure 34 Mounting 7360 ISAM FX-16 lower drip tray**



23912



- 4 If mounting a second shelf in the rack, verify the upper shelf unit and drip tray mounting positions; see Figure 30.

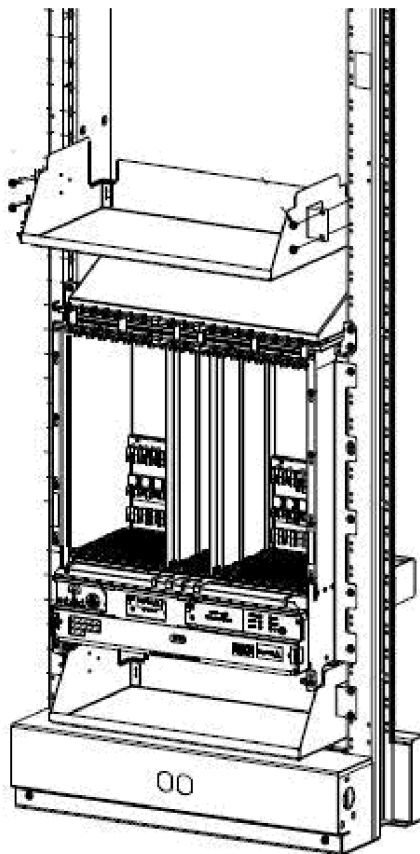


**Note 1** — Ensure the heat and fiber baffle kit is installed onto the first 7360 ISAM FX-16 shelf mounted in the lower mounting position in the rack prior to installing the drip tray for a second 7360 ISAM FX-16 shelf in the upper mounting position in the rack.

**Note 2** — If replacing the heat and fiber baffle kit from the 7360 ISAM FX-16 shelf installed in the lower mounting position of the rack, the drip tray installed under a second 7360 ISAM FX-16 shelf mounted in the upper mounting position of the rack must first be removed to ensure no interference with the replacement installation.

- 
- 5 Mount the drip tray in the upper mounting position. Attach the drip tray with screws to the rack upright, as shown in Figure 35.

**Figure 35** Mounting 7360 ISAM FX-16 upper drip tray



23917

**6** STOP. This procedure is complete.



**Note** — See section 5.2 “[Mounting the 7360 ISAM FX-16 shelf in a 23 in. rack](#)”.

## 5.4 Installing a 7360 ISAM FX-16 heat and fiber baffle kit

The 7360 ISAM FX-16 heat and fiber management baffle kit is required to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

The heat and fiber baffle kit must be installed above the card cage of the 7360 ISAM FX-16 shelf for cable management and support, and for protection from possible flame spread and damage to any equipment in the rack. The kit can be shipped factory installed in the rack, but can also be ordered as a separate unit for replacement on site.



**Note 1** — Shelves must already be mounted to a rack prior to following this procedure to install a baffle. See Procedure [10](#) for installing a 7360 ISAM FX-16 shelf.

**Note 2** — The 7360 ISAM FX-16 fiber management bracket pre-assembly must be installed on the cable management bracket of the shelf after the heat and fiber baffle kit is installed.

The heat and fiber baffle kit includes the following:

- Pre-assembled heat and fiber baffle kit provides protection from possible flames. The skirts work in conjunction with the intumescent panel so that any gaps are closed off in the shelf and flames are forced through the intumescent panel to protect the equipment from possible fire damage.
- Intumescent panels are required for heat protection and increased air flow.
- Top baffle is required for correct air flow, protection from heat and possible flame spread or loose falling particles that may cause damage to equipment, and fiber management purposes.
- Fiber management bracket is required for mounting onto the cable management bracket of the 7360 ISAM FX-16 shelf to enable the installation of the fiber management guide.

---

**Procedure 12 To install a 7360 ISAM FX-16 heat and fiber baffle kit above a shelf**

Use this procedure to install a heat and fiber baffle kit above a shelf or for replacement in an existing 7360 ISAM FX-16 rack configuration.



**Note** — The 7360 ISAM FX-16 shelf must be installed prior to installing the heat and fiber baffle kit.

- 
- 1    Unpack and inspect the heat and fiber baffle kit visually for physical damage.
- 
- 2    If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.



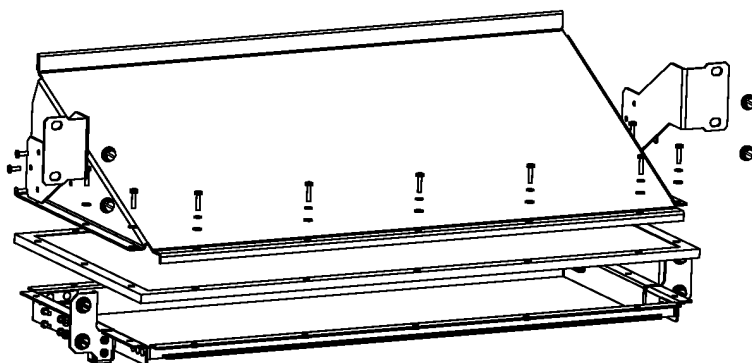
**Warning** — Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3    Put on the antistatic wrist strap and connect it to a grounding point.
- 
- 4    Remove the heat and fiber baffle kit from its shipping packaging and inspect the parts for damage. If damaged, do not install the baffle but notify the transportation carrier and Nokia immediately.
- 
- 5    Verify the shelf unit and heat and fiber baffle kit mounting positions; see Figure 30.
- 
- 6    Lift the pre-assembled heat and fiber baffle kit over the top of the installed shelf and then push downward until the support bracket located inside the air baffle connects with the top of the shelf.

Figure 36 shows the pre-assembly of the 7360 ISAM FX-16 heat and fiber baffle kit.

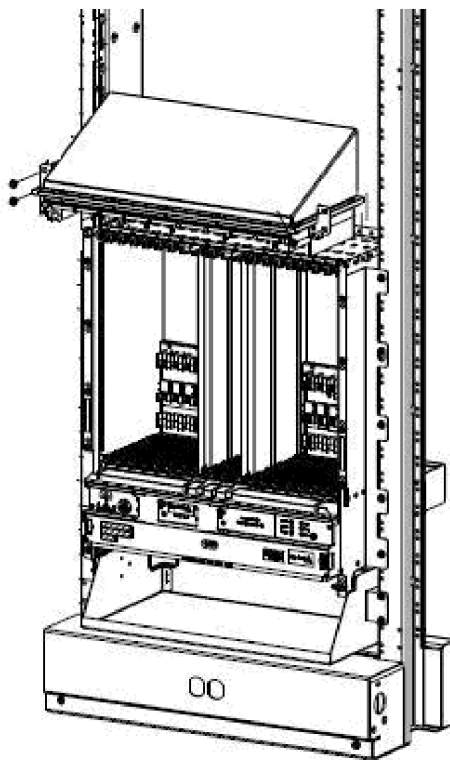
**Figure 36** Pre-assembled 7360 ISAM FX-16 heat and fiber baffle kit



23604

- 7 Attach the heat and fiber baffle kit to the top of the 7360 ISAM FX-16 shelf using the provided screws, as shown in Figure 37.

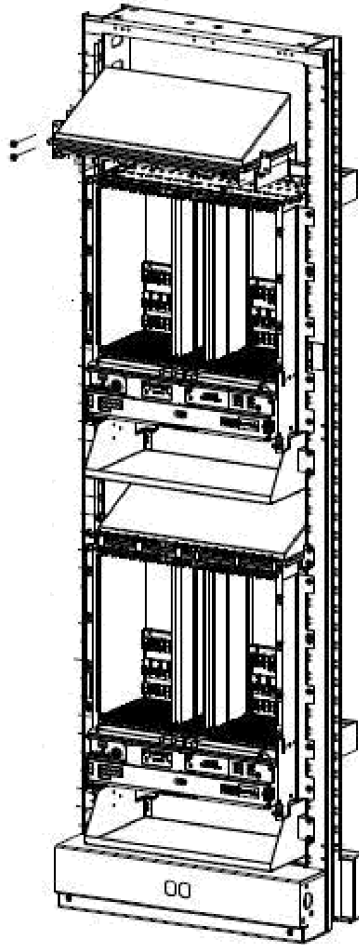
**Figure 37** Mounting 7360 ISAM FX-16 lower heat and fiber baffle kit



23913

- 
- 8 Repeat steps 5 to 7 if a second shelf is to be installed in the upper mounting position of the rack, see Figure 38.

**Figure 38** Mounting 7360 ISAM FX-16 upper heat and fiber baffle kit



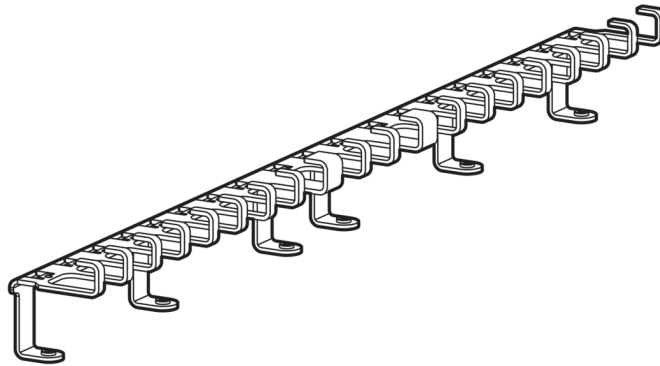
23916

- 
- 9 Once the heat and fiber baffle kit is mounted and secured to the top of the shelf, attach the fiber management bracket to the cable management bracket of the 7360 ISAM FX-16 shelf using two washers and one screw in an upward-facing position for each of the six mounting holes. See Figure 39 for an overall view of the fiber management bracket, and Figure 40 for the installation of the fiber management bracket.

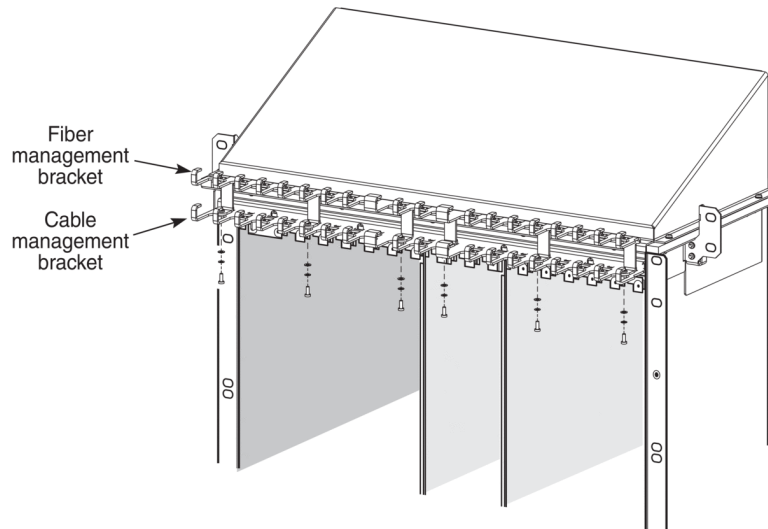


**Note** — Once the fiber management bracket has been attached to the cable management bracket, the fiber management guide can be installed. See Chapter 8 [“Fiber optic cable management in the 7360 ISAM FX-16 shelf”](#).

**Figure 39** Fiber management bracket



25361

**Figure 40** Fiber management bracket

25362

---

**10** STOP. This procedure is complete.

---

## 5.5 Installing or replacing the fan unit in a 7360 ISAM FX-16 shelf

The fan unit is a field-replaceable unit with wide-voltage-range fans, an alarm interface board, and (optional) a fan filter. The unit is installed in the shelf fan area and plugs directly into the backplane connectors. The front panel includes a single red alarm LED that lights up if fan failure occurs.

One version of the fan unit is available:

- intelligent fan unit (BFAN-H)

The fan unit can be shipped factory installed in the rack, but can also be ordered as a separate unit for replacement on site.



The fan unit can be hot inserted into the shelf. The fan unit does not have an on/off switch so removing the fan unit disconnects power provided from the backplane.



**Danger** — Risk of fire and equipment damage or system failure when cooling with the wrong fan unit, when the fans are off, or when the fan filter is dirty.

When a shelf in a powered system contains the wrong type of fan unit (for example, a fan unit with four instead of eight fans) or when fans are failing or out of operation, there is a risk of active plug-in units overheating. Fan units with dirty fan filters might no longer assure sufficient air cooling. Plug-in units might get seriously damaged, even ignite, or cause a system failure.

Observe the following rules:


- Before switching on the rack power, make sure the correct type of fan unit is installed and that the fan unit is equipped with a clean fan filter.
- Keep all the fans in operation as long as the system is active.
- When replacing a fan unit of an active system (for example, during maintenance, expansion or upgrade), never keep the fan area empty for longer than 2 minutes.
- Make sure the fan filter is clean and replace it, depending on the amount of dust in the CO, every 3 to 6 months.  
See the *7360 ISAM FX Product Information Guide* for information on orderable part numbers.



**Caution** — Hot insertion of the fan unit can sometimes cause service interruption.

### Procedure 13 To install or replace a fan unit

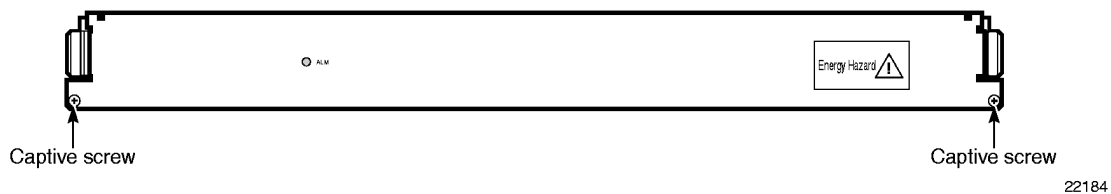
Use the following procedure to install or replace a fan unit.

- 1 Unpack and inspect the fan unit visually for physical damage.
  - 2 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.
- 

**Warning** — Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.
- 3 Put on the antistatic wrist strap and connect it to a grounding point.
  - 4 Verify if the fan unit type is correct for the rack configuration. See Table 6.
  - 5 Remove the fan unit from its shipping packaging and inspect it for damage. If damaged, do not install or replace the fan unit but notify the transportation carrier and Nokia immediately.
  - 6 In case of replacement, remove the installed fan unit:
    - i Loosen the captive screws of the fan cover and remove the cover; see Figure 41.

**Figure 41 Remove the fan cover**



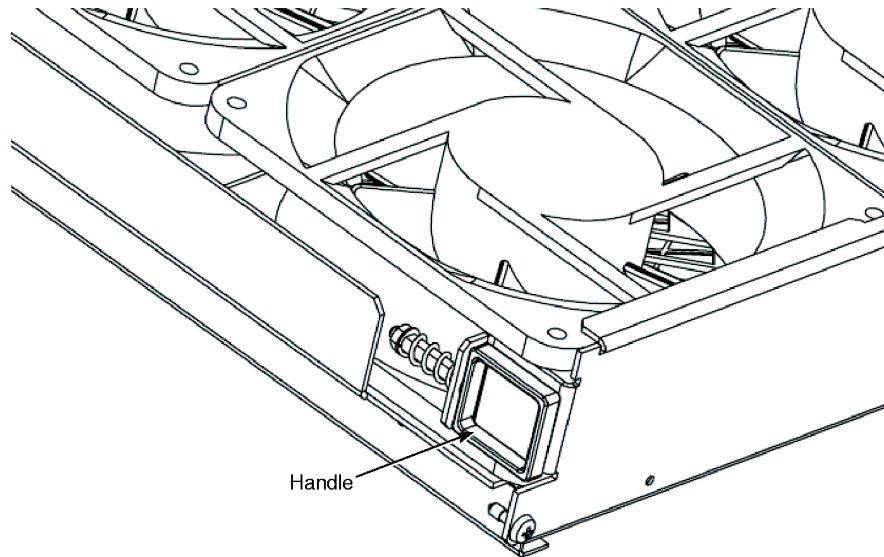
- ii Pull the unit out of the fan area by the handles; see Figure 42.



**Danger** — When the fan unit is extracted, the fans will still be rotating. Do not touch the fans, because this may cause bodily harm.



**Caution** — Be careful when removing the fan filter to ensure that dust will not get into the card cage area and onto the card components to prevent possible damage to the other equipment.

**Figure 42 Fan unit handles**

22372

- 
- 7 If the system is active, be aware of the maximum time (5 minutes) that the fans are allowed to be out of operation.



**Danger** — If the fans are not operating, the system may start a fire. Shut down shelves if fans are nonoperational for longer than 5 minutes.

- 
- 8 Install the new fan unit:
- i Gently insert the fan unit into the fan area until the backplane connectors are fully mated.
  - ii If a fan filter was installed, re-insert the fan filter.
  - iii Replace the fan unit cover and secure the cover and the fan unit by tightening the captive screws.
- 
- 9 In the same way, install the fan units of other shelf units, if any.

- 
- 10 Install a fan filter in the fan unit of each shelf or replace the filter, if required (each 3 to 6 months, depending on the amount of dust in the CO). See Procedure 14, “To replace a fan filter” for the instructions to replace a fan filter.
  - 11 STOP. This procedure is complete.
- 

## Procedure 14 To replace a fan filter

The fan filter must be replaced each three to six months, depending on the amount of dust in the CO). Use the following procedure to replace the fan unit.

- 
- 1 Unpack and inspect the fan filter visually for physical damage.
  - 2 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.
- 



**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3 Put on the antistatic wrist strap and connect it to a grounding point.
  - 4 Loosen the captive screw of the fan cover.
  - 5 Gently remove the fan unit.
  - 6 Carefully remove the fan filter and place it in the appropriate removal container.
- 



**Caution —** Be careful when removing the fan filter to ensure dust will not get into the card cage area and onto the card components, to prevent possible damage to the other equipment.

- 
- 7 Install the new fan filter.
  - 8 Replace the fan unit cover and secure the cover by tightening the captive screws.
  - 9 STOP. This procedure is complete.
-

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## 6 7360 ISAM FX-16 shelf cabling

- 6.1 Overview
- 6.2 Safety precautions
- 6.3 Shelf grounding connection
- 6.4 Rack grounding connection
- 6.5 Power cabling
- 6.6 CO external alarm connector
- 6.7 BITS interface connections
- 6.8 ToD/1 Hz connector
- 6.9 Remote craft port connector
- 6.10 Combo cable connector
- 6.11 POTS and LINE MDF cable connector
- 6.12 Vectoring cable connector

### 6.1 Overview

This chapter provides the following cabling information for the 7360 ISAM FX-16.

- Safety precautions
- Shelf grounding connection
- Rack grounding connection
- Power cabling
- CO external alarm connector
- BITS interface connections
- ToD/1 Hz connector
- Remote craft port connector
- Combo cable connector
- POTS and LINE MDF cable connector

## 6.2 Safety precautions

The following safety precautions apply:



**Danger 1** — Before working on the power supply unit, verify whether it is live.

If the power supply is live, which can deliver –48 Vdc, you must use an insulated tool kit. See *7360 ISAM FX Safety Manual* for more information about working with live components.

**Danger 2** — Avoid risk of electric shock.

Always wear protective gloves and footwear for all handling tasks.

Carefully follow the instructions.



**Warning 1** — Before connecting to the power, verify the specifications of all equipped fan units to ensure that the correct voltage will be supplied (–48 Vdc) to these units.

**Warning 2** — Before power is supplied, all fasteners requiring a specific torque must be tightened moderately before final tightening with a torque wrench or driver.

When power is supplied, tighten fasteners with insulated tools, according to the specified torque.

**Warning 3** — For Type 2 ports:

The intra-building port(s) of the 7360 ISAM FX equipment or sub-assembly is suitable for connection to intra-building or unexposed wiring or cabling only.

**Warning 4** — For Type 2 ports that require shielded cables:

The intra-building port(s) of the 7360 ISAM FX equipment or sub-assembly must use shielded intra-building wiring or cabling that is grounded at both ends.



**Caution** — Risk of EMC disturbance when MDF cables are not shielded.

When MDF cables have no or insufficient shielding, the xDSL and POTS signals carried could suffer from EMC disturbance, certainly when mixing different xDSL signal types (for example, xDSL over POTS with xDSL).

To comply with EMC, observe the following:

- Apply shielded LINE and POTS cables between the MDF and the 7356 ISAM FTTB (Nokia always provides shielded cables).
- Connect, if possible, the shielding of each MDF cable to ground at MDF end.

See the *7360 ISAM FX Safety Manual* for more information.

## 6.3 Shelf grounding connection

This section provides the 7360 ISAM FX-16 shelf grounding cable types, cable routing, and connection information.

Observe the following safety notes.



**Danger 1** — Rack or frame must be suitably connected to the office grounding network in accordance with Article 250 of the national electrical code (NEC) to ensure UL and CSA compliance. If outside the United States, ground per local electrical codes and practices.

**Danger 2** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.

### 6.3.1 Grounding cable type

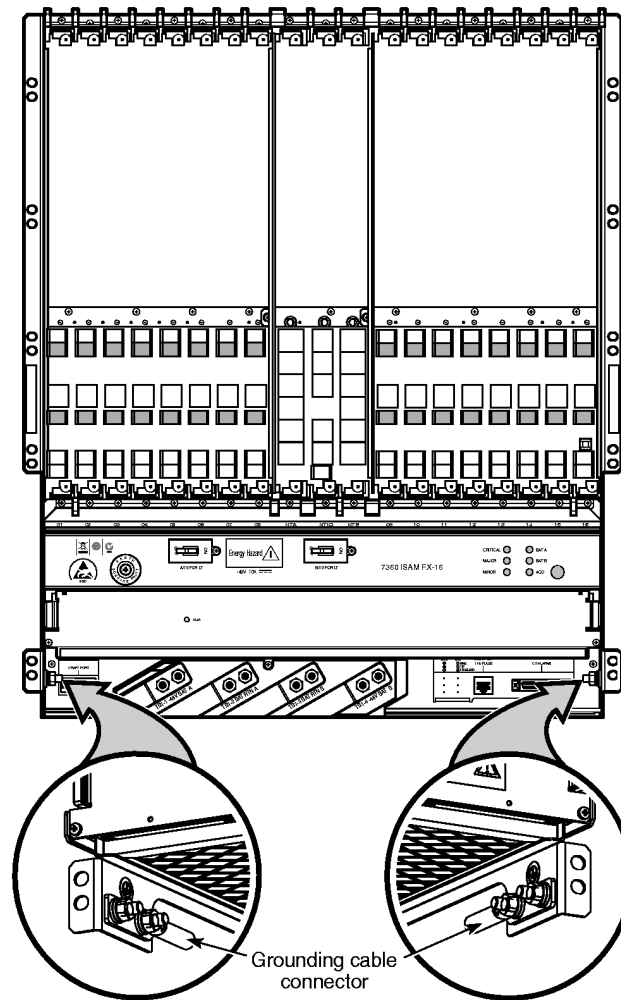
As shown in Figure 43, the 7360 ISAM FX-16 includes two grounding cable connectors. Each ground lug is a 4 AWG, 1/4 in. stud with 1 in. hole spacing, single crimp, peep, copper, UL and CSA recognized dual-hole lug. The preferred cable is 4 AWG, green with a yellow stripe. Other types and sizes of wire and lugs can also be used provided they meet the requirements of Article 250 of the NEC.

### 6.3.2 Cable routing and connection

The grounding cable must be used when the shelf is stand-alone and will not be used if the shelf is assembled in a rack. The cable is routed through an opening in the right side of the shelf or to the left side of the shelf to the grounding terminal.

The connections for the grounding cable are shown in Figure 43. The grounding cable is connected to the shelf frame with hardware included with the shelf.

**Figure 43 Shelf grounding cable connector locations on 7360 ISAM FX-16**



22193



---

**Procedure 15 To connect the grounding cable**

Use the following procedure to connect the grounding cable.

- 
- 1 Route the grounding cable to the right or left side of the shelf.
  - 2 Connect the dual-lug to the grounding cable connection point as shown in Figure 43.
- 



**Danger** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.



**Note** — The grounding cable nuts should be tightened with a torque of 13.28 to 17.7 lbf-in. (1.5 to 2.0 N.m).

- 
- 3 STOP. This procedure is complete.
- 

## 6.4 Rack grounding connection

The 7360 ISAM FX-16 requires a 2 AWG rack frame grounding lug for the rack grounding connection.



**Danger 1** — Rack or frame must be suitably connected to the office grounding network in accordance with Article 250 of the National Electrical Code (NEC) to ensure UL and CSA compliance. If outside the United States, ground per local electrical codes and practices.

**Danger 2** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

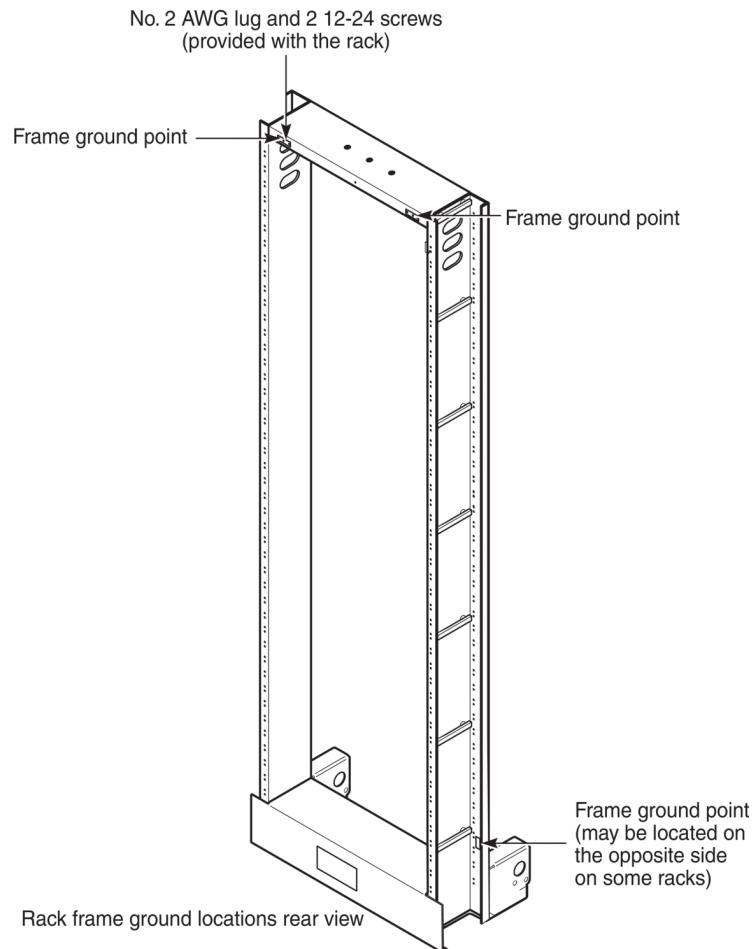
Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.

**Procedure 16 To connect the rack ground**

- 
- 1 Prepare the frame grounding cable.
  - 2 Following local practices, route the grounding cable to the top of the rack.
-

- 
- 3 Connect the grounding cable to one of the two frame grounding points on the top of the rack, as shown in Figure 44, using the screws provided with the rack.

**Figure 44** External frame ground point rear view



25880

- 
- 4 Perform power and ground tests as per local practices.
- 
- 5 STOP. This procedure is complete.
-

---

## 6.5 Power cabling

This section describes the 7360 ISAM FX-16 general information, power distribution unit location and the external power cabling procedure to connect the power cables.

### 6.5.1 General

This section includes information about the power distribution frame, external ground, and power cable routing.

#### 6.5.1.1 DC mains battery return connection

The 7360 ISAM FX-16 equipment is suitable for use in an installation using an IBN or a CBN. A bonding conductor between the return feed power conductor and the chassis cannot be made at the 7360 ISAM FX-16 shelf. When the installation environments require such bonding conductors, they must be installed in accordance with the requirements of the local authorities having jurisdiction, and all relevant electrical and building codes.

#### 6.5.1.2 Power distribution frame (PDF)

The 7360 ISAM FX-16 shelf is powered through two redundant branches A, and B, in a three-wire configuration provided by the PDF.

The 7360 ISAM FX-16 operates with a nominal voltage level of –48 Vdc supplied by battery power sources in the CO or cabinet.

#### 6.5.1.3 External ground

The standard rack provides three frame ground points with two located on top of the rack. The safety ground conductor used must be a green-yellow insulated cable (UL 60950-1 2nd Edition and CAN/CSA C22.2 NO. 60950-1-07 compliant).

#### 6.5.1.4 Cable routing

Power cables are routed from the PDF to the rack using cable channels overhead and are connected at the input terminal block inside the 7360 ISAM FX-16 shelf.

To minimize interference, Nokia recommends that you route power cables using separate channels for signal and power cables.

Keeping a distance of 4 in. (10 cm) between signal and power cables is advisable where it imposes no practical problems.

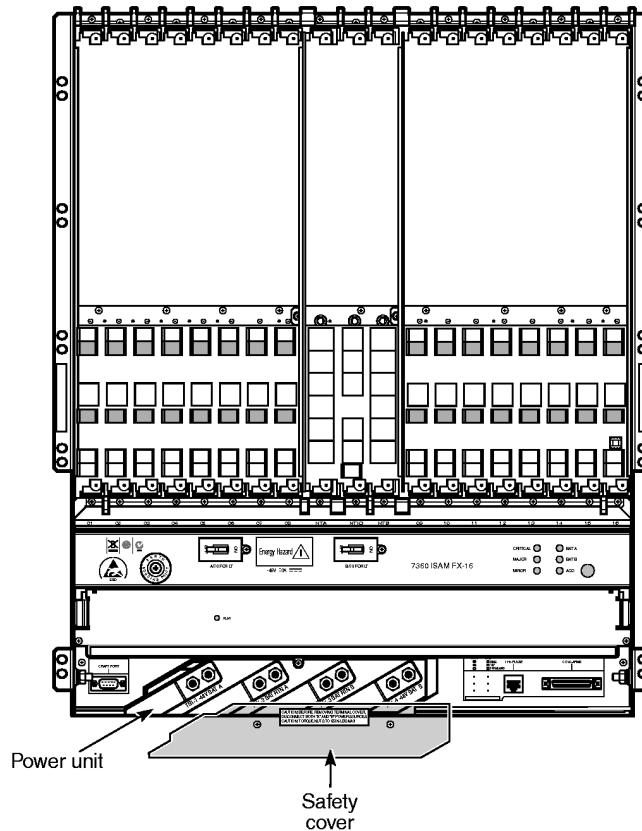
Crossing of signal cables with power cables and parallel routing over short distances is acceptable.

## 6.5.2 Power distribution unit

The 7360 ISAM FX-16 shelf is designed to be used as stand-alone equipment and is equipped with a –48 Vdc power distribution unit with terminal block.

The power distribution terminal block is located at the bottom of the shelf and is covered with a plastic safety cover; see Figure 45.

**Figure 45** Power distribution unit on 7360 ISAM FX-16



22189

Figure 46 shows the label on the safety cover.

**Figure 46**     **Safety cover label**

CAUTION: BEFORE REMOVING TERMINAL COVER,  
DISCONNECT BOTH "A" AND "B" POWER SOURCES  
CAUTION: TORQUE NUTS TO 65-LBS MAX

22371

## 6.5.3 Power cables

This section provides information about the types of power connection cables, cable routing, and a procedure for connecting the power cables on the 7360 ISAM FX-16.

### 6.5.3.1 Power cable type

The 7360 ISAM FX-16 requires the use of a 2 AWG power cable.



**Note 1** — The color of the power cables must be according to local installation practices.

**Note 2** — Nokia recommends the following crimp lugs and tooling for –48 Vdc input and return:

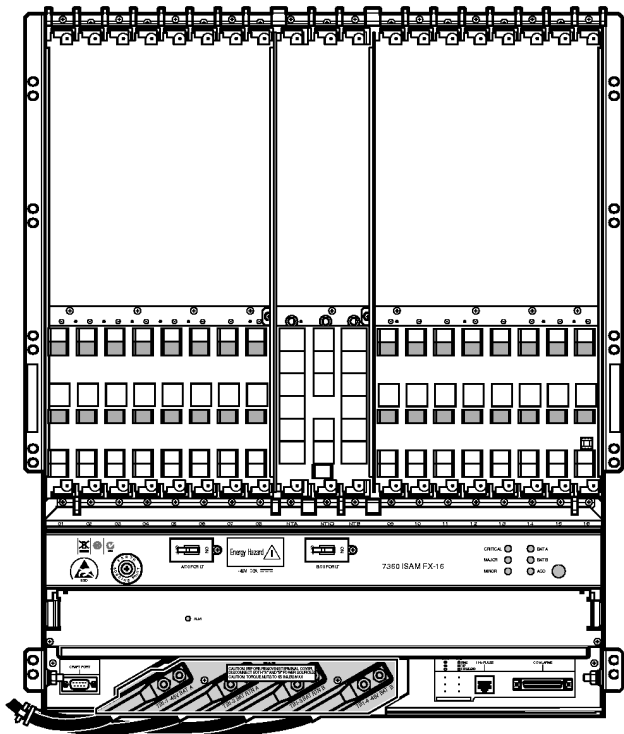
- input power lug: 2 AWG, 90C, Burndy YAZ2C-2TC14 or equivalent
- 2 AWG 1/4 - 5/8 dual-hole copper lug, long barrel, peep, uses Burndy Die Code 10. See Burndy catalog for additional tool options.
- input power lug: 2 AWG, 90C, Thomas and Betts 54855BEPH or equivalent
- 2 AWG 1/4 - 5/8 dual-hole copper lug, long barrel, peep, uses Thomas and Betts Die Code 33. See Thomas and Betts catalog for additional tool options.

**Note 3** — All required washers and nuts are included with the shelf.

### 6.5.3.2 Power cable routing and connection

The power cables are routed through the left side of the rack and can then be routed to the power distribution terminal block located on the bottom of the shelf; see Figure 47.

**Figure 47** Power cable routing for 7360 ISAM FX-16



22191

**Procedure 17** To connect power cables

Use the following procedure to connect the power cables to the 7360 ISAM FX-16 shelf.



**Danger** — Before connecting the power cables, make sure that the power to the cables has been disconnected and the circuit breakers for BAT A and BAT B are switched off.

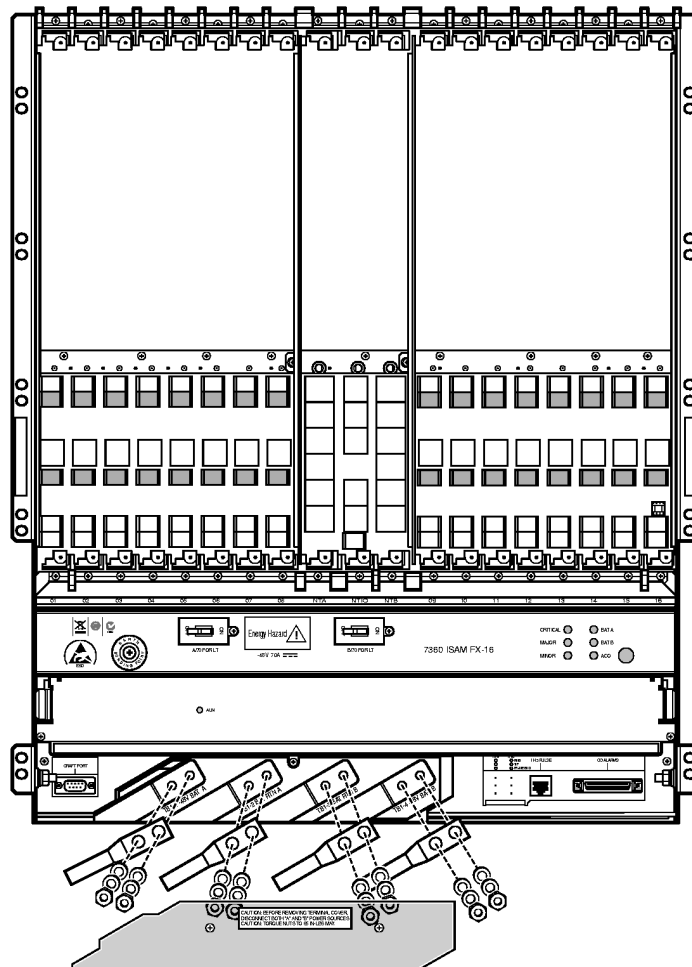


**Note 1** — Power cables connect the PDF directly to the shelf.

**Note 2** — All hardware shown in Figure 48 is provided with the 7360 ISAM FX-16.

**Note 3** — Avoid sharp bends in cables. Use the proper bend radius when installing cables.

- 1 Ensure the power to the wires has been disconnected.
- 2 Loosen the screws on the safety cover and remove the safety cover; see Figure 48.

**Figure 48** Mounting of power cable shoes and safety cover on 7360 ISAM FX-16

22192

- 3 Remove the nuts from the power terminals.



**Danger** — If the following sequence is not followed exactly, there can be a possible fire hazard.

- 4 Guide the power cables through the cable guide and connect them to the power terminals as follows:
  - first connect the BATRET cables RET A and RET B
  - then connect the battery cables BAT A and BAT B
- 5 Tighten the nuts back on the power terminals with a torque of 65 lbf-in. maximum.

- 
- 6 Place the safety cover back in its location and fasten the screws.
  - 7 Turn on the A and B power from the power distribution frame to the rack.
  - 8 Verify that the BAT A and BAT B LEDs are green.
  - 9 Switch the A and B circuit breakers to the ON position.
  - 10 Verify that the fans spin.
  - 11 STOP. This procedure is complete.
- 

### Procedure 18 To disconnect the power cables

Use the following procedure when the power cables need to be disconnected on 7360 ISAM FX-16.



**Warning —** If the following sequence is not followed exactly, there can be a possible fire hazard.

- 
- 1 Before disconnecting the power cables, ensure that power to the cables has been disconnected.
  - 2 Switch off the circuit breakers for BAT A and BAT B
  - 3 Disconnect the battery cables BAT A and BAT B
  - 4 Disconnect the BATRET cables RET A and RET B
  - 5 STOP. This procedure is complete.
- 

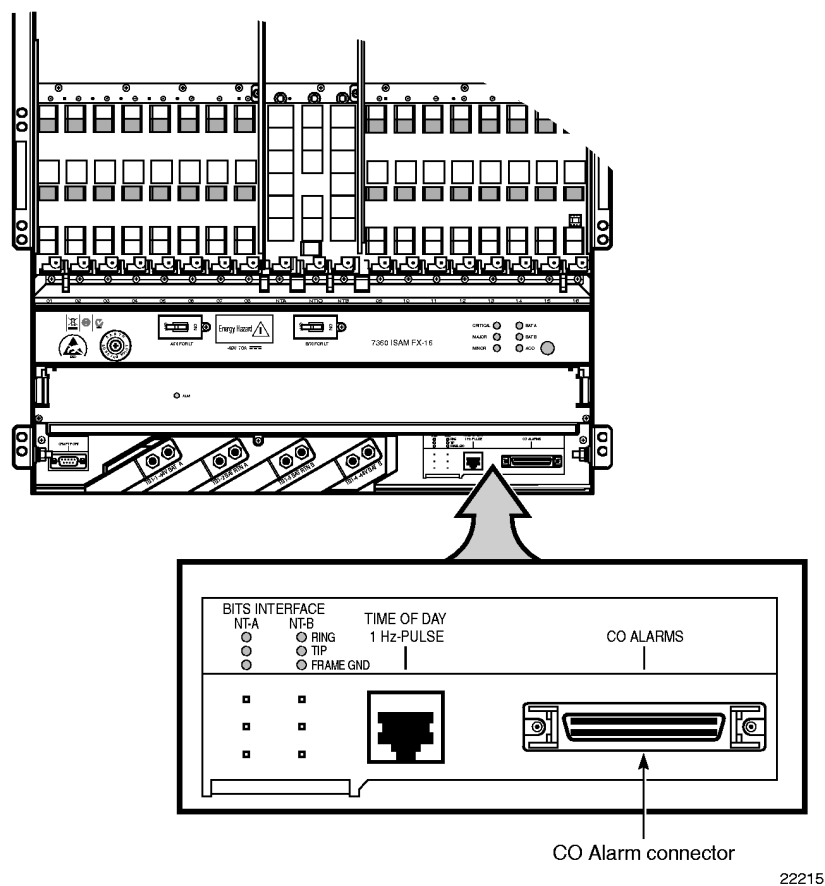
## 6.6 CO external alarm connector

The 7360 ISAM FX-16 provides a 50-pin micro DSUB connector for the CO external alarm connection. A cable assembly is available from Nokia (sold separately), that can be used with the 7360 ISAM FX-16.



See your Nokia representative for CO external alarm cable information and ordering.  
Figure 49 shows the CO external alarm connector location.

**Figure 49** CO external alarm connector on 7360 ISAM FX-16



For a description of the CO external alarm cable connector pinning, see your Nokia representative.

## 6.7 BITS interface connections

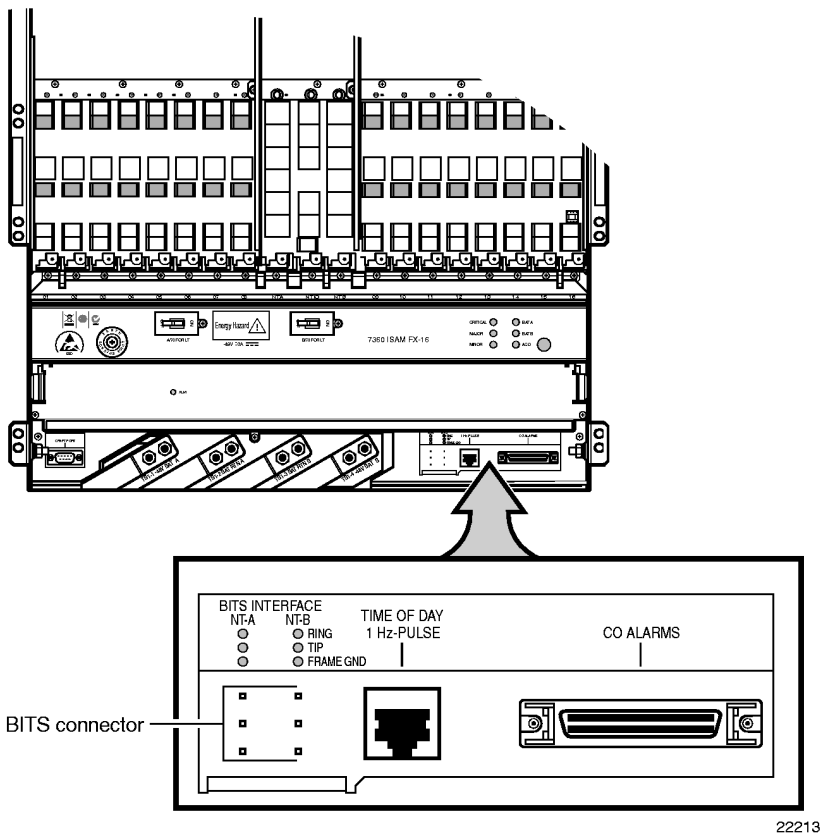
The 7360 ISAM FX-16 requires six wire-wrappable pins for the BITS clock timing connection. BITS timing signals will be supplied using two twisted pair cables (22 AWG solid copper conductors with overall shield and drain wire, Belden 1175A or equivalent). One cable will connect to the 3 wire-wrap pins for NT-A, and the other will connect to the 3 wire-wrap pins for NT-B.



**Note —** Connect the drain wire (FG) at one end only, either at the 7360 ISAM FX-16 or at the source.

Figure 50 shows the BITS interface connections on the 7360 ISAM FX-16.

**Figure 50** BITS interface connections on 7360 ISAM FX-16



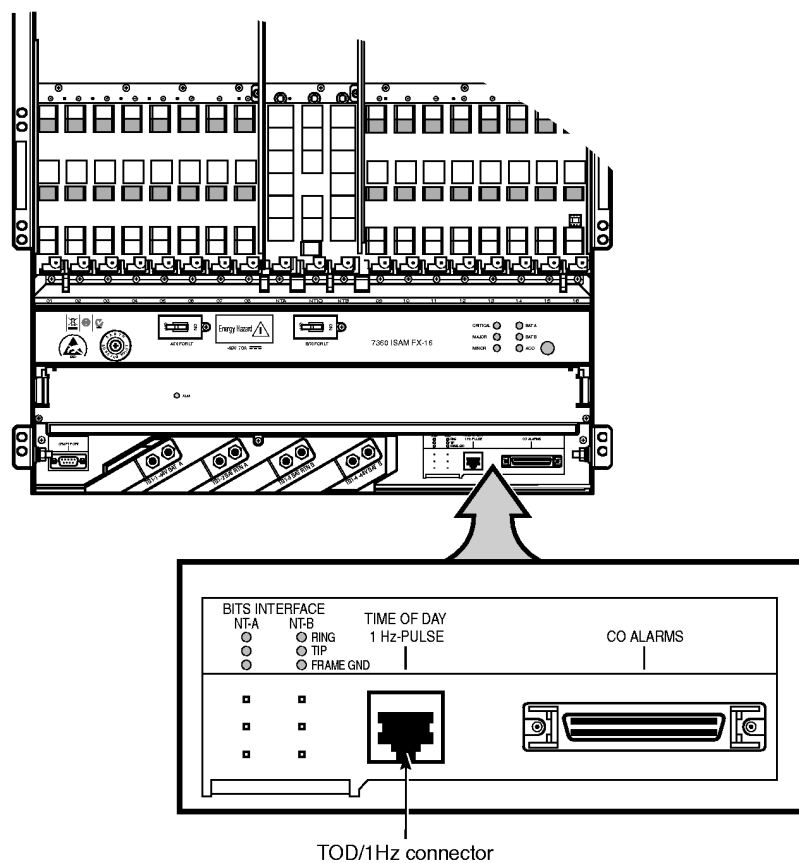
The BITS cables need to be wire-wrapped to the pins according to the BITS interface connections. For a description of the BITS connector pinning, see Appendix 27.

## 6.8 ToD/1 Hz connector

The 7360 ISAM FX-16 requires an RJ-45 connector for the ToD and 1 Hz signal connection.

Figure 51 shows the ToD/1 Hz connector on the 7360 ISAM FX-16.

**Figure 51** ToD/1 Hz connector on 7360 ISAM FX-16



For a description of the ToD/1 Hz connector pinning, see Appendix 27.

---

## 6.9 Remote craft port connector

The 7360 ISAM FX-16 requires a DB-9 female connector for the remote craft port connection.



**Note** — Nokia supports the use of a DB-9 female connector cable for the remote craft port connection to avoid potential damage due to exposed pins on the typically used DB-9 male connector.

When the remote craft port is provisioned as a DCE port, meaning it connects to a remote modem, the straight through DB-9 female connector cable is required. When the remote craft port is provisioned as a DTE port, meaning it connects to a computer, a DB-9 null-modem cable is required to invert the TX and RX signals. A commercially available DB-9 male adapter cable can be used with the DB-9 female connector cable to enable the use of standard cables.

Figure 51 also shows the remote craft port connection located on the bottom left side of the 7360 ISAM FX-16.

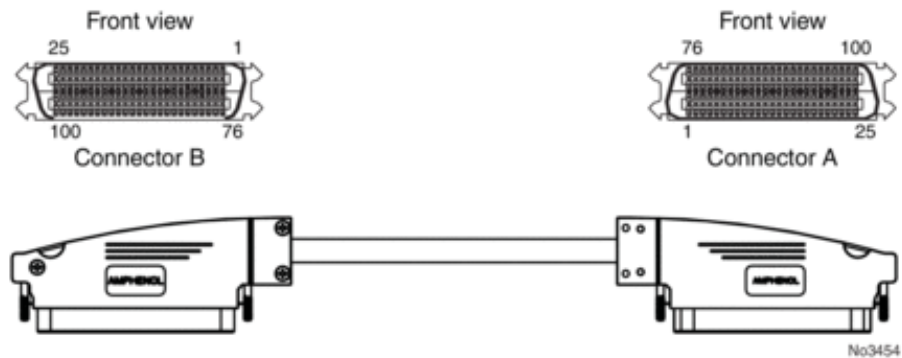
For a description of the remote craft port connection pinning, see Appendix 27.

## 6.10 Combo cable connector

This section describes the cabling procedure for the interconnection cabling between the voice LT card and the splitter card in an 7360 ISAM FX-16, in case of Combo configuration.

### 6.10.1 Cable type

The required cable is an MDF cable with two CHAMP100 connectors; see Figure 52.

**Figure 52 Combo cable**

**Note 1** — See Appendix 27 for the pinning of the CHAMP100 connectors.

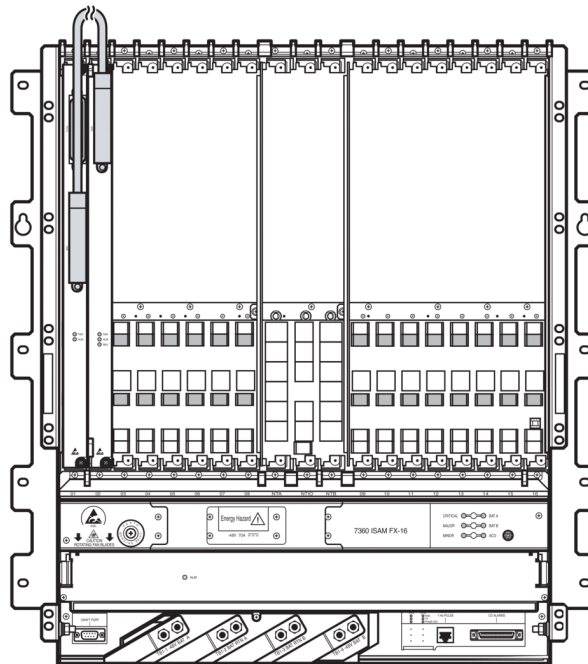
**Note 2** — See the *7360 ISAM FX Product Information Guide* for ordering information.

## 6.10.2 Connection/locking

The cable is plugged into the connectors on the LT card and the splitter card, and is locked into place with standoffs and nuts.

## 6.10.3 Cabling

The combo cable must be connected between the voice LT card and the splitter card in the 7360 ISAM FX-16. The excess cable length must be routed to the left side in the rack, see Figure 53.

**Figure 53** Combo cable connection on 7360 ISAM FX-16

23892

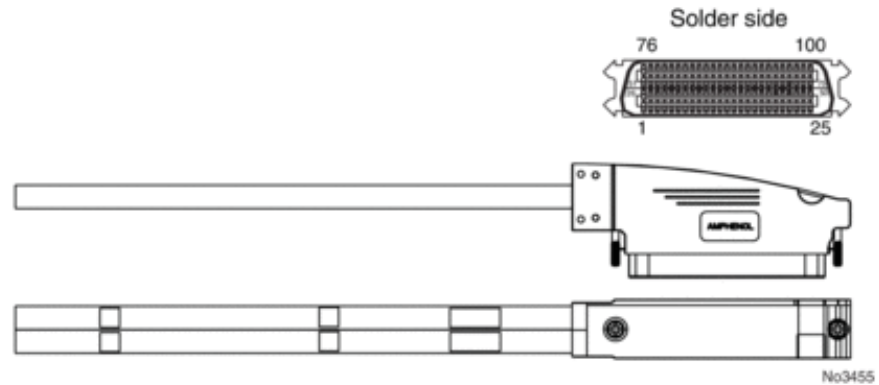
## 6.11 POTS and LINE MDF cable connector

This section describes the procedures to install MDF cables (xDSL and POTS) between the 7360 ISAM FX-16 and the Main Distribution Frame (MDF).

### 6.11.1 MDF cable type

The following cables can be used:

- for 24-line and 48-line cards: an MDF cable with two bundles of 24-pair cables and one CHAMP100 connector; see Figure 54.

**Figure 54**     **MDF cable for 48-line cards**

**Note 1** — See Appendix [27](#) for the pinning of the CHAMP100 connectors.

**Note 2** — See the *7360 ISAM FX Product Information Guide* for ordering information.

## 6.11.2 Prerequisites

The following tools are required:

- MDF (LINE/POTS) cables as provided by Nokia
- an antistatic wrist strap
- tie-wraps
- lacing cord for tying up and/or bundling cables

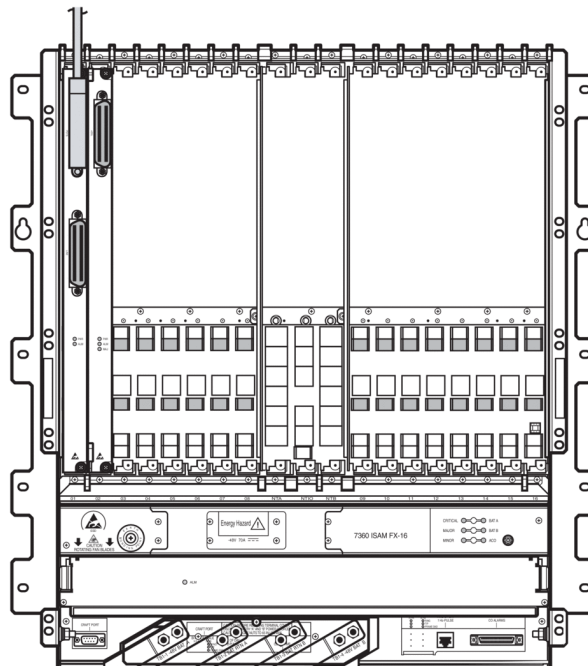
---

**Procedure 19 To connect MDF cabling for LT cards with integrated splitter**

Proceed as follows to connect the MDF cables for LINE and POTS to the LT card with integrated splitter:

- 
- 1 Connect the MDF cable for the LINE to the right-hand CHAMP connector on the LT card with integrated splitter, as shown in Figure 55.

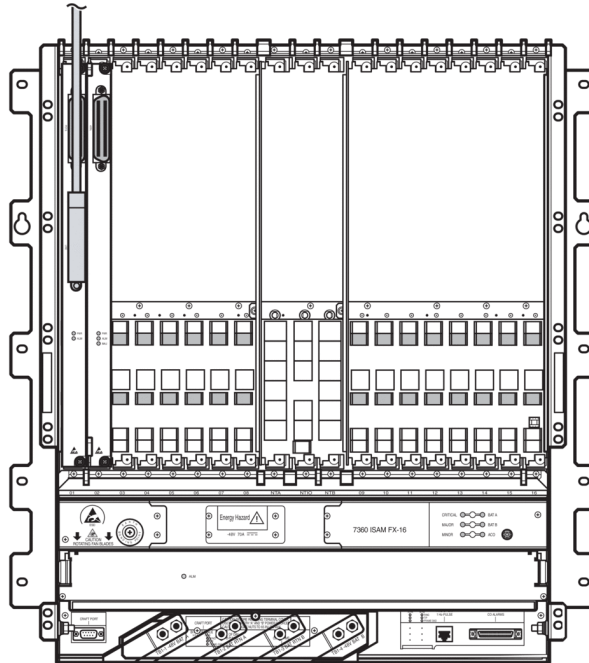
**Figure 55 MDF cable LINE connection on 7360 ISAM FX-16**



23890

- 
- 2 Secure the connector with standoffs and nuts.
- 
- 3 Route and connect the other end of the MDF cable as per site practices.
- 
- 4 Connect the MDF cable for the LINE to the left-hand CHAMP connector on the LT card with integrated splitter, as shown in Figure 56.



**Figure 56** MDF cable POTS connection on 7360 ISAM FX-16

23891

- 5 Secure the connector with either baillocks or screws, depending on which MDF cable is used.
- 6 Route and connect the other end of the MDF cable as per site practices.
- 7 STOP. This procedure is complete.

## 6.12 Vectoring cable connector

This DLP provides the steps to connect vectoring links between a NDPS-B card and NDLS-E cards.

## 6.12.1 VL cable

The VL cables must not be routed where they may be exposed to high voltage such as lightning strikes.



**Caution —** When VL cables need to be disconnected, only do so by pulling the release ring tab. Do not pull on the cable itself or on the QSFP+ modules pre-installed at each end.

While no particular arrangement of VL cables between SLV LTs and VL ports on the centralized vector processor card is required, it may be desirable to maintain a particular connection arrangement of these cables. In those circumstances, both ends of all cables may be labeled before installation so that each cable is uniquely identified. Examples of such identification include operator-provided colored zip ties and colored or write-on labels.

## 6.12.2 Prerequisites

The following tools are required:

- antistatic wrist strap

The following parts are required:

- cable ties or lacing cord
- QSFP+ 1m cable (3FE 68462 AA)

---

## Procedure 20 To connect vectoring links

Proceed as follows to connect vectoring links:



**Warning 1** — Units contain ESD-sensitive devices. These devices are susceptible to ESD damage in unconnected circuit conditions. Appropriate ESD procedures should always be followed when installing or removing units and cables.

**Warning 2** — Verify that cables are secure and do not interfere with the shelf cover.

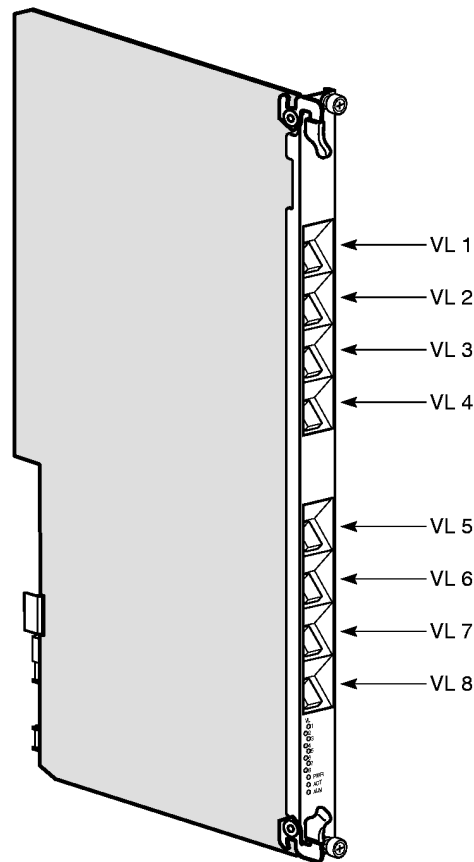


**Caution 1** — Avoid sharp bends in cables. Use the proper bend radius when installing cables.

**Caution 2** — Pinching of fiber cables may cause service interruption and damage the cables. Properly dress cables to ensure that cables are not twisted or kinked.

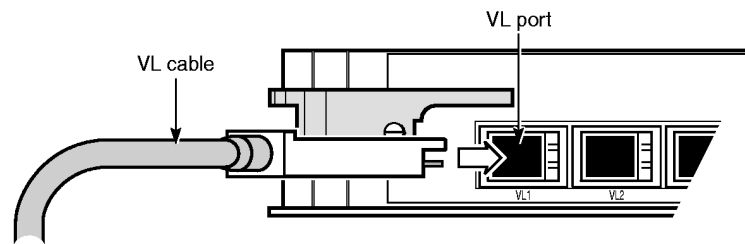
**Caution 3** — Improper cable placement can cause the cables to crimp and become damaged when the shelf cover is closed. Verify that fiber and Ethernet cables are secure and do not interfere with the shelf cover. Ensure that cables do not cross over the insertion and extraction tabs on top of the unit; rather, they pass to the side of the tabs.

- 
- 1 Put on the antistatic wrist strap and connect it to a grounding point. See [Shelf grounding connection](#) and [Rack grounding connection](#) for more information about grounding.
  - 2 Remove the shelf cover from the shelf or shelves that will have vectoring links.
    - i Loosen the threaded thumbscrews.
    - ii Remove the cover from the front of the shelf by rotating it away from the shelf and unhooking the cover from the cable management guide.
  - 3 Locate the appropriate VL port or ports on the NDPS-B card. Ports VL1 through VL4 should be used for vectoring links to EVLT-N cards in the same shelf as the NDPS-B card and ports VL5 through VL8 should be used for vectoring links to EVLT-N cards in another shelf. Figure 57 shows the VL ports on the NDPS-B.
-

**Figure 57** VL ports on the NDPS-B

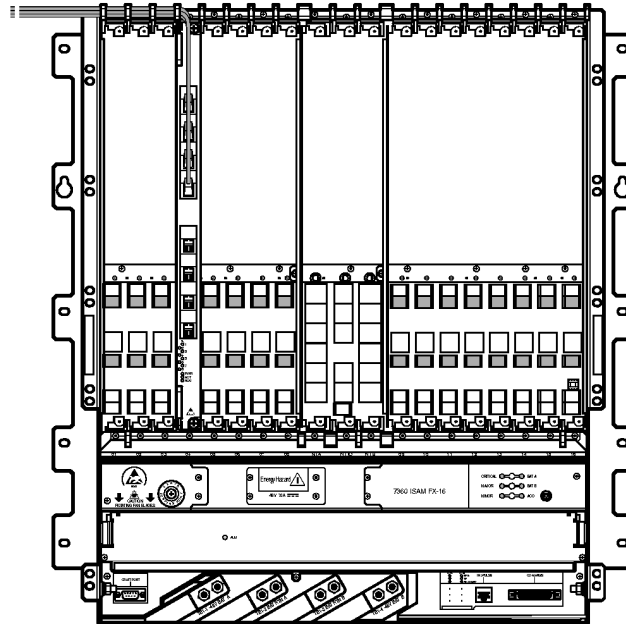
24286

- 4 Remove the dust covers from the VL ports identified in step 3.
- 5 Connect a VL cable of appropriate length to a VL port on the NDPS-B card by removing the cap from the cable connector and inserting the cable connector into the VL port; see Figure 58.

**Figure 58** Inserting the cable connector into a VL port on the NDPS-B card

23722

- 6 Route the VL cable through the appropriate cable exit area of the shelf; see Figure 59 for VL cable exit areas:
  - for a vertically mounted shelf (cards oriented vertically):
    - for the VL cable to stretch comfortably, it is recommended that the vector processing card be installed in slot #9
    - for a VL cable connected to ports VL1 through VL4 on the NDPS-B card, route the cable straight up through the cable exit area above the NDPS-B card
    - for a VL cable connected to ports VL5 through VL8 on the NDPS-B card, route the cable up and then towards the PWIO-B card so that the VL cable exists the shelf above PWIO-B card
  - for a horizontally mounted shelf (cards oriented horizontally):
    - for the VL cable to stretch comfortably, it is recommended that the vector processing card be installed in slot #9
    - for a VL cable connected to ports VL1 through VL4 on the NDPS-B card, route the cable straight to left through the cable exit area to the left of the VIPR-B card
    - for a VL cable connected to ports VL5 through VL8 on the NDPS-B card, route the cable towards the left and then up towards the PWIO-B card so that the VL cable exists the shelf at the left side of the PWIO-B card

**Figure 59** VL cable exit areas

23309

- 7 Route the other end of the VL cable to an NDLS-E card using the cable management tray and the cable tie down clips to secure the cable as needed.
- 8 Connect the VL cable to the VL port on the NDLS-E card by removing the dust cover from the VL port, removing the cap from the cable connector, and inserting the cable connector into the VL port. The VL LEDs on the NDLS-E and NDPS-B cards should come on to indicate that the link is active.
- 9 Repeat steps 3 to 8 for any additional VL cables that you want to connect between the NDPS-B card and NDLS-E cards.
- 10 Re-install the shelf cover or covers removed in step 2.
- 11 STOP. This procedure is complete.

---

# 7 Installing cards in the 7360 ISAM FX-16 shelf

## 7.1 Overview

## 7.2 Shelf areas and slot positions

## 7.3 Dummy front panels

## 7.4 Recommended tools

## 7.5 Guideline for card installation

## 7.6 Installation procedures

## 7.1 Overview

This chapter provides the procedures to install field-replaceable units (FRUs) in the 7360 ISAM FX-16.

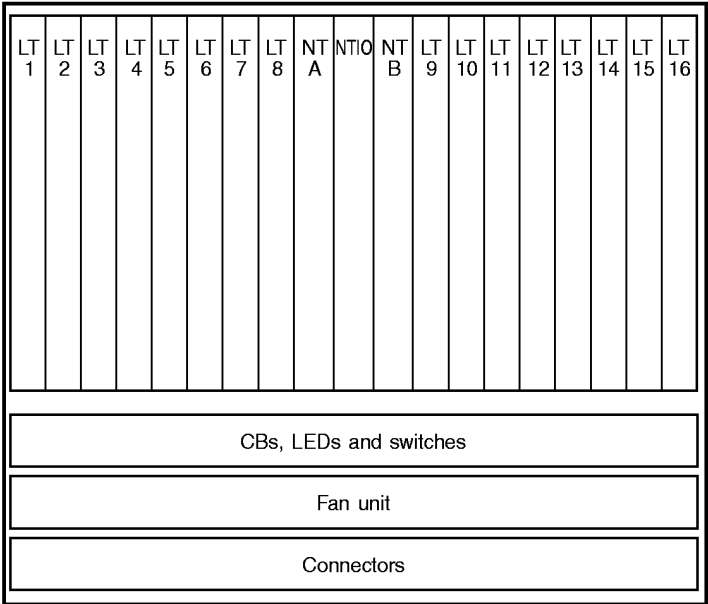


**Note** — For an overview of the supported cards, see the *7360 ISAM FX Product Information Guide*.

## 7.2 Shelf areas and slot positions

Figure 60 shows the NT and LT slot positions in a 7360 ISAM FX-16 shelf.

Figure 60 NT and LT slot positions in 7360 ISAM FX-16



22131

The 7360 ISAM FX-16 can be equipped with a maximum of 16 LT cards, 2 NT cards, and 1 NTIO card.



**Note** — Due to the length of the QSFP+ cable, it is recommended that the vectoring vector processor card be installed in slot #9.

### 7.3 Dummy front panels

Dummy front panels must be installed in any unused slot of a shelf to:

- ensure EMC compliance
- ensure thermal compliance via a correct airflow in the shelf
- ensure safety by avoiding direct contact with backplane connectors

At slot deployment, the dummy front panel is replaced by the appropriate card and the optical cables are connected to the card.

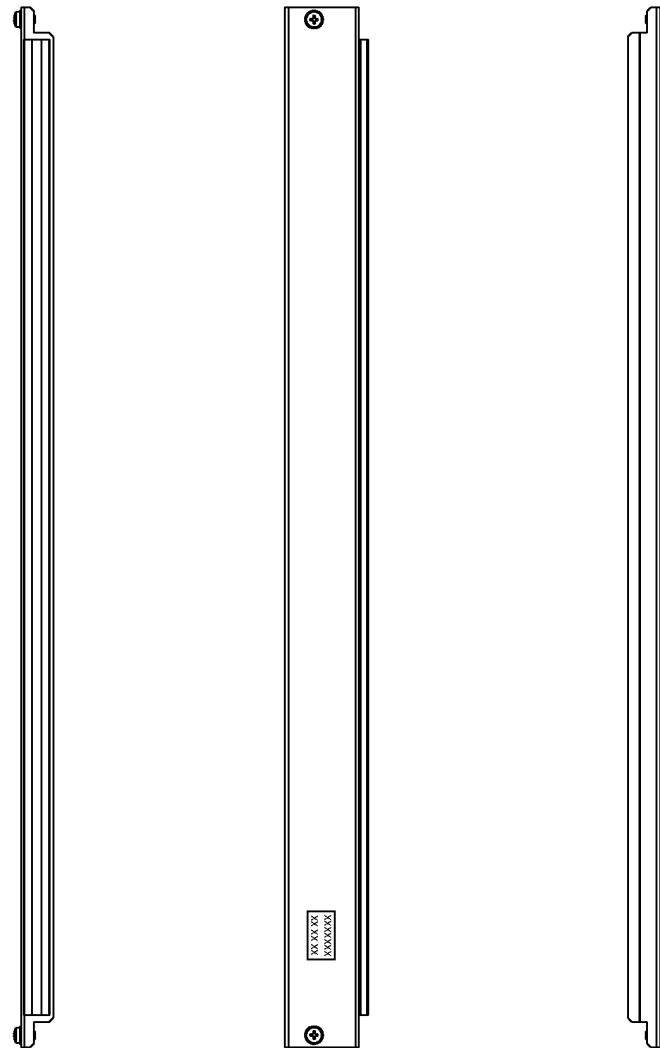
For more information on specific dummy front panels, see the *7360 ISAM FX Product Information Guide*.



### 7.3.1 NT dummy front panel

A dummy front panel must be used when the second NT card is not installed. Figure 61 shows the dummy front panel for NT card slots.

**Figure 61** Dummy front panel for NT card



22197

### 7.3.2 NTIO dummy front panel

A dummy front panel must be used when the NTIO card is not installed. Figure 62 shows one example of a dummy front panel for NTIO card slots.

**Figure 62** Universal dummy front panel for NTIO card

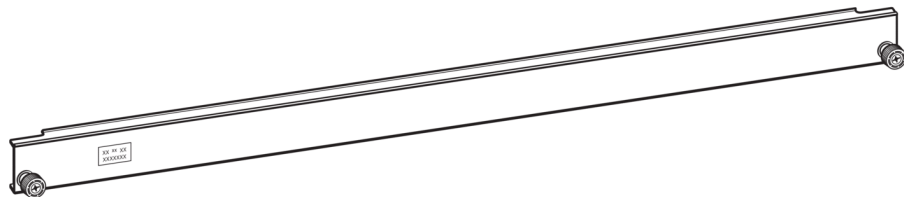


22429

### 7.3.3 Dummy front panel for optical LT cards

A dummy front panel must be used for all unused LT card slots. Figure 63 shows one example of a dummy front panel for optical LT card slots.

**Figure 63** Dummy front panel for optical LT card



26133

## 7.4 Recommended tools

The following tools are recommended:

- screwdriver to secure cards
- antistatic wrist strap for handling cards with ESD sensitive devices
- ohmmeter to check connection of wrist strap to earth bounding point

## 7.5 Guideline for card installation

This section provides a general guideline for the correct installation of a card in a shelf.

### Procedure 21 Installing a dummy front panel

To install a dummy front panel:

- 
- 1 Gently plug the card in the 7360 ISAM FX shelf until the front panel of the card touches the shelf. Guide the card to the right of the slot in the shelf card guides, while taking care that the SMD components of the card do not touch the card mounted below.
- 
- 2 For dummy front panels equipped with ejector handles:
    - Pull back the ejector handles.
    - Place left thumb at the left of the front panel, next to the mnemonic label, and place right thumb on the front panel below the right ejector handle.
    - Push with the left thumb and guide with the right thumb. The ejector handles should move inward.
    - Push both ejector handles simultaneously to completely insert the card in the shelf slot.
    - Lock the card in place by fastening the fixation screws.
- 
- 3 For dummy panels not equipped with ejector handles:
    - Align the dummy front panel to the 7360 ISAM FX shelf LT slot, ensuring that the dummy front panel thumbscrews are aligned to the shelf screw holes.
    - Hand tighten the thumbscrews. Fully secure thumbscrews using screwdriver.
- 
- 4 If the installed dummy front panel supports pre-cabling:
    - Attach the cables to the faceplate by aligning the MDF or POTS cable head shell screws with the faceplate standoffs, and secure the cable by tightening the connector screws using a screwdriver.
-

## 7.6 Installation procedures

This section describes the following card installation procedures:

- [To install NT cards](#)
- [To install NTIO cards](#)
- [To install LT cards](#)
- [To remove cards](#)

### 7.6.1 General

When installing cards in a new installation, install the NT card(s) first. Allow the NT cards to initialize and come in service before installing the LT cards. When replacing an LT card, verify that the NT card is in service before inserting the LT card.



**Warning** — Unplugging and reseating the active NT card in less than 3 seconds may result in an approximately 1 minute service interruption while the NT cards negotiate active/standby state during initialization. Wait at least 5 seconds before reseating an unplugged active NT card.



**Note 1** — Redundant NT cards must be provisioned first before they are installed. See the appropriate product Operations and Maintenance Guide to configure an NT card and to configure NT redundancy.

**Note 2** — The following steps must be followed if the NTIO card (FNIO-A) is moved to a new shelf:

- plan the NTIO card in the new shelf
- reset the shelf
- plug in the NTIO card

See *Operations and Maintenance Guide for FD 100/320 Gbps NT and FX NT* for planning information.

The NT and LT dummy panels (or filler plates) must be installed in any unused, unpopulated NT or LT card slot in order to maintain proper operation. Filler plate units have no electronic components; they are mechanical units used to provide ESD/EMI seal and thermal seal in the 7360 ISAM FX-16.

---

## 7.6.2 Rules for handling cards

Observe the following:



**Warning 1** — Units contain ESD sensitive devices. These devices are susceptible to ESD damage in unconnected circuit conditions. Appropriate ESD procedures should always be followed when installing or removing cards.

Units or assemblies with ESD sensitive components are labeled or tagged with the ESD awareness symbol; see Figure 64.

**Warning 2** — Keep the card in its original container until the card is ready to be installed. This is necessary to protect it from damage caused by ESD.

**Warning 3** — Always store and transport cards in original packing material when available. Materials must be in static-safe packaging or containers that are marked with an industry-standard static awareness symbol.

**Warning 4** — Keep all static-generating materials, such as plastics, away from all cards.

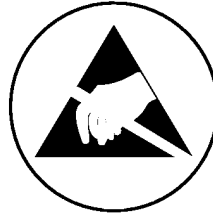
**Warning 5** — Use only dissipative materials for shipment. Shielding is not required unless specified.

**Warning 6** — Whenever possible and reasonable, maintain relative humidity above 40%.

See the *7360 ISAM FX Safety Manual* for more information about safety standard compliance.

### 7.6.2.1 ESD sensitive cards

Cards or assemblies with ESD sensitive devices are labeled or tagged with the ESD awareness symbol shown in Figure 64.

**Figure 64 ESD awareness symbol**

22390

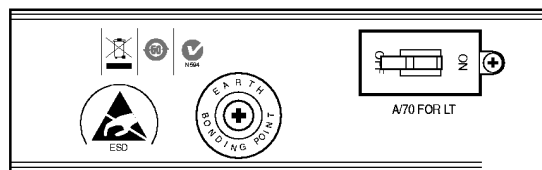


**Warning** — Risk of damage to equipment with ESD sensitive devices.

Most cards and powered equipment contain devices that are susceptible to ESD. ESD could damage these or other devices in unconnected circuit conditions.

Carefully follow these rules when handling ESD sensitive cards:

- transport and store cards in ESD protective bags or boxes
- make sure to wear a grounded wrist strap before handling
- connect the wrist strap to the earth bonding point at the bottom of the shelf; it carries the label shown in Figure 65
- test the ESD wrist strap with the ohmmeter to ensure effectiveness; it must measure  $1\text{ M}\Omega \pm 20\%$  to ground
- do not touch circuit traces or components on the card
- handle cards at the front and side edges only

**Figure 65 Label for earth bonding point**

22216

### 7.6.2.2 Cards with optical fiber connectors

Observe the following.



**Danger** — Risk of eye damage or skin burns by laser emission.

When installing optical cards or handling optical fibers, never look inside connectors of cards or fibers when these are not connected.

Put end caps on open connectors to protect against unexpected emission.



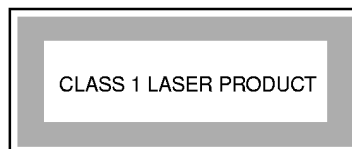
**Caution** — Risk of damage by ESD when card is not connected.

This card contains devices that are susceptible to damage caused by ESD in unconnected circuit conditions.

Carefully follow ESD safety precautions.

Figure 66 shows a laser classification label.

**Figure 66** Laser classification label



18256

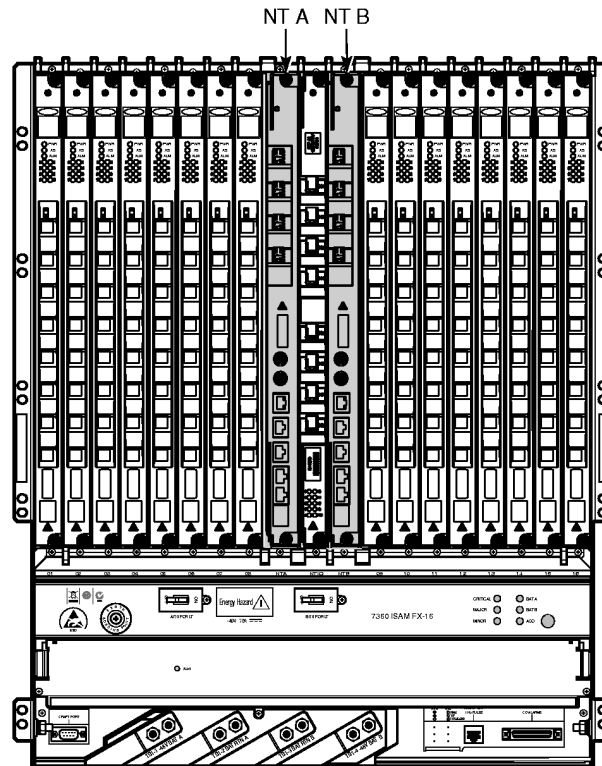
#### Procedure 22 To install NT cards

Use this procedure to install network termination (NT) cards in an 7360 ISAM FX-16.

A 7360 ISAM FX-16 has one or two NT cards:

- a single (first) NT card is inserted in slot NTA
- a redundant card, if any, in slot NTB

Figure 67 shows the 7360 ISAM FX-16 NT cards in the slots.

**Figure 67 NT card slots in 7360 ISAM FX-16**

22199

- 1 Remove the NT card from its ESD protective bag. Wear the antistatic wrist strap.
- 2 Ensure that the insertion/extraction tabs on the card are in the unlocked position.



**Warning 1** — Ensure that all protective coverings on the shelf backplane connectors are removed prior to installation of the cards, otherwise damage to the shelf pins and the connectors may occur.

**Warning 2** — Attempting to insert a misaligned card may cause bent pins on the backplane connector. Ensure that the card is properly positioned in the slot and aligned with the backplane connector before securing the insertion/extraction tabs.



- 
- 3 Slide the NT card into the NTA slot of the shelf; see Figure 67.



**Caution —** When sliding the NT card into the slot, ensure that the solder side of the NT card does not come into contact with the EMC shielding plate adjacent to the NT card slot. If not done properly, this may cause damage at the solder side of the NT card.

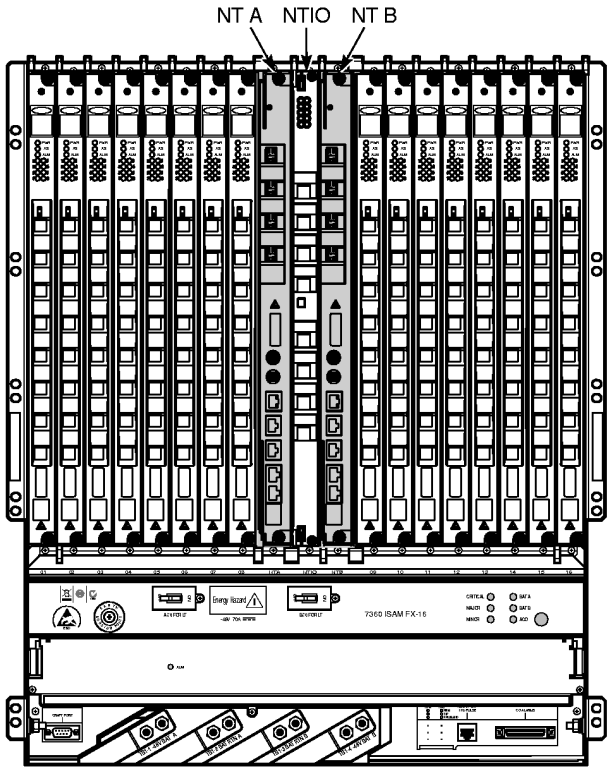
- 
- 4 Use the ejector handles to engage the connectors in the backplane; see Figure 72.
- 
- 5 Press the insertion/extraction tabs on the front panel to lock the card in place. Attach fixation screws located at the top and the bottom of the front panel of the card; see Figure 67. Maximum torque: 2.66 lbf-in. (0.3 N.m).
- 
- 6 Wait until the NT card in the NT-A slot is fully operational. The card first displays a heartbeat signal, that is, the green PWR LED is flashing. Then the card displays an enabling operation signal, that is:
- the green PWR LED is steady on
  - the green A/S LED is steady on
  - the red ALM LED is off
- 
- 7 Install the second NT card in slot NTB in the same way, then install the NT dummy panels in any unused, unpopulated NT card slot to maintain proper operation.
- 
- 8 STOP. This procedure is complete.
- 

## Procedure 23 To install NTIO cards

Each shelf containing one or two redundant NT cards can have an NT I/O applique. The NT I/O applique is a single card which is installed in the NT I/O slot between the two NT slots of the FX-16 shelf.

- 
- 1 Remove the NT I/O card from its ESD protective bag. Make sure to wear the antistatic wrist strap.
- 
- 2 Insert the NTIO card in the NTIO slot; see Figure 68.
-

Figure 68 NTIO slot



24500

- 3 Use the ejector handles to engage the card connectors in the backplane.
- 4 Lock the card in place with the fixation screws located at the top and bottom of the faceplate of the card; see Figure 68. The maximum torque is 0.6 Nm.



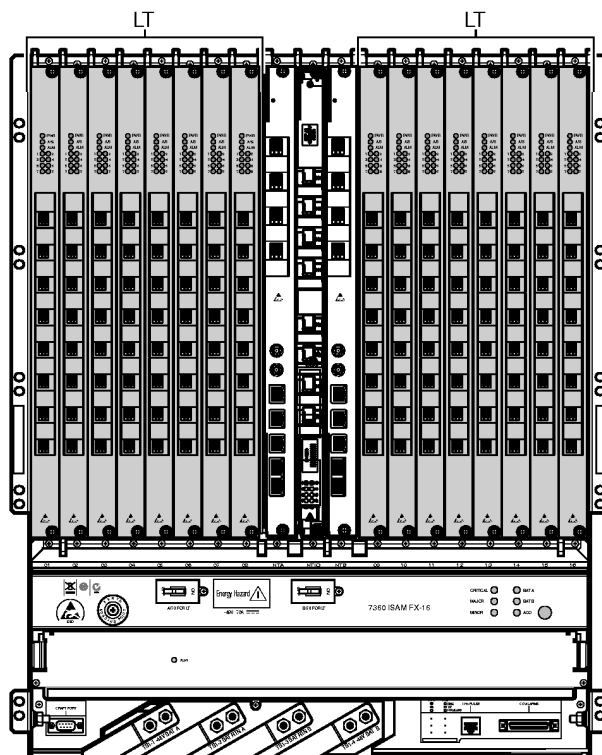
**Note** — Once the card is mounted in its slot, the green PWR LED lights up.

Procedure 24 To install LT cards

Depending on the configuration, the 7360 ISAM FX-16 can house up to 16 line termination (LT) cards.

Figure 69 shows the LT card slots.

**Figure 69** LT card slots in 7360 ISAM FX-16



22200

- 1 Locate the free LT card slots for mounting the LT cards; see Figure 69.
- 2 Remove the LT card from its ESD protective bag. Wear the antistatic wrist strap.



**Caution** — Risk of damage by ESD when the card is not connected.

This card contains devices that are susceptible to damage caused by ESD in unconnected circuit conditions.

Carefully follow ESD safety precautions.

- 3** Ensure the insertion/extraction tabs on the card are in the unlocked position.

- 
- 4 Slide the LT card into the appropriate LT card slot.



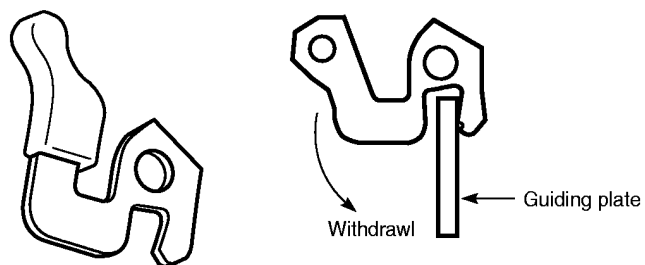
**Caution** — When sliding the LT card into slot 9, ensure that the solder side of the LT card does not come into contact with the EMC shielding plate adjacent to the LT card slot. If not done properly, this may cause damage at the solder side of the LT card.

- 
- 5 Press the insertion/extraction tabs on the front panel to lock the card in place. Attach fixation screws located at the top and the bottom of the front panel of the card; see Figure 69. Maximum torque: 2.66 lbf-in. (0.3 N.m).
- 
- 6 The card first displays a heartbeat signal, that is, the green PWR LED is flashing. Then the card displays an enabling operation signal:
- the green PWR LED is steady on
  - the red ALM LED is off
- 
- 7 In the same way, install all the planned LT cards for the shelf.
- 
- 8 Install LT card dummy panels in any unused, unpopulated LT card slots to maintain proper operation.
- 
- 9 STOP. This procedure is complete.
- 

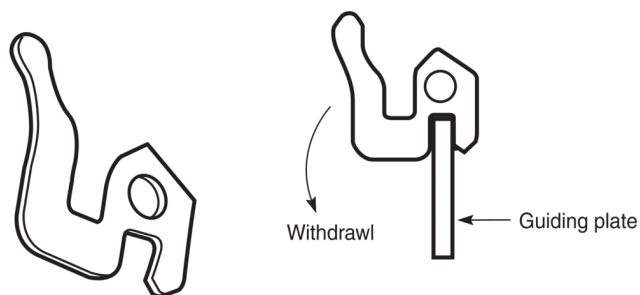
## Procedure 25 To remove cards

Use the following procedure to remove a card.

- 
- 1 Put on the antistatic wrist strap and connect it to the earth bonding point at the bottom of the 7360 ISAM FX-16 shelf; see Figure 65.
- 
- 2 Test the ESD wrist strap with the ohmmeter to ensure effectiveness; it must measure 1 MΩ +/-20% to ground.
- 
- 3 Loosen the fixation screws located at the top and the bottom of the front panel of the card.
- 
- 4 Use the ejector handles to disengage the connectors from the backplane. Figures 70 and 71 show the different ejector handles on LT cards. Figure 72 shows the ejector handles on NT cards.

**Figure 70** Ejector handles for LT cards

22376

**Figure 71** Ejector handles for LT cards

25830

**Figure 72** Ejector handles for NT cards

22375

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**5** Remove the card from its slot and place it in an ESD protective bag.

---

**6** STOP. This procedure is complete.

---



## 8 Fiber optic cable management in the 7360 ISAM FX-16 shelf

### 8.1 Overview

### 8.2 Managing fiber optic cables

### 8.3 Routing fiber optic cables

## 8.1 Overview

This chapter describes the fiber optic cable management for the 7360 ISAM FX-16 shelf.

The fiber optic cable management strategy is based on the following concepts:

- 1 To route the fiber optic cables out of the rack toward the vertical cable channels located on both sides of the front of the rack.
- 2 To route the fiber optic cables within the 7360 ISAM FX-16 shelf toward the dedicated fiber outlets of the shelf.
- 3 To protect the fiber optic cables using optional bending protection items.



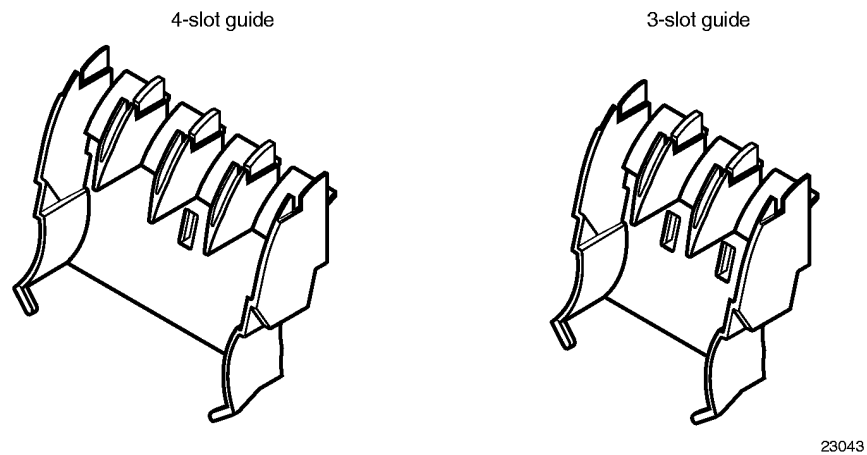
**Note** — see Appendix [29 “Fiber optic handling and acceptance criteria”](#) for more information.

The 7360 ISAM FX-16 fiber optic cable management strategy incorporates the following hardware:

- Fiber management guides to provide proper fiber optic cable handling, support and control.

Figure [73](#) shows a view of the 7360 ISAM FX-16 fiber guiding elements of the fiber management kit.

**Figure 73** Fiber guiding elements of the 7360 ISAM FX-16 optical fiber management kit



## 8.2 Managing fiber optic cables

This section describes how to fiber optic cables for NT cards and LT cards in the 7360 ISAM FX-16 shelf.



## 8.2.1 General safety and operations information

This section provides general safety and operations information. See the *7360 ISAM FX Safety Manual* for more information.



**Danger** — Non-terminated optical connectors may emit invisible laser radiation. Serious eye damage may occur if the laser beam is viewed directly or with improper optical instruments. Avoid direct exposure to the laser beam.



**Warning 1** — Do not use nylon cable ties for securing fiber optic cable.

**Warning 2** — During card installation, proper fiber management is crucial. Improper fiber placement can cause the fibers to crimp and become damaged.



**Caution 1** — When working with optical fiber cable, it is essential to use caution to avoid breaking the fibers. Do not pull, kink, or twist the optical fiber cable. If the cable is kinked, pulled, twisted, or otherwise damaged, it must be discarded and replaced with another cable.

**Caution 2** — Avoid sharp bends in cables. Use the proper bend radius when installing cables. The minimum bending radius of fiber optic cable is 1.5 in. (38mm), or 20 times the cable diameter, whichever is greater.

## 8.2.2 Optical modules

NT and LT cards are populated with a customer-defined combination of pluggable optical modules that provide the bandwidth required by the specific 7360 ISAM FX system deployment; see the local plans for more information.

The number of optical modules depends on the card type. Each of the connectors has a Tx port and an Rx port. Depending on the type of optical module, one or two optical fibers are required to connect to the optical module.



**Warning** — Do not use unauthorized SFPs or XFPs. This can adversely affect the system requiring operator intervention.



**Note 1** — For an overview of the supported SFP modules, see the *7360 ISAM FX Product Information Guide*.

**Note 2** — Nokia recommends protecting any SFP cage that is not equipped with an SFP modules with a dust cover in order to prevent dust intrusion.

**Note 3** — The type of optical fibers must match the particular SFP to guarantee the overall optical budget in the system and its correct operation of the system. Loss of optical power as a result of a mismatch in materials must be avoided.

### 8.2.3 Fiber cables

Standard single-mode fiber cables with LC connectors are connected to the SFP optical modules for transmit (Tx) and receive (Rx) purposes.

GPON SFPs require an SC/UPC connector.

The NELT-B requires 90° fiber connector strain relief boots.

### 8.2.4 Routing fiber optic cables in the rack

Fiber optic cables must be routed upward towards the top of the 7360 ISAM FX-16 shelf using the cable guides that are built into the baffle.

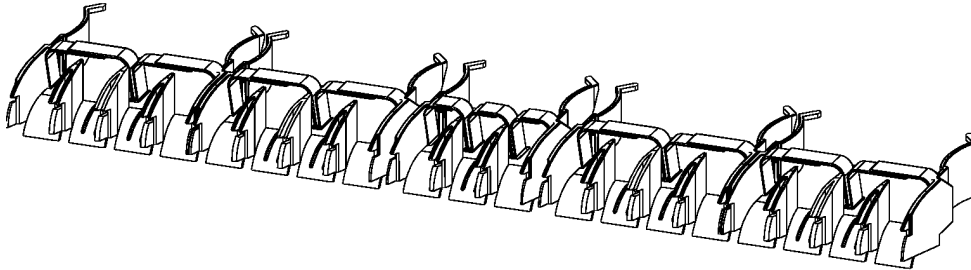
### 8.2.5 Fiber management kit

Fiber management guides are recommended for installment on the 7360 ISAM FX shelves to provide proper fiber optic cable handling. The kit contains:

- fiber management guide for the NT cards
- fiber management guide for the LT cards

One fiber management guide is required for every four LT cards.

Figure 74 shows an example of a fiber management guide.

**Figure 74** Fiber management guide for 7360 ISAM FX-16

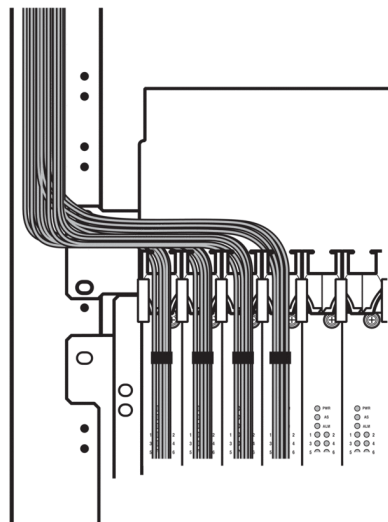
22202

## 8.3 Routing fiber optic cables

This section provides procedures for mounting fiber management guides, routing and connecting fiber optic cables to the NT and LT cards for 7360 ISAM FX-16, and for installing optical modules.

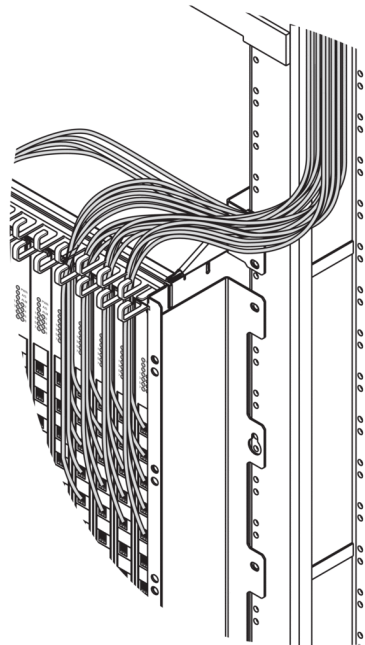
Figure 75 shows an example of the fiber optic routing and cable management, with the use of a fiber management guide for the 7360 ISAM FX-16 shelf.

Figure 76 shows an example of the fiber optic routing and cable management without the use of a fiber management guide for the 7360 ISAM FX-16 shelf.

**Figure 75** Fiber routing with a fiber management guide for 7360 ISAM FX-16

25370

**Figure 76** Fiber routing without a fiber management guide for 7360 ISAM FX-16



25373

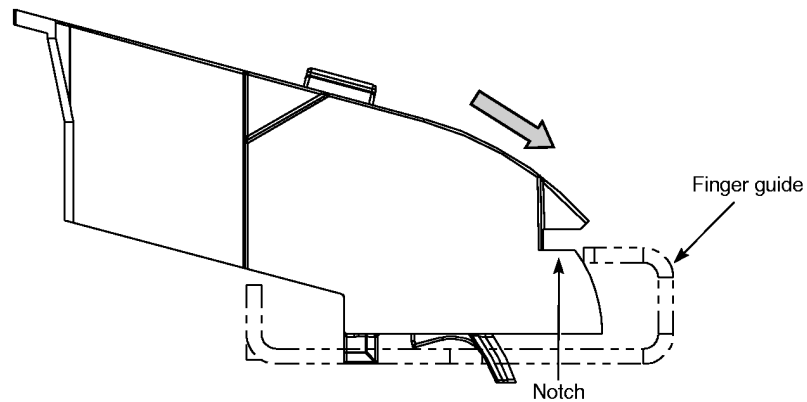
## Procedure 26 To mount the fiber management guide

Use the following procedure to mount the fiber management guide onto the 7360 ISAM FX-16.



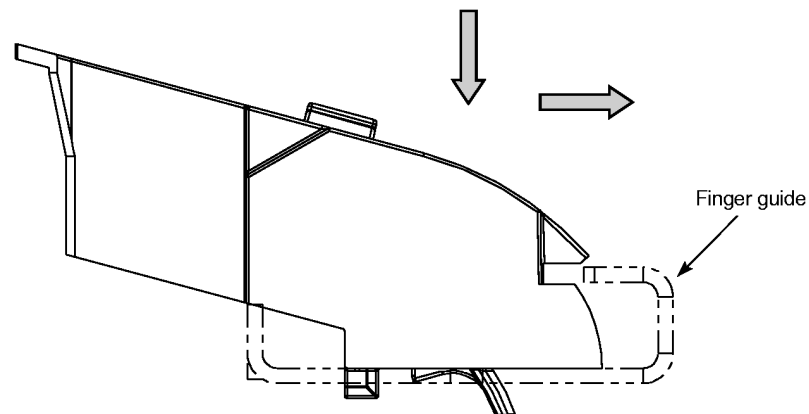
**Note —** The 7360 ISAM FX-16 fiber management bracket pre-assembly that is included in the heat and fiber baffle kit must be installed after the heat and fiber baffle kit.

- 1 Ensure the fiber management bracket is already mounted onto the fiber management cable bracket on the shelf as described in Chapter 5 [“Installing a 7360 ISAM FX-16 shelf”](#), section 5.4 [“Installing a 7360 ISAM FX-16 heat and fiber baffle kit”](#).
- 2 Align the pre-assembled fiber management bracket and fiber guiding elements with the finger guides located on the top of the shelf; see Figure 77.

**Figure 77 Alignment of 7360 ISAM FX-16 fiber management guide**

22203

- 3 Push down on the pre-assembled fiber management bracket and slide it forward onto the finger guides of the cable management bracket on the shelf until it locks into place; see Figure 78.

**Figure 78 Mount the 7360 ISAM FX-16 fiber management guide**

22204

- 4 STOP. This procedure is complete.

---

## Procedure 27 To route fiber cables to NT and LT cards

Use the following procedure to route and connect 7360 ISAM FX-16 fiber cables to NT and LT cards.

- 
- 1 To route fiber cables to NT and LT cards, proceed as follows:
    - a If routing fiber cables using a fiber management guide, mount the fiber management guide. See Procedure [26](#).
    - b If routing fiber cables without using a fiber management guide, continue to step [2](#).
  - 2 Prepare fiber optic cables for the equipped NT and LT cards.
  - 3 Label both ends of each cable with the following information, for future identification:
    - card connection name
    - Tx or Rx, depending on which port is used for the connection
  - 4 Route the fiber cables from the source to the top of the rack.
  - 5 If using a fiber management guide, route the fiber cables through the fiber management guides, and toward the NT and LT cards. Otherwise, route the fiber cables, maintaining a proper bend radius, toward the NT and LT cards:
    - a Route to the left for:
      - NT card A
      - LT cards in slots 01 to 08
    - b Route to the right for:
      - NT card B
      - LT cards in slots 09 to 16
- 



**Note** — For NELT-B cards, 90° fiber connector strain relief boots are required.

- 
- 6 Insert the fiber cables into the appropriate optical modules located on the front panels of the NT and LT cards. If optical modules must first be installed, see Procedure [28](#).
  - 7 Route and connect the other end of the fiber cables as per site practices.
  - 8 STOP. This procedure is complete.
-

---

## Procedure 28 Installing an optical module



**Caution —** It is important to install optical modules prior to connecting power to a 7360 ISAM FX shelf.

To install optical modules, proceed as follows:

- 
- 1 Put on an antistatic wrist strap and connect it to a grounding point.
- 
- 2 Install an optical module as follows:
    - i Align the optical module with an optical module port and slide it into the port until it clicks into place.
    - ii Remove the rubber cap from the optical module.



**Note —** The optical module can only be removed when the pull-down bar is released.

- 
- 3 STOP. This procedure is complete.
-





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# 7360 ISAM FX-8 shelf installation

- [9 Installing a 7360 ISAM FX-8 shelf](#)
- [10 7360 ISAM FX-8 shelf cabling](#)
- [11 Installing cards in the 7360 ISAM FX-8 shelf](#)
- [12 Fiber optic cable management in the 7360 ISAM FX-8 shelf](#)



## 9 Installing a 7360 ISAM FX-8 shelf

### 9.1 Overview

#### 9.2 Mounting the 7360 ISAM FX-8 shelf in a 19 in. rack

#### 9.3 Mounting the 7360 ISAM FX-8 shelf in a 23 in. rack

#### 9.4 Installing or replacing a fan unit in a 7360 ISAM FX-8 shelf

### 9.1 Overview

This chapter provides the steps to install a 7360 ISAM FX-8 shelf in a standard CO equipment rack, including procedures for:

- [Mounting the 7360 ISAM FX-8 shelf in a 19 in. rack](#)
- [Mounting the 7360 ISAM FX-8 shelf in a 23 in. rack](#)
- [Installing or replacing a fan unit in a 7360 ISAM FX-8 shelf](#)



**Warning —** The 7360 ISAM FX-8 is intended to be installed in a restricted access location (RAL) in accordance with the applicable requirements of NEC or CEC. The local authorities have jurisdiction. This unit is intended to be installed by qualified service personnel only. Observe the following for the 7360 ISAM FX-8.

- Connect to a reliably grounded –48 V dc SELV source that is grounded in the same building.
- Provide branch circuit overcurrent protection that is rated as 50 A with 8 AWG copper conductors.
- Incorporate a readily accessible disconnect device that is suitably approved and rated in the field wiring.

The 7360 ISAM FX-8 is suitable for the following:

- rack mounting on concrete floors or other non-combustible surfaces with the use of a drip tray
- use in an installation using an IBN or a CBN
- use in:
  - network telecommunication facilities
  - locations where the NEC applies
  - OSP

## 9.2 Mounting the 7360 ISAM FX-8 shelf in a 19 in. rack

The 7360 ISAM FX-8 shelf can be mounted:

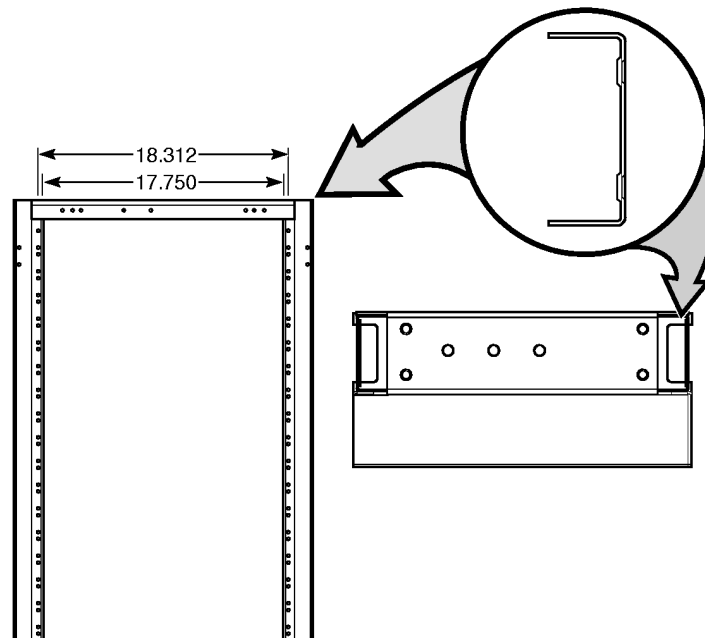
- horizontally in a EIA standard 19 in. rack (17.75 in. opening)
- vertically in a EIA standard 19 in. rack (17.75 in. opening)
- vertically in a seismic 19 in. rack (17.5 in. opening)



**Caution 1** — For horizontal mount of the 7360 ISAM FX-8 in an EIA standard 19 in. rack, the open channel of uprights should face toward the shelf wall as shown in Figure 79. The reverse configuration of the closed wall facing the shelf will impair thermal performance and is not supported.

**Caution 2** — The 7360 ISAM FX-8 vertical shelf mount kit must be used in a vertical mount installation to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

**Figure 79** 19 in. EIA standard rack upright channel direction for horizontal mount for 7360 ISAM FX-8



22742

### 9.2.1 7360 ISAM FX-8 rack mounting configurations

Table 7 describes the horizontal rack configurations for a 7360 ISAM FX-8 shelf in an EIA standard 19 in. rack.

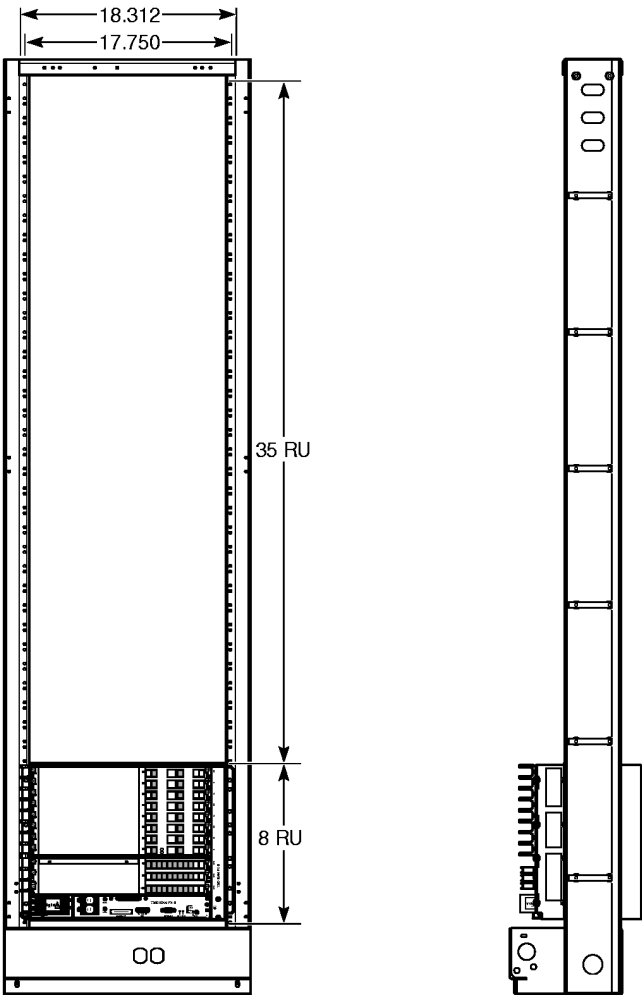
**Table 7** Horizontal mounting configurations for 7360 ISAM FX-8 in a 19 in. rack

Rack unit <sup>(1)</sup>	EIA standard 19 in. rack (17.75 in.)
SR 1	NFXS-E
	Horizontal shelf mount kit
Fan 1	BFAN-E (with fan filter)
SR 2	NFXS-E
	Horizontal shelf mount kit
Fan 2	BFAN-E (with fan filter)

Note  
(1) Although this table portrays only two 7360 ISAM FX-8 shelves, up to five shelves in a rack is supported.

Figure 80 shows the EIA standard 19 in. rack horizontal mounting configuration for 7360 ISAM FX-8.

**Figure 80**      **Horizontal mounting configuration for 7360 ISAM FX-8 in a 19 in. EIA standard rack**



22736

**Table 8**      **Vertical mounting configurations for 7360 ISAM FX-8 in a 19 in. rack**

Rack unit	EIA standard 19 in. rack (17.75 in. I.D.)	Seismic 19 in. rack (17.5 in. I.D.)
SR 1	NFXS-E	NFXS-E
	Vertical shelf mount kit	Vertical shelf mount kit
Fan 1	BFAN-E (with fan filter)	BFAN-E (with fan filter)

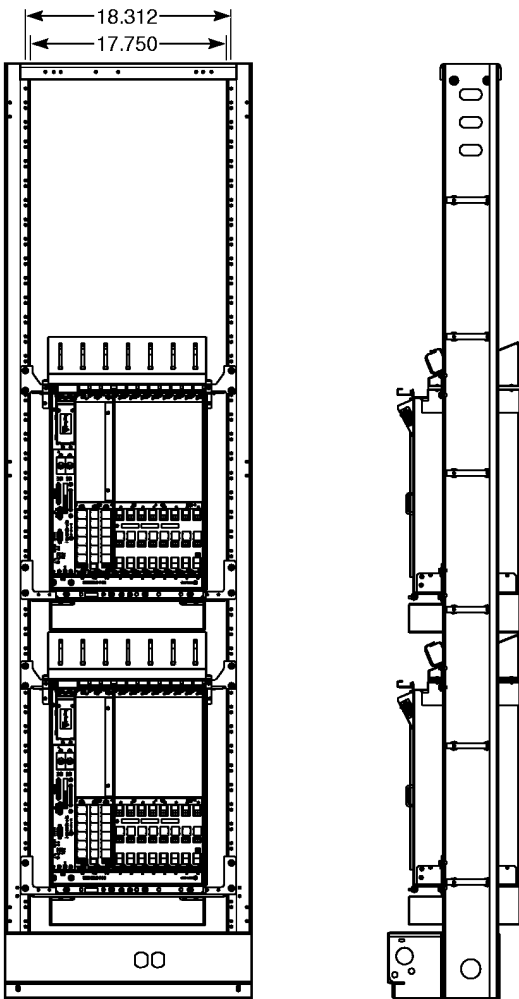
(1 of 2)

Rack unit	EIA standard 19 in. rack (17.75 in. I.D.)	Seismic 19 in. rack (17.5 in. I.D.)
SR 2	NFXS-E	NFXS-E
	Vertical shelf mount kit	Vertical shelf mount kit
Fan 2	BFAN-E (with fan filter)	BFAN-E (with fan filter)

(2 of 2)

Figure 81 shows the 7360 ISAM FX-8 vertical rack mounting configuration in a 19 in. EIA standard rack.

**Figure 81** Vertical mounting configuration for 7360 ISAM FX-8 in a 19 in. EIA standard rack



23345

---

## 9.2.2 Parts list

The following parts are required:

- 7360 ISAM FX-8 shelf (NFXS-E)
- grounded 19 in. EIA standard rack or 19 in. seismic standard rack that can accommodate the 7360 ISAM FX-8 shelf
- horizontal shelf mount kit containing:
  - 12-24 × 1/2 in. (12.7 mm) screws
  - mounting brackets not required
- vertical shelf mount kit containing:
  - pre-assembled top cross bracket, rear skirt and front skirt
  - pre-assembled shelf horizontal mount bracket and air intake baffle/drip tray
  - intumescent panel
  - top baffle
  - 12-24 × 1/2 in. (12.7 mm) screws
  - M3 × 5/16 in. (8 mm) screws
  - M3 × 9/16 in. (14 mm) screws
  - M3 × 9/16 in. (14 mm) screws
  - 12-24 × 1/2 in. (12.7 mm) screws
- fan unit (BFAN-E))
- 6 AWG power lug for horizontal mount
- 8 AWG power lug for vertical mount
- general facilities card, if replacing (NGFC-H)
- cables:
  - 50-pin micro DSUB connector
  - DB-9 connector
  - RJ-45 connector
  - 6-pin wire-wrap right angle header connector
  - 120-pin FCI power blade connector

## 9.2.3 Recommended tools

The following tools are recommended:

- screwdrivers
- protective gloves



---

**Procedure 29 To mount the 7360 ISAM FX-8 shelf horizontally in a 19 in. rack**

Use this procedure to mount a 7360 ISAM FX-8 shelf horizontally in a 19 in. EIA standard rack.

- 
- 1 Unpack and visually inspect the shelf for physical damage.
- 
- 2 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.

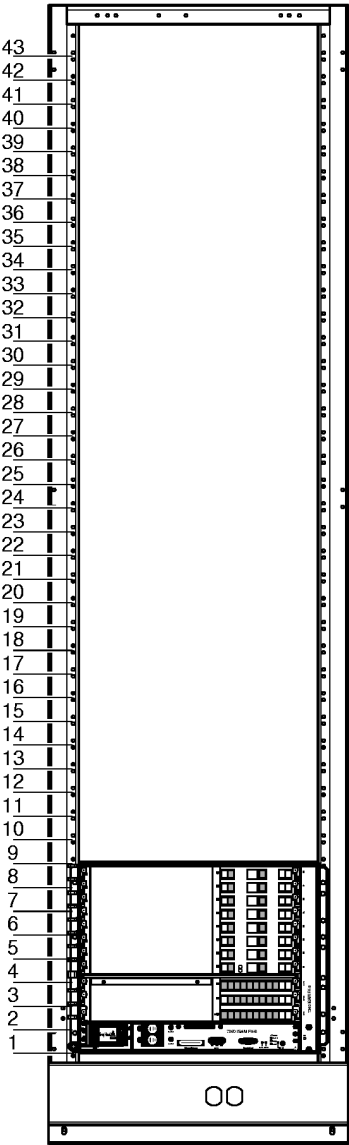


**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3 Put on the antistatic wrist strap and connect it to a grounding point.
- 
- 4 Verify the 7360 ISAM FX-8 shelf mounting locations on the rack; see Figure 82.
- 
- 5 Orient the 7360 ISAM FX-8 shelf horizontally with the fan unit located on the right side and align the shelf unit with the left and right rack mounting holes.
- 
- 6 Mount the 7360 ISAM FX-8 shelf with 12-24 × 1/2 in. (12.7 mm) screws to the left rack mounting hole, then to the right rack mounting hole securely.

**Figure 82**     Horizontal mounting locations in a 19 in. rack for 7360 ISAM FX-8



22737



**Note** — See Chapter 10 “7360 ISAM FX-8 shelf cabling” for 7360 ISAM FX-8 shelf cabling information.

7     STOP. This procedure is complete.

**Procedure 30 To mount the 7360 ISAM FX-8 shelf vertically in a 19 in. rack**

Use this procedure to mount a 7360 ISAM FX-8 vertically in a 19 in. EIA standard rack.



**Caution —** The vertical shelf mount kit must be used for the 7360 ISAM FX-8 in a vertical mount installation as the air intake baffle/drip tray and top baffle are required to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

- 
- 1 Unpack and visually inspect the vertical shelf mount kit for physical damage.
- 
- 2 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.

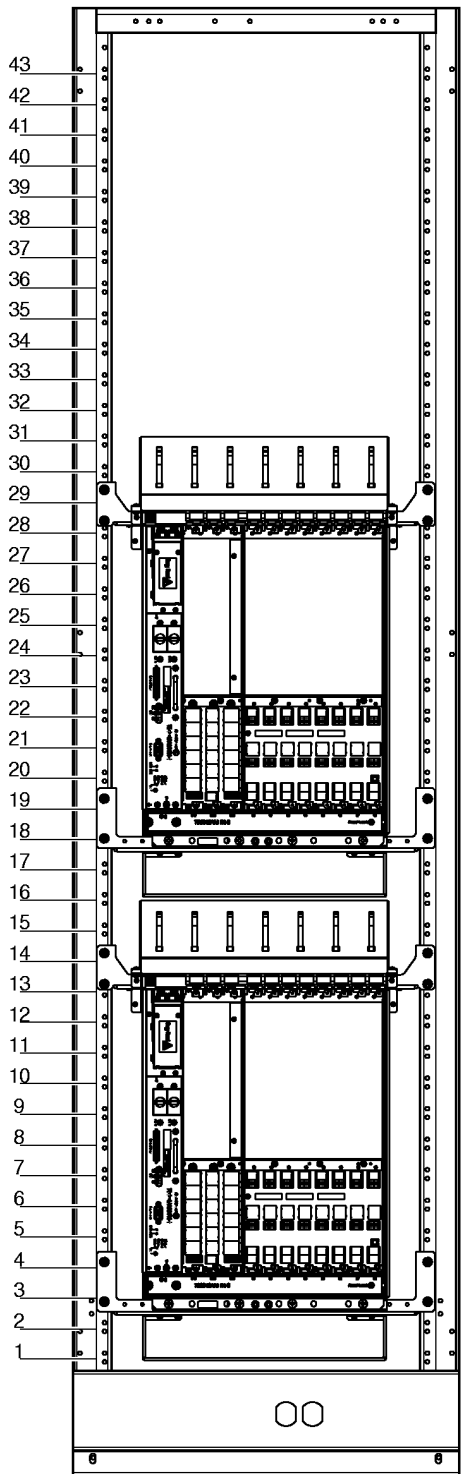


**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3 Put on the antistatic wrist strap and connect it to a grounding point.
- 
- 4 Verify the 7360 ISAM FX-8 shelf mounting locations on the rack; see Figure 83.

**Figure 83** Vertical mounting locations in a 19 in. rack for the 7360 ISAM FX-8



23344

- 
- 5 Install the pre-assembled shelf horizontal mounting bracket and air intake baffle/drip tray onto the bottom of the 19 in. rack as shown in Figure 84.

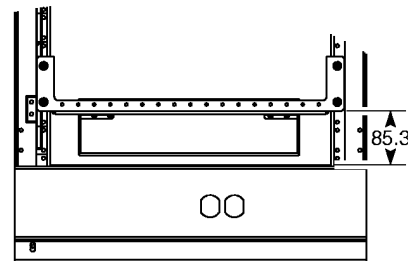
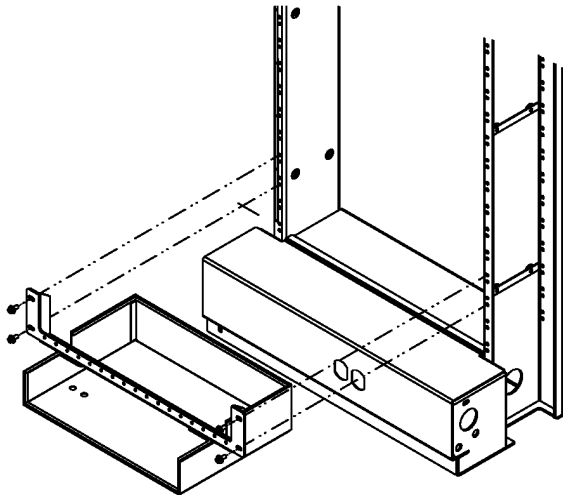


**Caution —** The pre-assembled shelf mounting bracket and air intake baffle/drip tray is required in the bottom position of each installed 7360 ISAM FX-8 shelf in a rack.



**Note —** Torque the mounting bracket screws to 28 in. to 30 in. per lbs after attaching the air intake/drip tray assembly to the rack.

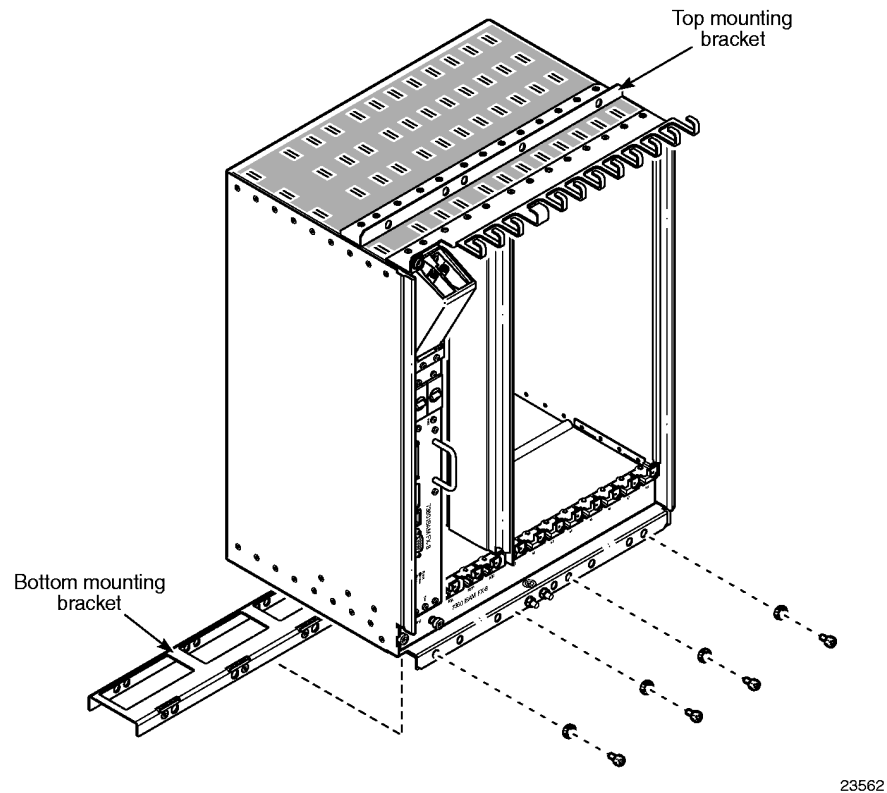
**Figure 84** Mounting the 7360 ISAM FX-8 pre-assembled shelf mounting bracket and air intake baffle/drip tray in a 19 in. rack



23352

- 
- 6 Remove and discard the top mounting bracket and screws that were shipped with the shelf, see Figure 85 for the location.

**Figure 85** Location of 7360 ISAM FX-8 top mounting bracket

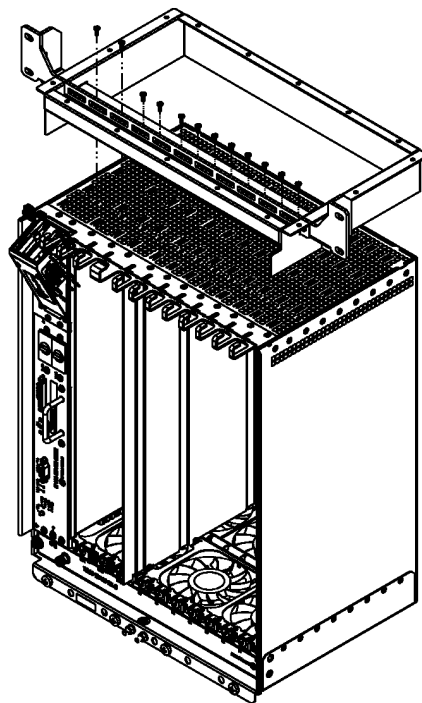


- 7 Remove the bottom mounting bracket, screws, and washers and retain them to re-install later.
- 8 Attach the pre-assembled skirts and mounting bracket to the shelf using the M3 × 8mm screws as shown in Figure 86.



**Note** — Torque the mounting bracket screws to 4.3 in. to 6.3 in. per lbs after placing the skirt assembly onto the shelf.

**Figure 86** Mounting the 7360 ISAM FX-8 pre-assembled skirts and bracket



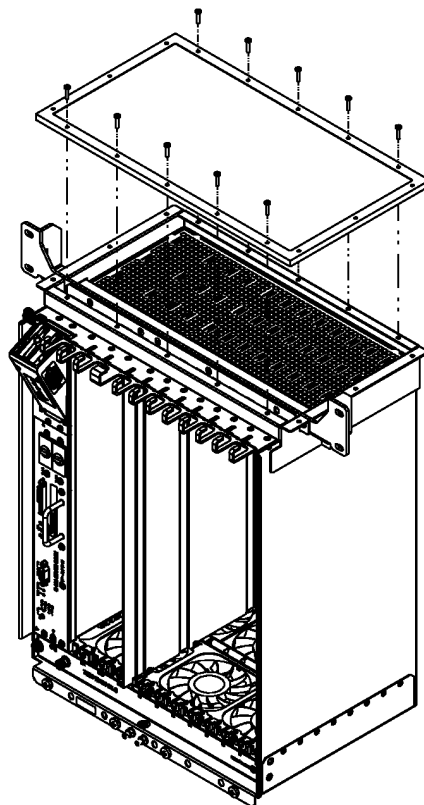
23353

- 9 Orient the intumescent panel horizontally over the top of the skirt assembly aligning the holes, and attach it to the skirt assembly using the M3 × 14 mm screws as shown in Figure 87.



**Note —** Torque the intumescent panel screws to 4.3 in. to 6.3 in. per lbs after placing it on top the skirt assembly.

**Figure 87** Mounting the 7360 ISAM FX-8 intumescent panel onto the skirt assembly



23354

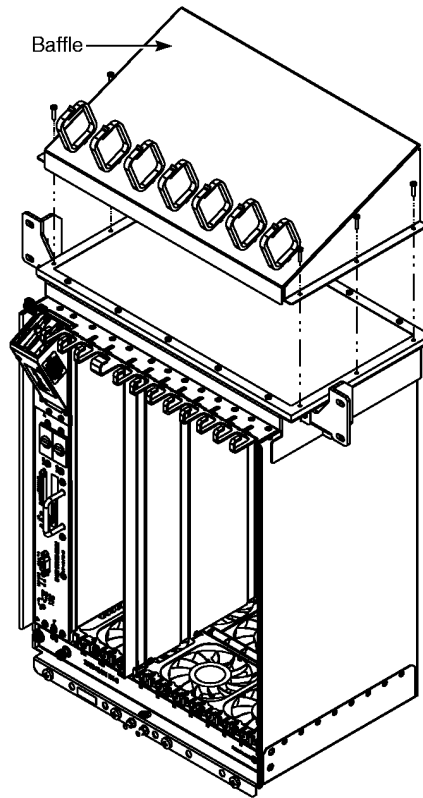
- 10** Orient the top baffle horizontally over the top of the intumescent panel aligning the holes, and attach it to the intumescent panel using the M3 × 14 mm screws as shown in Figure 88.



**Note** — Torque the mounting bracket screws to 4.3 in. to 6.3 in. per lbs after placing it on top of the intumescent panel.



**Figure 88** Mounting the 7360 ISAM FX-8 top baffle

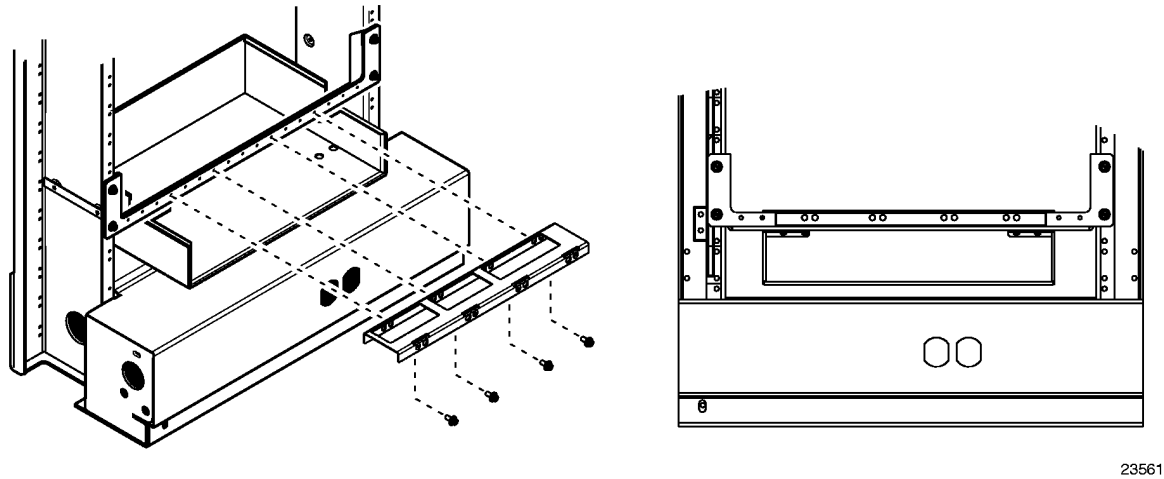


23355



**Note** — Proceed to step 8 to complete the 23 in. rack installation. Continue on to step 11 for the 19 in. rack installation.

- 11 Attach the bottom mounting bracket that was removed in an earlier step to the shelf horizontal mounting bracket and the air intake baffle/drip tray assembly using the 12-24 × 1/2 in. (12.7 mm) screws. Ensure that the flange is facing down, and align the right side of the bracket to the right side of the drip tray. See Figure 89.

**Figure 89 Attaching the 7360 ISAM FX-8 bottom mounting bracket in a 19 in. rack**

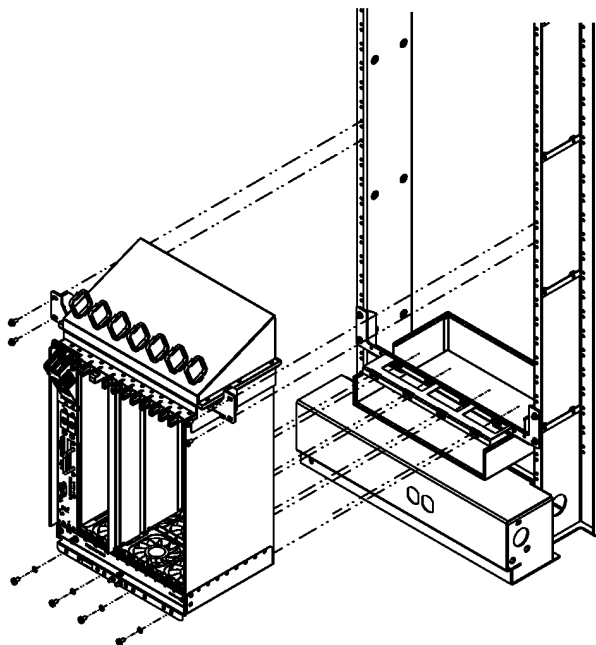
- 12 Attach the shelf assembly above the air intake/drip tray assembly and onto the bottom mounting bracket using the 12-24 × 1/2 in. (12.7 mm) screws and the screws and washers that were removed earlier, as shown in Figure 90.



**Note 1** — Removing the bottom mounting bracket from the shelf in the previous step allows the screws to be easily attached to the recessed flange on the bottom of the shelf in this step.

**Note 2** — Torque the mounting bracket screws to 28 in. to 30 in. per lbs after attaching the shelf assembly to the rack.

**Figure 90** Mounting the 7360 ISAM FX-8 shelf assembly vertically in a 19 in. rack



23356



**Note** — See Chapter 10 “7360 ISAM FX-8 shelf cabling” for 7360 ISAM FX-8 shelf cabling information.

**13** STOP. This procedure is complete.

### 9.3 Mounting the 7360 ISAM FX-8 shelf in a 23 in. rack

The 7360 ISAM FX-8 shelf can be mounted:

- horizontally in a 23 in. rack with 21.5 in. opening
- vertically in a 23 in. rack with 21.5 in. opening



**Caution** — The vertical shelf mount kit must be used for the 7360 ISAM FX-8 in a vertical mount installation as the air intake baffle/drip tray and top baffle are required to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

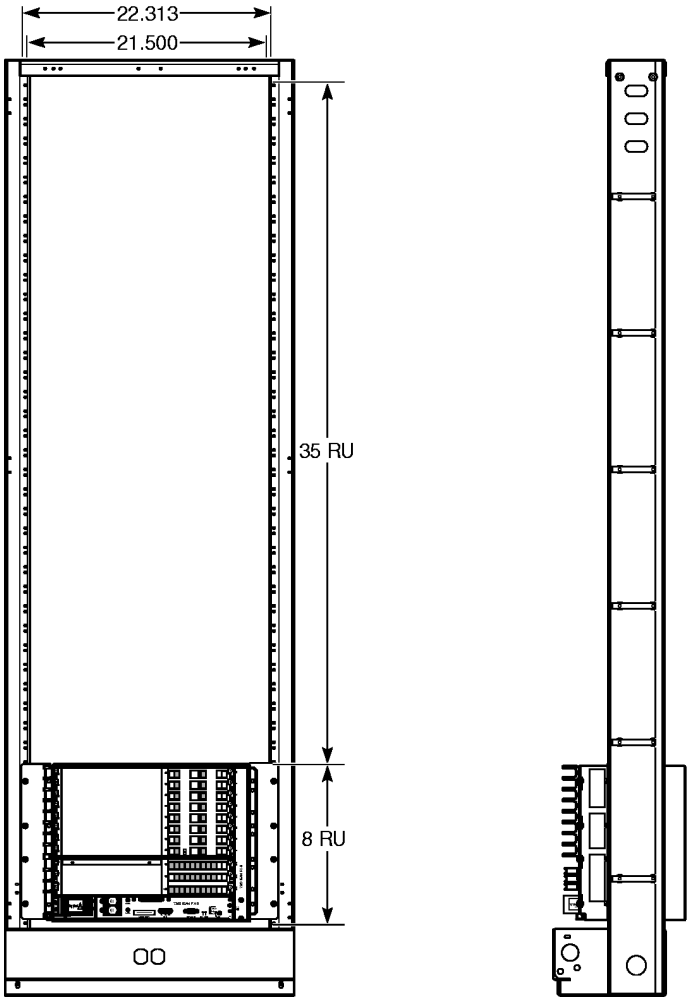
#### 9.3.1 7360 ISAM FX-8 rack mounting configurations

Table 9 describes the horizontal rack mounting configuration for a 7360 ISAM FX-8 shelf in a 23 in. rack. Figure 91 shows the horizontal rack mounting configuration.

**Table 9** Horizontal mounting configuration supported in a 23 in. rack for 7360 ISAM FX-8

Rack unit	23 in. rack horizontal mount (21.5 in. opening)
SR 1	NFXS-E
	Horizontal shelf mount kit
Fan 1	BFAN-E (with fan filter)
SR 2	NFXS-E
	Horizontal shelf mount kit
Fan 2	BFAN-E (with fan filter)

**Figure 91**     **Horizontal mounting configuration in a 23 in. rack for 7360 ISAM FX-8**



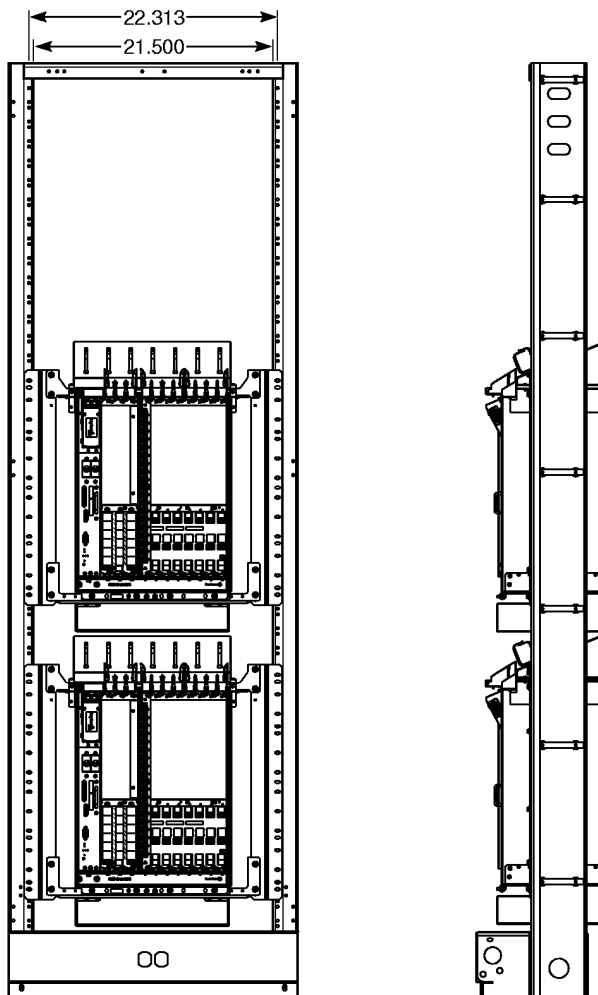
22734

Table 10 describes the vertical rack mounting configuration for a 7360 ISAM FX-8 shelf in a 23 in. rack. Figure 92 shows the vertical rack mounting configuration.

**Table 10**      **Vertical mounting configuration for 7360 ISAM FX-8 in a 23 in. rack**

Rack unit	23 in. rack vertical mount (21.5 in. opening)
SR 1	NFXS-E
	Vertical shelf mount kit
Fan 1	BFAN-E (with fan filter)
SR 1	NFXS-E
	Vertical shelf mount kit
Fan 1	BFAN-E (with fan filter)

**Figure 92** Vertical mounting configuration for 7360 ISAM FX-8 in a 23 in. rack



23346

### 9.3.2 Parts list

The following parts are required:

- 7360 ISAM FX-8 shelf (NFXS-E)
- grounded 23 in. rack that can accommodate the 7360 ISAM FX-8 shelf

- horizontal shelf mount kit containing:
  - shelf horizontal brackets (x2)
  - 12-24 × 1/2 in. (12.7 mm) screws
  - 6-32 × 3/8 in. (9.53 mm) screws
- vertical shelf mount kit containing:
  - rack adapter brackets
  - pre-assembled top cross bracket, rear skirt and front skirt
  - pre-assembled shelf horizontal mount bracket and air intake baffle/drip tray
  - intumescent panel
  - top baffle
  - 12-24 × 1/2 in. (12.7 mm) screws
  - M3 × 5/16 in. (8 mm) screws
  - M3 × 9/16 in. (14 mm) screws
  - M3 × 9/16 in. (14 mm) screws
  - 12-24 × 1/2 in. (12.7 mm) screws
- fan unit (BFAN-E))
- 8 AWG power lug
- general facilities card, if replacing (NGFC-H)
- cables:
  - 50-pin micro DSUB connector
  - DB-9 connector
  - RJ-45 connector
  - 6-pin wire-wrap right angle header connector
  - 120-pin FCI power blade connector

### Procedure 31 To mount the 7360 ISAM FX-8 shelf horizontally in a 23 in. rack

Use this procedure to mount a 7360 ISAM FX-8 shelf horizontally in a 23 in. rack.

- 1 Unpack and inspect the shelf visually for physical damage.
- 2 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.

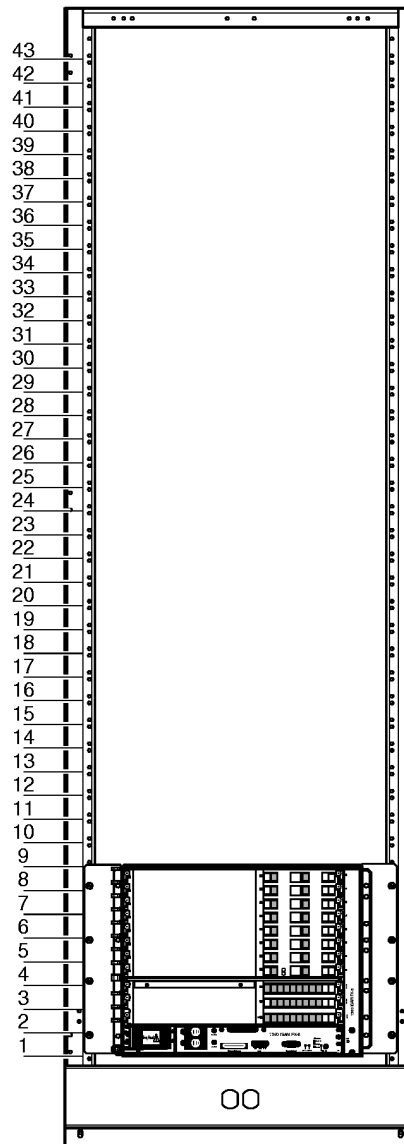


**Warning** — Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 3 Put on the antistatic wrist strap and connect it to a grounding point.
- 4 Verify the 7360 ISAM FX-8 shelf mounting locations on the rack; see Figure 93.



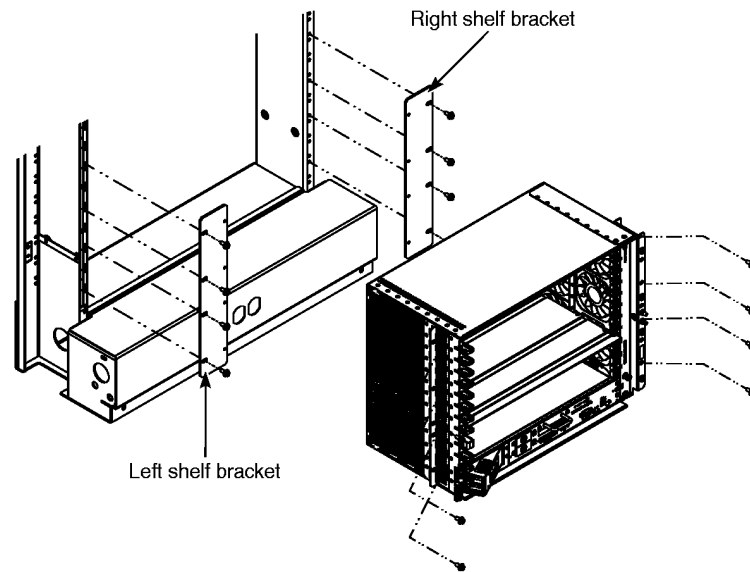
**Figure 93** Horizontal mounting locations for 7360 ISAM FX-8 in a 23 in. rack

22735

- 5 Attach the left and right shelf mounting plates to the 7360 ISAM FX-8 rack using 12-24 × 1/2 in. (12.7 mm) screws.
- 6 Orient the 7360 ISAM FX-8 shelf horizontally with the fan unit located on the right side and align the shelf unit with the left and right mounting plate holes.

- 
- 7 Mount the 7360 ISAM FX-8 shelf with 12-24  $\times$  1/2 in. (12.7 mm) screws to the left mounting plate on the rack, then to the right mounting plate on the rack securely; see Figure 94.

**Figure 94** Horizontal mounting installation for 7360 ISAM FX-8 in a 23 in. rack



22745



**Note** — See Chapter 10 “7360 ISAM FX-8 shelf cabling” for 7360 ISAM FX-8 shelf cabling information.

- 
- 8 STOP. This procedure is complete.
-

---

**Procedure 32 To mount the 7360 ISAM FX-8 shelf vertically in a 23 in. rack**

Use this procedure to mount the 7360 ISAM FX-8 vertically in a 23 in. rack.



**Caution —** The vertical shelf mount kit must be used for the 7360 ISAM FX-8 in a vertical mount installation as the air intake baffle/drip tray and top baffle are required to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

- 
- 1    Unpack and inspect the shelf and vertical shelf mount kit visually for physical damage.
- 
- 2    If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.

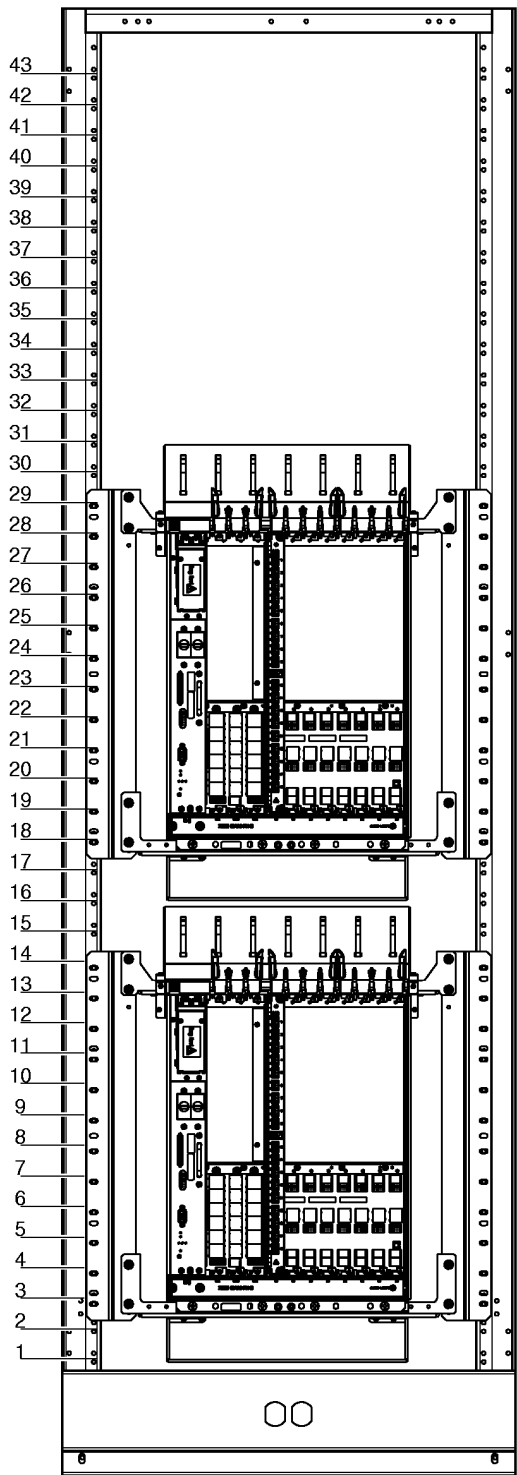


**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3    Put on the antistatic wrist strap and connect it to a grounding point.
- 
- 4    Verify the 7360 ISAM FX-8 shelf mounting locations on the rack; see Figure 95.

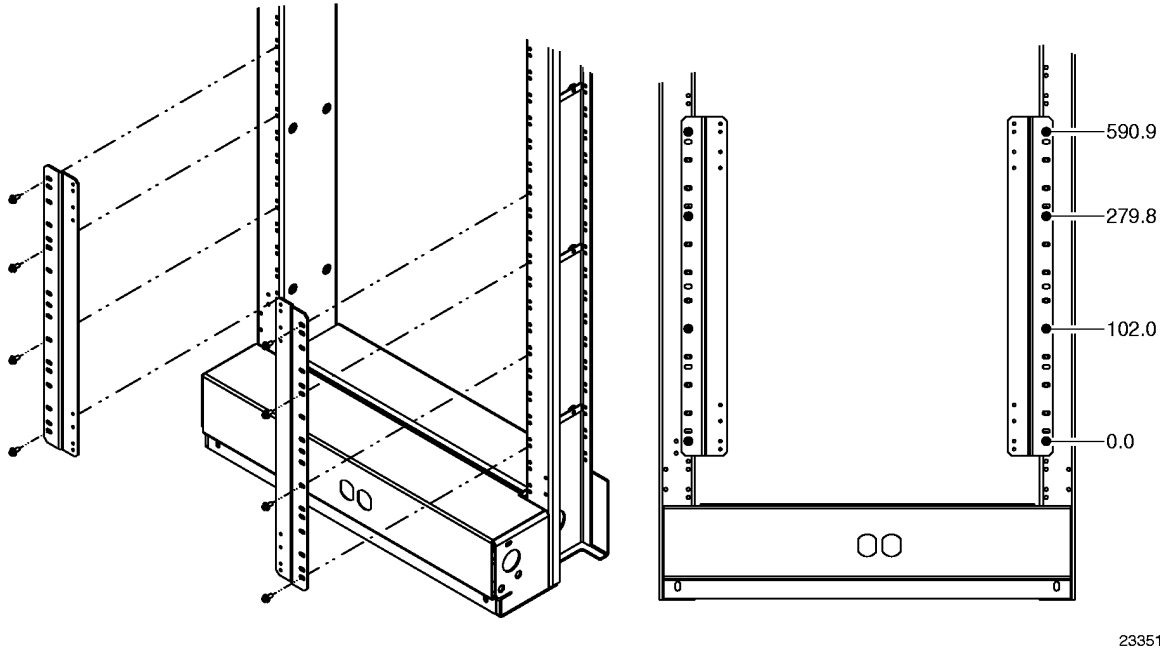
Figure 95 Veritcal mounting locations for 7360 ISAM FX-8 in a 23 in. rack



23347

- 5 Attach the rack adapter brackets to the shelf using 12-24 × 1/2 in. (12.7 mm) screws as shown in Figure 96.

**Figure 96** Mounting the 7360 ISAM FX-8 rack adapter brackets to a 23 in. rack



- 6 Install the pre-assembled shelf horizontal mounting bracket and air intake baffle/drip tray onto the bottom of the 23 in. rack as shown in Figure 97.

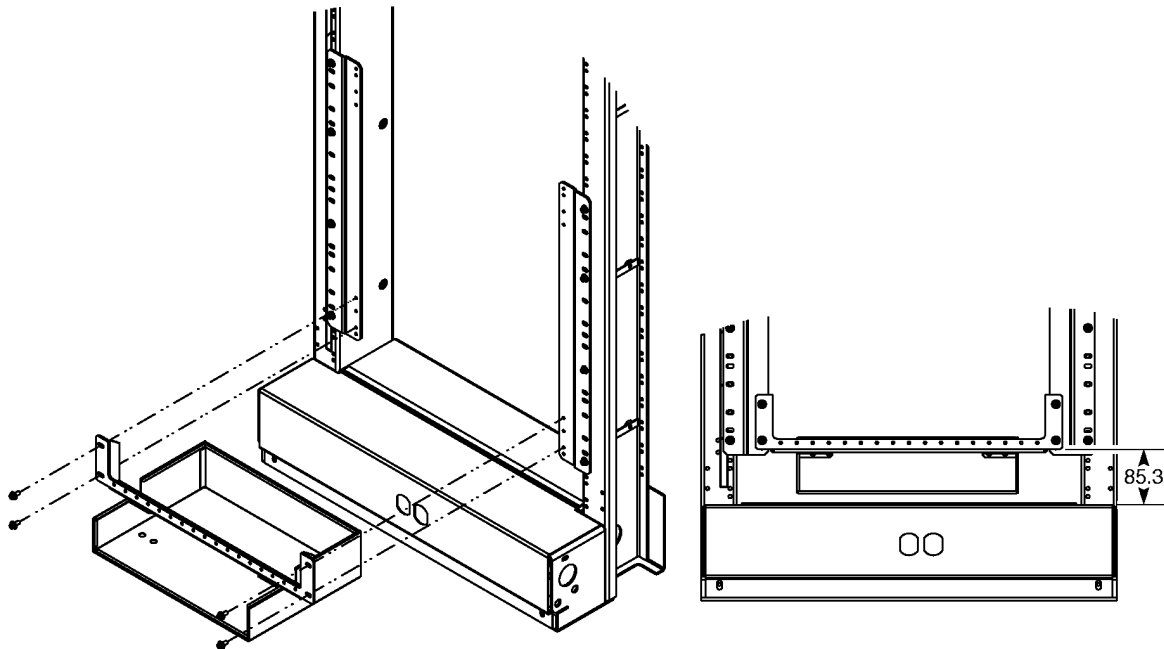


**Caution** — The pre-assembled shelf mounting bracket and air intake baffle/drip tray is required in the bottom position of each installed 7360 ISAM FX-8 shelf in a rack.



**Note** — Torque the mounting bracket screws to 28 in. to 30 in. per lbs after attaching the air intake/drip tray assembly to the rack.

**Figure 97** Mounting the 7360 ISAM FX-8 pre-assembled shelf mounting bracket and air intake baffle/drip tray in a 23 in. rack



23361

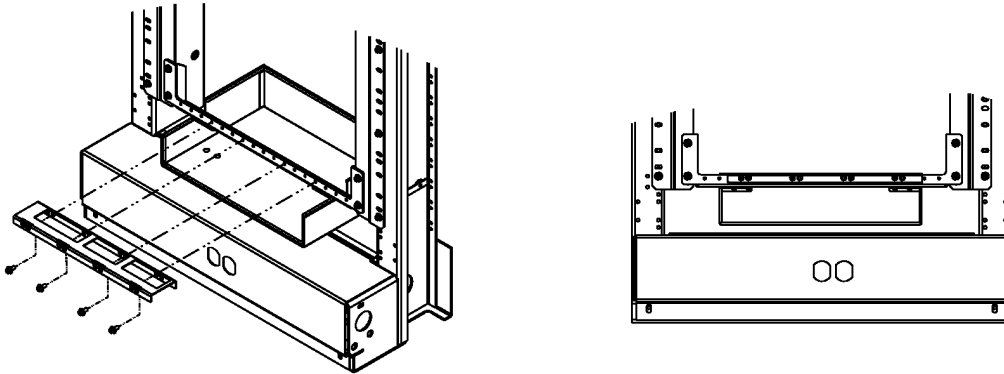
- 7 Assemble the shelf using the vertical mounting kit pre-assembled parts as shown in the 19 in. vertical mounting procedures; see [To mount the 7360 ISAM FX-8 shelf vertically in a 19 in. rack.](#)



**Note —** The procedure to assemble the vertical mounting kit is the same for both 19 in. and 23 in. rack installations. Once the similar 19 in. install procedure are complete, continue with step 8 below to complete the 23 in. install procedure.

- 8 Attach the bottom mounting bracket that was removed earlier to the shelf horizontal mounting bracket and the air intake baffle/drip tray assembly using the 12-24 × 1/2 in. (12.7 mm) screws. Ensure that the flange is facing down, and align the right side of the bracket to the right side of the drip tray; see Figure 98.

**Figure 98** Attaching the 7360 ISAM FX-8 bottom mounting bracket in a 23 in. rack



23577

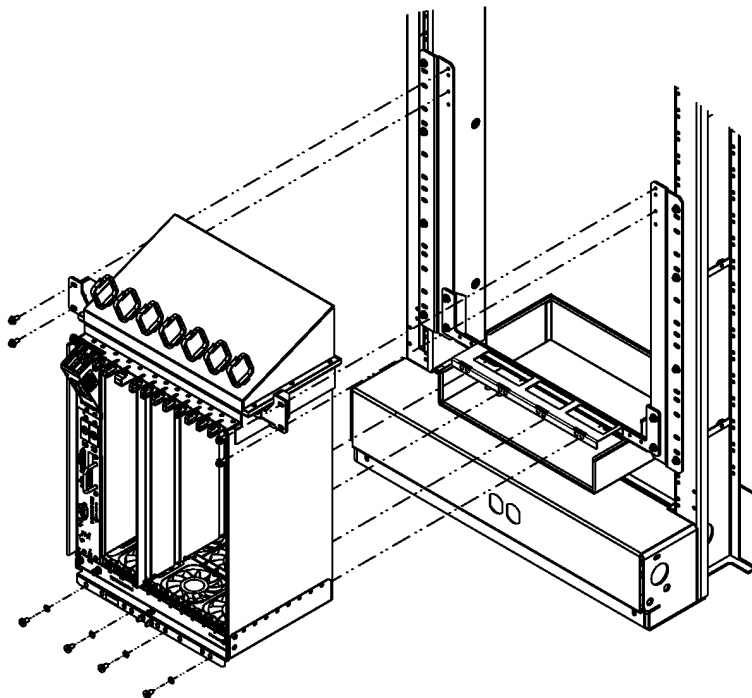
- 9 Attach the shelf assembly above the air intake/drip tray assembly and onto the bottom mounting bracket using the 12-24 × 1/2 in. (12.7 mm) screws and the screws and washers that were removed in an earlier step, as shown Figure 99.



**Note 1** — Removing the bottom mounting bracket from the shelf in previous steps allows the screws to be easily attached to the recessed flange on the bottom of the shelf in this step.

**Note 2** — Torque the mounting bracket screws to 28 in. to 30 in. per lbs after attaching the shelf assembly to the rack.

**Figure 99** Mounting the 7360 ISAM FX-8 shelf assembly vertically in a 23 in. rack



23362



**Note** — See Chapter 10 “7360 ISAM FX-8 shelf cabling” for 7360 ISAM FX-8 shelf cabling information.

**10** STOP. This procedure is complete.

## 9.4 Installing or replacing a fan unit in a 7360 ISAM FX-8 shelf

The fan unit is a field-replaceable unit with wide-voltage-range fans and an alarm interface board and (optional) fan filter. The unit is installed in the shelf fan area and plugs directly into the backplane connectors. The front panel includes a single red alarm LED that lights up if fan failure occurs.



One version of the fan unit is available:

- intelligent fan unit (BFAN-E)

The fan unit can be shipped factory installed in the rack, but can also be ordered as a separate unit for replacement on site.

The fan unit can be hot inserted into the shelf. The fan unit has no on/off switch so removing the fan unit disconnects power provided from the backplane.



**Danger** — Risk of fire and equipment damage or system failure when cooling with the wrong fan unit, when the fans are off, or when the fan filter is dirty.

When a shelf in a powered system contains the wrong type of fan unit (for example, a fan unit with four instead of eight fans) or when fans are failing or out of operation, there is a risk of active plug-in units overheating. Fan units with dirty fan filters might no longer assure sufficient air cooling. Plug-in units might get seriously damaged, even ignite, or cause a system failure.

Observe the following rules:

- Before switching on the rack power, make sure the correct type of fan unit is installed and that the fan unit is equipped with a clean fan filter.
- Keep all the fans in operation as long as the system is active.
- When replacing a fan unit of an active system (for example, during maintenance, expansion or upgrade), never keep the fan area empty for longer than 2 minutes.
- Make sure the fan filter is clean and replace it, depending on the amount of dust in the CO, every 3 to 6 months.  
See the *7360 ISAM FX Product Information Guide* for information on orderable part numbers.



**Caution** — Hot insertion of the fan unit can sometimes cause service disruption.

---

**Procedure 33 To install or replace a fan unit**

Use the following procedure to install or replace a fan unit.

- 
- 1    Unpack and inspect the fan unit visually for physical damage.

---

  - 2    If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.



**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3    Put on the antistatic wrist strap and connect it to a grounding point.

---

  - 4    Verify if the fan unit type is correct for the rack configuration. See Table 9.

---

  - 5    Verify the mounting position of the fan unit; see Figure 93.

---

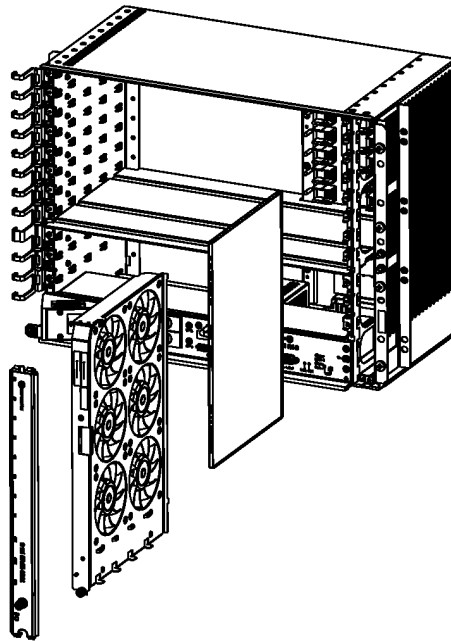
  - 6    Remove the fan unit from its shipping packaging and inspect it for damage. If damaged, do not mount the fan unit but notify the transportation carrier and Nokia immediately.

---

7 In case of replacement, remove the installed fan unit:

- i Loosen the captive screw of the fan cover and remove the cover; see Figure 100.

**Figure 100 Fan installation for 7360 ISAM FX-8**



22389

- ii Pull the fan unit out of the fan area by the handles.
- iii If a fan filter was installed, remove the fan filter.



**Danger** — When the fan unit is extracted, the fans will still be rotating. Do not touch the fans, because this may cause bodily harm.



**Caution** — Be careful when removing the fan filter to ensure that dust will not get into the card cage area and onto the card components to prevent possible damage to the other equipment.

---

8 If the system is active, keep in mind the maximum time (5 minutes) fans are allowed to be out of operation (see Danger warning about the risk of fire).

- 
- 9 Install the new fan unit:
    - i Gently insert the fan unit into the fan area until the backplane connectors are fully mated.
    - ii If a fan filter was installed, re-insert the fan filter.
    - iii Replace the fan unit cover and secure the cover and the fan unit by tightening the captive screws.
- 
- 10 In the same way, install the fan units of other shelf units, if any.
- 
- 11 Install a fan filter in the fan unit of each shelf or replace the filter, if required (each 3 to 6 months, depending on the amount of dust in the CO).

See the *7360 ISAM FX Product Information Guide* for information on orderable part numbers.
- 
- 12 STOP. This procedure is complete.
- 

## Procedure 34 To replace a fan filter

The fan filter must be replaced each 3 to 6 months, depending on the amount of dust in the CO). Use the following procedure to replace the fan filter. See the *7360 ISAM FX Product Information Guide* for information on orderable part numbers.

- 
- 1 Unpack and inspect the fan filter visually for physical damage.
- 
- 2 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.



**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3 Put on the antistatic wrist strap and connect it to a grounding point.
- 
- 4 Loosen the captive screw of the fan cover; see Figure 100.
- 
- 5 Gently remove the fan unit.

- 
- 6 Carefully remove the fan filter and place it in the appropriate removal container.



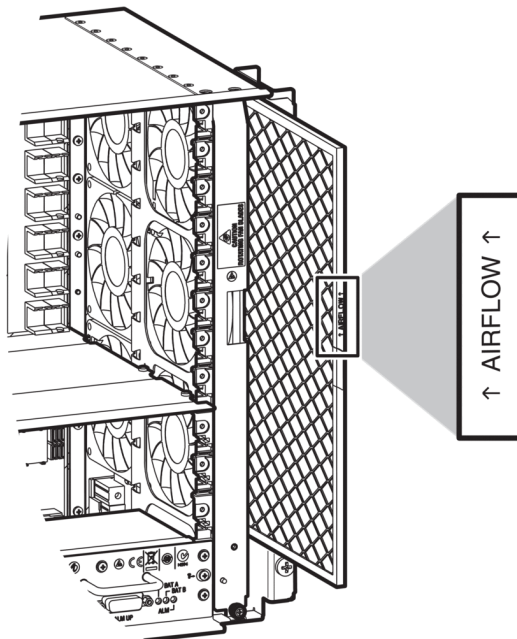
**Caution —** Be careful when removing the fan filter to ensure that dust will not get into the card cage area and onto the card components, to prevent possible damage to the other equipment.

- 
- 7 Install the new fan filter; see Figure 101.



**Caution —** Ensure that the metal grid of the fan filter, as well as the arrows on the frame of the fan filter, face inward toward the fan unit.

**Figure 101 Fan filter installation for 7360 ISAM FX-8 shelf**



26702

- 
- 8 Replace the fan unit cover and secure the cover by tightening the captive screws.
- 
- 9 STOP. This procedure is complete.
-



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# 10 7360 ISAM FX-8 shelf cabling

## 10.1 Overview

## 10.2 Safety precautions

## 10.3 Shelf grounding connection

## 10.4 Rack grounding connection

## 10.5 Power cabling

## 10.6 CO alarm connector

## 10.7 BITS interface connections

## 10.8 ToD/PPS connector

## 10.9 Remote craft port connector

## 10.10 Combo cable connector

## 10.11 POTS and LINE MDF cable connector

## 10.12 Vectoring cable connector

## 10.1 Overview

This chapter provides the following cabling information for the 7360 ISAM FX-8 shelf.

- Safety precautions
- Shelf grounding connection
- Rack grounding connection
- Power cabling
- CO alarm connector
- BITS interface connections
- ToD/PPS connector
- Remote craft port connector

## 10.2 Safety precautions

The following safety precautions apply:



**Danger 1** — Before working on the power supply unit, verify whether it is live.

If the power supply is live, which can deliver –48 Vdc, you must use an insulated tool kit. See *7360 ISAM FX Safety Manual* for more information about working with live components.

**Danger 2** — Avoid risk of electric shock.

Always wear protective gloves and footwear for all handling tasks.

Carefully follow the instructions.



**Warning 1** — Before connecting to the power, verify the specifications of all equipped fan units to ensure that the correct voltage will be supplied (–48 V dc) to these units.

**Warning 2** — Before power is supplied, all fasteners requiring a specific torque must be tightened moderately before final tightening with a torque wrench or driver.

When power is supplied, tighten fasteners with insulated tools, according to the specified torque.

**Warning 3** — For Type 2 ports:

The intra-building port(s) of the 7360 ISAM FX equipment or sub-assembly is suitable for connection to intra-building or unexposed wiring or cabling only.

**Warning 4** — For Type 2 ports that require shielded cables:

The intra-building port(s) of GR-1089-CORE Type 2 of the 7360 ISAM FX equipment or sub-assembly must use shielded intra-building wiring or cabling that is grounded at both ends.

See the *7360 ISAM FX Safety Manual* for more information.

## 10.3 Shelf grounding connection

This section provides the 7360 ISAM FX-8 shelf grounding cable types, cable routing, and connection information.



---

Observe the following safety notes.



**Danger 1** — Rack or frame must be suitably connected to the office grounding network in accordance with Article 250 of the national electrical code (NEC) to ensure UL and CSA compliance. If outside the United States, ground per local electrical codes and practices.

**Danger 2** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.

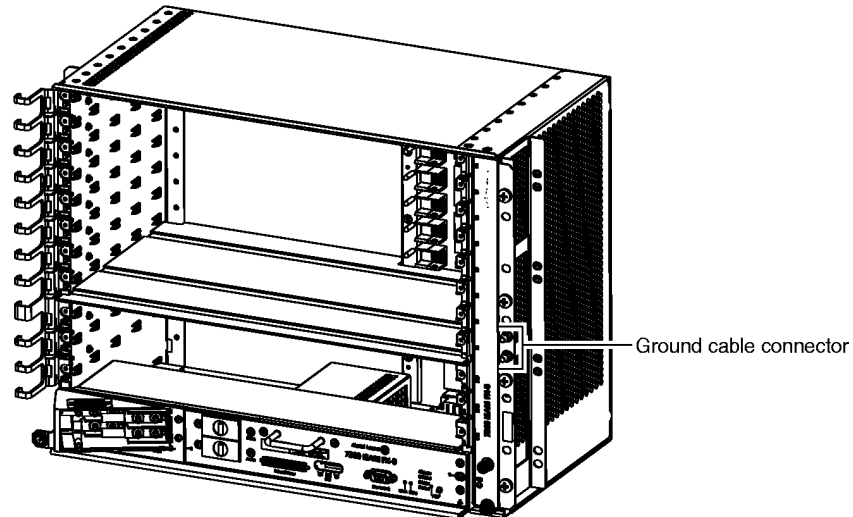
### 10.3.1 Grounding cable type

As shown in Figure 102, the 7360 ISAM FX-8 includes two grounding cable connectors. Each ground lug is a 4 AWG, with 1/4 in. holes, with 3/4 in. spacing, single crimp, peep, copper, UL and CSA recognized dual-hole lug. The preferred cable is 4 AWG, green with a yellow stripe. Other types and sizes of wire and lugs can also be used provided they meet the requirements of Article 250 of the NEC.

### 10.3.2 Cable routing and connection

The grounding cable must be used when the shelf is stand-alone and will not be used if the shelf is assembled in a rack. The cable is routed through an opening in the right side of the shelf to the grounding terminal.

The connections for the grounding cable are shown in Figure 102. The grounding cable is connected to the shelf frame with hardware included with the shelf.

**Figure 102** Grounding cable connection on 7360 ISAM FX-8

22381

**Procedure 35** To connect the grounding cable

Use the following procedure to connect the grounding cable.

- 1 Route the grounding cable to the right side of the shelf and up to the middle of the shelf.
- 2 Connect the dual-lug to the grounding cable connection point as shown in Figure 102.



**Danger** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.



**Note** — The grounding cable nuts should be tightened with a torque of 13.28 to 17.7 lbf-in. (1.5 to 2.0 N.m).

- 3 STOP. This procedure is complete.

---

## 10.4 Rack grounding connection

The 7360 ISAM FX-8 requires a 6 AWG rack frame grounding cable for the rack grounding connection.



**Danger 1** — Rack or frame must be suitably connected to the office grounding network in accordance with Article 250 of the National Electrical Code (NEC) to ensure UL and CSA compliance. If outside the United States, ground per local electrical codes and practices.

**Danger 2** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.

### Procedure 36 To connect the rack ground

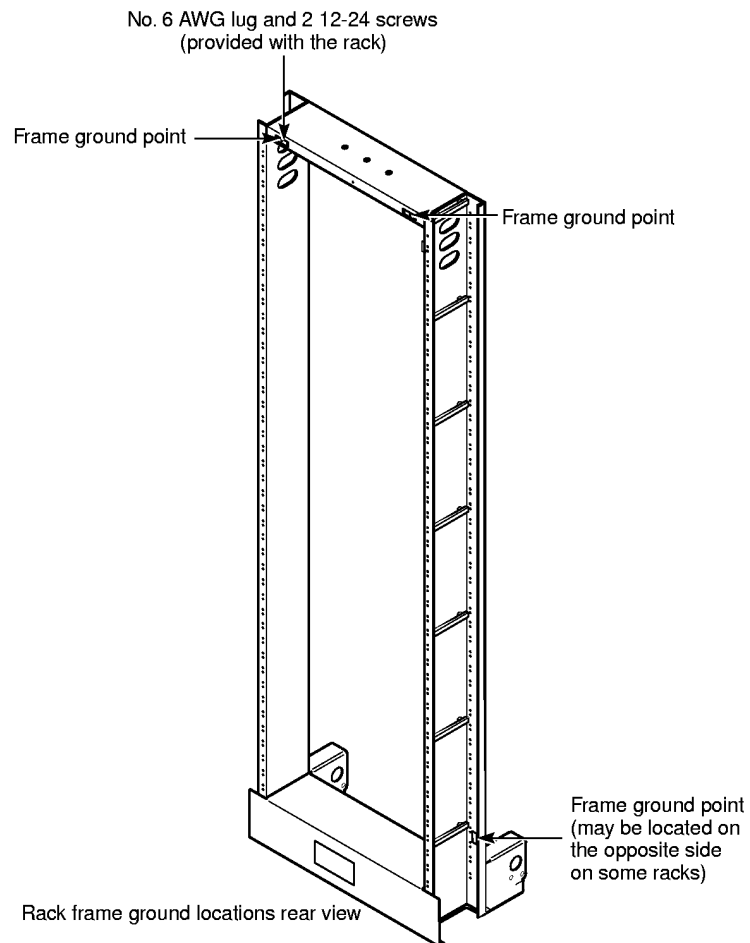
- 
- 1 Prepare the frame grounding cable.

---

  - 2 Following local practices, route the grounding cable to the top of the rack.

---

  - 3 Connect the grounding cable to one of the two frame grounding points on the top of the rack, as shown in Figure 103, using the screws provided with the rack.

**Figure 103 External frame ground point rear view**

22676

---

**4** Perform power and ground tests as per local practices.

---

**5** STOP. This procedure is complete.

---

## 10.5 Power cabling

This section describes the 7360 ISAM FX-8 general information, power distribution unit location, and the external power cabling procedure to connect the power cables.

## 10.5.1 General

This section includes information about the power distribution frame, external ground, and power cable routing.

### 10.5.1.1 Power distribution frame (PDF)

The 7360 ISAM FX-8 shelf is powered through two redundant branches A, and B, in a three-wire configuration provided by the PDF.

The 7360 ISAM FX-8 operates with a nominal voltage level of –48 Vdc supplied by battery power sources in the CO or cabinet.

### 10.5.1.2 External ground

The standard rack provides three frame ground points with two located on top of the rack. The safety ground conductor used must be a green-yellow insulated cable (UL 60950-1 2nd Edition and CAN/CSA C22.2 NO. 60950-1-07 compliant).

### 10.5.1.3 Cable routing

Power cables are routed from the PDF to the rack using cable channels overhead and are connected at the input terminal block inside the 7360 ISAM FX-8 shelf.

To minimize interference, Nokia recommends that you route power cables using separate channels for signal and power cables.

Keeping a distance of 4 in. (10 cm) between signal and power cables is advisable where it imposes no practical problems.

Crossing of signal cables with power cables and parallel routing over short distances is acceptable.

## 10.5.2 Power distribution unit

The 7360 ISAM FX-8 is designed to be used as stand-alone equipment. It is equipped with a –48 Vdc power distribution unit with terminal block.

The power distribution terminal block is located at the bottom left of the shelf and is covered with a plastic safety cover.

---

## 10.5.3 Power cables

This section provides information about the types of power connection cables, cable routing, and a procedure for connecting the power cables on the 7360 ISAM FX-8.

### 10.5.3.1 Power cable type

The 7360 ISAM FX-8 requires the use of an 8 AWG power cable.



**Note 1** — The color of the power cables must be according to local installation practices.

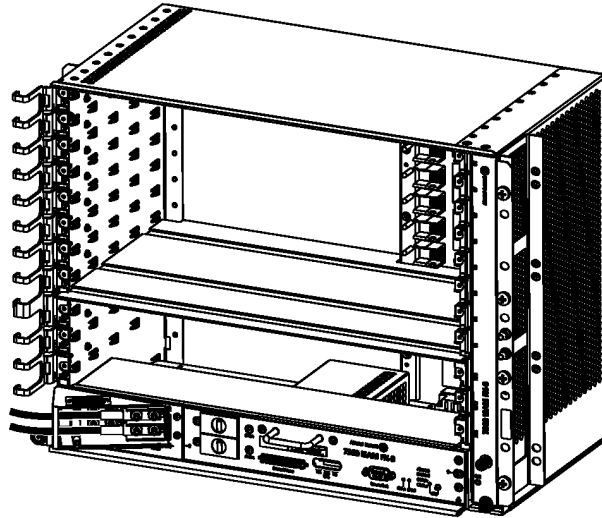
**Note 2** — Nokia recommends the following crimp lugs and crimp lug tool:

- input power lug: 8 AWG, 90C, Burndy YAZ8C-2TC10 or equivalent
- 8 AWG #10 stud with 5/8 in. spacing, dual-hole copper lug, long barrel, peep, uses Burndy Die Code 49. See Burndy catalog for additional tool options.

**Note 3** — All required washers and nuts are included with the shelf.

### 10.5.3.2 Power cable routing and connection

The power cables are routed through the left side of the rack and can then be routed to the power distribution terminal block located on the bottom of the shelf; see Figure 104.

**Figure 104** Power cable routing for 7360 ISAM FX-8

22384

**Procedure 37** To connect power cables

Use the following procedure to connect the power cables to the 7360 ISAM FX-8 shelf.



**Danger** — Before connecting the power cables, make sure that the power to the cables has been disconnected and the circuit breakers for BAT A and BAT B are switched off.



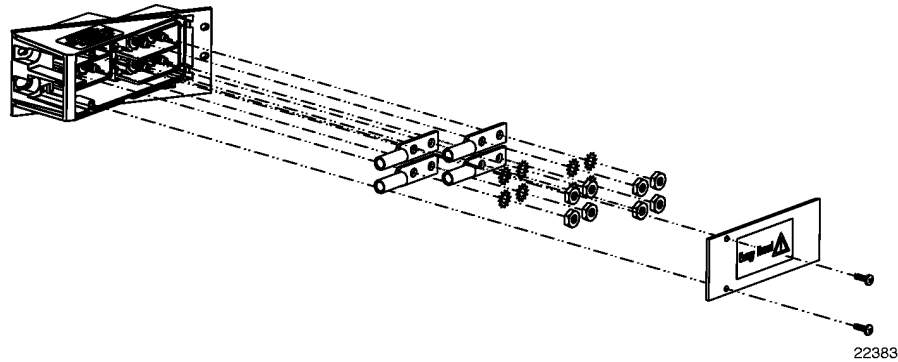
**Note 1** — Power cables connect the PDF directly to the shelf.

**Note 2** — All hardware shown in Figure 105 is provided with the 7360 ISAM FX-8 shelf.

**Note 3** — Avoid sharp bends in cables. Use the proper bend radius when installing cables.

- 
- 1 Ensure the power to the cables has been disconnected.
  - 2 Loosen the screws on the safety cover and remove the safety cover; see Figure 105.
-

**Figure 105** Mounting of power cable shoes and safety cover on 7360 ISAM FX-8



- 3 Remove the nuts from the power terminals; see Figure 105.



**Danger** — If the following sequence is not followed exactly, there can be a possible fire hazard.

- 4 Guide the power cables through the cable guide and connect them to the power terminals as follows; see Figure 104 showing the cables connected:



**Note** — The RET A and RET B connections are on a common ground.

- first connect the BATRET cables RET A and RET B
- then connect the battery cables BAT A and BAT B

- 5 Tighten the nuts back on the power terminals with a torque of 13.28 to 17.7 lbf-in. (1.5 to 2.0 N.m).
- 6 Place the safety cover back in its location and fasten the screws.
- 7 Turn on the A and B power from the power distribution frame to the rack.
- 8 Verify that the BAT A and BAT B LEDs are green.
- 9 Switch the A and B circuit breakers to the ON position.



- 
- 10** Verify that the fans spin.
- 
- 11** STOP. This procedure is complete.
- 

### Procedure 38 To disconnect the power cables

Use the following procedure when the power cables need to be disconnected on 7360 ISAM FX-8.



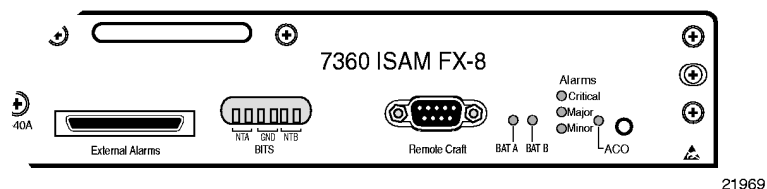
**Warning —** If the following sequence is not followed exactly, there can be a possible fire hazard.

- 
- 1** Before disconnecting the power cables, ensure that power to the cables has been disconnected.
- 
- 2** Switch off the circuit breakers for BAT A and BAT B
- 
- 3** Disconnect the battery cables BAT A and BAT B
- 
- 4** Disconnect the BATRET cables RET A and RET B
- 
- 5** STOP. This procedure is complete.
- 

## 10.6 CO alarm connector

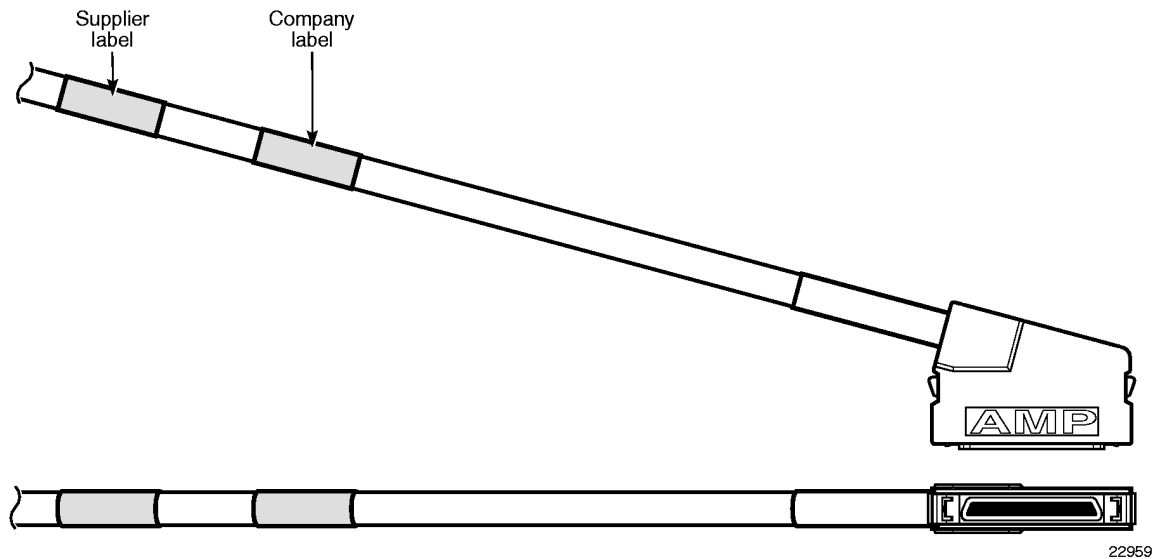
Figure 106 shows the external interfaces on the 7360 ISAM FX-8 shelf.

**Figure 106 External interfaces on 7360 ISAM FX-8**



The 7360 ISAM FX-8 requires a 50-pin micro DSUB connector with an angled head for the CO external alarm connection. A cable assembly is available from Nokia (sold separately), that can be used with the 7360 ISAM FX-8, as shown in Figure 107. See Figure 106 for the location of the CO external alarm connector.

**Figure 107 CO external alarm cable for 7360 ISAM FX-8**



For a description of the CO external alarm connector pinning, see your Nokia representative.

## 10.7 BITS interface connections

The 7360 ISAM FX-8 requires six wire-wrappable pins for the BITS clock timing connection. BITS timing signals will be supplied using two twisted pair cables (22 AWG solid copper conductors with overall shield and drain wire, Belden 1175A or equivalent). One cable will connect to the 3 wire-wrap pins for NT-A, and the other will connect to the 3 wire-wrap pins for NT-B.



**Note** — Connect the drain wire (FG) at one end only, either at the 7360 ISAM FX-8 or at the source.

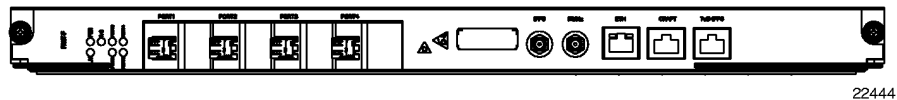
See Figure 106 for the connection location.

For a description of the BITS interface pinning, see Appendix 27.

## 10.8 ToD/PPS connector

The 7360 ISAM FX-8 requires an RJ-45 connector cable for the Time of Day and PPS signal connection located on the NT card. See Figure 108 for the location of the connector.

**Figure 108** ToD/PPS connector location on NT card



For a description of the ToD/PPS cable connector pinning, see Appendix 28.

## 10.9 Remote craft port connector

The 7360 ISAM FX-8 requires a DB-9 female connector for the remote craft port connection.



**Note** — Nokia supports the use of a DB-9 female connector cable for the remote craft port connection to avoid potential damage due to exposed pins on the typically used DB-9 male connector.

When the remote craft port is provisioned as a DCE port, meaning it connects to a remote modem, the straight through DB-9 female connector cable is required. When the remote craft port is provisioned as a DTE port, meaning it connects to a computer, a DB-9 null-modem cable is required to invert the TX and RX signals. A commercially available DB-9 male adapter cable can be used with the DB-9 female connector cable to enable the use of standard cables.

See Figure 106 for the location of the connector on the GFC card.

For a description of the remote craft cable connector pinning, see Appendix 27.

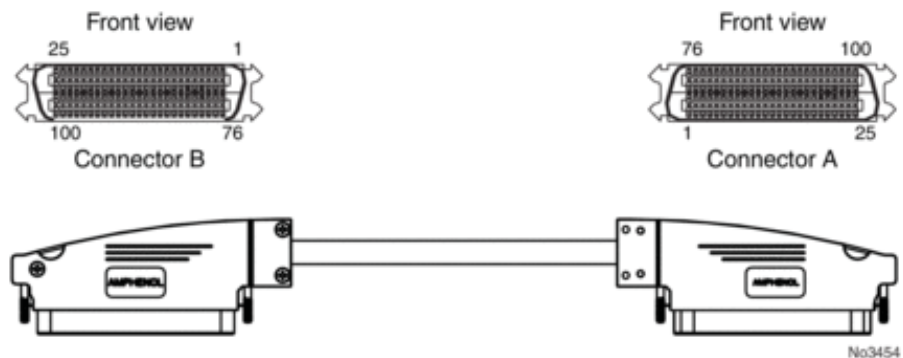
## 10.10 Combo cable connector

This section describes the cabling procedure for the interconnection cabling between the voice LT card and the splitter card in an 7360 ISAM FX-8, in case of Combo configuration.

### 10.10.1 Cable type

The required cable is an MDF cable with two CHAMP100 connectors; see Figure 109.

**Figure 109** Combo cable



**Note 1** — See Appendix 27 for the pinning of the CHAMP100 connectors.

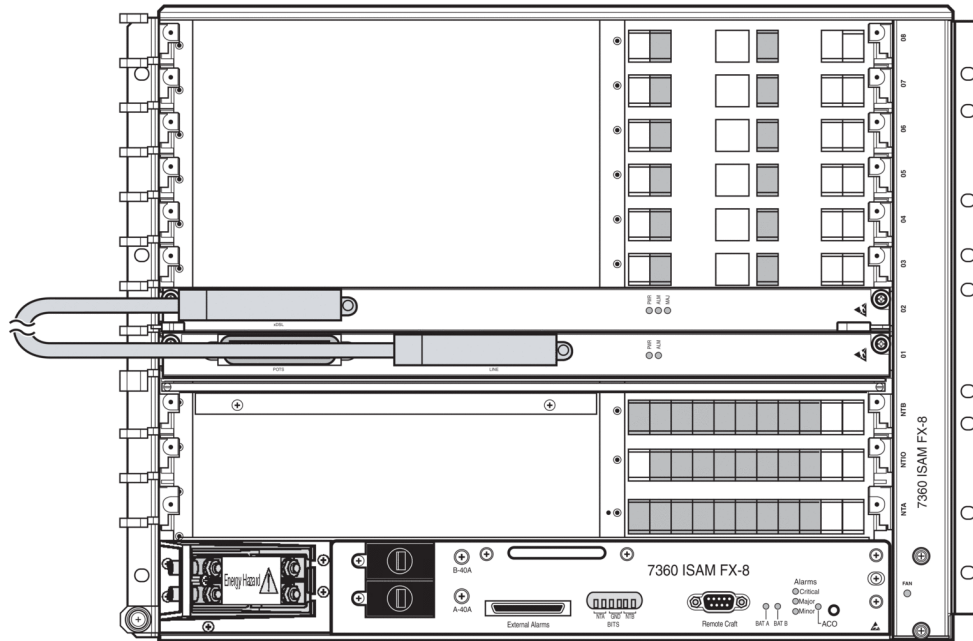
**Note 2** — See the *7360 ISAM FX Product Information Guide* for ordering information.

### 10.10.2 Connection/locking

The cable is plugged into the connectors on the LT card and the splitter card, and is locked into place with standoffs and nuts.

### 10.10.3 Cabling

The combo cable must be connected between the voice LT card and the splitter card in the 7360 ISAM FX-8. The excess cable length must be routed to the left side in the rack, see Figure 110.

**Figure 110** Combo cable connection on 7360 ISAM FX-8

23893

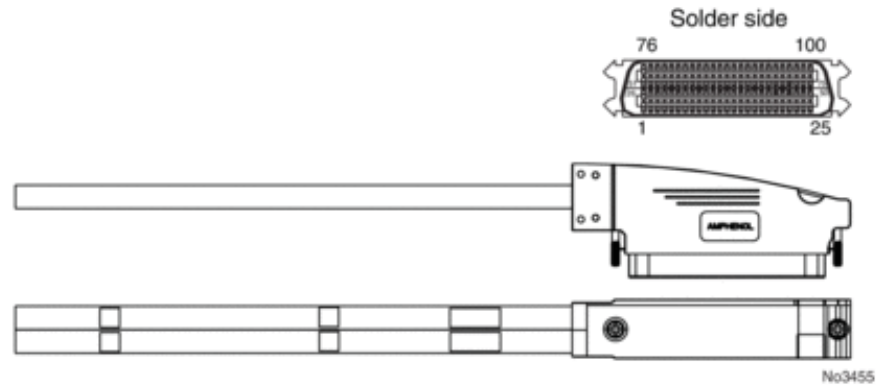
## 10.11 POTS and LINE MDF cable connector

This section describes the procedures to install MDF cables (xDSL and POTS) between the 7360 ISAM FX-8 and the Main Distribution Frame (MDF).

### 10.11.1 MDF cable type

The following cables can be used:

- for 24-line and 48-line cards: an MDF cable with two bundles of 24-pair cables and one CHAMP100 connector; see Figure 111.

**Figure 111** MDF cable for 48-line cards

**Note 1** — See Appendix [27](#) for the pinning of the CHAMP100 connectors.

**Note 2** — See the *7360 ISAM FX Product Information Guide* for ordering information.

## 10.11.2 Prerequisites

The following tools are required:

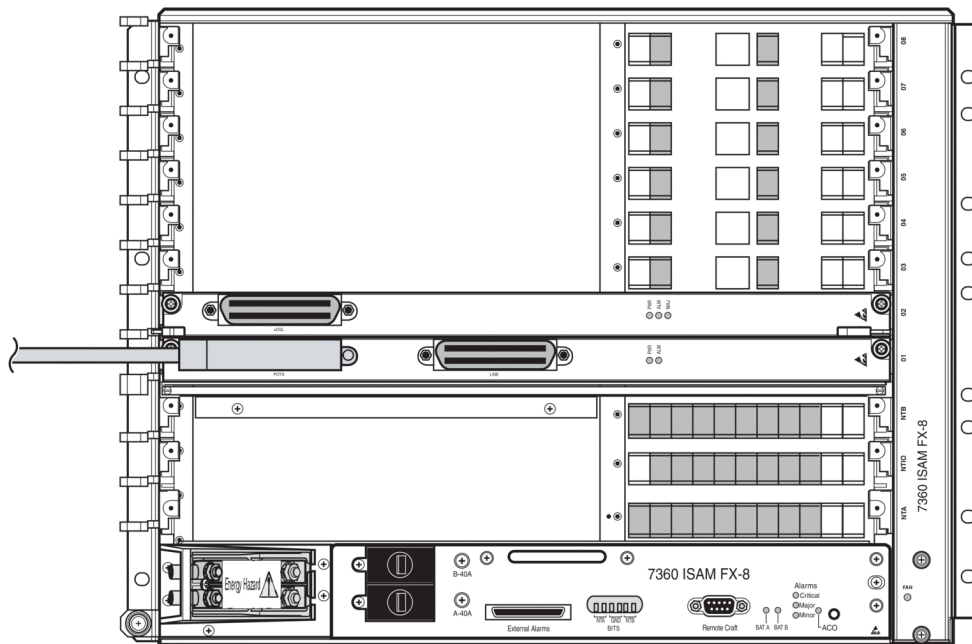
- MDF (LINE/POTS) cables as provided by Nokia
- an antistatic wrist strap
- tie-wraps
- lacing cord for tying up and/or bundling cables

### Procedure 39 MDF cabling procedure for LT cards with integrated splitter

Proceed as follows to connect the MDF cables for LINE and POTS to the LT card with integrated splitter:

- 1 Connect the MDF cable for the LINE to the right-hand CHAMP connector on the LT card with integrated splitter, as shown in Figure 112.

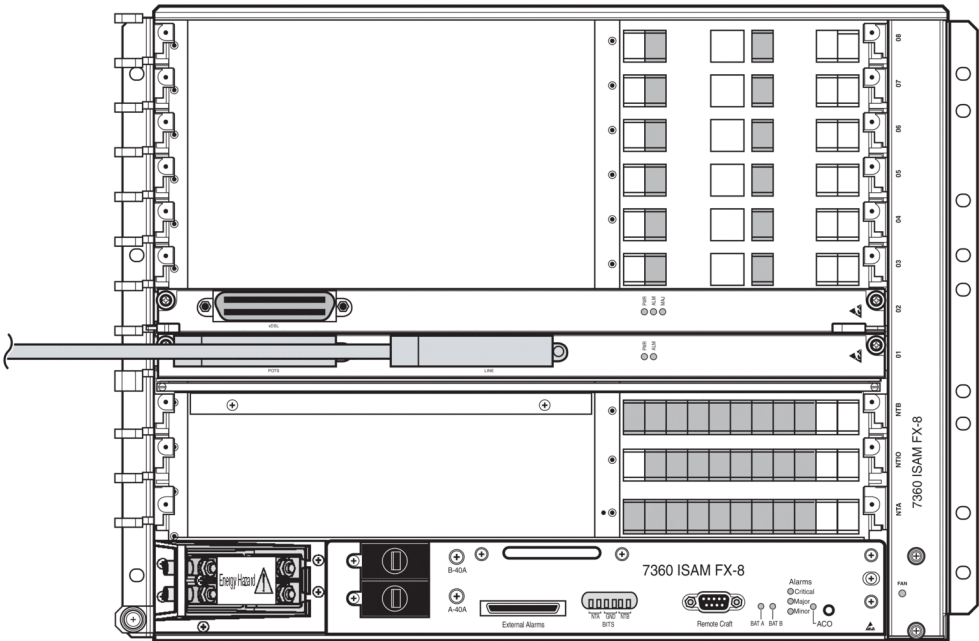
**Figure 112** MDF cable LINE connection on 7360 ISAM FX-8



23895

- 2 Secure the connector with standoffs and nuts.
- 3 Route and connect the other end of the MDF cable as per site practices.
- 4 Connect the MDF cable for the LINE to the left-hand CHAMP connector on the LT card with integrated splitter, as shown in Figure 113.

**Figure 113**    **MDF cable POTS connection on 7360 ISAM FX-8**



23894

- 5

Secure the connector with standoffs and nuts.
- 6

Route and connect the other end of the cable as per site practices.
- 7

STOP. This procedure is complete.

## 10.12    Vectoring cable connector

This DLP provides the steps to connect vectoring links between a NDPS-B card and NDLS-E cards.



## 10.12.1 VL cable

The VL cables must not be routed where they may be exposed to high voltage such as lightning strikes.



**Caution —** When VL cables need to be disconnected, only do so by pulling the release ring tab. Do not pull on the cable itself or on the QSFP+ modules pre-installed at each end.

While no particular arrangement of VL cables between SLV LTs and VL ports on the centralized vector processor card is required, it may be desirable to maintain a particular connection arrangement of these cables. In those circumstances, both ends of all cables may be labeled before installation so that each cable is uniquely identified. Examples of such identification include operator-provided colored zip ties and colored or write-on labels.

## 10.12.2 Prerequisites

The following tools are required:

- antistatic wrist strap

The following parts are required:

- cable ties or lacing cord
- QSFP+ 1m cable (3FE 68462 AA)

---

## Procedure 40 To connect vectoring links

Proceed as follows to connect vectoring links:



**Warning 1** — Units contain ESD-sensitive devices. These devices are susceptible to ESD damage in unconnected circuit conditions. Appropriate ESD procedures should always be followed when installing or removing units and cables.

**Warning 2** — Verify that cables are secure and do not interfere with the shelf cover.

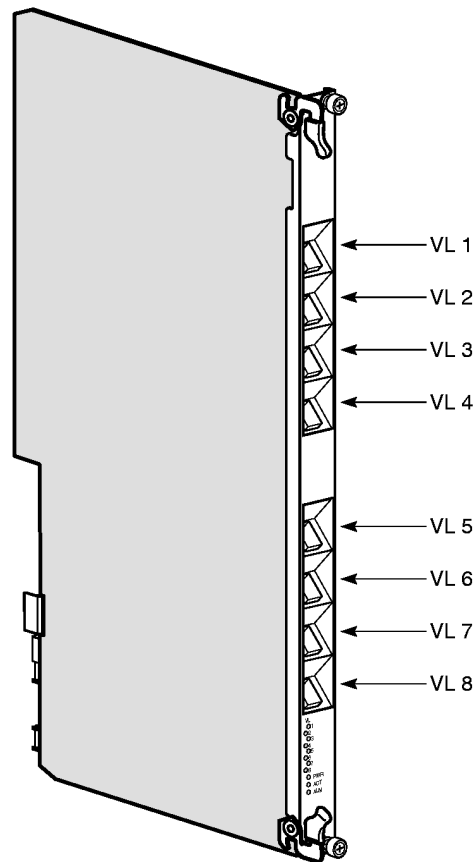


**Caution 1** — Avoid sharp bends in cables. Use the proper bend radius when installing cables.

**Caution 2** — Pinching of fiber cables may cause service interruption and damage the cables. Properly dress cables to ensure that cables are not twisted or kinked.

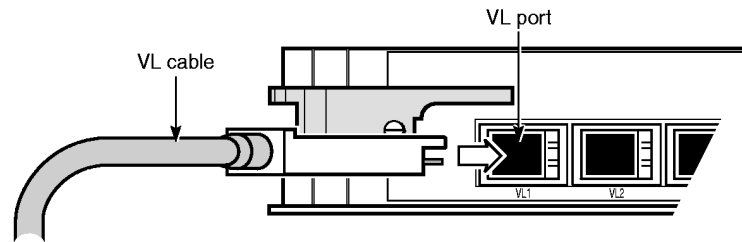
**Caution 3** — Improper cable placement can cause the cables to crimp and become damaged when the shelf cover is closed. Verify that fiber and Ethernet cables are secure and do not interfere with the shelf cover. Ensure that cables do not cross over the insertion and extraction tabs on top of the unit; rather, they pass to the side of the tabs.

- 
- 1 Put on the antistatic wrist strap and connect it to a grounding point. See [Shelf grounding connection](#) and [Rack grounding connection](#) for more information about grounding.
  - 2 Remove the shelf cover from the shelf or shelves that will have vectoring links.
    - i Loosen the threaded thumbscrews.
    - ii Remove the cover from the front of the shelf by rotating it away from the shelf and unhooking the cover from the cable management guide.
  - 3 Locate the appropriate VL port or ports on the NDPS-B card. Ports VL1 through VL4 should be used for vectoring links to EVLT-N cards in the same shelf as the NDPS-B card and ports VL5 through VL8 should be used for vectoring links to EVLT-N cards in another shelf. Figure 114 shows the VL ports on the NDPS-B.
-

**Figure 114** VL ports on the NDPS-B

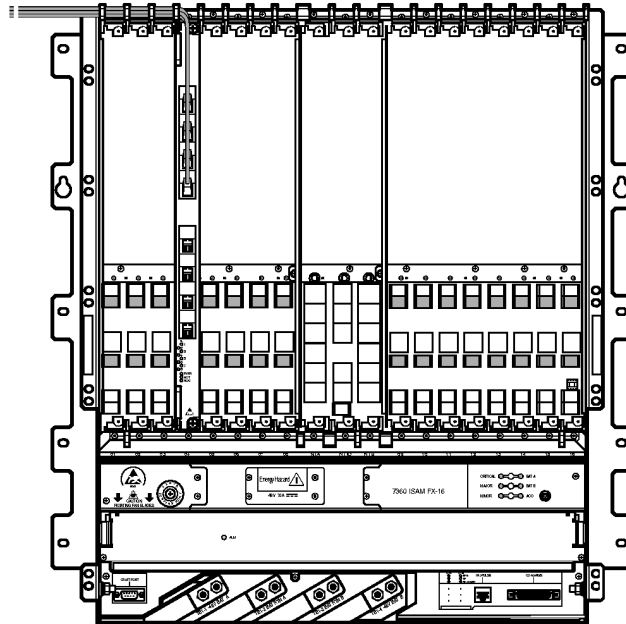
24286

- 4 Remove the dust covers from the VL ports identified in step 3.
- 5 Connect a VL cable of appropriate length to a VL port on the NDPS-B card by removing the cap from the cable connector and inserting the cable connector into the VL port; see Figure 115.

**Figure 115** Inserting the cable connector into a VL port on the NDPS-B card

23722

- 6 Route the VL cable through the appropriate cable exit area of the shelf; see Figure 116 for the VL cable exit areas:
  - for a vertically mounted shelf (cards oriented vertically):
    - for a VL cable connected to ports VL1 through VL4 on the NDPS-B card, route the cable straight up through the cable exit area above the NDPS-B card
    - for a VL cable connected to ports VL5 through VL8 on the NDPS-B card, route the cable up and then towards the PWIO-B card so that the VL cable exists the shelf above PWIO-B card
  - for a horizontally mounted shelf (cards oriented horizontally):
    - for a VL cable connected to ports VL1 through VL4 on the NDPS-B card, route the cable straight to left through the cable exit area to the left of the VIPR-B card
    - for a VL cable connected to ports VL5 through VL8 on the NDPS-B card, route the cable towards the left and then up towards the PWIO-B card so that the VL cable exists the shelf at the left side of the PWIO-B card

**Figure 116** VL cable exit areas

23309

- 7 Route the other end of the VL cable to an NDLS-E card using the cable management tray and the cable tie down clips to secure the cable as needed.
- 8 Connect the VL cable to the VL port on the NDLS-E card by removing the dust cover from the VL port, removing the cap from the cable connector, and inserting the cable connector into the VL port. The VL LEDs on the NDLS-E and NDPS-B cards should come on to indicate that the link is active.
- 9 Repeat steps 3 to 8 for any additional VL cables that you want to connect between the NDPS-B card and NDLS-E cards.
- 10 Re-install the shelf cover or covers removed in step 2.
- 11 STOP. This procedure is complete.



---

# 11 Installing cards in the 7360 ISAM FX-8 shelf

## 11.1 Overview

### 11.2 Shelf areas and slot positions

### 11.3 Dummy front panels

### 11.4 Recommended tools

### 11.5 Guideline for card installation

### 11.6 Installation procedures

## 11.1 Overview

This chapter provides the procedures to install field-replaceable units (FRUs) in a 7360 ISAM FX-8 shelf.



**Note** — For an overview of the supported cards, see the *7360 ISAM FX Product Information Guide*.

## 11.2 Shelf areas and slot positions

Figure 117 shows the LT and NT card slot positions in a 7360 ISAM FX-8 shelf.

**Figure 117** LT and NT slot positions on 7360 ISAM FX-8

LT 8	FAN
LT 7	
LT 6	
LT 5	
LT 4	
LT 3	
LT 2	
LT 1	
NT B	
NT I/O	
NT A	
NGFC-H	

21959

The 7360 ISAM FX-8 can be equipped with a maximum of 8 LT cards, 2 NT cards, and 1 NTIO card.

### 11.3 Dummy front panels

Dummy front panels must be installed in any unused slot of a shelf to:

- ensure EMC compliance
- ensure thermal compliance through correct airflow in the shelf
- ensure safety by avoiding direct contact with backplane connectors

At slot deployment, the dummy front panel is replaced by the appropriate card and the optical cables are connected to the card.

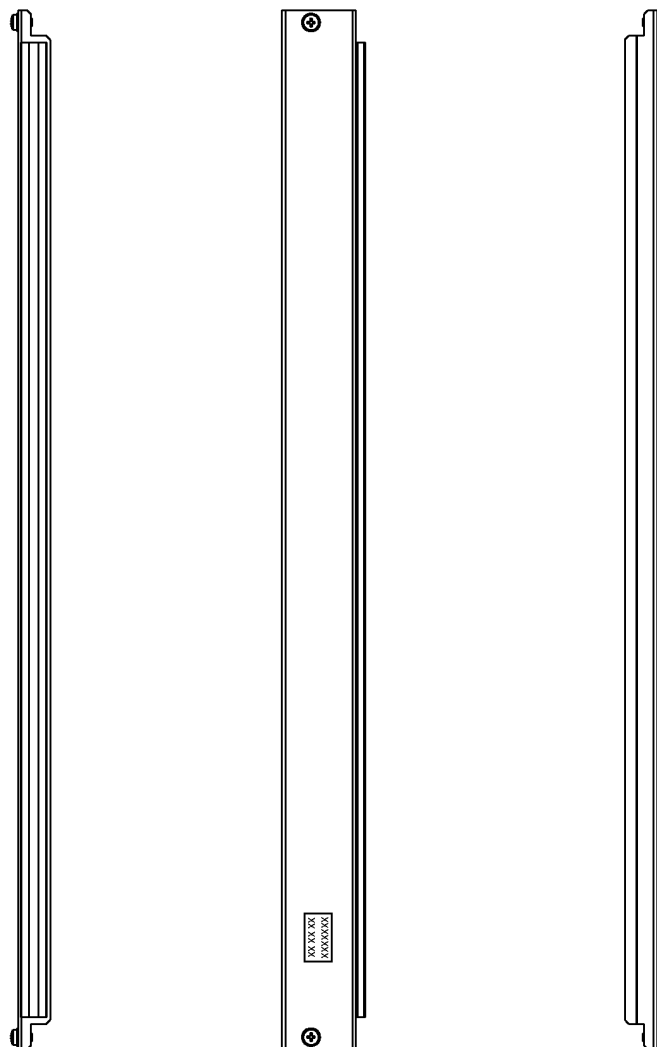
For more information on specific dummy front panels, see the *7360 ISAM FX Product Information Guide*.

#### 11.3.1 NT dummy front panel

A dummy front panel must be used when the second NT card is not installed. Figure 118 shows the dummy front panel for NT card slots.



**Figure 118** Dummy front panel for NT card



22197

### 11.3.2 NTIO dummy front panel

A dummy front panel must be used when the NTIO card is not installed. Figure [119](#) shows one example of a universal dummy front panel for NTIO card slots.

**Figure 119** Universal dummy front panel for NTIO card



22429

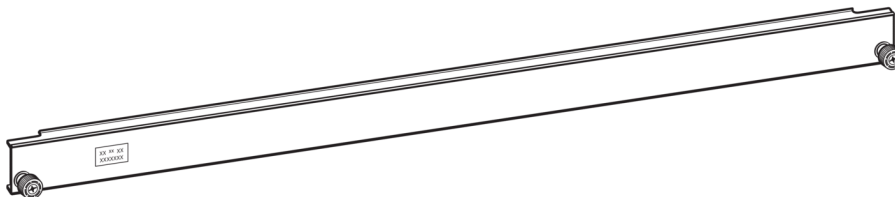


**Note** — This dummy front panel can also be used for LT slots where no pre-cabling is foreseen.

### 11.3.3 Dummy front panel for optical LT cards

A dummy front panel must be used for all unused LT card slots. Figure 120 shows one example of a dummy front panel for optical LT card slots.

**Figure 120** Dummy front panel for optical LT card



26133

---

## 11.4 Recommended tools

The following tools are recommended:

- screwdriver to secure cards
- antistatic wrist strap for handling cards with ESD sensitive devices
- ohmmeter to check connection of wrist strap to earth bounding point

## 11.5 Guideline for card installation

This section provides a general guideline for the correct installation of a card in a shelf.

### Procedure 41 Installing a dummy front panel

To install a dummy front panel:

- 
- 1 Gently plug the card in the 7360 ISAM FX shelf until the front panel of the card touches the shelf. Guide the card to the right of the slot in the shelf card guides, while taking care that the SMD components of the card do not touch the card mounted below.
- 
- 2 For dummy front panels equipped with ejector handles:
    - Pull back the ejector handles.
    - Place left thumb at the left of the front panel, next to the mnemonic label, and place right thumb on the front panel below the right ejector handle.
    - Push with the left thumb and guide with the right thumb. The ejector handles should move inward.
    - Push both ejector handles simultaneously to completely insert the card in the shelf slot.
    - Lock the card in place by fastening the fixation screws.
- 
- 3 For dummy panels not equipped with ejector handles:
    - Align the dummy front panel to the 7360 ISAM FX shelf LT slot, ensuring that the dummy front panel thumbscrews are aligned to the shelf screw holes.
    - Hand tighten the thumbscrews. Fully secure thumbscrews using screwdriver.
- 
- 4 If the installed dummy front panel supports pre-cabling:
    - Attach the cables to the faceplate by aligning the MDF or POTS cable head shell screws with the faceplate standoffs, and secure the cable by tightening the connector screws using a screwdriver.
-

## 11.6 Installation procedures

This section describes the following card installation procedures:

- [To install NTIO cards](#)
- [To install NT cards](#)
- [To install LT cards](#)
- [To remove cards](#)
- [To change the NGFC-H card](#)



**Warning** — For the 7360 ISAM FX-8, installation of NTIO cards must be performed prior to installation of NT cards.

### 11.6.1 General

When installing cards in a new installation, install the NTIO card first. Allow the NT IO card to initialize and come into service before installing NT or LT cards. When replacing an LT card, verify that the NT card is in service before inserting the LT card.



**Warning** — Unplugging and reseating the active NT card in less than 3 seconds may result in an approximately 1 minute service interruption while the NT cards negotiate active/standby state during initialization. Wait at least 5 seconds before reseating an unplugged active NT card.



**Note 1** — Redundant NT cards must be provisioned first before they are installed. See the appropriate product Operations and Maintenance Guide to configure an NT card and to configure NT redundancy.

**Note 2** — The following steps must be followed if the NTIO card (FNIO-A) is moved to a new shelf:

- plan the NTIO card in the new shelf
- reset the shelf
- plug in the NTIO card

See *Operations and Maintenance Guide for FD 100/320 Gbps NT and FX NT* for planning information.

The NT and LT dummy panels (or dummy front panels) must be installed in any unused, unpopulated NT or LT card slot in order to maintain proper operation. Filler plate units have no electronic components; they are mechanical units used to provide ESD/EMI seal and thermal seal in the 7360 ISAM FX-8.

---

## 11.6.2 Rules for handling cards

Observe the following:



**Warning 1** — Units contain ESD sensitive devices. These devices are susceptible to ESD damage in unconnected circuit conditions. Appropriate ESD procedures should always be followed when installing or removing cards.

Units or assemblies with ESD sensitive components are labeled or tagged with the ESD awareness symbol; see Figure 121.

**Warning 2** — Keep the card in its original container until the card is ready to be installed. This is necessary to protect it from damage caused by ESD.

**Warning 3** — Always store and transport cards in original packing material when available. Materials must be in static-safe packaging or containers that are marked with an industry-standard static awareness symbol.

**Warning 4** — Keep all static-generating materials, such as plastics, away from all cards.

**Warning 5** — Use only dissipative materials for shipment. Shielding is not required unless specified.

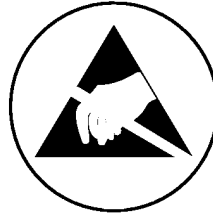
**Warning 6** — Whenever possible and reasonable, maintain relative humidity above 40%.

See the *7360 ISAM FX Safety Manual* for more information about safety standard compliance.

### 11.6.2.1 ESD sensitive cards

Cards or assemblies with ESD sensitive devices are labeled or tagged with the ESD awareness symbol shown in Figure 121.

**Figure 121 ESD awareness symbol**



22390



**Warning** — Risk of damage to equipment with ESD sensitive devices.

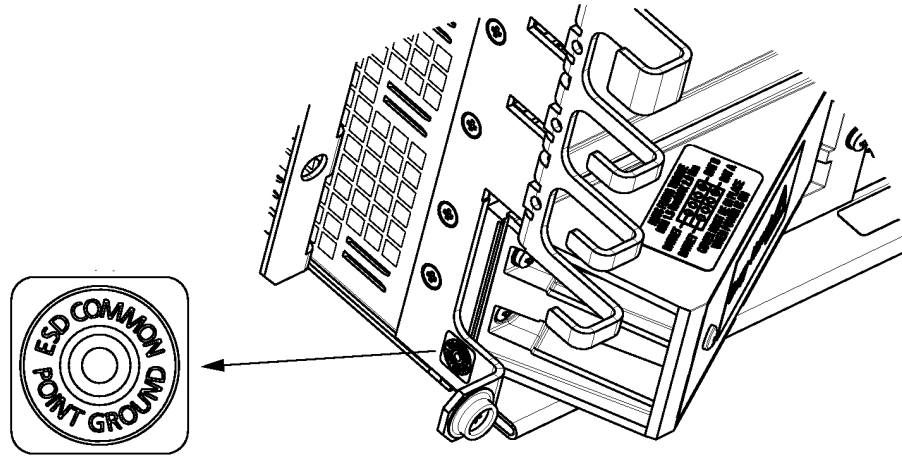
Most cards and powered equipment contain devices that are susceptible to ESD. ESD could damage these or other devices in unconnected circuit conditions.

Carefully follow these rules when handling ESD sensitive cards:

- transport and store cards in ESD protective bags or boxes
- make sure to wear a grounded wrist strap before handling
- connect the wrist strap to the earth bonding point at the bottom of the shelf; it carries the label shown in Figure 122
- test the ESD wrist strap with the ohmmeter to ensure effectiveness; it must measure 1 M $\Omega$  +/-20% to ground
- do not touch circuit traces or components on the card
- handle cards at the front and side edges only

Figure 122 shows the 7360 ISAM FX-8 earth bonding point location.

**Figure 122** Label for earth bonding point



22391

### 11.6.2.2 Cards with optical fiber connectors

Observe the following.



**Danger** — Risk of eye damage or skin burns by laser emission.

When installing optical cards or handling optical fibers, never look inside connectors of cards or fibers when these are not connected.

Put end caps on open connectors to protect against unexpected emission.



**Caution** — Risk of damage by ESD when card is not connected.

This card contains devices that are susceptible to damage caused by ESD in unconnected circuit conditions.

Carefully follow ESD safety precautions.

Figure [123](#) shows a laser classification label.

Figure 123 Laser classification label



18256

Procedure 42 To install NTIO cards

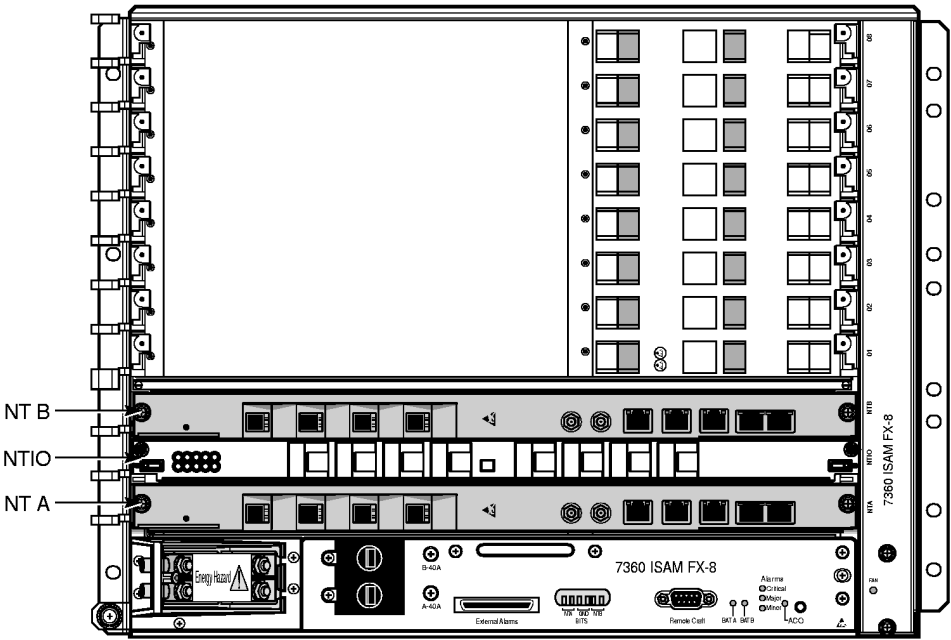
Each shelf containing one or two redundant NT cards can have an NT I/O applique. The NT I/O applique is a single card which is installed in the NT I/O slot between the two NT slots of the FX-8 shelf.

- 1

Remove the NT I/O card from its ESD protective bag. Make sure to wear the antistatic wrist strap.
- 2

Insert the NTIO card in the NTIO slot; see Figure 124.

Figure 124 NTIO slot



24502



- 
- 3 Use the ejector handles to engage the card connectors in the backplane.
  - 4 Lock the card in place with the fixation screws located at the top and bottom of the faceplate of the card; see Figure 124. The maximum torque is 0.6 Nm.
- 



**Note** — Once the card is mounted in its slot, the green PWR LED lights up.

---

### Procedure 43 To install NT cards

Use this procedure to install network termination (NT) cards in a 7360 ISAM FX-8 shelf.

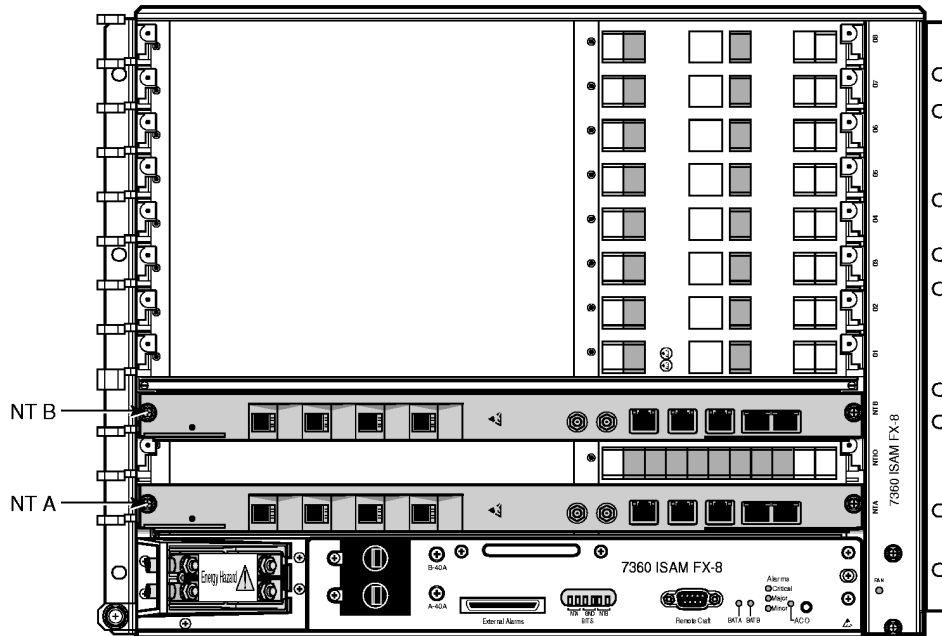


**Warning** — For the 7360 ISAM FX-8, installation of NTIO cards must be performed prior to installation of NT cards.

A 7360 ISAM FX-8 has one or two NT cards:

- a single (first) NT card is inserted in slot NT-A
- a redundant card, if any, in slot NT-B

Figure 125 shows the 7360 ISAM FX-8 NT cards in the slots.

**Figure 125 NT card slots in 7360 ISAM FX-8**

22438

- 1 Remove the NT card from its ESD protective bag. Wear the antistatic wrist strap.
- 2 Ensure that the insertion/extraction tabs on the card are in the unlocked position.



**Warning 1** — Ensure that all protective coverings on the shelf backplane connectors are removed prior to installation of the cards, otherwise damage to the shelf pins and the connectors may occur.

**Warning 2** — Attempting to insert a misaligned card may cause bent pins on the backplane connector. Ensure that the card is properly positioned in the slot and aligned with the backplane connector before securing the insertion/extraction tabs.

- 3 Slide the NT card in the NT-A slot of the shelf; see Figure 125.



**Caution** — When sliding the NT card into the slot, ensure that the solder side of the NT card does not come into contact with the EMC shielding plate adjacent to the NT card slot. If not done properly, this may cause damage at the solder side of the NT card.

- 4 Use the ejector handles to engage the card connectors in the backplane; see Figure 129.

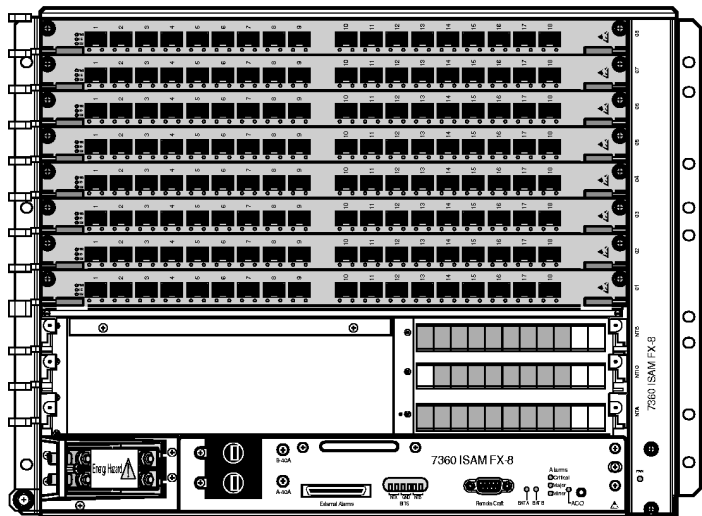
- 
- 5 Press the insertion/extraction tabs on the front panel to lock the card in place. Attach fixation screws located at the top and the bottom of the front panel of the card; see Figure 125. Maximum torque: 2.66 lbf-in. (0.3 N.m).
  - 6 Wait until the NT card in the NT-A slot is fully operational. The card first displays a heartbeat signal, that is, the green PWR LED is flashing. Then the card displays an enabling operation signal, that is:
    - the green PWR LED is steady on
    - the green A/S LED is steady on
    - the red ALM LED is off
  - 7 Install the second NT card in slot NT-B in the same way, then install the NT dummy panels in any unused, unpopulated NT card slot to maintain proper operation.
  - 8 STOP. This procedure is complete.
- 

#### Procedure 44 To install LT cards

Depending on the configuration, the 7360 ISAM FX-8 can house up to 8 line termination (LT) cards.

Figure 126 shows the LT card slots.

Figure 126 LT cards slots in 7360 ISAM FX-8



22385

- 1 Locate the free LT card slots for mounting the LT cards; see Figure 126.
- 2 Remove the LT card from its ESD protective bag. Wear the antistatic wrist strap.



**Caution —** Risk of damage by ESD when card is not connected.

This card contains devices that are susceptible to damage caused by ESD in unconnected circuit conditions.

Carefully follow ESD safety precautions.

- 3 Ensure the insertion/extraction tabs on the card are in the unlocked position.
- 4 Slide the LT card in the appropriate LT card slot.



**Caution —** When sliding the LT card into slot 1, special attention is required so that the solder side of the LT card does not come into contact with the EMC shielding plate adjacent to the LT card slot. If not done properly, this may cause damage at the solder side of the LT card.

- 5 Press the insertion/extraction tabs on the front panel to lock the card in place. Attach fixation screws located at the top and the bottom of the front panel of the card; see Figure 126. Maximum torque: 2.66 lbf-in. (0.3 N.m).

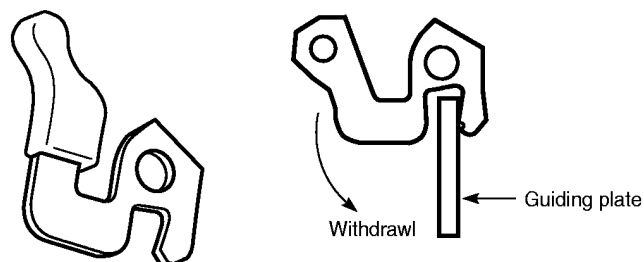
- 
- 6 The card first displays a heartbeat signal, that is, the green PWR LED is flashing. Then the card displays an enabling operation signal:
    - the green PWR LED is steady on
    - the red ALM LED is off
  - 7 In the same way, install all the planned LT cards for the shelf.
  - 8 Install LT card dummy panels in any unused, unpopulated LT card slots to maintain proper operation.
  - 9 STOP. This procedure is complete.
- 

## Procedure 45 To remove cards

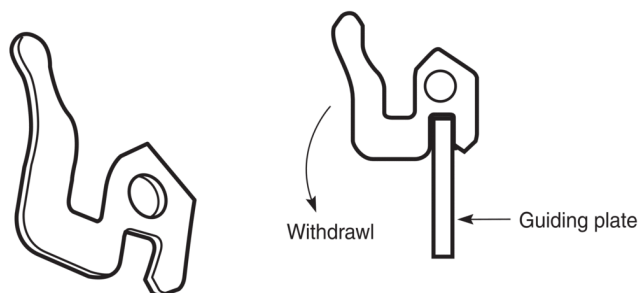
Use the following procedure to remove a cards.

- 
- 1 Put on the antistatic wrist strap and connect it to the earth bonding point at the bottom of the 7360 ISAM FX-8; see Figure 122.
  - 2 Test the ESD wrist strap with the ohmmeter to ensure effectiveness; it must measure 1 M $\Omega$  +/-20% to ground.
  - 3 Loosen the fixation screws located at the top and bottom of the front panel of the card.
  - 4 Use the ejector handles to disengage the card connectors from the backplane. Figures 127 and 128 show the ejector handles for LT cards. Figure 129 shows the ejector handles for NT cards.
- 

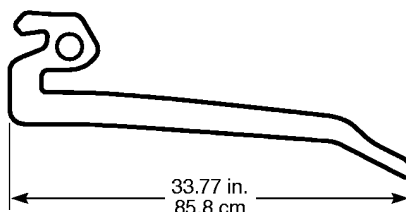
**Figure 127 Ejector handles for LT cards**



22376

**Figure 128 Ejector handles for LT cards**

25830

**Figure 129 Ejector handles for NT cards**

22375

---

**5** Remove the card from its slot and place it in an ESD protective bag.

---

**6** STOP. This procedure is complete.

---

## **Procedure 46 To change the NGFC-H card**

Use the following procedure to change the NGFC-H card on the 7360 ISAM FX-8 shelf.

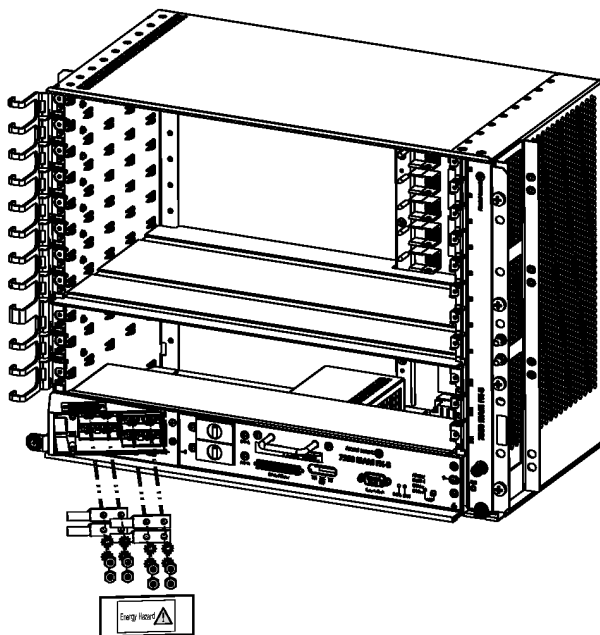
- 
- 1** Before disconnecting the power cable, ensure that power to the cables has been disconnected and the circuit breakers are switched to the off position.
- 



**Warning —** If the following steps to disconnect the power cables are not followed exactly, there can be a possible fire hazard.

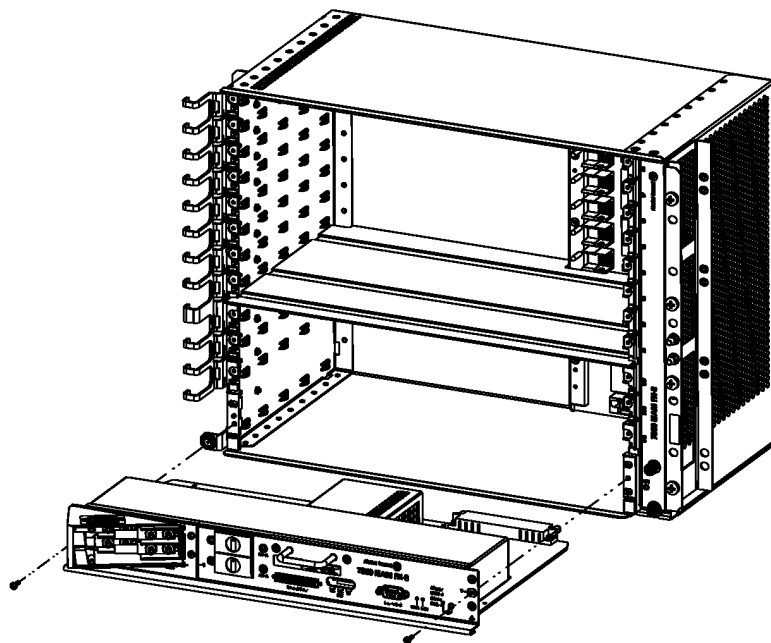
- 
- 2 Remove the safety cover and power cable connectors (loosen and remove the screws); see Figure 130.

**Figure 130** Remove safety cover and power cable shoes on 7360 ISAM FX-8



22382

- 
- 3 Remove the fixation screws located on the front panel of the card; see Figure 131.

**Figure 131** Remove fixation screws for NGFC-H card

22386

- 4 Remove the NGFC-H card from the shelf and wear the antistatic wrist strap. Place the card in an ESD protective bag.
- 5 Remove the new NGFC-H card from its ESD protective bag. Wear the antistatic wrist strap.
- 6 Slide the new NGFC-H card in its slot.
- 7 Secure the NGFC-H card in place with the fixation screws. Maximum torque: 1 N.m  $\pm$ 10%.
- 8 Reconnect the power cable connectors and safety cover.
- 9 STOP. This procedure is complete.



# 12 Fiber optic cable management in the 7360 ISAM FX-8 shelf

## 12.1 Overview

### 12.2 Managing fiber optic cables

### 12.3 Routing fiber optic cables

## 12.1 Overview

This chapter describes the fiber optic cable management and installation procedures for the 7360 ISAM FX-8 shelf.

The fiber optic cable management strategy is based on the following concepts:

- 1 To route the fiber optic cables out of the rack toward the vertical cable channels located on both sides of the front of the rack.
- 2 To route the fiber optic cables within the 7360 ISAM FX-8 shelf toward the dedicated fiber outlets of the shelf.
- 3 To protect the fiber optic cables using optional bending protection items.



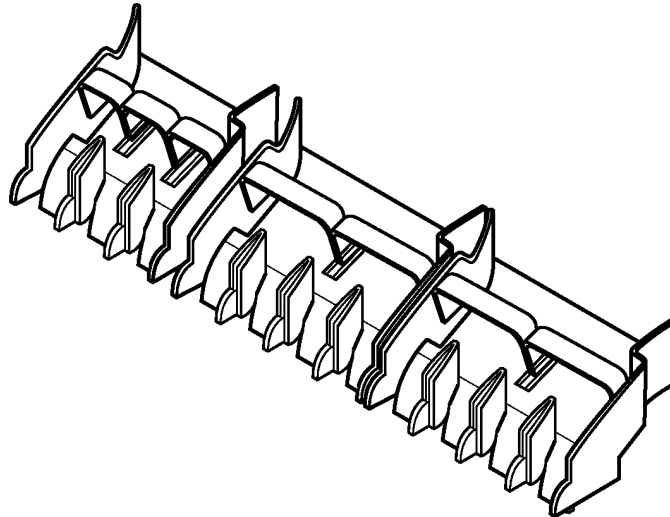
**Note** — See Appendix 29 “[Fiber optic handling and acceptance criteria](#)” for more information.

The 7360 ISAM FX-8 fiber optic cable management strategy incorporates the following hardware:

- Fiber management kit to provide proper fiber optic cable handling
- Fiber routing ring guides specially designed for fiber optic cable routing management that are factory installed on the 7360 ISAM FX-8 top baffle to provide:
  - cable control
  - cable support

Figure 132 shows a view of the 7360 ISAM FX-8 fiber management kit.

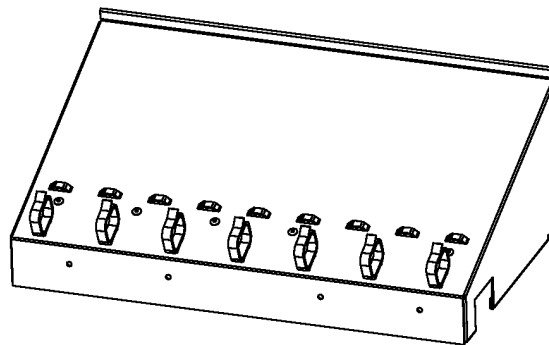
**Figure 132** Fiber management kit for 7360 ISAM FX-8



23565

Figure 133 shows a view of the 7360 ISAM FX-8 heat and fiber baffle for vertical mount configurations.

**Figure 133** Baffle for 7360 ISAM FX-8 vertical rack mounting configurations



22387

## 12.2 Managing fiber optic cables

This section describes how to fiber optic cables for NT cards and LT cards in the 7360 ISAM FX-8 shelf.

## 12.2.1 General safety and operations information

This section provides general safety and operations information. See the *7360 ISAM FX Safety Manual* for more information.



**Danger** — Non-terminated optical connectors may emit invisible laser radiation. Serious eye damage may occur if the laser beam is viewed directly or with improper optical instruments. Avoid direct exposure to the laser beam.



**Warning 1** — Do not use nylon cable ties for securing fiber optic cable.

**Warning 2** — During card installation, proper fiber management is crucial. Improper fiber placement can cause the fibers to crimp and become damaged.



**Caution 1** — When working with optical fiber cable, it is essential to use caution to avoid breaking the fibers. Do not pull, kink, or twist the optical fiber cable. If the cable is kinked, pulled, twisted, or otherwise damaged, it must be discarded and replaced with another cable.

**Caution 2** — Avoid sharp bends in cables. Use the proper bend radius when installing cables. The minimum bending radius of fiber optic cable is 1.5 in. (38mm), or 20 times the cable diameter, whichever is greater.

## 12.2.2 Optical modules

NT and LT cards are populated with a customer-defined combination of pluggable optical modules that provide the bandwidth required by the specific 7360 ISAM FX system deployment; see the local plans for more information.

The number of optical modules depends on the card type. Each of the connectors has a Tx port and an Rx port. Depending on the type of optical module, one or two optical fibers are required to connect to the optical module.



**Warning** — Do not use unauthorized SFPs or XFPs. This can adversely affect the system requiring operator intervention.



**Note 1** — For an overview of the supported SFP modules, see the *7360 ISAM FX Product Information Guide*.

**Note 2** — Nokia recommends protecting any SFP cage that is not equipped with an SFP module, with a dust cover in order to prevent dust intrusion.

**Note 3** — The type of optical fibers selected must match the particular SFP to guarantee the overall optical budget in the system and its correct operation. Loss of optical power as a result of a mismatch in materials must be avoided.

### 12.2.3 Fiber cables

Standard single-mode fiber cables with LC connectors are connected to the SFP optical modules for transmit (Tx) and receive (Rx) purposes.

GPON SFPs require an SC/UPC connector.

The NELT-B requires 90° fiber connector strain relief boots.

### 12.2.4 Fiber management kit

Fiber management guides are recommended for installment on the 7360 ISAM FX shelves to provide proper fiber optic cable handling. The kit contains:

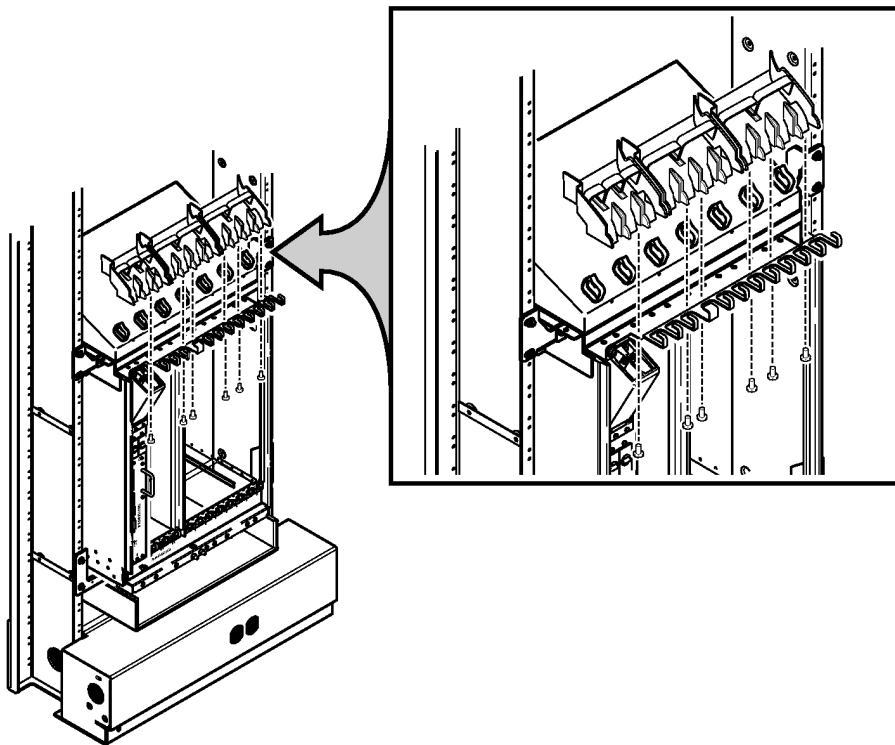
- fiber management guide for the NT and NTIO cards
- fiber management guide for the LT cards

One fiber management guide is required for every four LT cards.

## 12.3 Routing fiber optic cables

This section provides procedures for mounting fiber management guides, routing and connecting fiber optic cables to the NT and LT cards for 7360 ISAM FX-8, and for installing optical modules.

Figure [134](#) shows the 7360 ISAM FX-8 mounting of the fiber management kit.

**Figure 134** Mounting of 7360 ISAM FX-8 fiber management kit

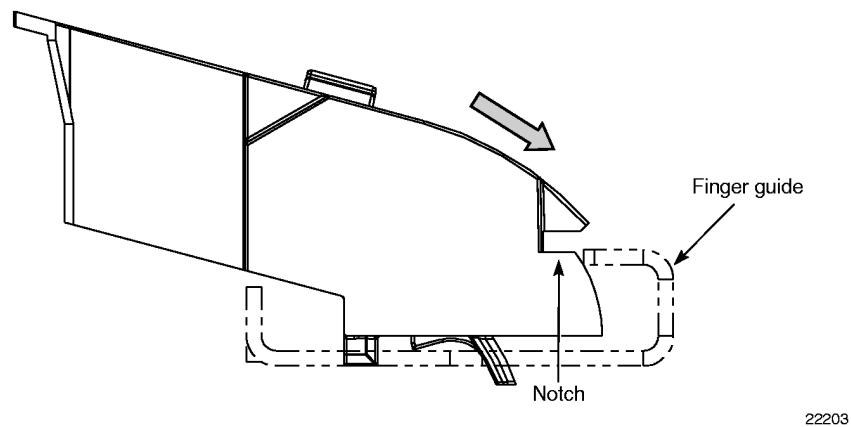
23566

## Procedure 47 To mount the fiber management guide

Use the following procedure to mount the fiber management guide onto the 7360 ISAM FX-8.

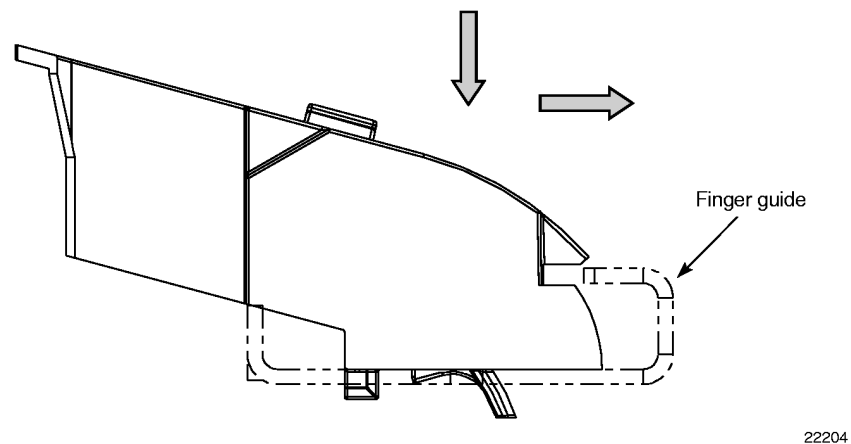
- 1 Align the notches on the front of the fiber management guide with the finger guides located on the top of the shelf, see Figure 135.

**Figure 135 Alignment of 7360 ISAM FX-8 fiber management guide**



- 2 Push down on the fiber management guide and slide it forward onto the finger guides of the shelf, see Figure 136.

**Figure 136 Mount the 7360 ISAM FX-8 fiber management guide**



---

**3** Attach the fiber management guides as shown in Figure 134 using the provided screws.

---

**4** STOP. This procedure is complete.

---

## Procedure 48 To route fiber cables to NT and LT cards

Use the following procedure to route and connect 7360 ISAM FX-8 fiber cables to NT and LT cards.

---

**1** To route fiber cables to NT and LT cards, proceed as follows:

- a** If routing fiber cables using a fiber management guide, mount the fiber management guide. See Procedure 47.
- b** If routing fiber cables without using a fiber management guide, continue to step 2.

---

**2** Prepare fiber optic cables for the equipped NT and LT cards.

---

**3** Label both ends of each cable with the following information, for future identification:

- card connection name
- Tx or Rx, depending on which port is used for the connection

---

**4** Route the fiber cables from the source to the top of the rack.

---

**5** If using a fiber management guide for a vertical installment of the 7360 ISAM FX-8 shelf, route the fiber cables through the ring-guides and through the fiber management guides, and toward the NT and LT cards. Otherwise, route the fiber cables, maintaining a proper bend radius, toward the NT and LT cards:

- a** Route to the left for:
  - NT card A
  - LT cards in slots 01 to 08
- b** Route to the right for:
  - NT card B
  - LT cards in slots 09 to 16



**Note —** For NELT-B cards, 90° fiber connector strain relief boots are required.

- 
- 6 Insert the fiber cables into the appropriate optical modules located on the front panels of the NT and LT cards. If optical modules must first be installed, see Procedure 49.
  - 7 Route and connect the other end of the fiber cables as per site practices.
  - 8 STOP. This procedure is complete.
- 

## Procedure 49 Installing an optical module



**Caution —** It is important to install optical modules prior to connecting power to a 7360 ISAM FX shelf.

To install optical modules, proceed as follows:

- 
- 1 Put on an antistatic wrist strap and connect it to a grounding point.
  - 2 Install an optical module as follows:
    - i Align the optical module with an optical module port and slide it into the port until it clicks into place.
    - ii Remove the rubber cap from the optical module.
- 



**Note —** The optical module can only be removed when the pull-down bar is released.

- 
- 3 STOP. This procedure is complete.
-



---

# 7360 ISAM FX-4 shelf installation

**13 Installing a 7360 ISAM FX-4 shelf**

**14 7360 ISAM FX-4 shelf cabling**

**15 Installing cards in the 7360 ISAM FX-4 shelf**

**16 Fiber optic cable management in the 7360 ISAM FX-4 shelf**



# 13 Installing a 7360 ISAM FX-4 shelf

## 13.1 Overview

### 13.2 Mounting the 7360 ISAM FX-4 shelf in a 19 in. rack

### 13.3 Mounting the 7360 ISAM FX-4 shelf in a 23 in. rack

### 13.4 Installing or replacing a fan unit in a 7360 ISAM FX-4 shelf

## 13.1 Overview

This chapter provides the steps to install a 7360 ISAM FX-4 shelf in a standard CO equipment rack, including procedures for:

- [Mounting the 7360 ISAM FX-4 shelf in a 19 in. rack](#)
- [Mounting the 7360 ISAM FX-4 shelf in a 23 in. rack](#)
- [Installing or replacing a fan unit in a 7360 ISAM FX-4 shelf](#)



**Warning —** The 7360 ISAM FX-4 is intended to be installed in a restricted access location (RAL) in accordance with the applicable requirements of NEC or CEC. The local authorities have jurisdiction. This unit is intended to be installed by qualified service personnel only. Observe the following.

- Connect to a reliably grounded –48 V dc SELV source that is grounded in the same building.
- Provide branch circuit overcurrent protection that is rated as 40 A with 10 AWG copper wire rated minimum 90°C.
- Incorporate a readily accessible disconnect device that is suitably approved and rated in the field wiring.

The 7360 ISAM FX-4 is suitable for the following:

- rack mounting on concrete floors or other non-combustible surfaces with the use of a drip tray
- use in an installation using an IBN or a CBN
- use in:
  - network telecommunication facilities
  - locations where the NEC applies
  - OSP

## 13.2 Mounting the 7360 ISAM FX-4 shelf in a 19 in. rack

The 7360 ISAM FX-4 shelf can be mounted:

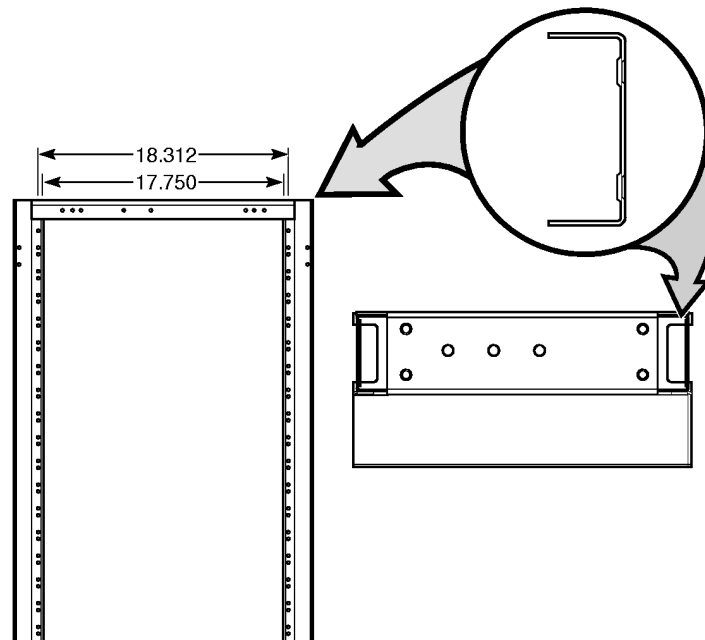
- horizontally in a 19 in. EIA standard rack (17.75 in. opening)
- vertically in a seismic 19 in. rack (17.5 in. opening)
- vertically in a seismic 19 in. rack (17.5 in. opening)



**Caution 1** — For horizontal mount of the 7360 ISAM FX-4 in an EIA standard 19 in. rack, the open channel of uprights should face toward the shelf wall as shown in Figure 137. The reverse configuration of the closed wall facing the shelf will impair thermal performance and is not supported.

**Caution 2** — The 7360 ISAM FX-4 vertical shelf mount kit must be used in a vertical mount installation to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

**Figure 137** 19 in. EIA standard rack upright channel direction in horizontal mount for 7360 ISAM FX-4



22742

### 13.2.1 7360 ISAM FX-4 rack mounting configurations

Table 11 describes the horizontal rack mounting configurations for a 7360 ISAM FX-4 shelf in an EIA standard 19 in. rack.

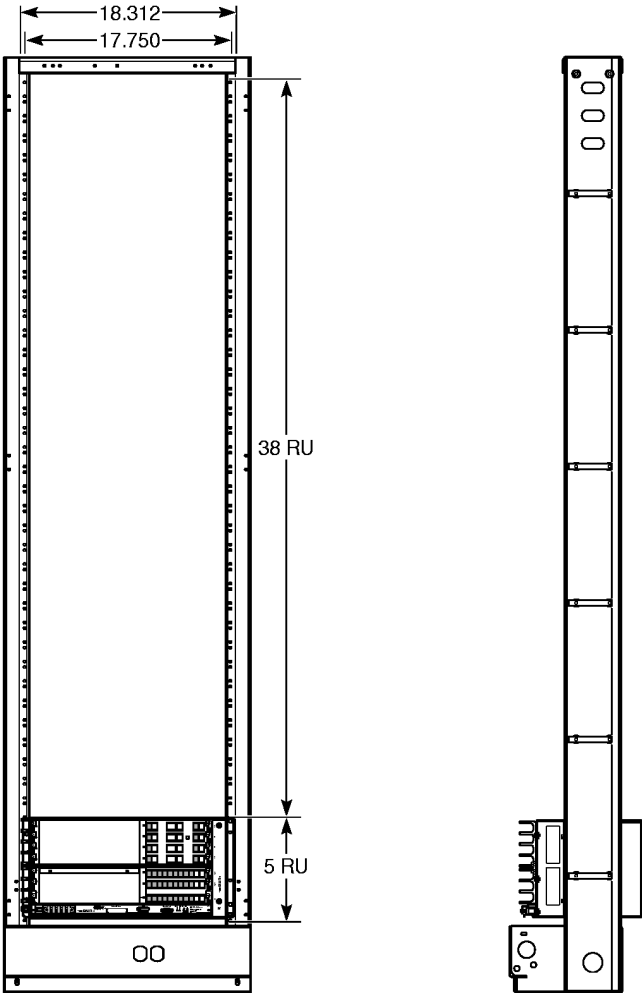
**Table 11** Horizontal mounting configurations for 7360 ISAM FX-4 in a 19 in. rack

Rack unit <sup>(1)</sup>	EIA standard 19 in. rack (17.75 in.)
SR 1	NFXS-F
	Horizontal shelf mount kit
Fan 1	BFAN-X (with fan filter)
SR 2	NFXS-F
	Horizontal shelf mount kit
Fan 2	BFAN-X (with fan filter)

Note  
<sup>(1)</sup> Although only two 7360 ISAM FX-4 shelves are portrayed in this table, up to seven shelves in a rack is supported.

Figure 138 shows the EIA standard 19 in. rack horizontal mounting configuration for 7360 ISAM FX-4.

**Figure 138** Horizontal mounting configuration for 7360 ISAM FX-4 in a 19 in. EIA standard rack



22740

**Table 12** Vertical mounting configurations for 7360 ISAM FX-4 in a 19 in. rack

Rack unit	EIA standard 19 in. rack (17.75 in. opening)	Seismic 19 in. rack (17.5 in. opening)
SR 1	NFXS-F	NFXS-F
	Vertical shelf mount kit	Vertical shelf mount kit
Fan 1	BFAN-X (with fan filter)	BFAN-X (with fan filter)

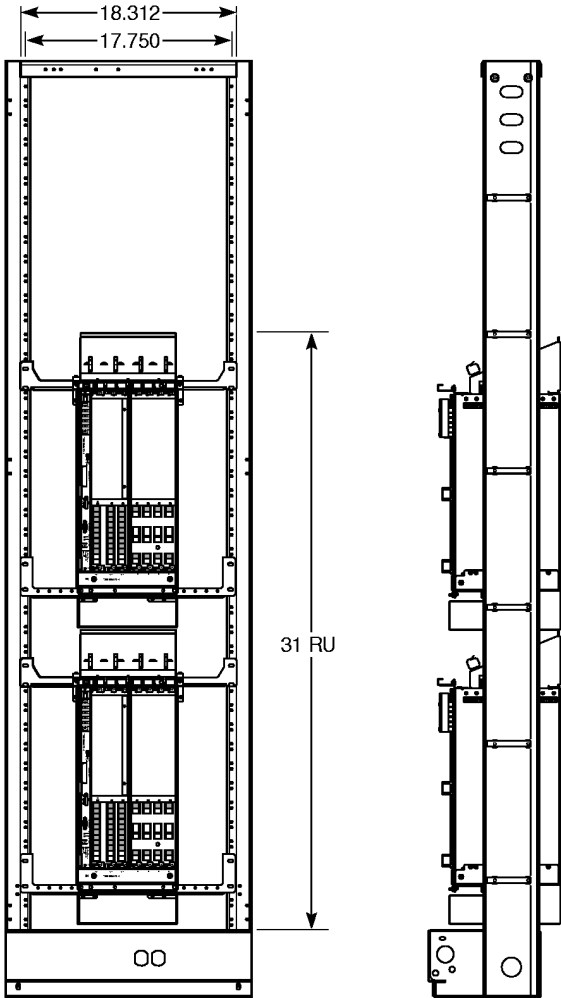
(1 of 2)

Rack unit	EIA standard 19 in. rack (17.75 in. opening)	Seismic 19 in. rack (17.5 in. opening)
SR 2	NFXS-F	NFXS-F
	Vertical shelf mount kit	Vertical shelf mount kit
Fan 2	BFAN-X (with fan filter)	BFAN-X (with fan filter)

(2 of 2)

Figure 139 shows the 7360 ISAM FX-4 vertical rack mounting configuration in a 19 in. EIA standard rack.

**Figure 139** Vertical mounting configuration for 7360 ISAM FX-4 in a 19 in. EIA standard rack



23567

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## 13.2.2 Parts list

The following parts are required:

- 7360 ISAM FX-4 shelf (NFXS-F)
- grounded 19 in. EIA standard rack or 19 in. seismic standard rack that can accommodate the 7360 ISAM FX-4 shelf
- horizontal shelf mount kit containing:
  - 12-24 × 1/2 in. (12.7 mm) screws
  - mounting brackets not required
- vertical shelf mount kit containing:
  - pre-assembled top cross bracket, rear skirt and front skirt
  - pre-assembled shelf horizontal mount bracket and air intake baffle/drip tray
  - intumescent panel
  - top baffle
  - 12-24 × 1/2 in. (12.7 mm) screws
  - M3 × 5/16 in. (8 mm) screws
  - M3 × 9/16 in. (14 mm) screws
  - M3 × 9/16 in. (14 mm) screws
  - 12-24 × 1/2 in. (12.7 mm) screws
- fan unit (BFAN-X)
- 10 AWG power lug
- general facilities card, if replacing (NGFC-G)
- cables:
  - 50-pin micro DSUB connector
  - DB-9 connector
  - RJ-45 connector
  - 6-pin wire-wrap right angle header connector
  - 120-pin FCI power blade connector

## 13.2.3 Recommended tools

The following tools are recommended:

- screwdrivers
- protective gloves



**Procedure 50    To mount the 7360 ISAM FX-4 shelf horizontally in a 19 in. rack**

Use this procedure to mount a 7360 ISAM FX-4 shelf horizontally in a 19 in. EIA standard rack.

- 
- 1**    Verify the 7360 ISAM FX-4 shelf mounting locations on the rack; see Figure [140](#).

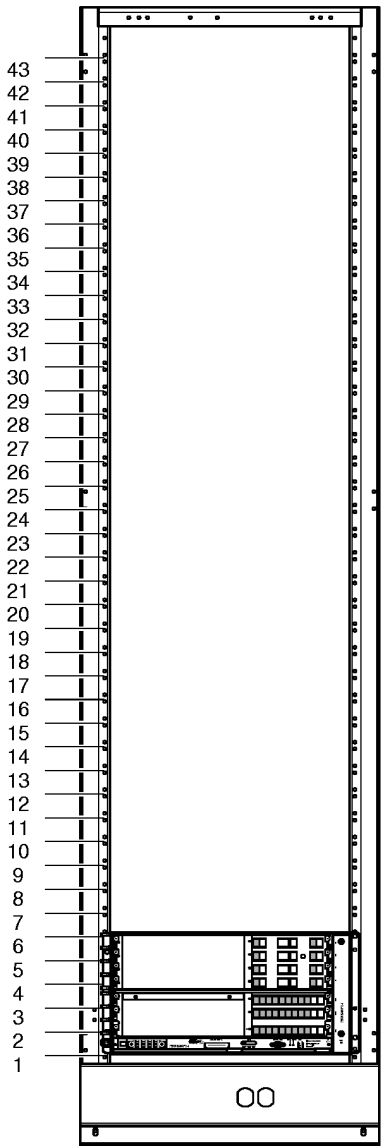
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  - 2**    Orient the 7360 ISAM FX-4 shelf horizontally with the fan unit located on the right side and align the shelf unit with the left and right rack mounting holes.

---

  - 3**    Mount the 7360 ISAM FX-4 shelf with 12-24 × 1/2 in. (12.7 mm ) screws to the left rack mounting hole, then to the right rack mounting hole securely.

**Figure 140** Horizontal mounting locations in a 19 in. rack for 7360 ISAM FX-4



22741



**Note** — See Chapter 14 “7360 ISAM FX-4 shelf cabling” for 7360 ISAM FX-4 shelf cabling information.

**4** STOP. This procedure is complete.

**Procedure 51 To mount the 7360 ISAM FX-4 shelf in vertically in a 19 in. rack**

Use this procedure to mount a 7360 ISAM FX-4 vertically in a 19 in. EIA standard rack.



**Caution —** The vertical shelf mount kit must be used for the 7360 ISAM FX-8 in a vertical mount installation as the air intake baffle/drip tray and top baffle are required to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

- 
- 1 Unpack and inspect the shelf and vertical shelf mount kit visually for physical damage.
  - 2 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.

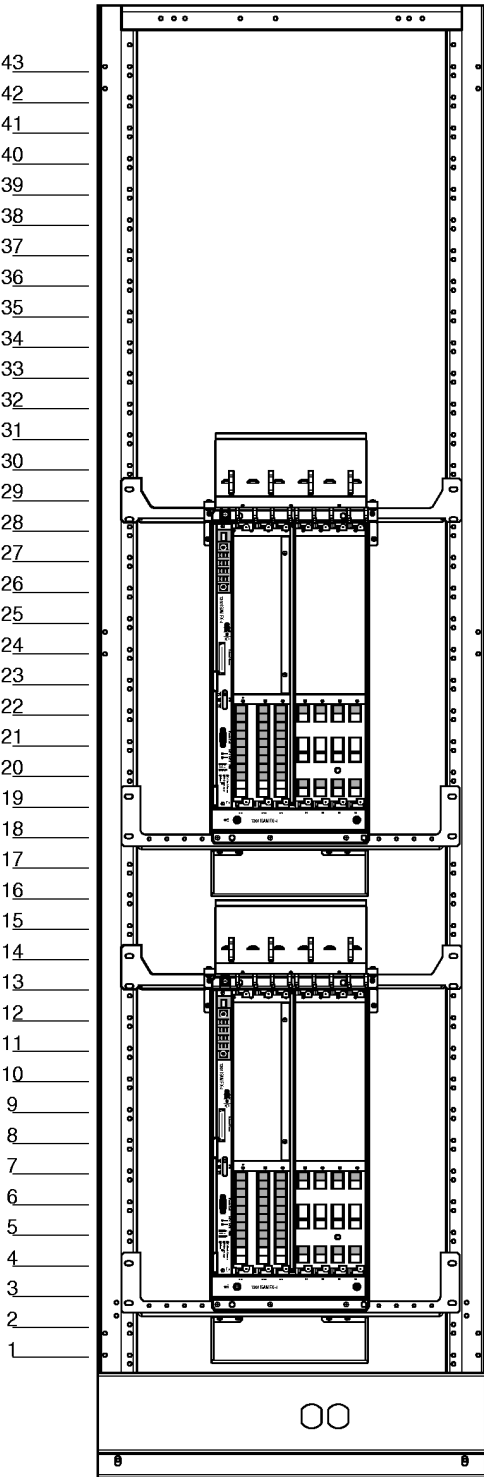


**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3 Put on the antistatic wrist strap and connect it to a grounding point.
  - 4 Verify the 7360 ISAM FX-4 shelf mounting locations on the rack; see Figure 141.
-

Figure 141 Vertical mounting locations for the 7360 ISAM FX-4 in a 19 in. rack



23570

- 
- 5 Install the pre-assembled shelf horizontal mounting bracket and air intake baffle/drip tray onto the bottom of the 19 in. rack as shown in Figure 142.

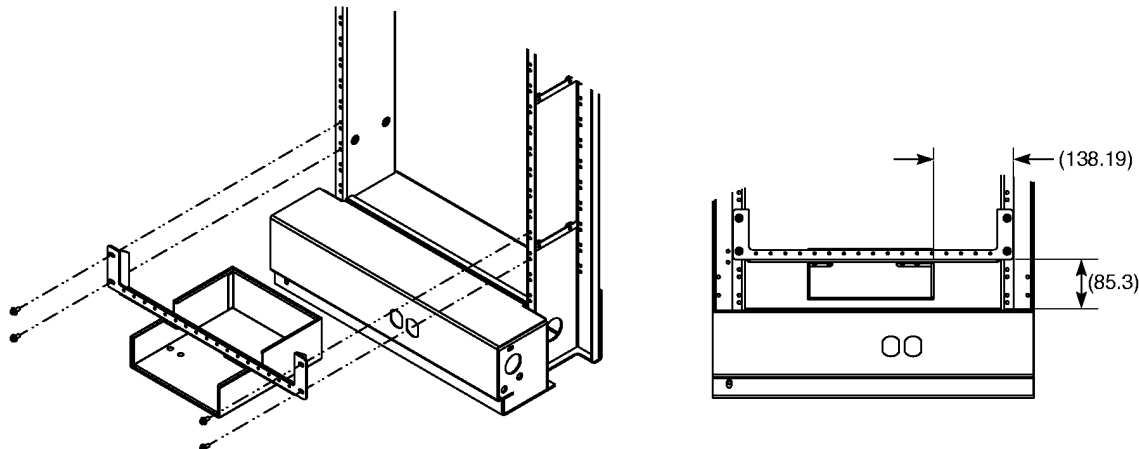


**Caution —** The pre-assembled shelf mounting bracket and air intake baffle/drip tray is required in the bottom position of each installed 7360 ISAM FX-4 shelf in a rack.



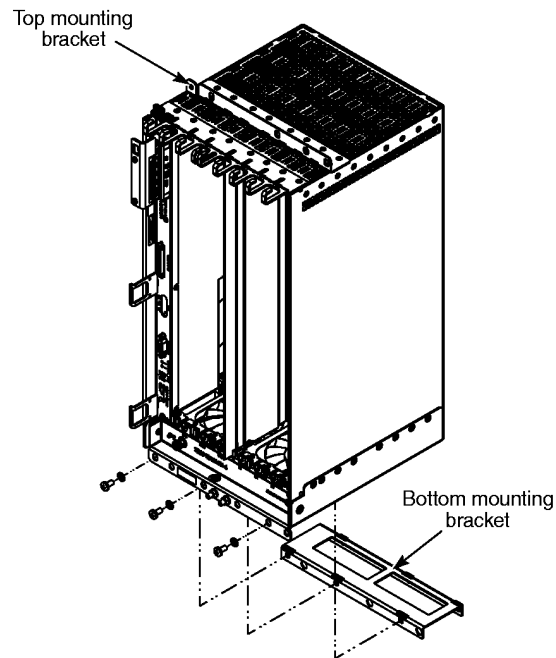
**Note —** Torque the mounting bracket screws to 28 in. to 30 in. per lbs after attaching the air intake/drip tray assembly to the rack.

**Figure 142** Mounting the 7360 ISAM FX-4 pre-assembled shelf mounting bracket and air intake baffle/drip tray in a 19 in. rack



23571

- 
- 6 Remove and discard the top mounting bracket and screws that were shipped with the shelf.
- 
- 7 Remove the bottom mounting bracket, screws, and washers and retain them to re-install later, see Figure 143 for the locations.

**Figure 143** Location of 7360 ISAM FX-4 top and bottom mounting brackets

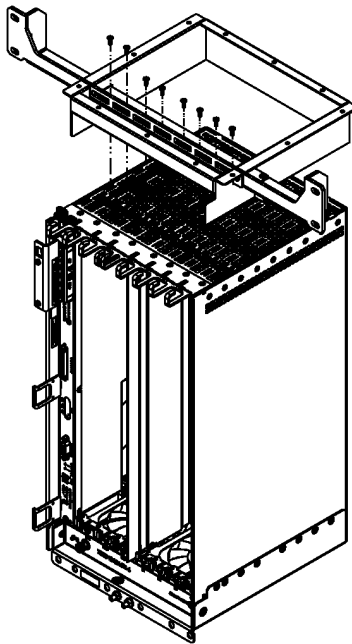
23579

- 8 Attach the pre-assembled skirts and mounting bracket to the shelf using the M3 × 8mm screws as shown in Figure 144.



**Note** — Torque the mounting bracket screws to 4.3 in. to 6.3 in. per lbs after placing the skirt assembly onto the shelf.

**Figure 144** Mounting the 7360 ISAM FX-4 pre-assembled skirts and bracket



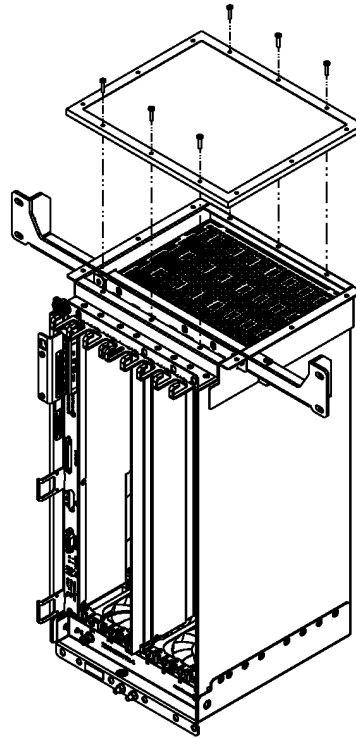
23580

- 9 Orient the intumescent panel horizontally over the top of the skirt assembly aligning the holes, and attach it to the skirt assembly using the M3 × 14 mm screws as shown in Figure 145.



**Note —** Torque the intumescent panel screws to 4.3 in. to 6.3 in. per lbs after placing it on top the skirt assembly.

**Figure 145** Mounting the 7360 ISAM FX-4 intumescent panel onto the skirt assembly



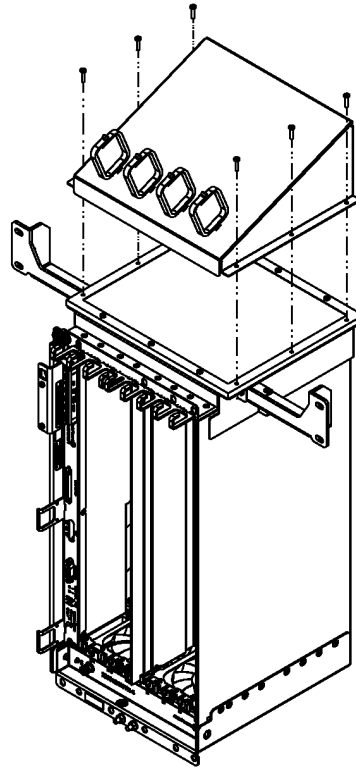
23581

- 10** Orient the top baffle horizontally over the top of the intumescent panel aligning the holes, and attach it to the intumescent panel using the M3 × 14 mm screws as shown in Figure 146.



**Note —** Torque the mounting bracket screws to 4.3 in. to 6.3 in. per lbs after placing it on top of the intumescent panel.



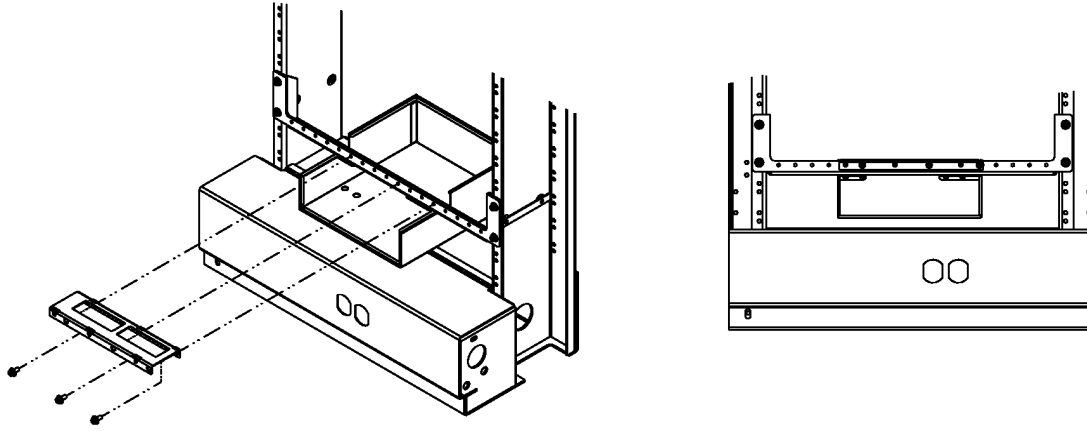
**Figure 146** Mounting the 7360 ISAM FX-4 top baffle

23582

Proceed to step 12 to complete the 23 in. rack installation.

Continue on to step 11 for the 19 in. rack installation.

- 11** Attach the bottom mounting bracket that was removed in an earlier step to the shelf horizontal mounting bracket and the air intake baffle/drip tray assembly using the 12-24 × 1/2 in. (12.7 mm) screws. Ensure that the flange is facing down, and align the right side of the bracket to the right side of the drip tray. See Figure 147.

**Figure 147** Attaching the 7360 ISAM FX-4 bottom mounting bracket in a 19 in. rack

23574

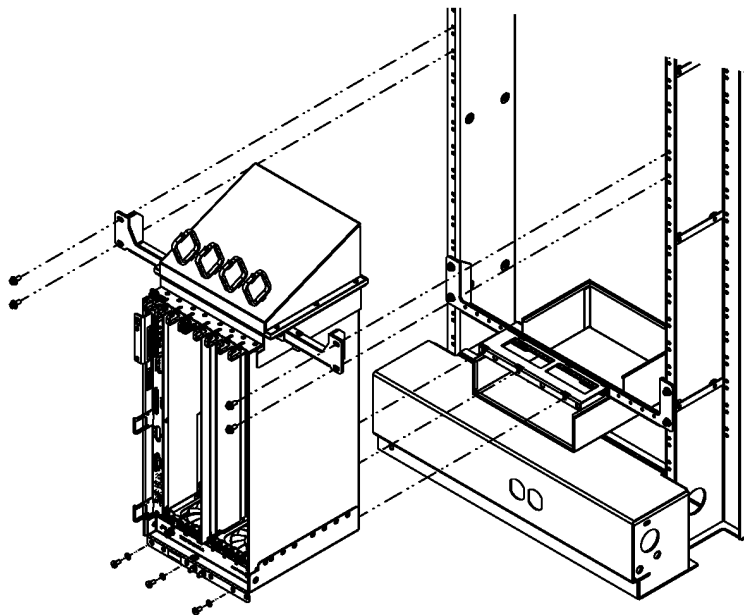
- 12** Attach the shelf assembly above the air intake/drip tray assembly and onto the bottom mounting bracket using the 12-24 × 1/2 in. (12.7 mm) screws and the screws and washers that were removed earlier, as shown in Figure 148.



**Note 1** — Removing the bottom mounting bracket from the shelf in the previous step allows the screws to be easily attached to the recessed flange on the bottom of the shelf in this step.

**Note 2** — Torque the mounting bracket screws to 28 in. to 30 in. per lbs after attaching the shelf assembly to the rack.

**Figure 148** Mounting the 7360 ISAM FX-4 shelf assembly vertically in a 19 in. rack



23573



**Note** — See Chapter 14 “7360 ISAM FX-4 shelf cabling” for 7360 ISAM FX-4 shelf cabling information.

**13** STOP. This procedure is complete.

### 13.3 Mounting the 7360 ISAM FX-4 shelf in a 23 in. rack

The 7360 ISAM FX-4 shelf can be mounted:

- horizontally in a 23 in. rack with 21.5 in. I.D.
- vertically in a 23 in. rack with 21.5 in. I.D.



**Caution —** The vertical shelf mount kit must be used for the 7360 ISAM FX-4 in a vertical mount installation as the air intake baffle/drip tray and top baffle are required to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

#### 13.3.1 7360 ISAM FX-4 rack mounting configurations

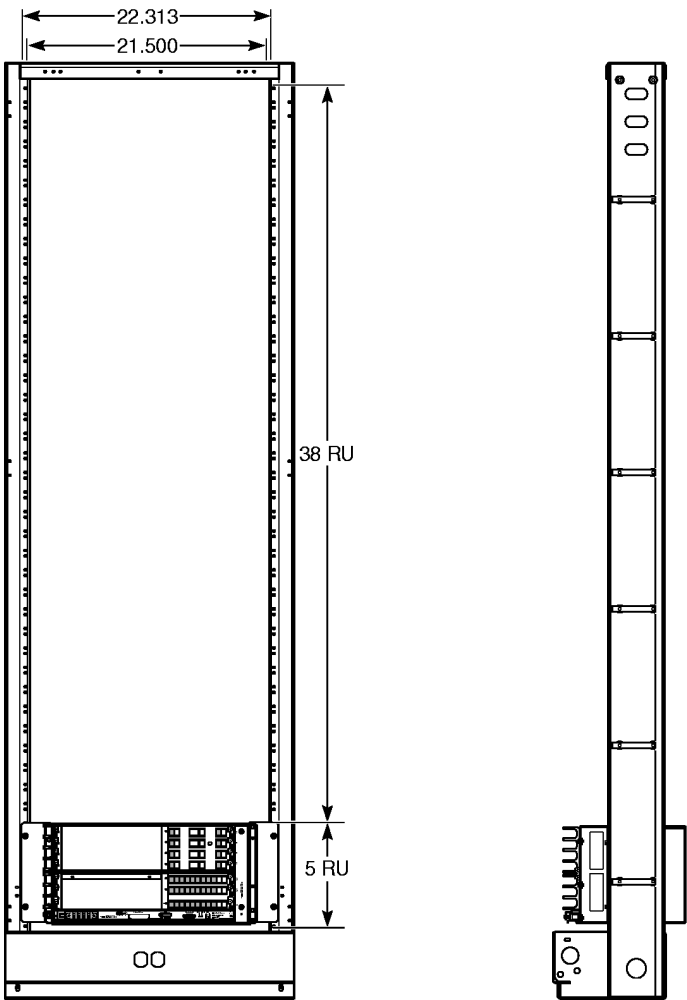
Table 13 describes the horizontal rack mounting configuration for a 7360 ISAM FX-4 shelf in a 23 in. rack.

**Table 13      23 in. rack horizontal mounting configuration for 7360 ISAM FX-4**

Rack unit	23 in. rack horizontal mount (21.5 in. opening)
SR 1	NFXS-F
	Horizontal shelf mount kit
Fan 1	BFAN-X (with fan filter)
SR 2	NFXS-F
	Horizontal shelf mount kit
Fan 2	BFAN-X (with fan filter)

Figure 149 shows the horizontal rack mounting configuration.

**Figure 149** 23 in. rack horizontal mounting configuration for 7360 ISAM FX-4



22738

Table 14 describes the vertical rack mounting configuration for a 7360 ISAM FX-4 shelf in a 23 in. rack. Figure 150 shows the vertical rack mounting configuration.

**Table 14** Vertical mounting configuration for 7360 ISAM FX-4 23 in. rack

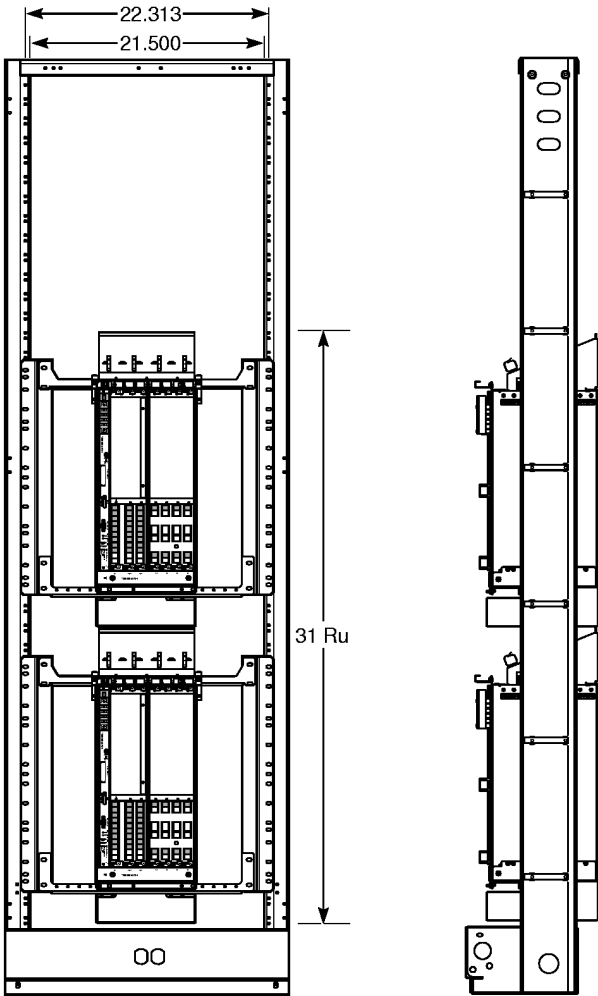
Rack unit	23 in. rack vertical mount (21.5 in. opening)
SR 1	NFXS-F
	Vertical shelf mount kit

(1 of 2)

Rack unit	23 in. rack vertical mount (21.5 in. opening)
Fan 1	BFAN-X (with fan filter)
SR 2	NFXS-F
	Vertical shelf mount kit
Fan 2	BFAN-X (with fan filter)

(2 of 2)

**Figure 150** Vertical mounting configuration for 7360 ISAM FX-4 in a 23 in. rack



23568

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## 13.3.2 Parts list

The following parts are required:

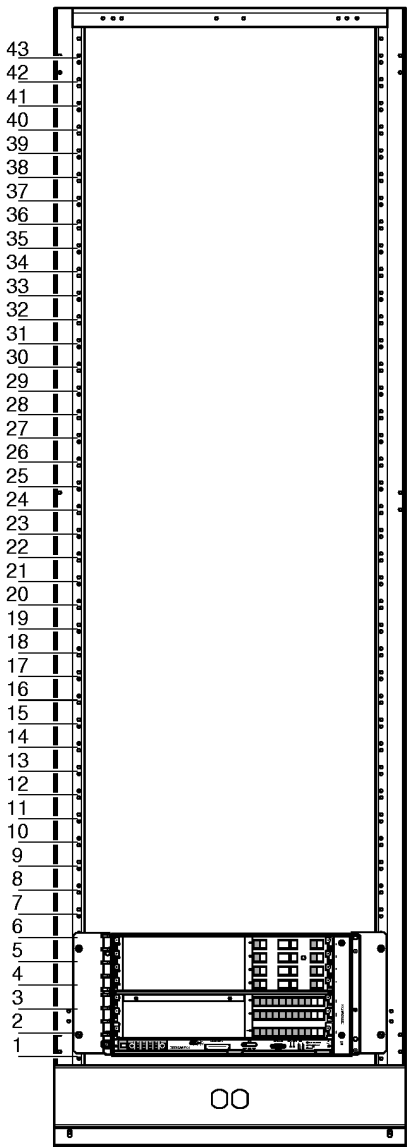
- 7360 ISAM FX-4 shelf (NFXS-F)
- grounded 23 in. rack that can accommodate the 7360 ISAM FX-4 shelf
- horizontal shelf mount kit rack containing:
  - shelf horizontal brackets (x2)
  - 12-24 × 1/2 in. (12.7 mm) screws
  - 6-32 × 3/8 in. (9.53 mm) screws
- vertical shelf mount kit containing:
  - rack adapter brackets
  - pre-assembled top cross bracket, rear skirt and front skirt
  - pre-assembled shelf horizontal mount bracket and air intake baffle/drip tray
  - intumescent panel
  - top baffle
  - 12-24 × 1/2 in. (12.7 mm) screws
  - M3 × 5/16 in. (8 mm) screws
  - M3 × 9/16 in. (14 mm) screws
  - M3 × 9/16 in. (14 mm) screws
  - 12-24 × 1/2 in. (12.7 mm) screws
- fan unit (BFAN-X)
- general facilities card, if replacing (NGFC-G)
- cables:
  - 50-pin micro DSUB connector
  - DB-9 connector
  - RJ-45 connector
  - 6-pin wire-wrap right angle header connector
  - 120-pin FCI power blade connector

**Procedure 52    To mount the 7360 ISAM FX-4 shelf horizontally in a 23 in. rack**

Use this procedure to mount the 7360 ISAM FX-4 shelf horizontally in a 23 in. rack.

- 1    Verify the 7360 ISAM FX-4 shelf mounting locations on the rack; see Figure 151.

**Figure 151    Horizontal mounting locations for 7360 ISAM FX-4 in a 23 in. rack**

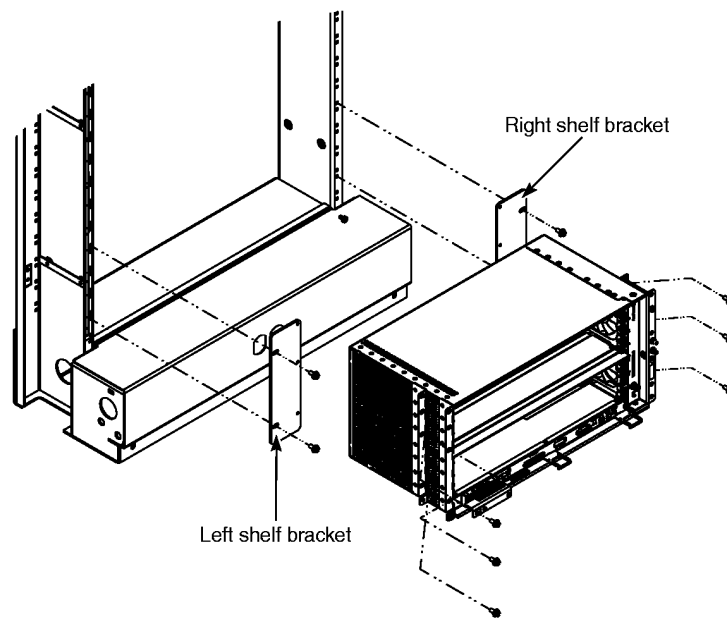


22739



- 
- 2 Attach the left and right shelf horizontal brackets to the 7360 ISAM FX-4 shelf using 12-24 × 1/2 in. (12.7 mm) screws.
  - 3 Orient the 7360 ISAM FX-4 shelf horizontally with the fan unit located on the right side and align the shelf unit with the left and right mounting bracket holes.
  - 4 Mount the 7360 ISAM FX-4 shelf with 12-24 × 1/2 in. (12.7 mm) screws to the left mounting bracket then to the right mounting bracket securely; see Figure 152.
- 

**Figure 152** Horizontal mounting installation for 7360 ISAM FX-4 in a 23 in. rack



22746



**Note** — See Chapter 14 “7360 ISAM FX-4 shelf cabling” for 7360 ISAM FX-4 shelf cabling information.

- 
- 5 STOP. This procedure is complete.
-

---

**Procedure 53 To mount the 7360 ISAM FX-4 shelf vertically in a 23 in. rack**

Use this procedure to mount the 7360 ISAM FX-4 shelf vertically in a 23 in. rack; see Figure 157.



**Caution —** The vertical shelf mount kit must be used for the 7360 ISAM FX-4 in a vertical mount installation as the air intake baffle/drip tray and top baffle are required to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

- 
- 1    Unpack and inspect the shelf vertical shelf mount kit visually for physical damage.
- 
- 2    If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.

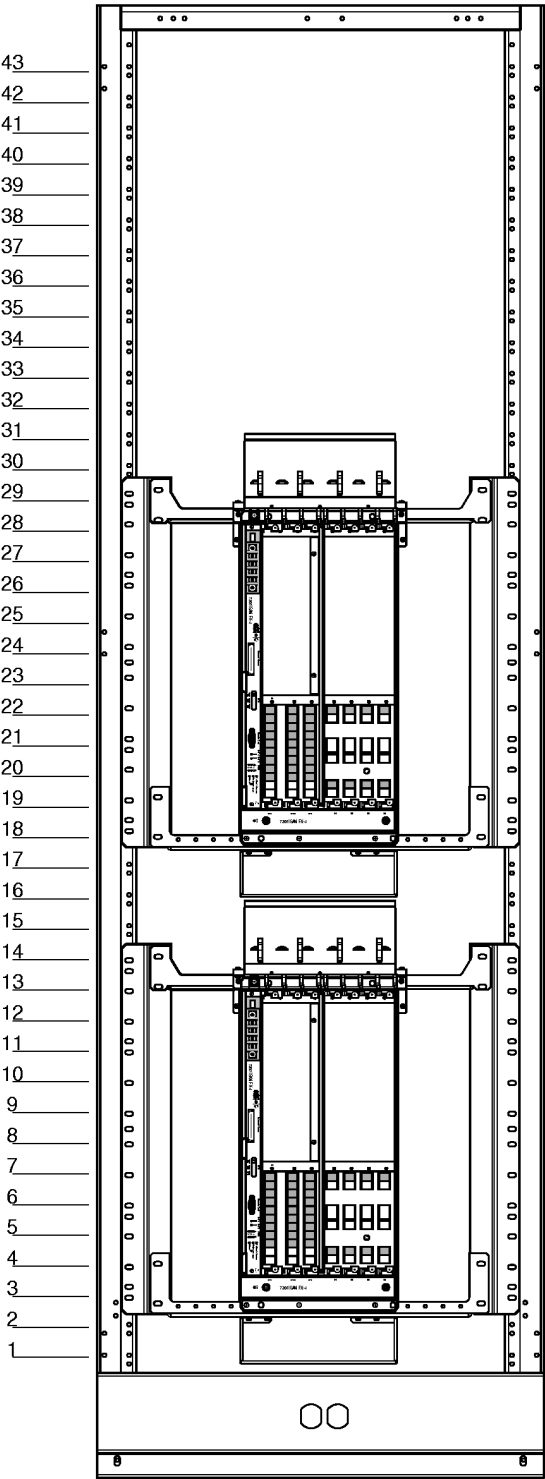


**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3    Put on the antistatic wrist strap and connect it to a grounding point.
- 
- 4    Verify the 7360 ISAM FX-4 shelf mounting locations on the rack; see Figure 153.

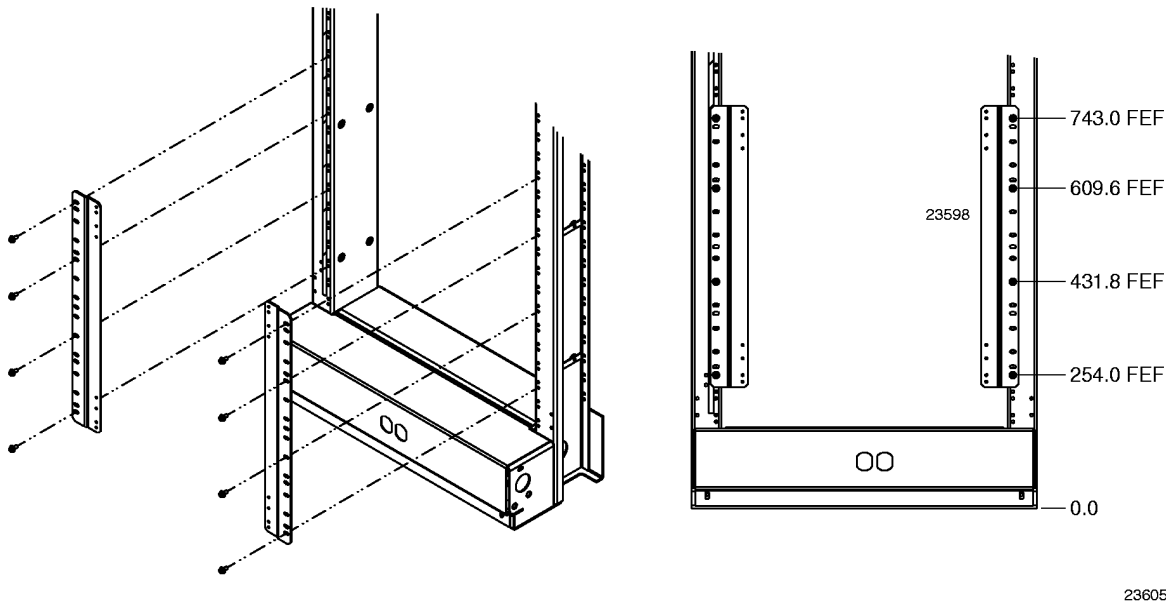
Figure 153 Vertical mount locations for the 7360 ISAM FX-4 in a 23 in. rack



23569

- 5 Attach the rack adapter brackets to the shelf using 12-24 × 1/2 in. (12.7 mm) screws as shown in Figure 154.

**Figure 154** Mounting the 7360 ISAM FX-4 rack adapter brackets to a 23 in. rack



- 6 Install the pre-assembled shelf horizontal mounting bracket and air intake baffle/drip tray onto the bottom of the 23 in. rack as shown in Figure 155.

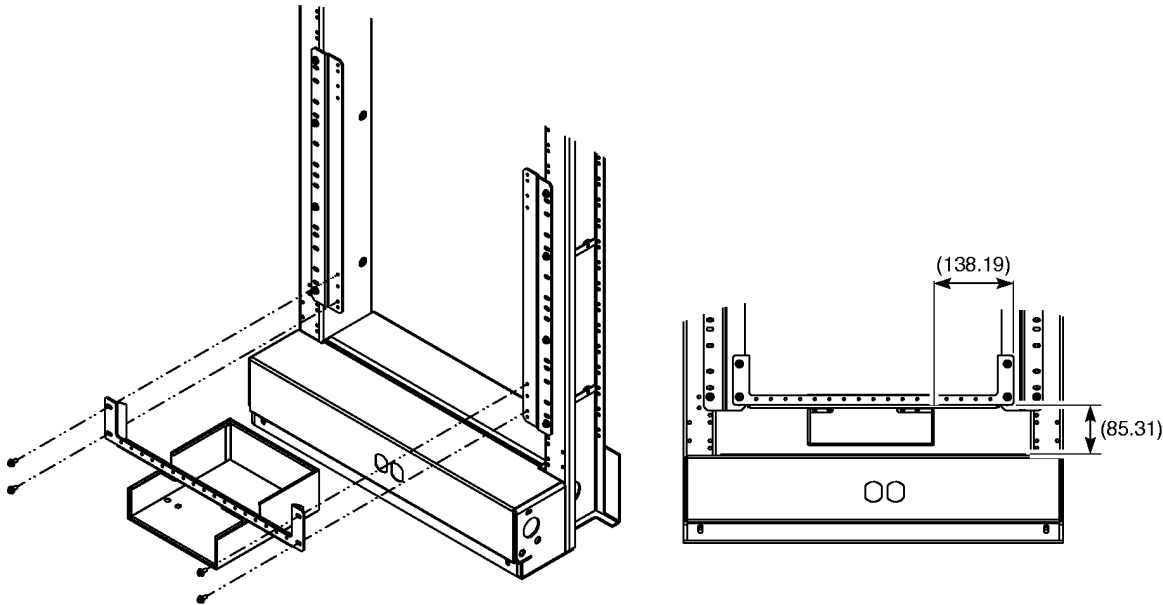


**Caution** — The pre-assembled shelf mounting bracket and air intake baffle/drip tray is required in the bottom position of each installed 7360 ISAM FX-4 shelf in a rack.



**Note** — Torque the mounting bracket screws to 28 in. to 30 in. per lbs after attaching the air intake/drip tray assembly to the rack.

**Figure 155** Mounting the 7360 ISAM FX-4 pre-assembled shelf mounting bracket and air intake baffle/drip tray in a 23 in. rack



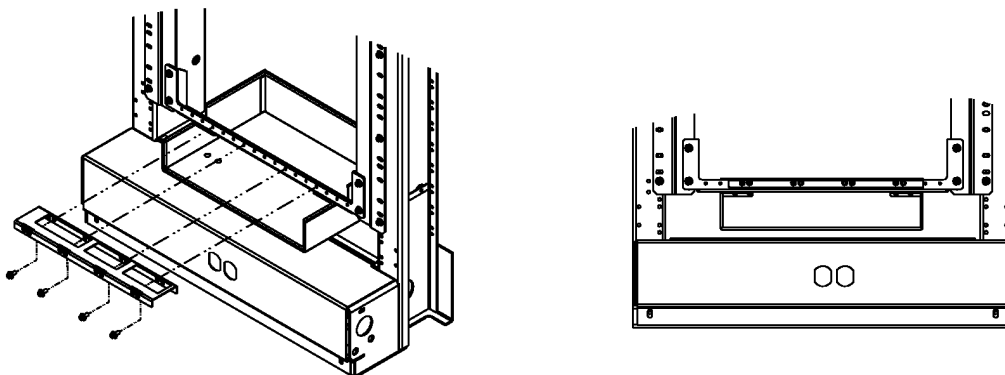
23578

- 7 Assemble the shelf using the vertical mounting kit pre-assembled parts as shown in the 19 in. vertical mounting procedures; see [To mount the 7360 ISAM FX-4 shelf in vertically in a 19 in. rack.](#)



**Note —** The procedure to assemble the vertical mounting kit is the same for both 19 in. and 23 in. rack installations. Once the similar 19 in. install procedure are complete, continue with step 8 below to complete the 23 in. install procedure.

- 8 Attach the bottom mounting bracket that was removed earlier to the shelf horizontal mounting bracket and the air intake baffle/drip tray assembly using the 12-24 × 1/2 in. (12.7 mm) screws. Ensure that the flange is facing down, and align the right side of the bracket to the right side of the drip tray. See [Figure 156](#)

**Figure 156** Attaching the 7360 ISAM FX-4 bottom mounting bracket in a 23 in. rack

23577

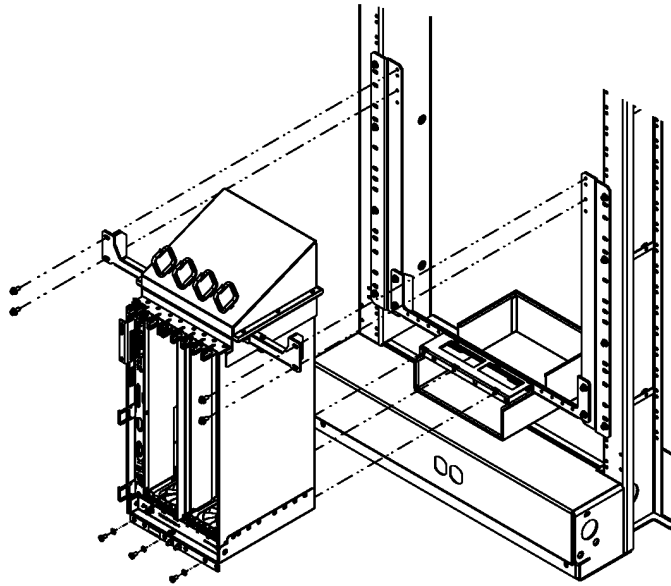
- 9 Attach the shelf assembly above the air intake/drip tray assembly and onto the bottom mounting bracket using the 12-24 × 1/2 in. (12.7 mm) screws and the screws and washers that were removed in an earlier step, as shown Figure 157.



**Note 1** — Removing the bottom mounting bracket from the shelf in previous steps allows the screws to be easily attached to the recessed flange on the bottom of the shelf in this step.

**Note 2** — Torque the mounting bracket screws to 28 in. to 30 in. per lbs after attaching the shelf assembly to the rack.

**Figure 157** Mounting the 7360 ISAM FX-4 shelf assembly vertically in a 23 in. rack



23606



**Note** — See Chapter 14 “7360 ISAM FX-4 shelf cabling” for 7360 ISAM FX-8 shelf cabling information.

**10** STOP. This procedure is complete.

## 13.4 Installing or replacing a fan unit in a 7360 ISAM FX-4 shelf

The fan unit is a field-replaceable unit with wide-voltage-range fans and an alarm interface board and (optional) fan filter. The unit is installed in the shelf fan area and plugs directly into the backplane connectors providing connection. The front panel includes a single red alarm LED that lights up if fan failure occurs.

One version of the fan unit is available:

- intelligent fan unit (BFAN-X)

The fan unit can be shipped factory installed in the rack, but can also be ordered as separate unit for replacement on site.

The fan unit can be hot inserted in the shelf. The fan unit does not have an on/off switch so removing the fan unit disconnects power provided from the backplane.



**Danger** — Risk of fire and equipment damage or system failure when cooling with the wrong fan unit, when the fans are off, or when the fan filter is dirty.

When a shelf in a powered system contains the wrong type of fan unit (for example, a fan unit with four instead of eight fans) or when fans are failing or out of operation, there is a risk of active plug-in units overheating. Fan units with dirty fan filters might no longer assure sufficient air cooling. Plug-in units might get seriously damaged, even ignite, or cause a system failure.

Observe the following rules:

- Before switching on the rack power, make sure the correct type of fan unit is installed and that the fan unit is equipped with a clean fan filter.
- Keep all the fans in operation as long as the system is active.
- When replacing a fan unit of an active system (for example, during maintenance, expansion or upgrade), never keep the fan area empty for longer than 2 minutes.
- Make sure the fan filter is clean and replace it, depending on the amount of dust in the CO, every 3 to 6 months.

See the *7360 ISAM FX Product Information Guide* for information on orderable part numbers.



**Caution** — Hot insertion of the fan unit can sometimes cause service disruption.

## Procedure 54 To install or replace a fan unit

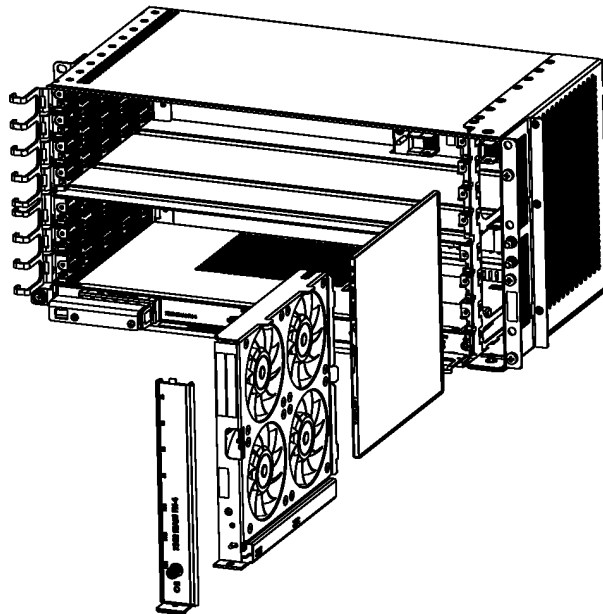
Use the following procedure to install or replace a fan unit.

- 1 Verify if the fan unit type is correct for the rack configuration. See Table 13.
- 2 Verify the mounting position of the fan unit; see Figure 151.
- 3 Remove the fan unit from its shipping packaging and inspect it for damage. If damaged, do not mount the fan unit but notify the transportation carrier and Nokia immediately.



- 
- 4 In case of replacement, remove the installed fan unit:
- i Loosen the captive screw of the fan cover and remove the cover; see Figure 158.

**Figure 158 Fan installation for 7360 ISAM FX-4 shelf**



22402

- ii If a fan filter was installed, remove the fan filter.



**Danger —** When the fan unit is extracted, the fans will still be rotating. Do not touch the fans, because this may cause bodily harm.



**Caution —** Be careful when removing the fan filter to ensure that dust will not get into the card cage area and onto the card components to prevent possible damage to the other equipment.

- 
- 5 If the system is active, keep in mind the maximum time (5 minutes) fans are allowed to be out of operation (see Danger warning about the risk of fire).

- 
- 6** Install the new fan unit:
- i** Gently insert the fan unit into the fan area until the backplane connectors are fully mated.
  - ii** If a fan filter was installed, re-insert the fan filter.
  - iii** Replace the fan unit cover and secure the cover and the fan unit by tightening the captive screw.
- 

- 7** In the same way, install the fan units of other shelf units, if any.
- 

- 8** Install a fan filter in the fan unit of each shelf or replace the filter, if required (each 3 to 6 months, depending on the amount of dust in the CO).

See the *7360 ISAM FX Product Information Guide* for information on orderable part numbers.

---

- 9** STOP. This procedure is complete.
- 

## Procedure 55 To replace a fan filter

The fan filter must be replaced each 3 to 6 months, depending on the amount of dust in the CO). Use the following procedure to replace the fan filter.

- 
- 1** Loosen the captive screw of the fan cover; see Figure 158.
- 
- 2** Gently remove the fan unit.
- 
- 3** Carefully remove the fan filter and place it in the appropriate removal container.
- 



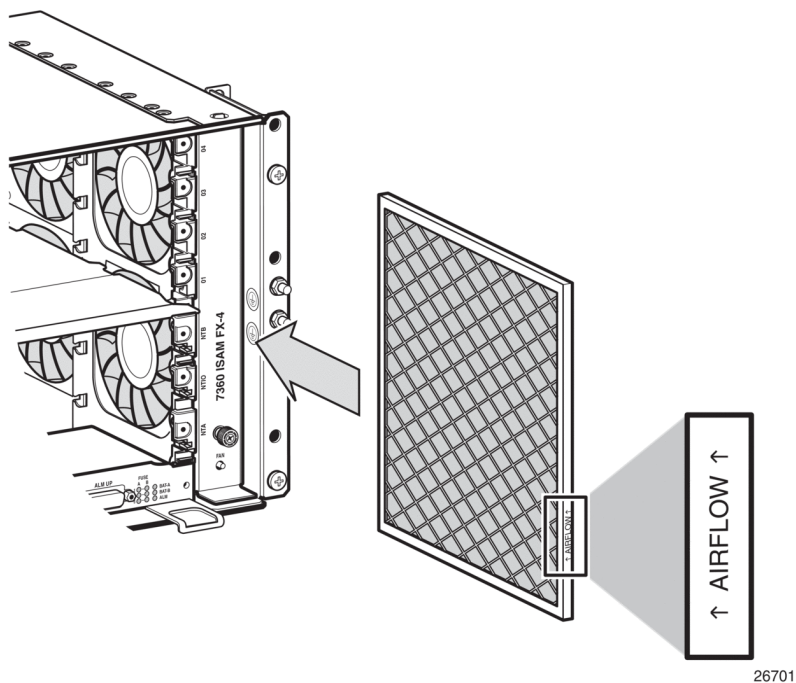
**Caution** — Be careful when removing the fan filter to ensure that dust will not get into the card cage area and onto the card components to prevent possible damage to the other equipment.

---

- 4** Install the new fan filter; see Figure 159.
- 



**Caution** — Ensure that the metal grid of the fan filter, as well as the arrows on the frame of the fan filter, face inward toward the fan unit.

**Figure 159** Fan filter installation for 7360 ISAM FX-4 shelf

- 5 Replace the fan unit cover and secure the cover by tightening the captive screw.
- 6 STOP. This procedure is complete.



---

# 14 7360 ISAM FX-4 shelf cabling

## 14.1 Overview

## 14.2 Safety precautions

## 14.3 Shelf grounding connection

## 14.4 Rack grounding connection

## 14.5 Power cabling

## 14.6 CO external alarm connector

## 14.7 BITS interface connections

## 14.8 ToD/PPS connector

## 14.9 Remote craft port connector

## 14.10 Combo cable connector

## 14.11 POTS and LINE MDF cable connector

## 14.12 Vectoring cable connector

## 14.1 Overview

This chapter provides the following cabling information for the 7360 ISAM FX-4 shelf.

- Safety precautions
- Shelf grounding connection
- Rack grounding connection
- Power cabling
- CO external alarm connector
- BITS interface connections
- ToD/PPS connector
- Remote craft port connector
- Combo cable connector
- POTS and LINE MDF cable connector

---

## 14.2 Safety precautions

The following safety precautions apply:



**Danger 1** — Before working on the power supply unit, verify whether it is live.

If the power supply is live, which can deliver –48 Vdc, you must use an insulated tool kit. See *7360 ISAM FX Safety Manual* for more information about working with live components.

**Danger 2** — Avoid risk of electric shock.

Always wear protective gloves and footwear for all handling tasks.

Carefully follow the instructions.



**Warning 1** — Before connecting to the power, verify the specifications of all equipped fan units to ensure that the correct voltage will be supplied (–48 Vdc) to these units.

**Warning 2** — Before power is supplied, all fasteners requiring a specific torque must be tightened moderately before final tightening with a torque wrench or driver.

When power is supplied, tighten fasteners with insulated tools, according to the specified torque.

**Warning 3** — For Type 2 ports:

The intra-building port(s) of the 7360 ISAM FX equipment or sub-assembly is suitable for connection to intra-building or unexposed wiring or cabling only.

**Warning 4** — For Type 2 ports that require shielded cables:

The intra-building port(s) of the 7360 ISAM FX equipment or sub-assembly must use shielded intra-building wiring or cabling that is grounded at both ends.

See the *7360 ISAM FX Safety Manual* for more information.

## 14.3 Shelf grounding connection

This section provides the 7360 ISAM FX-4 shelf grounding cable types, cable routing, and connection information.

---

Observe the following safety notes:



**Danger 1** — Rack or frame must be suitably connected to the office grounding network in accordance with Article 250 of the national electrical code (NEC) to ensure UL and CSA compliance. If outside the United States, ground per local electrical codes and practices.

**Danger 2** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.

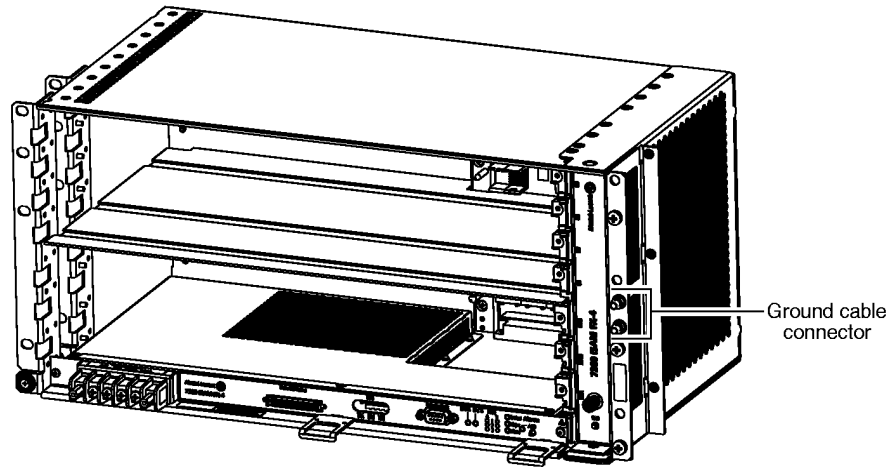
### 14.3.1 Grounding cable type

As shown in Figure 160, the 7360 ISAM FX-4 includes two grounding cable connectors. Each ground lug is a 4 AWG, with 1/4 in. holes, with 3/4 in. spacing, single crimp, peep, copper, UL and CSA recognized dual-hole lug. The preferred cable is 4 AWG, green with a yellow stripe. Other types and sizes of wire and lugs can also be used provided they meet the requirements of Article 250 of the NEC.

### 14.3.2 Cable routing and connection

The grounding cable must be used when the shelf is stand-alone and will not be used if the shelf is assembled in a rack. The cable is routed through an opening in the right side of the shelf to the grounding terminal.

The connections for the grounding cable are shown in Figure 160. The grounding cable is connected to the shelf frame with hardware included with the shelf.

**Figure 160** Grounding cable connection on 7360 ISAM FX-4

22393

**Procedure 56** To connect the grounding cable

Use the following procedures to connect the grounding cable.

- 1 Route the grounding cable to the right side of the shelf and up to the middle of the shelf.
- 2 Connect the dual-lug to the grounding cable connection point as shown in Figure 160.



**Danger** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.



**Note** — The grounding cable nuts should be tightened with a torque of 13.28 to 17.7 lbf-in. (1.5 to 2.0 N.m).

- 3 STOP. This procedure is complete.



---

## 14.4 Rack grounding connection

The 7360 ISAM FX-4 requires a 6 AWG rack frame grounding cable for the rack grounding connection.



**Danger 1** — Rack or frame must be suitably connected to the office grounding network in accordance with Article 250 of the National Electrical Code (NEC) to ensure UL and CSA compliance. If outside the United States, ground per local electrical codes and practices.

**Danger 2** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.

### Procedure 57 To connect the rack ground

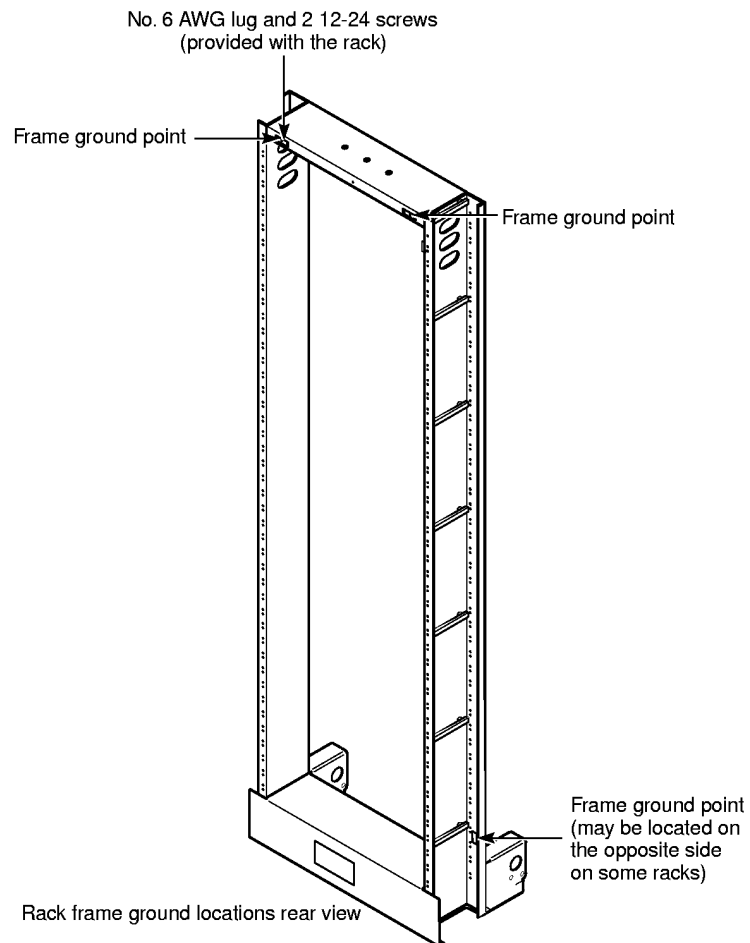
- 
- 1 Prepare the frame grounding cable.

---

  - 2 Following local practices, route the grounding cable to the top of the rack.

---

  - 3 Connect the grounding cable to one of the two frame grounding points on the top of the rack as shown in Figure 161, using the screws provided with the rack.

**Figure 161 External frame ground point rear view**

22676

---

**4** Perform power and ground tests as per local practices.

---

**5** STOP. This procedure is complete.

---

## 14.5 Power cabling

This section describes the 7360 ISAM FX-4 general information, power distribution unit location, and the external power cabling procedure to connect the power cables.

## 14.5.1 General

This section includes information about the power distribution frame, external ground, and power cable routing.

### 14.5.1.1 Power distribution frame (PDF)

The 7360 ISAM FX-4 shelf is powered through two redundant branches A, and B, in a three-wire configuration provided by the PDF.

The 7360 ISAM FX-4 operates with a nominal voltage level of –48 Vdc supplied by battery power sources in the CO or cabinet.

### 14.5.1.2 External ground

The standard rack provides three frame ground points with two located on top of the rack. The safety ground conductor used must be a green-yellow insulated cable (UL 60950-1 2nd Edition and CAN/CSA C22.2 NO. 60950-1-07 compliant).

### 14.5.1.3 Cable routing

Power cables are routed from the PDF to the rack using cable channels overhead and are connected at the input terminal block inside the 7360 ISAM FX-4 shelf.

In order to minimize interference, Nokia recommends that you route power cables using separate channels for signal and power cables.

Keeping a distance of 4 in. (10 cm) between signal and power cables is advisable where it imposes no practical problems.

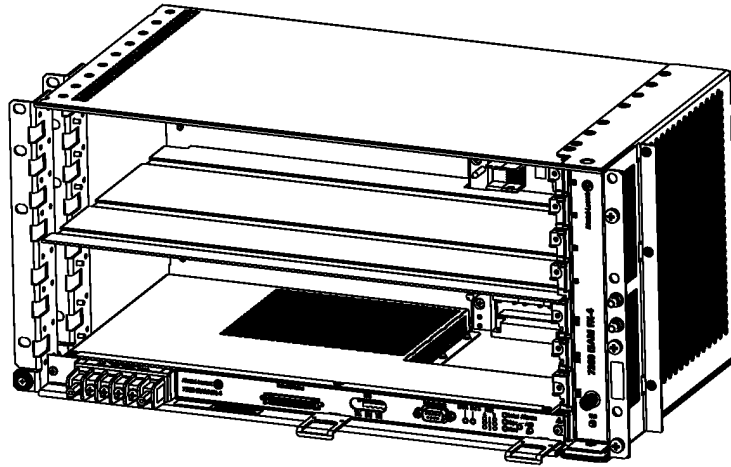
Crossing of signal cables with power cables and parallel routing over short distances are acceptable.

## 14.5.2 Power distribution unit

The 7360 ISAM FX-4 is designed to be used as stand-alone equipment. It is equipped with a –48 Vdc power distribution unit with terminal block.

The power distribution terminal block is located at the bottom left of the shelf and is covered with a plastic safety cover; see Figures [162](#) and [164](#).

**Figure 162** Power distribution unit on 7360 ISAM FX-4



22394

### 14.5.3 Power cables

This section provides information about the types of power connection cables, cable routing, and a procedure for connecting the power cables on the 7360 ISAM FX-4.

#### 14.5.3.1 Power cable type

The 7360 ISAM FX-4 requires the use of a 10 AWG power cable.

The maximum cable size that can be terminated on the power distribution terminal block is 10 AWG power lug.



**Note 1** — The color of the power cables must be according to local installation practices.

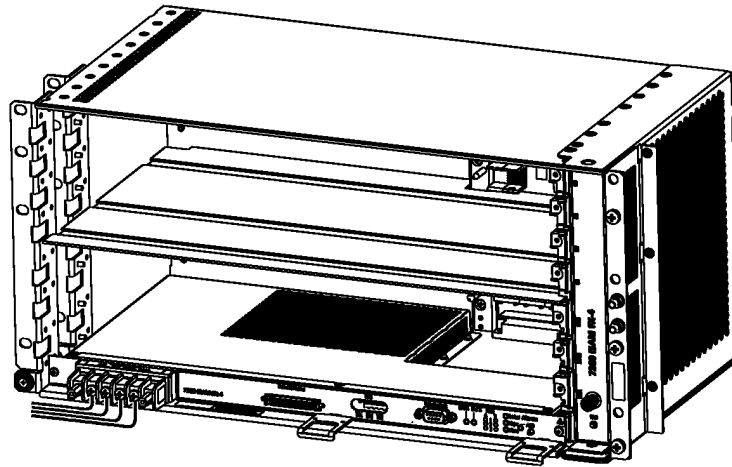
**Note 2** — Nokia recommends the following crimp lugs and crimp lug tool:

- input power lug: Panduit crimp ring lugs PV10-10R to be used with 10 AWG cable
- crimp tool: CT-100A, CT-600A, CT-1551, CT-2500

### 14.5.3.2 Power cable routing and connection

The power cables are routed through the left side of the rack and can then be routed to the power distribution terminal block located on the bottom of the shelf; see Figure 163.

**Figure 163** Power cable routing for 7360 ISAM FX-4



22395

#### Procedure 58 To connect power cables

Use the following procedure to connect the power cables on the 7360 ISAM FX-4.



**Danger** — Before connecting the power cables, make sure that the power to the cables has been disconnected.



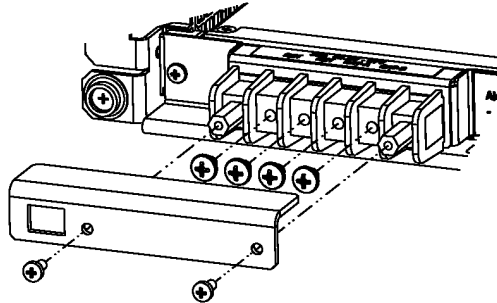
**Note 1** — Power cables connect the PDF directly to the shelf.

**Note 2** — All hardware shown in Figure 164 is provided with the 7360 ISAM FX-4.

**Note 3** — Avoid sharp bends in cables. Use the proper bend radius when installing cables.

- 1 Ensure the power to the cables has been disconnected.
- 2 Loosen the screws on the safety cover and remove the safety cover; see Figure 164.

**Figure 164** Mounting of power cable screws and safety cover on 7360 ISAM FX-4



22398

- 3 Remove the screws from the power terminals; see Figure 164.



**Danger** — If the following sequence is not followed exactly, there can be a possible fire hazard.

- 4 Guide the power cables through the cable guide and connect them to the power terminals as follows; see Figure 163 showing the cables connected:



**Note** — The RET A and RET B connections are on a common ground.

- first connect the BATRET cables RET A and RET B
- then connect the battery cables BAT A and BAT B

- 5 Tighten the nuts back on the power terminals with a torque of 13.28 to 17.7 lbf-in. (1.5 to 2.0 N.m).
- 6 Place the safety cover back in its location and fasten the screws.
- 7 Turn on the A and B power from the power distribution frame to the rack.
- 8 Verify that the BAT A and BAT B LEDs are green.

- 
- 9 Verify that the fans spin.
  - 10 STOP. This procedure is complete.
- 

### Procedure 59 To disconnect the power cables

Use the following procedure when the power cables need to be disconnected on 7360 ISAM FX-4.



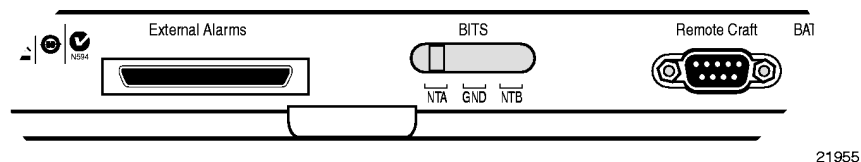
**Warning** — If the following sequence is not followed exactly, there can be a possible fire hazard.

- 
- 1 Before disconnecting the power cables, ensure that power to the cables have been disconnected.
  - 2 Disconnect the battery cables BAT A and BAT B
  - 3 Disconnect the BATRET cables RET A and RET B
  - 4 STOP. This procedure is complete.
- 

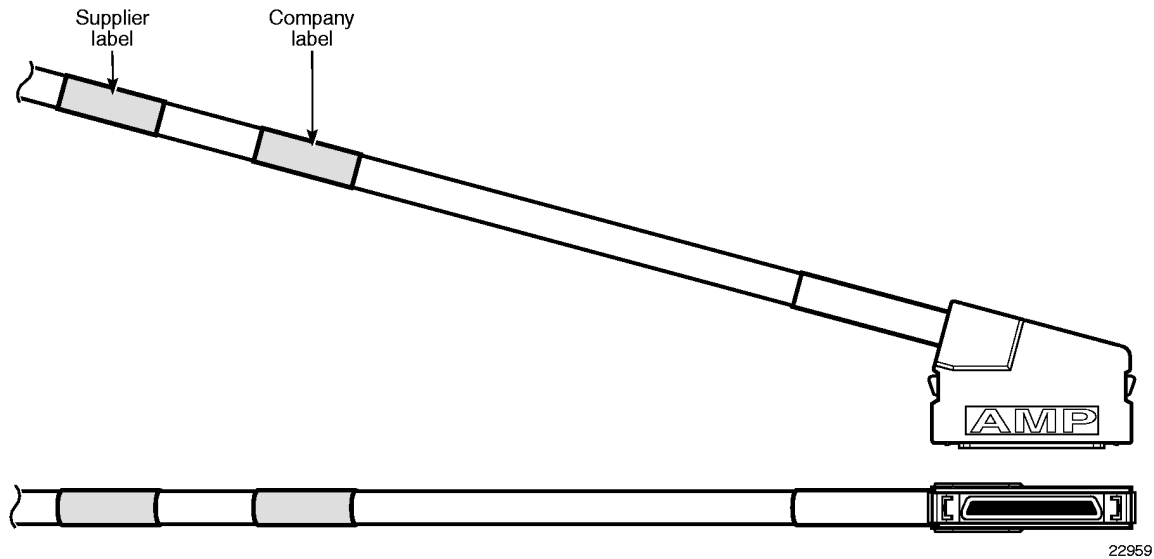
## 14.6 CO external alarm connector

Figure 165 shows the external interfaces on the 7360 ISAM FX-4 shelf.

**Figure 165** External interfaces on 7360 ISAM FX-4



The 7360 ISAM FX-4 requires a 50-pin micro DSUB connector with an angled head for the CO external alarm connection. A cable assembly is available from Nokia (sold separately), that can be used with the 7360 ISAM FX-4, as shown in Figure 166. See Figure 165 for the location of the CO external alarm connector on the GFC card.

**Figure 166** External CO alarm cable for 7360 ISAM FX-4

For a description of the CO external alarm connector pinning, see your Nokia representative.

## 14.7 BITS interface connections

The 7360 ISAM FX-4 requires six wire-wrappable pins for the BITS clock timing connection. BITS timing signals will be supplied using two twisted pair cables (22 AWG solid copper conductors with overall shield and drain wire, Belden 1175A or equivalent). One cable will connect to the 3 wire-wrap pins for NT-A, and the other will connect to the 3 wire-wrap pins for NT-B.



**Note** — Connect the drain wire (FG) at one end only, either at the 7360 ISAM FX-4 or at the source.

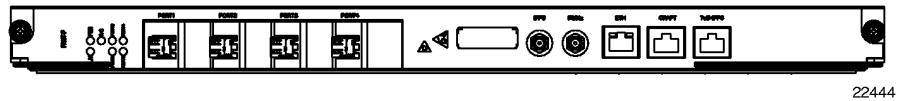
See Figure 165 for the connection location on the GFC card.

For a description of the BITS cable connector pinning, see Appendix 27.

## 14.8 ToD/PPS connector

The 7360 ISAM FX-4 requires an RJ-45 connector cable for the Time of Day and PPS signal connection located on the NT card. See Figure 167 for the location of the connector.



**Figure 167 ToD/PPS connector location on NT card**

For a description of the ToD/PPS cable connector pinning, see Appendix [28](#).

## 14.9 Remote craft port connector

The 7360 ISAM FX-4 requires a DB-9 female connector cable for the remote craft port connection.



**Note** — Nokia supports the use of a DB-9 female connector cable for the remote craft port connection to avoid potential damage due to exposed pins on the typically used DB-9 male connector.

When the remote craft port is provisioned as a DCE port, meaning it connects to a remote modem, the straight through DB-9 female connector cable is required. When the remote craft port is provisioned as a DTE port, meaning it connects to a computer, a DB-9 null-modem cable is required to invert the TX and RX signals. A commercially available DB-9 male adapter cable can be used with the DB-9 female connector cable to enable the use of standard cables.

See Figure [165](#) for the location of the connector on the GFC card.

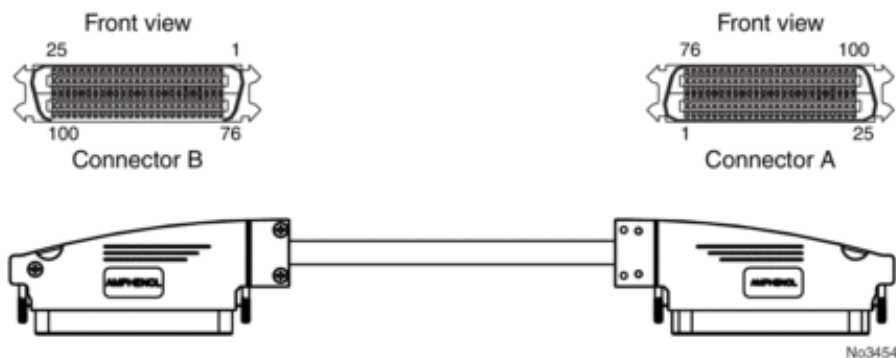
For a description of the remote craft cable connector pinning, see Appendix [27](#).

## 14.10 Combo cable connector

This section describes the cabling procedure for the interconnection cabling between the voice LT card and the splitter card in an 7360 ISAM FX-4, in case of Combo configuration.

### 14.10.1 Cable type

The required cable is an MDF cable with two CHAMP100 connectors; see Figure [168](#).

**Figure 168 Combo cable**

**Note 1** — See Appendix 27 for the pinning of the CHAMP100 connectors.

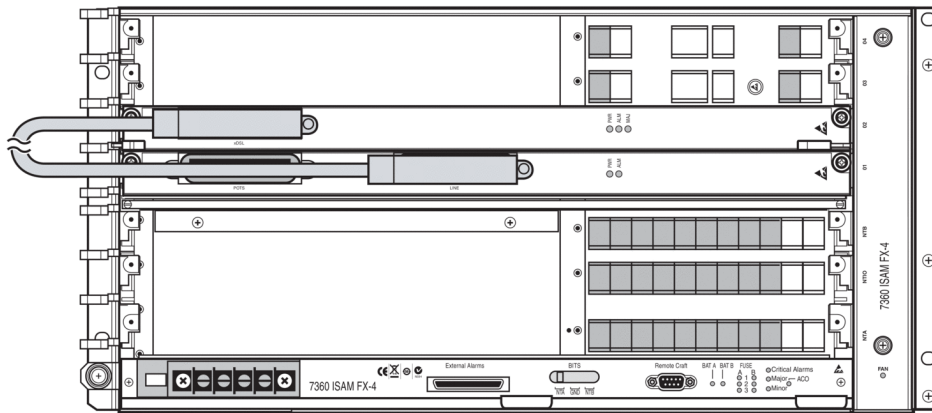
**Note 2** — See the *7360 ISAM FX Product Information Guide* for ordering information.

## 14.10.2 Connection/locking

The cable is plugged into the connectors on the LT card and the splitter card, and is locked into place with standoffs and nuts.

## 14.10.3 Cabling

The combo cable must be connected between the voice LT card and the splitter card in the 7360 ISAM FX-4. The excess cable length must be routed to the left side in the rack, see Figure 169.

**Figure 169** Combo cable connection on 7360 ISAM FX-4

23898

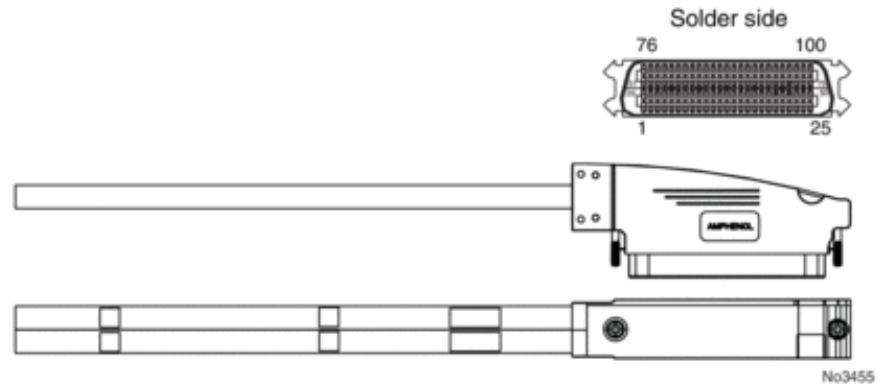
## 14.11 POTS and LINE MDF cable connector

This section describes the procedures to install MDF cables (xDSL and POTS) between the 7360 ISAM FX-4 and the Main Distribution Frame (MDF).

### 14.11.1 MDF cable type

The following cables can be used:

- for 24-line and 48-line cards: an MDF cable with two bundles of 24-pair cables and one CHAMP100 connector; see [Figure 170](#).

**Figure 170** MDF cable for 48-line cards

**Note 1** — See Appendix [27](#) for the pinning of the CHAMP100 connectors.

**Note 2** — See the *7360 ISAM FX Product Information Guide* for ordering information.

## 14.11.2 Prerequisites

The following tools are required:

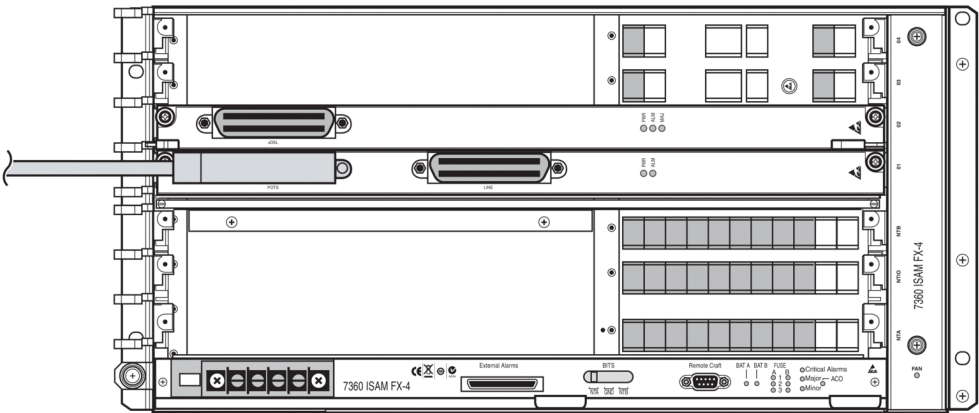
- MDF (LINE/POTS) cables as provided by Nokia
- an antistatic wrist strap
- tie-wraps
- lacing cord for tying up and/or bundling cables

**Procedure 60    MDF cabling procedure for LT cards with integrated splitter**

Proceed as follows to connect the MDF cables for LINE and POTS to the LT card with integrated splitter:

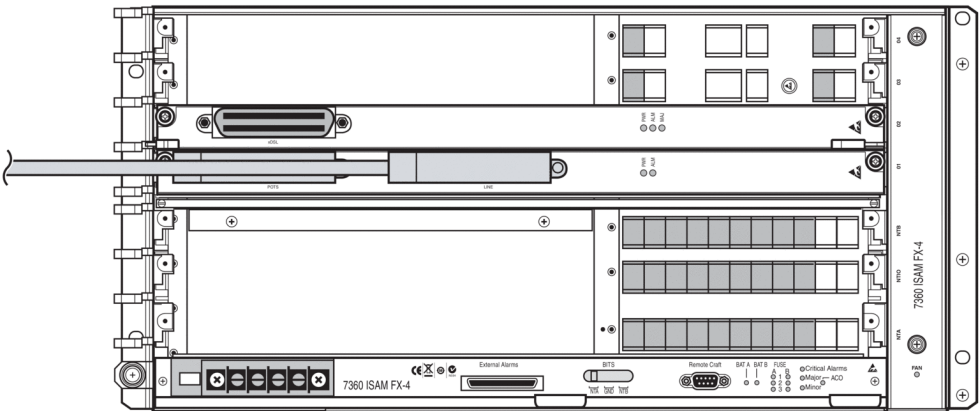
- 1    Connect the MDF cable for the LINE to the right-hand CHAMP connector on the LT card with integrated splitter, as shown in Figure 171.

**Figure 171    MDF cable LINE connection on 7360 ISAM FX-4**



- 2    Secure the connector with standoffs and nuts.
- 3    Route and connect the other end of the MDF cable as per site practices.
- 4    Connect the MDF cable for the LINE to the left-hand CHAMP connector on the LT card with integrated splitter, as shown in Figure 172.

**Figure 172    MDF cable POTS connection on 7360 ISAM FX-4**



- 
- |       |   |
|-------|---|
| 5     | Secure the connector with standoffs and nuts.                           |
| <hr/> |   |
| 6     | Route and connect the other end of the MDF cable as per site practices. |
| <hr/> |   |
| 7     | STOP. This procedure is complete.                                       |
- 

## 14.12 Vectoring cable connector

This DLP provides the steps to connect vectoring links between a NDPS-B card and NDLS-E cards.

### 14.12.1 VL cable

The VL cables must not be routed where they may be exposed to high voltage such as lightning strikes.



**Caution —** When VL cables need to be disconnected, only do so by pulling the release ring tab. Do not pull on the cable itself or on the QSFP+ modules pre-installed at each end.

While no particular arrangement of VL cables between SLV LTs and VL ports on the centralized vector processor card is required, it may be desirable to maintain a particular connection arrangement of these cables. In those circumstances, both ends of all cables may be labeled before installation so that each cable is uniquely identified. Examples of such identification include operator-provided colored zip ties and colored or write-on labels.

### 14.12.2 Prerequisites

The following tools are required:

- antistatic wrist strap

The following parts are required:

- cable ties or lacing cord
- QSFP+ 1m cable (3FE 68462 AA)

---

## Procedure 61 To connect vectoring links

Proceed as follows to connect vectoring links:



**Warning 1** — Units contain ESD-sensitive devices. These devices are susceptible to ESD damage in unconnected circuit conditions. Appropriate ESD procedures should always be followed when installing or removing units and cables.

**Warning 2** — Verify that cables are secure and do not interfere with the shelf cover.



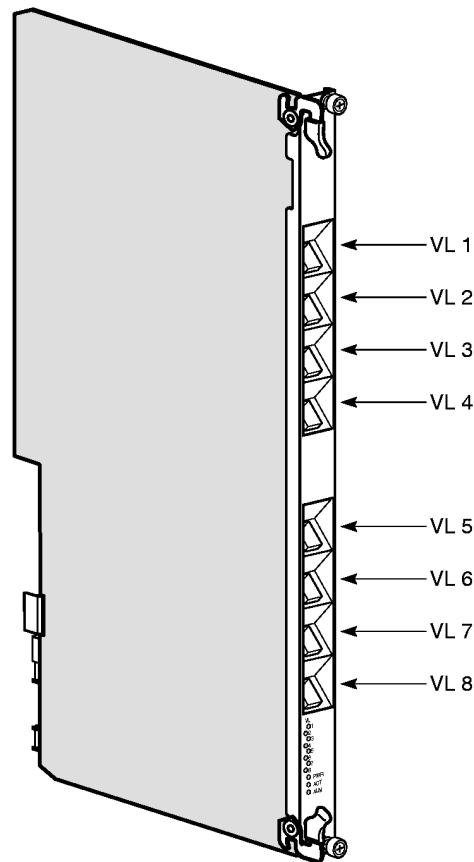
**Caution 1** — Avoid sharp bends in cables. Use the proper bend radius when installing cables.

**Caution 2** — Pinching of fiber cables may cause service interruption and damage the cables. Properly dress cables to ensure that cables are not twisted or kinked.

**Caution 3** — Improper cable placement can cause the cables to crimp and become damaged when the shelf cover is closed. Verify that fiber and Ethernet cables are secure and do not interfere with the shelf cover. Ensure that cables do not cross over the insertion and extraction tabs on top of the unit; rather, they pass to the side of the tabs.

- 
- 1 Put on the antistatic wrist strap and connect it to a grounding point. See [Shelf grounding connection](#) and [Rack grounding connection](#) for more information about grounding.
  - 2 Remove the shelf cover from the shelf or shelves that will have vectoring links.
    - i Loosen the threaded thumbscrews.
    - ii Remove the cover from the front of the shelf by rotating it away from the shelf and unhooking the cover from the cable management guide.
  - 3 Locate the appropriate VL port or ports on the NDPS-B card. Ports VL1 through VL4 should be used for vectoring links to EVLT-N cards in the same shelf as the NDPS-B card and ports VL5 through VL8 should be used for vectoring links to EVLT-N cards in another shelf. Figure 173 shows the VL ports on the NDPS-B.
-

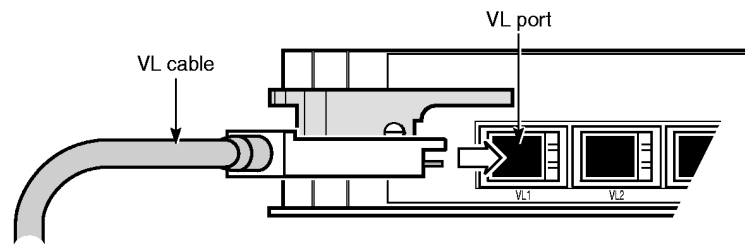
**Figure 173 VL ports on the NDPS-B**



24286

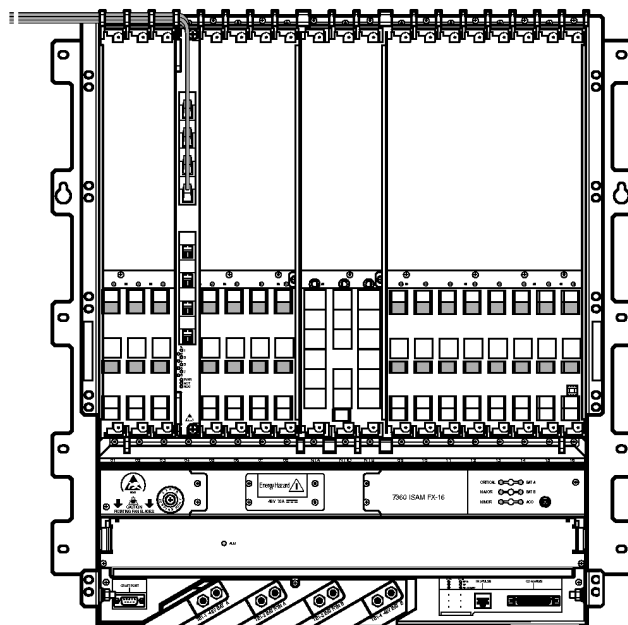
- 4 Remove the dust covers from the VL ports identified in step 3.
- 5 Connect a VL cable of appropriate length to a VL port on the NDPS-B card by removing the cap from the cable connector and inserting the cable connector into the VL port; see Figure 174.



**Figure 174** Inserting the cable connector into a VL port on the NDPS-B card

23722

- 6 Route the VL cable through the appropriate cable exit area of the shelf; see Figure 175 for the VL cable exit areas:
- for a vertically mounted shelf (cards oriented vertically):
    - for a VL cable connected to ports VL1 through VL4 on the NDPS-B card, route the cable straight up through the cable exit area above the NDPS-B card
    - for a VL cable connected to ports VL5 through VL8 on the NDPS-B card, route the cable up and then towards the PWIO-B card so that the VL cable exists the shelf above PWIO-B card
  - for a horizontally mounted shelf (cards oriented horizontally):
    - for a VL cable connected to ports VL1 through VL4 on the NDPS-B card, route the cable straight to left through the cable exit area to the left of the VIPR-B card
    - for a VL cable connected to ports VL5 through VL8 on the NDPS-B card, route the cable towards the left and then up towards the PWIO-B card so that the VL cable exists the shelf at the left side of the PWIO-B card

**Figure 175** VL cable exit areas

23309

- 7 Route the other end of the VL cable to an NDLS-E card using the cable management tray and the cable tie down clips to secure the cable as needed.
- 8 Connect the VL cable to the VL port on the NDLS-E card by removing the dust cover from the VL port, removing the cap from the cable connector, and inserting the cable connector into the VL port. The VL LEDs on the NDLS-E and NDPS-B cards should come on to indicate that the link is active.
- 9 Repeat steps 3 to 8 for any additional VL cables that you want to connect between the NDPS-B card and NDLS-E cards.
- 10 Re-install the shelf cover or covers removed in step 2.
- 11 STOP. This procedure is complete.

# 15 Installing cards in the 7360 ISAM FX-4 shelf

- 15.1 Overview
- 15.2 Shelf areas and slot positions
- 15.3 Dummy front panels
- 15.4 Recommended tools
- 15.5 Guideline for card installation
- 15.6 Installation procedures

## 15.1 Overview

This chapter provides the procedures to install field-replaceable units (FRUs) in a 7360 ISAM FX-4 shelf.



**Note** — For an overview of the supported cards, see the *7360 ISAM FX Product Information Guide*.

## 15.2 Shelf areas and slot positions

Figure 176 shows the NT and LT card slot positions in a 7360 ISAM FX-4 shelf.

**Figure 176** NT and LT slot positions in 7360 ISAM FX-4

LT 4	FAN
LT 3	
LT 2	
LT 1	
NT B	
NT I/O	
NT A	
NGFC-G	

22405

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The 7360 ISAM FX-4 can be equipped with a maximum of 4 LT cards, 2 NT cards, and 1 NTIO card.

## 15.3 Dummy front panels

Dummy front panels must be mounted on any unused slot of a shelf to:

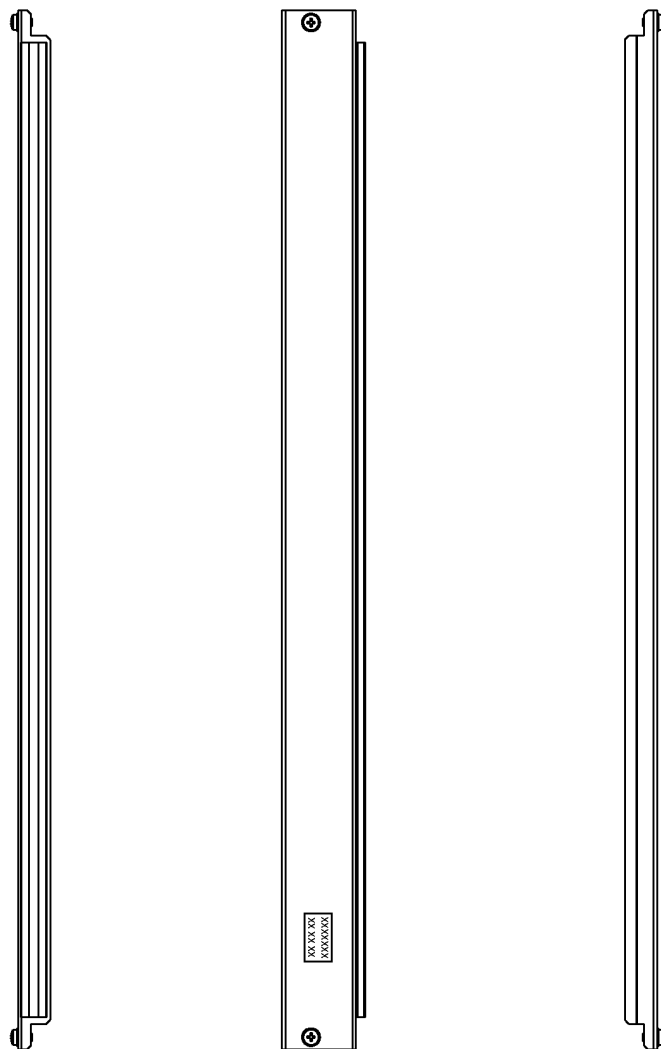
- ensure EMC compliance
- ensure thermal compliance through correct airflow in the shelf
- ensure safety by avoiding direct contact with backplane connectors

At slot deployment, the dummy front plate is replaced by the appropriate card and the optical cables are connected to the card.

For more information on specific dummy front panels, see the *7360 ISAM FX Product Information Guide*.

### 15.3.1 NT dummy front panel

A dummy front panel must be used when the second NT card is not installed. Figure 177 shows the dummy front panel for NT card slots.

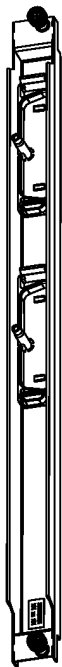
**Figure 177** Dummy front panel for NT card

22197

### 15.3.2 NTIO dummy front panel

A dummy front panel must be used when the NTIO card is not installed. Figure [178](#) shows one example of a universal dummy front panel for NTIO card slots.

**Figure 178** Universal dummy front panel for NTIO card



22429

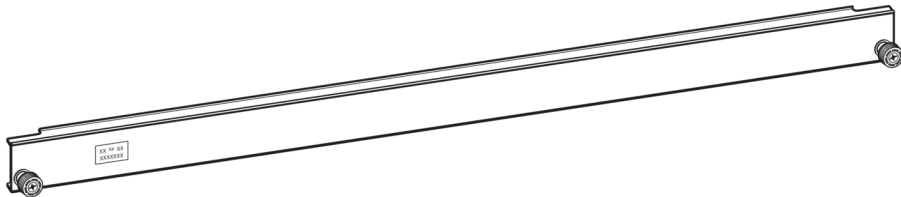


**Note** — This dummy front panel can also be used for LT slots where no pre-cabling is foreseen.

### 15.3.3 Dummy front panel for optical LT cards

A dummy front panel must be used for all unused LT card slots. Figure 179 shows one example of a dummy front panel for optical LT card slots.

**Figure 179** Dummy front panel for optical LT card



26133

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## 15.4 Recommended tools

The following tools are recommended:

- screwdriver to secure cards
- antistatic wrist strap for handling cards with ESD sensitive devices
- ohmmeter to check connection of wrist strap to earth bounding point

## 15.5 Guideline for card installation

This section provides a general guideline for the correct installation of a card in a shelf.

### Procedure 62 Installing a dummy front panel

To install a dummy front panel:

- 
- 1 Gently plug the card in the 7360 ISAM FX shelf until the front panel of the card touches the shelf. Guide the card to the right of the slot in the shelf card guides, while taking care that the SMD components of the card do not touch the card mounted below.
- 
- 2 For dummy front panels equipped with ejector handles:
    - Pull back the ejector handles.
    - Place left thumb at the left of the front panel, next to the mnemonic label, and place right thumb on the front panel below the right ejector handle.
    - Push with the left thumb and guide with the right thumb. The ejector handles should move inward.
    - Push both ejector handles simultaneously to completely insert the card in the shelf slot.
    - Lock the card in place by fastening the fixation screws.
- 
- 3 For dummy panels not equipped with ejector handles:
    - Align the dummy front panel to the 7360 ISAM FX shelf LT slot, ensuring that the dummy front panel thumbscrews are aligned to the shelf screw holes.
    - Hand tighten the thumbscrews. Fully secure thumbscrews using screwdriver.
- 
- 4 If the installed dummy front panel supports pre-cabling:
    - Attach the cables to the faceplate by aligning the MDF or POTS cable head shell screws with the faceplate standoffs, and secure the cable by tightening the connector screws using a screwdriver.
-

## 15.6 Installation procedures

This section describes the following card installation procedures:

- [To install NTIO cards](#)
- [To install NT cards](#)
- [To install LT cards](#)
- [To remove cards](#)
- [To change the NGFC-G card](#)



**Warning** — For the 7360 ISAM FX-4, installation of NTIO cards must be performed prior to installation of NT cards.

### 15.6.1 General

When installing cards in a new installation, install the NTIO card first. Allow the NT IO card to initialize and come into service before installing NT or LT cards. When replacing an LT card, verify that the NT card is in service before inserting the LT card.



**Warning** — Unplugging and reseating the active NT card in less than 3 seconds may result in an approximately 1 minute service interruption while the NT cards negotiate active/standby state during initialization. Wait at least 5 seconds before reseating an unplugged active NT card.



**Note 1** — Redundant NT cards must be provisioned first before they are installed. See the appropriate product Operations and Maintenance Guide to configure an NT card and to configure NT redundancy.

**Note 2** — The following steps must be followed if the NTIO card (FNIO-A) is moved to a new shelf:

- plan the NTIO card in the new shelf
- reset the shelf
- plug in the NTIO card

See *Operations and Maintenance Guide for FD 100/320 Gbps NT and FX NT* for planning information.

The NT and LT dummy panels (or dummy front panels) must be installed in any unused, unpopulated NT or LT card slot in order to maintain proper operation. Filler plate units have no electronic components; they are mechanical units used to provide ESD/EMI seal and thermal seal in the 7360 ISAM FX-4.



---

## 15.6.2 Rules for handling cards

Observe the following:



**Warning 1** — Units contain ESD sensitive devices. These devices are susceptible to ESD damage in unconnected circuit conditions. Appropriate ESD procedures should always be followed when installing or removing cards.

Units or assemblies with ESD sensitive components are labeled or tagged with the ESD awareness symbol; see Figure 180.

**Warning 2** — Keep the card in its original container until the card is ready to be installed. This is necessary to protect it from damage caused by ESD.

**Warning 3** — Always store and transport cards in original packing material when available. Materials must be in static-safe packaging or containers that are marked with an industry-standard static awareness symbol.

**Warning 4** — Keep all static-generating materials, such as plastics, away from all cards.

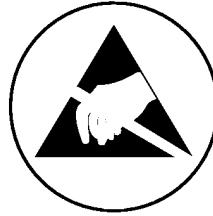
**Warning 5** — Use only dissipative materials for shipment. Shielding is not required unless specified.

**Warning 6** — Whenever possible and reasonable, maintain relative humidity above 40%.

See the *7360 ISAM FX Safety Manual* for more information about safety standard compliance.

### 15.6.2.1 ESD sensitive cards

Cards or assemblies with ESD sensitive devices are labeled or tagged with the ESD awareness symbol shown in Figure 180.

**Figure 180 ESD awareness symbol**

22390



**Warning** — Risk of damage to equipment with ESD sensitive devices.

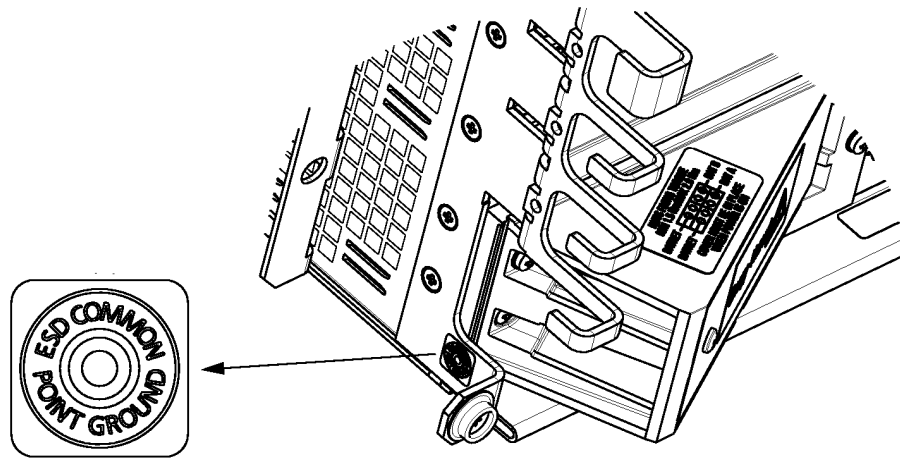
Most cards and powered equipment contain devices that are susceptible to ESD. ESD could damage these or other devices in unconnected circuit conditions.

Carefully follow these rules when handling ESD sensitive cards:

- transport and store cards in ESD protective bags or boxes
- make sure to wear a grounded wrist strap before handling
- connect the wrist strap to the earth bonding point at the bottom of the shelf; it carries the label shown in Figure 181
- test the ESD wrist strap with the ohmmeter to ensure effectiveness; it must measure 1 M $\Omega$  +/-20% to ground
- do not touch circuit traces or components on the card
- handle cards at the front and side edges only

Figure 181 shows the 7360 ISAM FX-8 earth bonding point location. Note that the 7360 ISAM FX-4 earth bonding point location is in the exact same location.

**Figure 181** Label for earth bonding point



22391

### 15.6.2.2 Cards with optical fiber connectors

Observe the following.



**Danger** — Risk of eye damage or skin burns by laser emission.

When installing optical cards or handling optical fibers, never look inside connectors of cards or fibers when these are not connected.

Put end caps on open connectors to protect against unexpected emission.



**Caution** — Risk of damage by ESD when card is not connected.

This card contains devices that are susceptible to damage caused by ESD in unconnected circuit conditions.

Carefully follow ESD safety precautions.

Figure 182 shows a laser classification label.

Figure 182 Laser classification label



18256

Procedure 63 To install NTIO cards

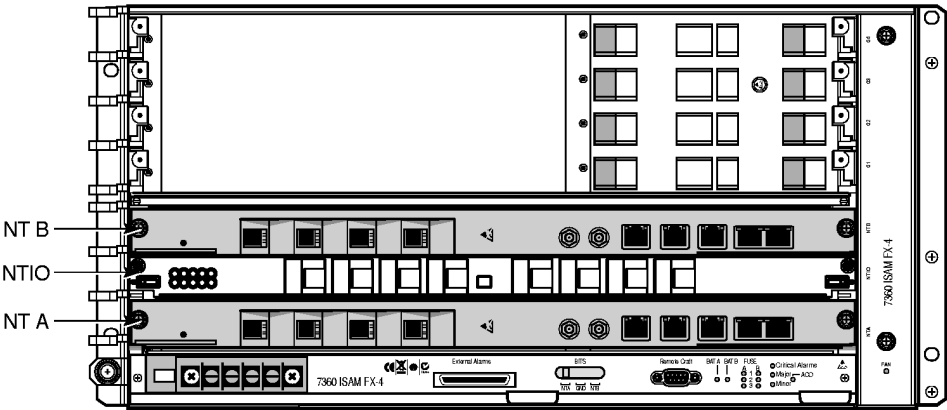
Each shelf containing one or two redundant NT cards can have an NT I/O applique. The NT I/O applique is a single card which is installed in the NT I/O slot between the two NT slots of the FX-4 shelf.

- 1

Remove the NT I/O card from its ESD protective bag. Make sure to wear the antistatic wrist strap.
- 2

Insert the NTIO card in the NTIO slot; see Figure 183.

Figure 183 NTIO slot



24501

- 
- 3 Use the ejector handles to engage the card connectors in the backplane.
  - 4 Lock the card in place with the fixation screws located at the top and bottom of the faceplate of the card; see Figure 183. The maximum torque is 0.6 Nm.
- 



**Note** — Once the card is mounted in its slot, the green PWR LED lights up.

---

## Procedure 64 To install NT cards

Use this procedure to install network termination (NT) cards in a 7360 ISAM FX-4 shelf.

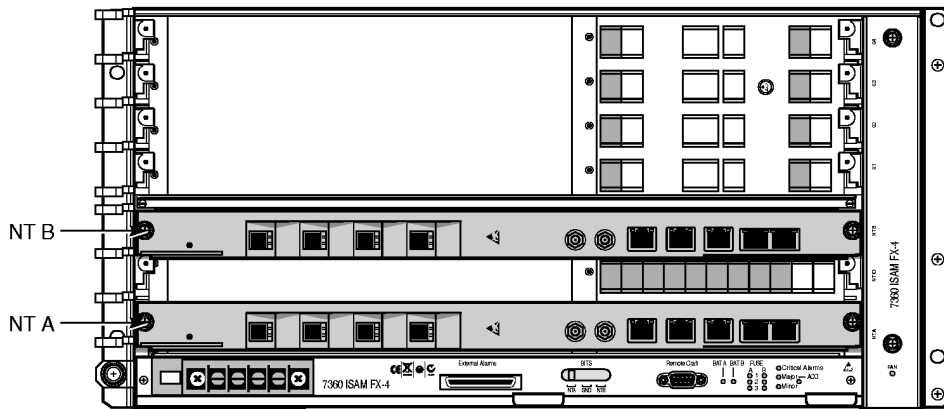


**Warning** — For the 7360 ISAM FX-4, installation of NTIO cards must be performed prior to installation of NT cards.

An 7360 ISAM FX-4 shelf has one or two NTcards.

- a single (first) NT card is inserted in slot NT-A
- the redundant card, if any, in slot NT-B

Figure 184 shows the 7360 ISAM FX-4 NT cards in the slots.

**Figure 184** NT card slots in 7360 ISAM FX-4

22437

- 1 Remove the NT card from its ESD protective bag. Wear the antistatic wrist strap.
- 2 Ensure that the insertion/extraction tabs on the card are in the unlocked position.



**Warning 1** — Ensure that all protective coverings on the shelf backplane connectors are removed prior to installation of the cards, otherwise damage to the shelf pins and the connectors may occur.

**Warning 2** — Attempting to insert a misaligned card may cause bent pins on the backplane connector. Ensure that the card is properly positioned in the slot and aligned with the backplane connector before securing the insertion/extraction tabs.

- 3 Slide the NT card in the NT-A slot of the shelf; see Figure 184.



**Caution** — When sliding the NT card into the slot, ensure that the solder side of the NT card does not come into contact with the EMC shielding plate adjacent to the NT card slot. If not done properly, this may cause damage at the solder side of the NT card.

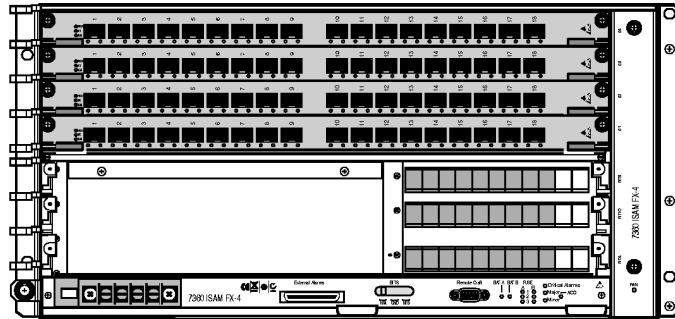
- 4 Use the ejector handles to engage the card connectors in the backplane; see Figure 188.
- 5 Press the insertion/extraction tabs on the front panel to lock the card in place. Attach fixation screws located at the top and the bottom of the front panel of the card; see Figure 184. Maximum torque: 2.66 lbf-in. (0.3 N.m).

- 
- 6 Wait until the NT card in the NT-A slot is fully operational. The card first displays a heartbeat signal, that is, the green PWR LED is flashing. Then the card displays an enabling operation signal, that is:
    - the green PWR LED is steady on
    - the green A/S LED is steady on
    - the red ALM LED is off
  - 7 Install the second NT card in slot NT-B in the same way, then install the NT dummy panels in any unused, unpopulated NT card slot to maintain proper operation.
  - 8 STOP. This procedure is complete.
- 

## Procedure 65 To install LT cards

Depending on the configuration, the 7360 ISAM FX-4 can house up to 4 line termination (LT) cards.

Figure 185 shows the LT card slots.

**Figure 185** LT card slots in 7360 ISAM FX-4

22397

- 1 Locate the free LT card slots for mounting the LT cards; see Figure 185.
- 2 Remove the LT card from its ESD protective bag. Wear the antistatic wrist strap.



**Caution** — Risk of damage by ESD when card is not connected.

This card contains devices that are susceptible to damage caused by ESD in unconnected circuit conditions.

Carefully follow ESD safety precautions.

- 3 Ensure the insertion/extraction tabs on the card are in the unlocked position.
- 4 Slide the LT card in the appropriate LT card slot.



**Caution** — When sliding the LT card into slot 1, special attention is required so that the solder side of the LT card does not come into contact with the EMC shielding plate adjacent to the LT card slot. If not done properly, this may cause damage at the solder side of the LT card.

- 5 Press the insertion/extraction tabs on the front panel to lock the card in place. Attach fixation screws located at the top and the bottom of the front panel of the card; see Figure 185. Maximum torque: 2.66 lbf-in. (0.3 N.m).
- 6 The card first displays a heartbeat signal, that is, the green PWR LED is flashing. Then the card displays an enabling operation signal:
  - the green PWR LED is steady on
  - the red ALM LED is off
- 7 In the same way, install all the planned LT cards for the shelf.



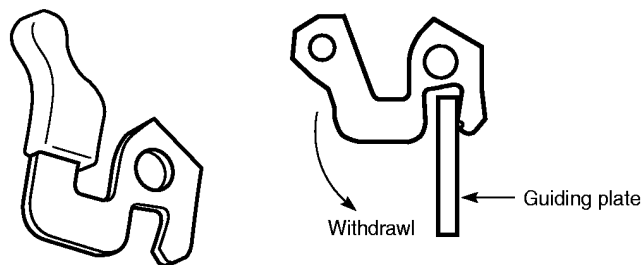
- 
- 8 Install LT card dummy panels in any unused, unpopulated LT card slots to maintain proper operation.
  - 9 STOP. This procedure is complete.
- 

## Procedure 66 To remove cards

Use the following procedure to remove cards.

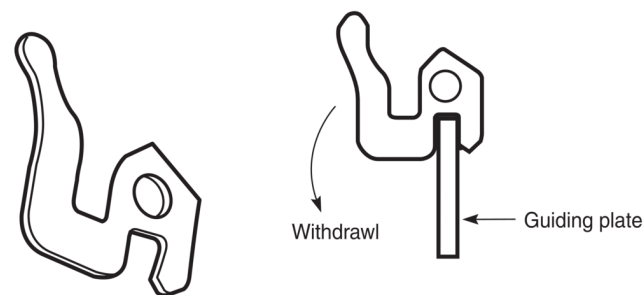
- 
- 1 Put on the antistatic wrist strap and connect it to the earth bonding point at the bottom of the 7360 ISAM FX-4; see Figure 181.
  - 2 Test the ESD wrist strap with the ohmmeter to ensure effectiveness; it must measure 1 M $\Omega$  +/-20% to ground.
  - 3 Loosen the fixation screws located at the top and bottom of the front panel of the card.
  - 4 Use the ejector handles to disengage the card connectors from the backplane. Figures 186 and 187 show the ejector handles for LT cards. Figure 188 shows the ejector handles for NT cards.
- 

**Figure 186 Ejector handles for LT cards**



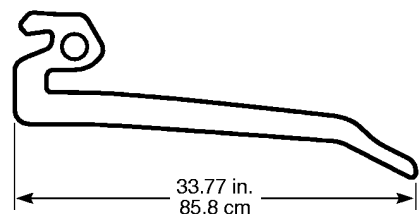
22376

**Figure 187** Ejector handles for LT cards



25830

**Figure 188** Ejector handles for NT cards



22375

- 
- 5** Remove the card from its slot and place it in an ESD protective bag.
- 
- 6** STOP. This procedure is complete.
- 

**Procedure 67 To change the NGFC-G card**

Use the following procedure to change the NGFC-G card on the 7360 ISAM FX-4.

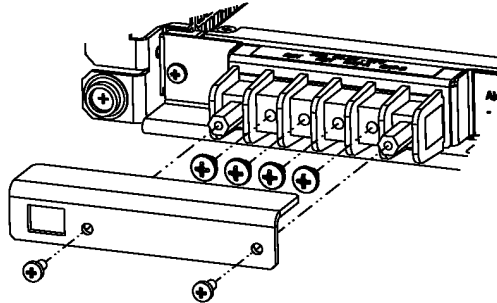
- 
- 1** Before disconnecting the power cable, ensure power to the cables has been disconnected.
- 



**Warning —** If the following steps to disconnect the power cables are not followed exactly, there can be a possible fire hazard.

- 
- 2** Remove the safety cover and power cable screws (loosen and remove the screws); see Figure 189.
-

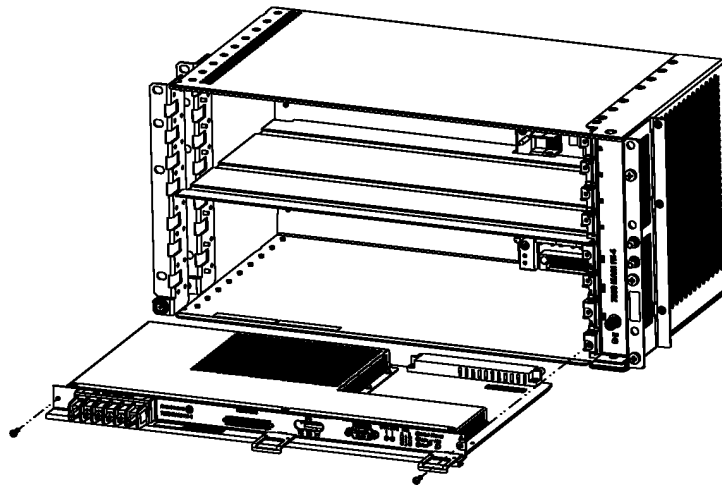
**Figure 189** Remove safety cover and power cable screws on 7360 ISAM FX-4



22398

- 3 Remove the fixation screws located on the front panel of the card; see Figure 190.

**Figure 190** Remove fixation screws for NGFC-G card



22400

- 4 Remove the NGFC-G card from the shelf and wear the antistatic wrist strap. Place the card in an ESD protective bag.
- 5 Remove the new NGFC-G card from its ESD protective bag. Wear the antistatic wrist strap.
- 6 Slide the new NGFC-G card in its slot.
- 7 Secure the NGFC-G card in place with the fixation screws. Maximum torque: 1 N.m  $\pm$ 10%.

---

**8** Reconnect the power cable connectors and safety cover.

---

**9** STOP. This procedure is complete.

---

# 16 Fiber optic cable management in the 7360 ISAM FX-4 shelf

## 16.1 Overview

### 16.2 Managing fiber optic cables

### 16.3 Routing fiber optic cables

## 16.1 Overview

This chapter describes the fiber optic cable management for the 7360 ISAM FX-4 shelf.

The fiber optic cable management strategy is based on the following concepts:

- 1 To route the fiber optic cables out of the rack toward the vertical cable channels located on both sides of the front of the rack.
- 2 To route the fiber optic cables within the 7360 ISAM FX-4 shelf toward the dedicated fiber outlets of the shelf.
- 3 To protect the fiber optic cables using optional bending protection items.



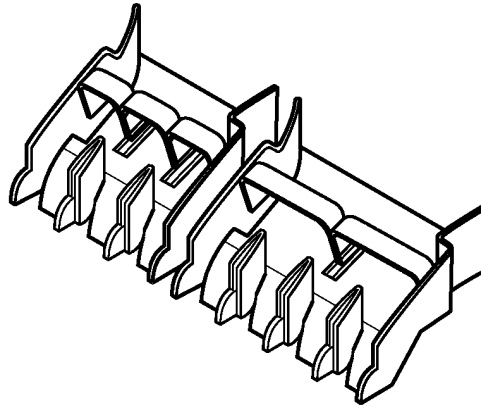
**Note** — See Appendix 29 “[Fiber optic handling and acceptance criteria](#)” for more information.

The 7360 ISAM FX-4 fiber optic cable management strategy incorporates the following hardware:

- Fiber management kit to provide proper fiber optic cable handling
- Fiber routing ring guides specially designed for fiber optic cable routing management that are factory installed on the 7360 ISAM FX-4 top baffle to provide:
  - cable control
  - cable support

Figure 191 shows a view of the 7360 ISAM FX-4 fiber management kit.

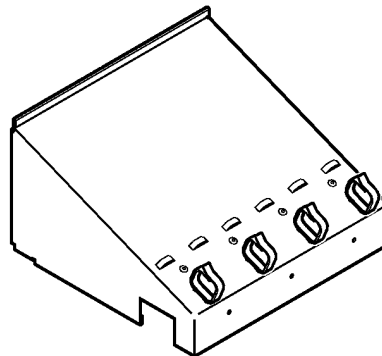
**Figure 191** Fiber management kit for 7360 ISAM FX-4



23576

Figure 192 shows a view of the 7360 ISAM FX-4 baffle for vertical mount options.

**Figure 192** Baffle for 7360 ISAM FX-4 vertical rack mounting configurations



22562

## 16.2 Managing fiber optic cables

This section describes how to fiber optic cables for NT cards and LT cards in the 7360 ISAM FX-4 shelf.

## 16.2.1 General safety and operations information

This section provides general safety and operations information. See the *7360 ISAM FX Safety Manual* for more information.



**Danger** — Non-terminated optical connectors may emit invisible laser radiation. Serious eye damage may occur if the laser beam is viewed directly or with improper optical instruments. Avoid direct exposure to the laser beam.



**Warning 1** — Do not use nylon cable ties for securing fiber optic cable.

**Warning 2** — During card installation, proper fiber management is crucial. Improper fiber placement can cause the fibers to crimp and become damaged.



**Caution 1** — When working with optical fiber cable, it is essential to use caution to avoid breaking the fibers. Do not pull, kink, or twist the optical fiber cable. If the cable is kinked, pulled, twisted, or otherwise damaged, it must be discarded and replaced with another cable.

**Caution 2** — Avoid sharp bends in cables. Use the proper bend radius when installing cables. The minimum bending radius of fiber optic cable is 1.5 in. (38mm), or 20 times the cable diameter, whichever is greater.

## 16.2.2 Optical modules

NT and LT cards are populated with a customer-defined combination of pluggable optical modules that provide the bandwidth required by the specific 7360 ISAM FX system deployment; see the local plans for more information.

The number of optical modules depends on the card type. Each of the connectors has a Tx and Rx port. Depending on the type of optical module used, one or two optical fibers are required to connect to the optical module.



**Warning** — Do not use unauthorized SFPs or XFPs. This can adversely affect the system requiring operator intervention.



**Note 1** — For a description of the supported SFP and XFP modules; see the *7360 ISAM FX Product Information Guide*.

**Note 2** — Nokia recommends protecting any SFP cage that is not equipped with an SFP module, with a dust cover in order to prevent dust intrusion.

**Note 3** — The type of optical fibers selected must match the particular SFP to guarantee the overall optical budget in the system and its correct operation. Loss of optical power as a result of a mismatch in materials must be avoided.

### 16.2.3 Fiber cables

Standard single-mode fiber cables with LC connectors are connected to the SFP optical modules for transmit (Tx) and receive (Rx) purposes.

GPON SFPs require an SC/UPC connector.

The NELT-B requires 90° fiber connector strain relief boots.

### 16.2.4 Fiber management kit

Fiber management guides are recommended for installment on the 7360 ISAM FX shelves to provide proper fiber optic cable handling. The kit contains:

- fiber management guide for the NT and NTIO cards
- fiber management guide for the LT cards

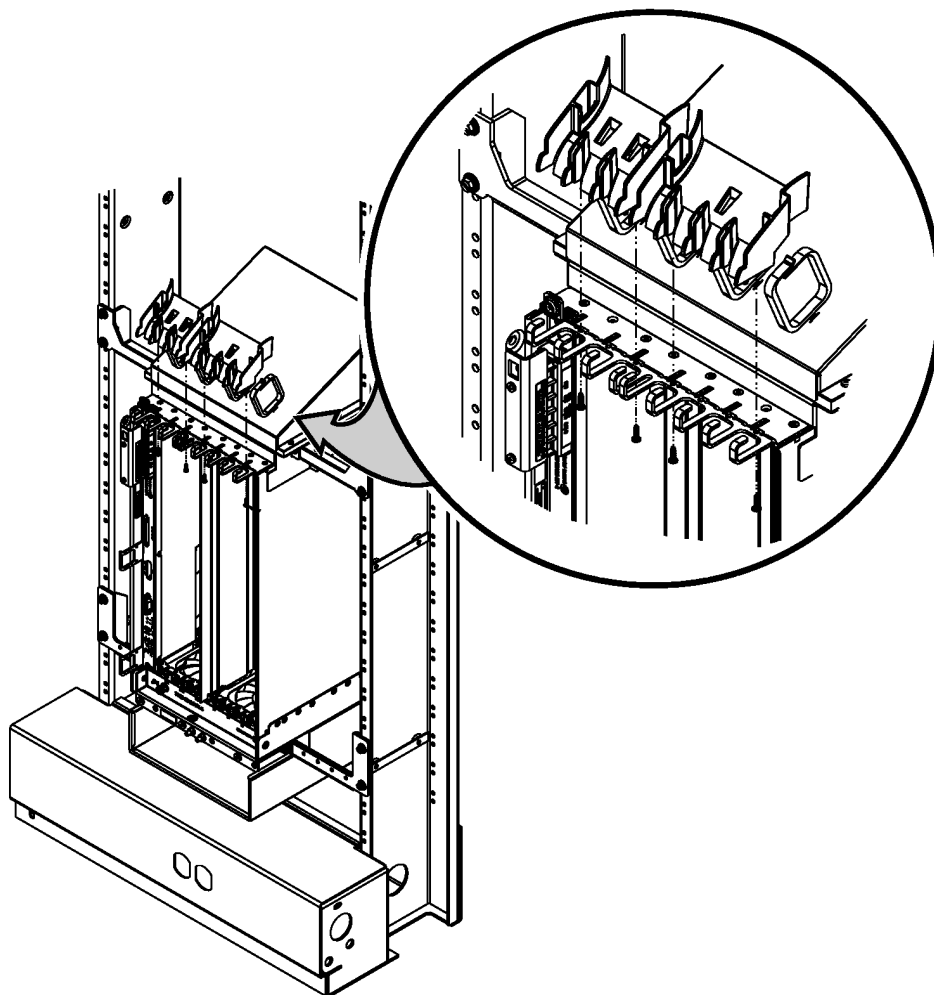
One fiber management guide is required for every four LT cards.

## 16.3 Routing fiber optic cables

This section provides procedures for mounting fiber management guides, routing and connecting fiber optic cables to the NT and LT cards for 7360 ISAM FX-4, and for installing optical modules.

Figure 193 shows the 7360 ISAM FX-4 mounting of the fiber management kit.



**Figure 193** Mounting of the 7360 ISAM FX-4 fiber management kit

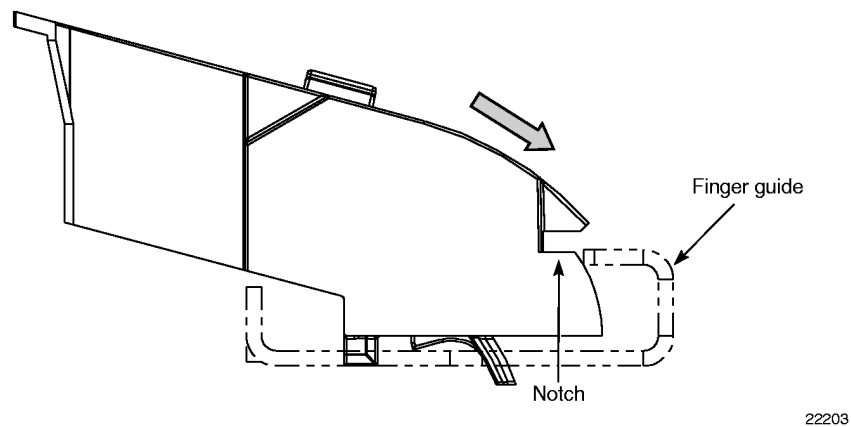
23575

## Procedure 68 To mount the fiber management guide

Use the following procedure to mount the fiber management guide onto the 7360 ISAM FX-4.

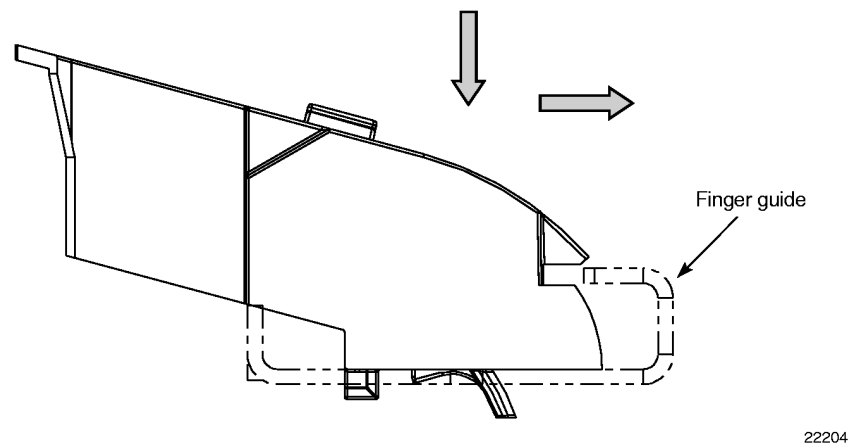
- 1 Align the notches on the front of the fiber management guide with the finger guides located on the top of the shelf, see Figure 194.

**Figure 194 Alignment of 7360 ISAM FX-4 fiber management guide**



- 2 Push down on the fiber management guide and slide it forward onto the finger guides, see Figure 195.

**Figure 195 Mount the 7360 ISAM FX-4 fiber management guide**



---

**3** Attach the fiber management guides as shown in Figure 193 using the provided screws.

---

**4** STOP. This procedure is complete.

---

## Procedure 69 To route fiber cables to NT and LT cards

Use the following procedure to route and connect 7360 ISAM FX-4 fiber cables to NT and LT cards.

---

**1** To route fiber cables to NT and LT cards, proceed as follows:

- a** If routing fiber cables using a fiber management guide, mount the fiber management guide. See Procedure 68.
- b** If routing fiber cables without using a fiber management guide, continue to step 2.

---

**2** Prepare fiber optic cables for the equipped NT and LT cards.

---

**3** Label both ends of each cable with the following information, for future identification:

- card connection name
- Tx or Rx, depending on which port is used for the connection

---

**4** Route the fiber cables from the source to the top of the rack.

---

**5** If using a fiber management guide for a vertical installment of the 7360 ISAM FX-4 shelf, route the fiber cables through the ring-guides and through the fiber management guides, and toward the NT and LT cards. Otherwise, route the fiber cables, maintaining a proper bend radius, toward the NT and LT cards:

- a** Route to the left for:
  - NT card A
  - LT cards in slots 01 and 02
- b** Route to the right for:
  - NT card B
  - LT cards in slots 03 and 04



**Note —** For NELT-B cards, 90° fiber connector strain relief boots are required.

- 
- 6 Insert the fiber cables into the appropriate optical modules located on the front panels of the NT and LT cards. If optical modules must first be installed, see Procedure 70.
  - 7 Route and connect the other end of the fiber cables as per site practices.
  - 8 STOP. This procedure is complete.
- 

## Procedure 70 Installing an optical module



**Caution —** It is important to install optical modules prior to connecting power to a 7360 ISAM FX shelf.

To install optical modules, proceed as follows:

- 
- 1 Put on an antistatic wrist strap and connect it to a grounding point.
  - 2 Install an optical module as follows:
    - i Align the optical module with an optical module port and slide it into the port until it clicks into place.
    - ii Remove the rubber cap from the optical module.
- 



**Note —** The optical module can only be removed when the pull-down bar is released.

- 
- 3 STOP. This procedure is complete.
-

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# 7360 ISAM Active WM shelf installation

- [17 Installing a 7360 ISAM Active WM shelf](#)
- [18 7360 ISAM Active WM shelf cabling](#)
- [19 Installing cards in the 7360 ISAM Active WM shelf](#)
- [20 Fiber optic cable management in the 7360 ISAM Active WM shelf](#)



# 17 Installing a 7360 ISAM Active WM shelf

## 17.1 Overview

### 17.2 Installing a drip tray below a 7360 ISAM WM shelf

### 17.3 Mounting the 7360 ISAM WM shelf in a 23 in. rack

## 17.1 Overview

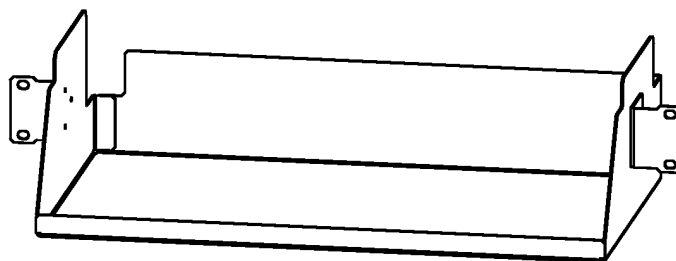
This chapter describes the procedure for installing a 7360 ISAM WM shelf in a 23 in. rack, and for installing a drip tray beneath the 7360 ISAM WM shelf.

## 17.2 Installing a drip tray below a 7360 ISAM WM shelf

In compliance with safety standards, a drip tray must be installed below each 7360 ISAM WM shelf for protection from heat and falling particles that may cause damage to the equipment.

Figure 196 shows a view of the 7360 ISAM WM drip tray.

**Figure 196** View of drip tray for 7360 ISAM WM



23602

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The drip tray can be shipped factory installed in the rack, but can also be ordered as a separate unit for installation or replacement on site.



**Caution 1** — For safety reasons, it is critical that the spacing between the shelf bracket and the drip tray bracket does not exceed a distance of 2.36 in. (60 mm).

**Caution 2** — Drip trays must be installed beneath each 7360 ISAM WM shelf in a rack, including below the bottom shelf of a rack when mounted on combustible flooring surfaces. For example, carpet.

### Procedure 71 To install a drip tray below a 7360 ISAM WM shelf

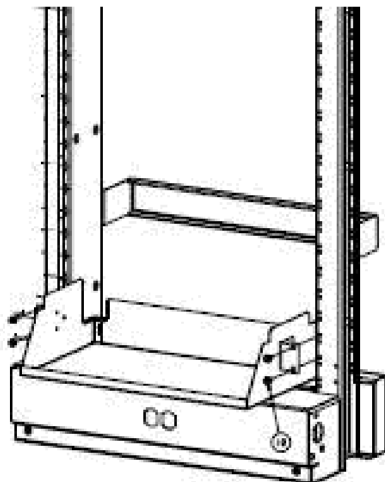
Use this procedure to install a drip tray or to replace a drip tray below an existing 7360 ISAM WM rack configuration.

- 1 Verify the drip tray type is correct for the rack configuration. See Figure 199 to verify the correct installation position.
- 2 Remove the drip tray unit from its shipping packaging and inspect the part for damage. If damaged, do not install the drip tray, but instead notify the transportation carrier and Nokia immediately.
- 3 Mount the drip tray in the mounting position shown in Figure 197. Attach the drip tray with screws to the rack uprights.



---

**Figure 197** Mounting 7360 ISAM WM drip tray



23912

---

**4** STOP. This procedure is complete.



**Note** — See section [17.3 “Mounting the 7360 ISAM WM shelf in a 23 in. rack”](#).

## 17.3 Mounting the 7360 ISAM WM shelf in a 23 in. rack

The 7360 ISAM WM shelf can be mounted vertically in a 23 in. rack.



**Warning** — The 7360 ISAM WM is intended to be installed in a restricted access location (RAL) in accordance with the applicable requirements of NEC or CEC. The local authorities have jurisdiction. This unit is intended to be installed by qualified service personnel only.



**Caution** — Due to high heat dissipation for the 7360 ISAM WM shelf, special shelf room cooling may be required, or aisle spacing may need to be increased.

The 7360 ISAM WM is suitable for the following:

- rack mounting on concrete floors or other non-combustible surfaces with the use of a drip tray
- use in an installation using an IBN or a CBN
- use in:
  - network telecommunication facilities
  - locations where the NEC applies
  - OSP

### 17.3.1 7360 ISAM WM rack mounting

The 7360 ISAM WM shelf can be mounted vertically in a standard 23 in. rack with a 21.5 in. opening.



**Caution** — The 7360 ISAM WM drip tray must be used in a vertical mount installation to meet NEBS preferred airflow specifications (air flows in the front, and out the rear of the shelf).

#### 17.3.1.1 7360 ISAM WM rack mounting configurations

Table 15 describes the vertical rack mounting configuration for a 7360 ISAM WM shelf in a 23 in. rack, used in conjunction with a 7360 ISAM FX-16 shelf and associated components.

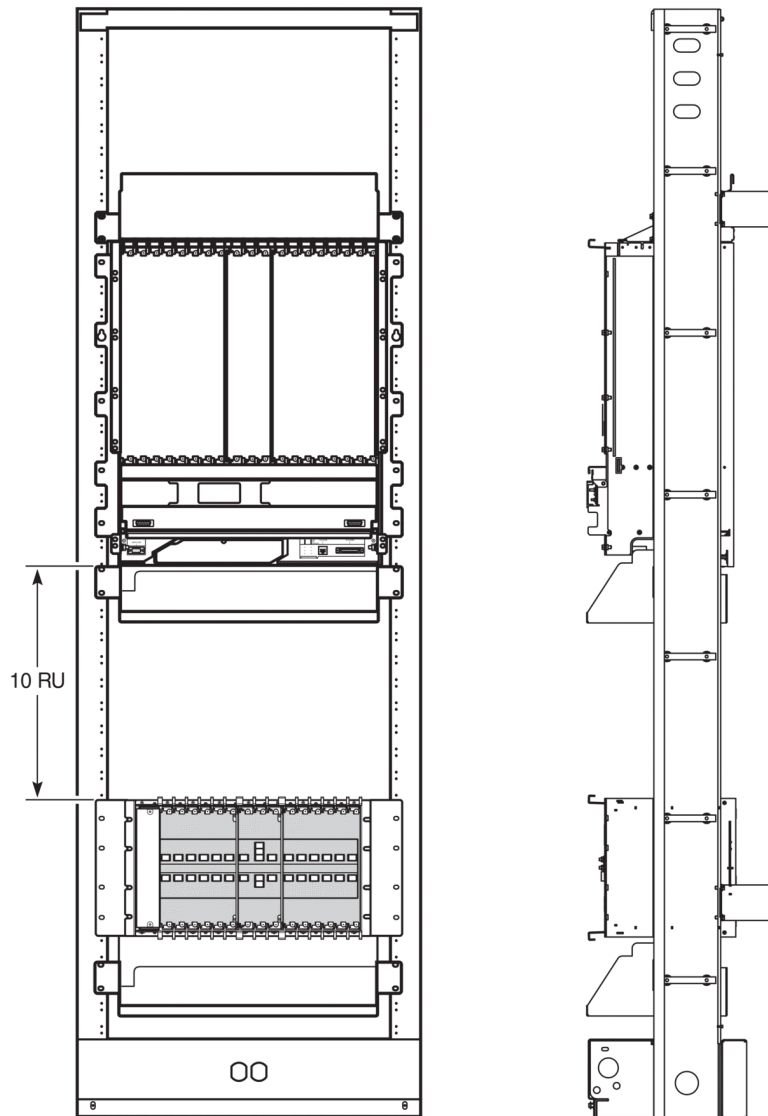
**Table 15** Supported rack configuration with the 7360 ISAM WM shelf

Component	Part number
23 in. rack	1AD 01412 0044
7360 ISAM WM shelf (FWMS-I)	3FE 71568 AA
mounting kit	3FE 72570 AA
Optical fiber management kit	3FE 61087 GB
Drip tray	3FE 68295 AA

Figure 198 shows an example of a supported rack mounting configuration.



**Note** — The 7360 ISAM WM can also be installed in a rack with a 7360 ISAM FX-8 or 7360 ISAM FX-4 shelf, with similar installation and distance between shelves. Contact your Nokia representative for more information.

**Figure 198** 23 in. rack vertical mounting configuration for 7360 ISAM WM

25785

### 17.3.2 Parts list

The following parts are required:

- 7360 ISAM WM shelf (FWMS-I)
  - 12 x 24 1/2 in. (12 mm) hex screws (x4 for each side)

- grounded 23 in. rack that can accommodate the 7360 ISAM WM shelf, and has the 7360 ISAM FX-16 shelf, fan unit, drip tray, and heat and fiber baffle kit already installed
- Mounting kit containing:
  - shelf brackets (x2)
  - M6 x 16 mm pan head screws (x8)
  - lock washers (x8)
- Optical fiber management kit
- Drip tray

### 17.3.3 Recommended tools

The following tools are recommended:

- Torque wrench with M6 attachment
- Protective gloves
- Hex driver

### 17.3.4 Procedures

This section describes the procedure for installing a 7360 ISAM WM shelf in a 23 in. rack.

### 17.3.5 Prerequisites

Before starting the procedure to mount the 7360 ISAM WM shelf, a drip tray must first be installed; see Procedure [71 “To install a drip tray below a 7360 ISAM WM shelf”](#).

---

**Procedure 72    Installing a 7360 ISAM WM shelf in a 23 in. rack**

Proceed as follows to install a 7360 ISAM WM shelf:

- 
- 1    Unpack and visually inspect the shelf and mounting kit for physical damage.
- 
- 2    If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph any damaged equipment. Keep all the inspection and packing documents as a reference.



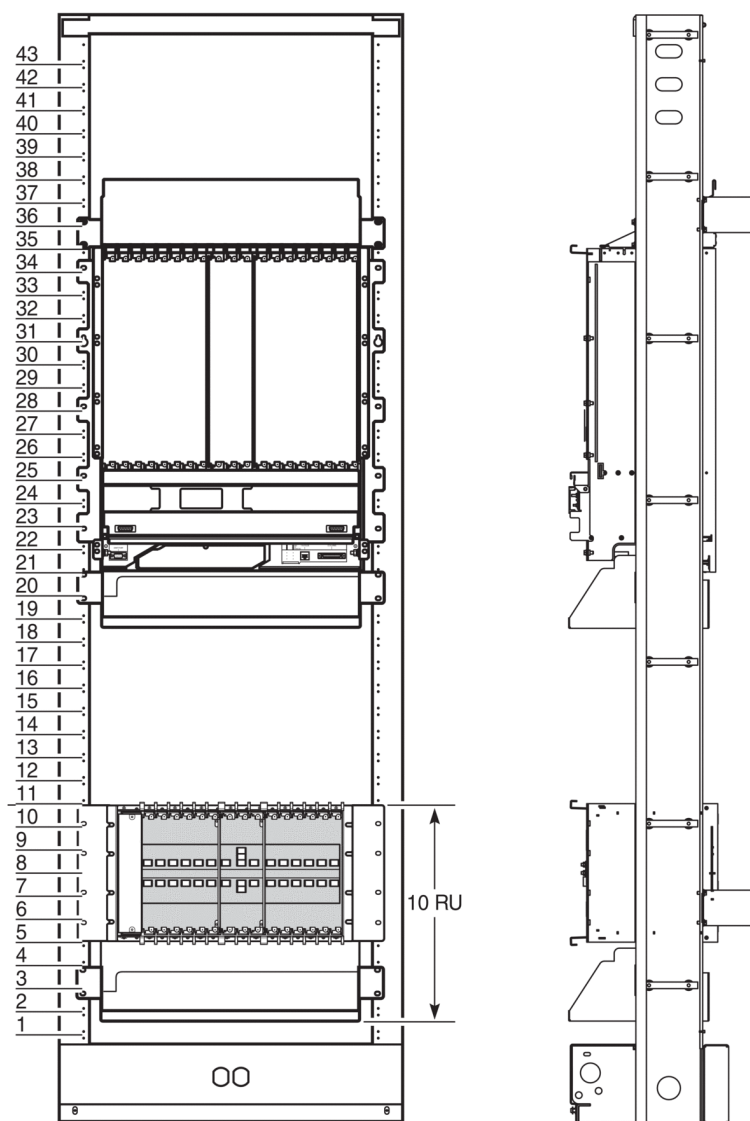
**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3    Put on the antistatic wrist strap and connect it to a grounding point.
- 
- 4    Verify the 7360 ISAM WM shelf mounting positions, as shown in Figure 199.



**Note —** Figure 199 shows the 7360 ISAM WM installed at the bottom of a rack, and in conjunction with a 7360 ISAM FX-16 shelf. The 7360 ISAM WM can also be installed in a rack with a 7360 ISAM FX-8 or 7360 ISAM FX-4 shelf, with similar installation and distance between shelves. Contact your Nokia representative for more information.

**Figure 199** Mounting a 7360 ISAM WM in a 23 in. rack

25786

- 5 Attach the left and right shelf mounting brackets to the 7360 ISAM WM shelf using the eight M6 x 16 mm pan head screws and lock washers provided with the mounting kit.

- 
- 6 Ensure that the drip tray has been installed in the correct position beneath the 7360 ISAM WM shelf.



**Note 1** — A drip tray must be installed in the rack before the 7360 ISAM WM shelf is installed. See Procedure [71 “To install a drip tray below a 7360 ISAM WM shelf”](#).

**Note 2** — Once the drip tray is installed, the 7360 ISAM WM shelf must be lifted over the drip tray and then lowered into the correct mounting position, to avoid interference between the 7360 ISAM WM shelf and drip tray side walls.

- 
- 7 Mount the 7360 ISAM WM shelf in the third lowest mounting position in the rack by lifting the shelf over the already installed drip tray, and then lowering it slowly into the correct mounting position.

- 
- 8 Attach the shelf to the rack using eight 12 x 24 1/2 in. (12 mm) hex screws; see Figure [200](#).

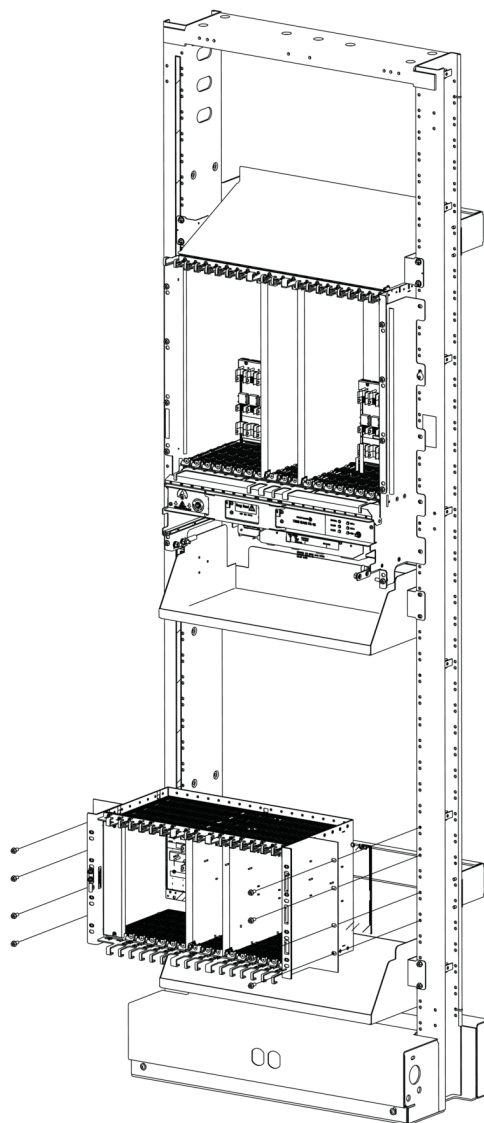


**Warning** — Risk of physical harm or damage when lifting shelf.

The shelf has to be lifted by two persons. Pay attention to possible sharp edges when handling. It is advisable to wear protective gloves.



**Figure 200** Attaching the 7360 ISAM WM shelf to the rack



25787

**9** STOP. This procedure is complete.



**Note** — See section [18 “7360 ISAM Active WM shelf cabling”](#).



---

# 18 7360 ISAM Active WM shelf cabling

## 18.1 Overview

## 18.2 Safety precautions

## 18.3 Shelf grounding connection

## 18.4 Rack grounding connection

## 18.5 Power Cable

## 18.6 Alarm cable

## 18.1 Overview

This chapter provides the following cabling information for the 7360 ISAM WM.

- [Safety precautions](#)
- [Shelf grounding connection](#)
- [Rack grounding connection](#)
- [Power Cable](#)
- [Alarm cable](#)

## 18.2 Safety precautions

The following safety precautions apply:



**Danger 1** — Before working on the power supply unit, verify whether it is live.

If the power supply is live, which can deliver –48 Vdc, you must use an insulated tool kit. See *7360 ISAM FX Safety Manual* for more information about working with live components.

**Danger 2** — Avoid risk of electric shock.

Always wear protective gloves and footwear for all handling tasks.

Carefully follow the instructions.



**Warning 1** — Before connecting to the power, verify the specifications of all equipped fan units to ensure that the correct voltage will be supplied (–48 Vdc) to these units.

**Warning 2** — Before power is supplied, all fasteners requiring a specific torque must be tightened moderately before final tightening with a torque wrench or driver.

When power is supplied, tighten fasteners with insulated tools, according to the specified torque.

**Warning 3** — The 7360 ISAM WM power card does not support hot insertion.

## 18.3 Shelf grounding connection

This section provides the 7360 ISAM FX-16 shelf grounding cable types, cable routing, and connection information.

Observe the following safety notes:



**Danger 1** — Rack or frame must be suitably connected to the office grounding network in accordance with Article 250 of the national electrical code (NEC) to ensure UL and CSA compliance. If outside the United States, ground per local electrical codes and practices.

**Danger 2** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.

### 18.3.1 Grounding cable type

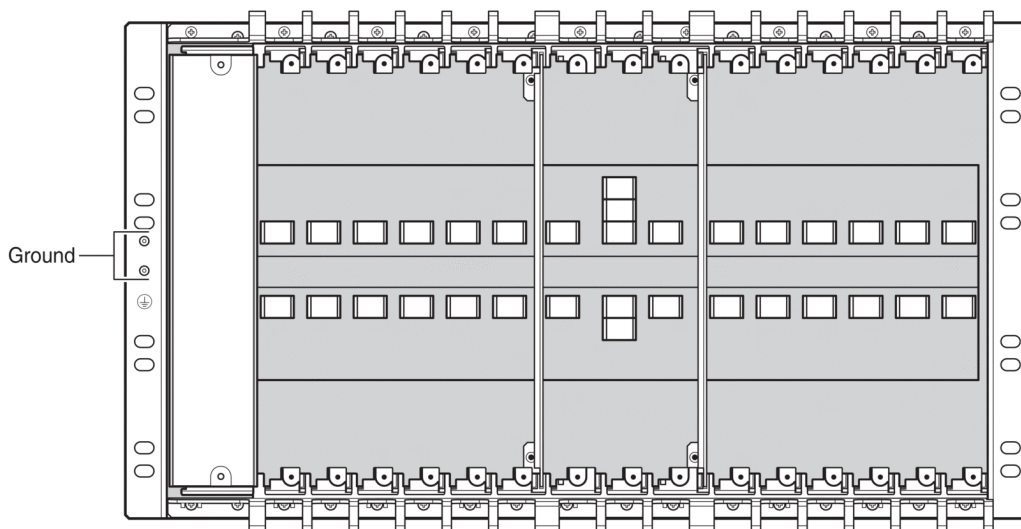
As shown in Figure 201, the 7360 ISAM WM includes one grounding cable connector. Each ground lug is a 4 AWG, 3/8 in. stud with 1 in. hole spacing, single crimp, peep, copper, UL- and CSA-recognized dual-hole lug. The preferred cable is 4 AWG, green with a yellow stripe. Other types and sizes of wire and lugs can also be used provided they meet the requirements of Article 250 of the NEC. The 7360 ISAM WM shelf will also accept lugs with 1/4 in. holes.

### 18.3.2 Cable routing and connection

The grounding cable must be used when the shelf is assembled in a rack. The cable is routed to the grounding terminal through an opening in the right side of the shelf, or an opening in the left side of the shelf.

The left side connection for the grounding cable is shown in Figure 201. The grounding cable is connected to the shelf frame with hardware included with the shelf.

**Figure 201** Shelf grounding cable connector location on 7360 ISAM WM



25782

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**Procedure 73 To connect the grounding cable**

Use the following procedure to connect the grounding cable.

- 
- 1 Route the grounding cable to the right or left side of the shelf.
  - 2 Connect the dual lug to the grounding cable connection point as shown in Figure 201.
- 



**Danger** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.



**Note** — The grounding cable nuts should be tightened with a torque of 13.28 to 17.7 lbf-in. (1.5 to 2.0 N.m).

- 
- 3 STOP. This procedure is complete.
- 

## 18.4 Rack grounding connection

The 7360 ISAM WM requires a 2 AWG rack frame grounding lug for the rack grounding connection.



**Danger 1** — Rack or frame must be suitably connected to the office grounding network in accordance with Article 250 of the National Electrical Code (NEC) to ensure UL and CSA compliance. If outside the United States, ground per local electrical codes and practices.

**Danger 2** — Possible risk of personal injury or damage to equipment due to inaccurate or faulty ground cabling.

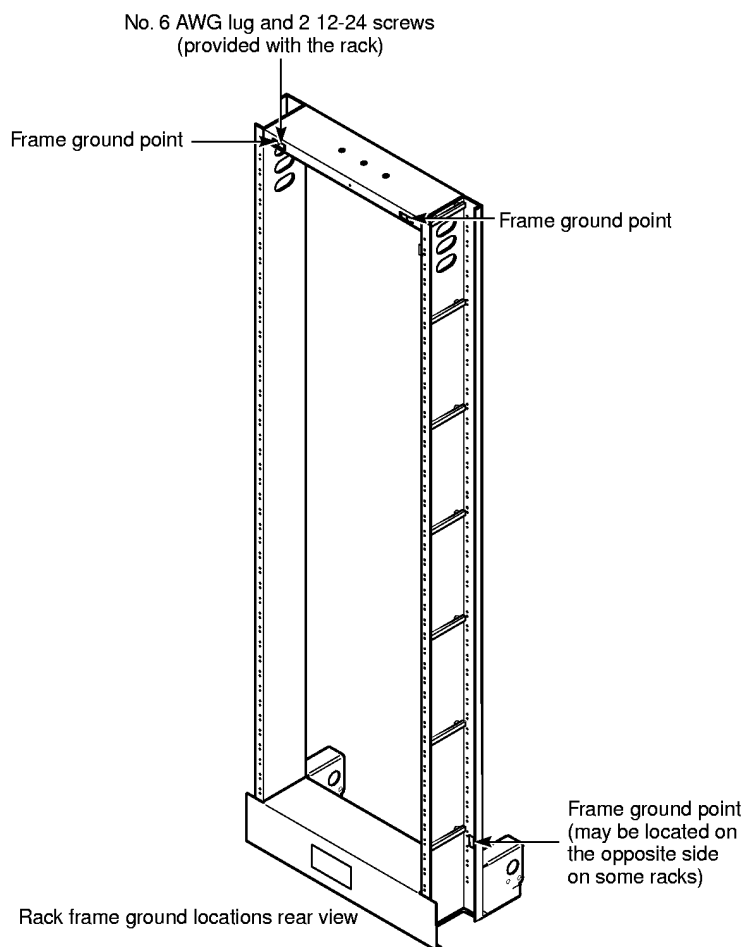
Inaccurate grounding connection can cause electric shock or equipment damage when the rack power is switched on.

**Procedure 74 To connect the rack ground**

- 
- 1 Prepare the frame grounding cable.
  - 2 Following local practices, route the grounding cable to the top of the rack.
-

- 
- 3 Connect the grounding cable to one of the two frame grounding points on the top of the rack, as shown in Figure 202, using the screws provided with the rack.

**Figure 202 External frame ground point rear view**



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- 
- 4 Perform power and ground tests as per local practices.
- 
- 5 STOP. This procedure is complete.
-

## 18.5 Power Cable

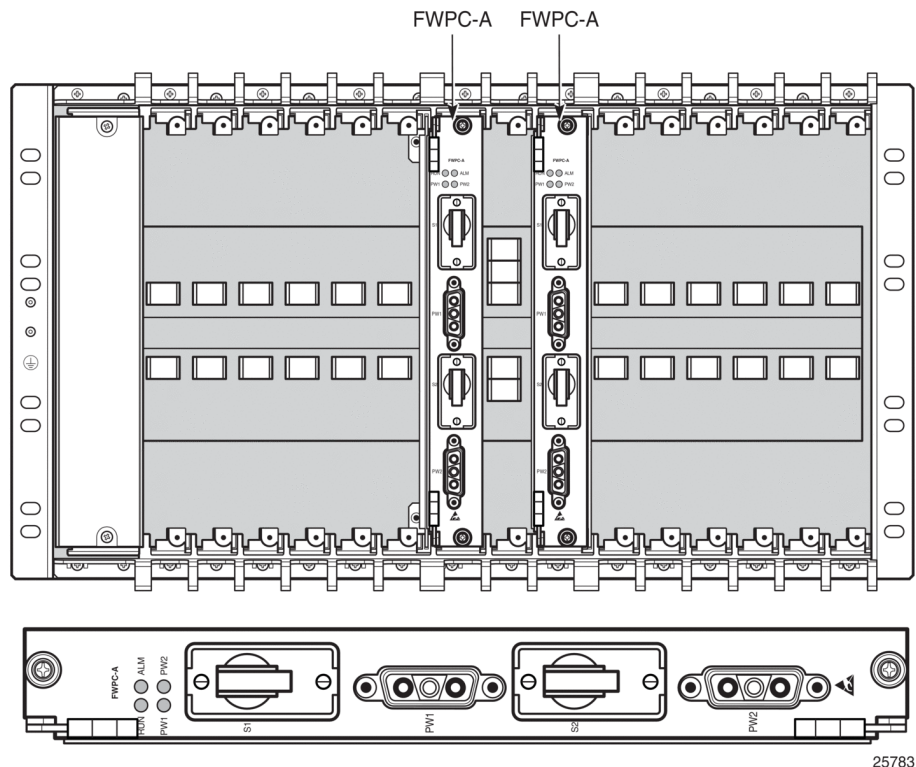
The 7360 ISAM WM shelf operates with nominal voltage levels of  $-48$  V dc as well as  $-60$  V dc supplied by the 7360 ISAM WM power card. This power card is connected to the power terminals of either the 7360 ISAM FX-16, 7360 ISAM FX-8, or 7360 ISAM FX-4 shelf through a power cable.

### 18.5.1 Power card and power cable routing

The 7360 ISAM WM shelf is only mechanical equipment, and must be used in conjunction with the 7360 ISAM WM power card (FWPC-A), which provides the entire 7360 ISAM WM shelf with power.

The 7360 ISAM WM power card is inserted in the middle of the 7360 ISAM WM shelf; see Figure 203. Two 7360 ISAM WM power cards can be used to provide power redundancy.

**Figure 203** Power distribution on the 7360 ISAM WM shelf





18.5.1.1 Power cable

Power cables are routed from the power interface of the 7360 ISAM WM power card to the power terminals of either the 7360 ISAM FX-16, 7360 ISAM FX-8, or 7360 ISAM FX-4, through the left side of the rack. See Table 16 for the supported power cable, and see Figure 204 for a view of the supported power cable.

Table 16 Supported 7360 ISAM WM power cable

Part number	Connection point for 3-pin, D-SUB connector	Connection point for 8 mm lug	Maximum current	Maximum length
3FE 72530 AA	FWPC-A power interface PW1. PW2 is used for power redundancy (using two 7360 ISAM FX-16 shelves, though this function is not yet supported).	BAT-A, BAT-B, and BATRET-A/B on 7360 ISAM FX-16, 7360 ISAM FX-8, or 7360 ISAM FX-4 shelves.	15 A	2 m

Figure 204 7360 ISAM WM power cable



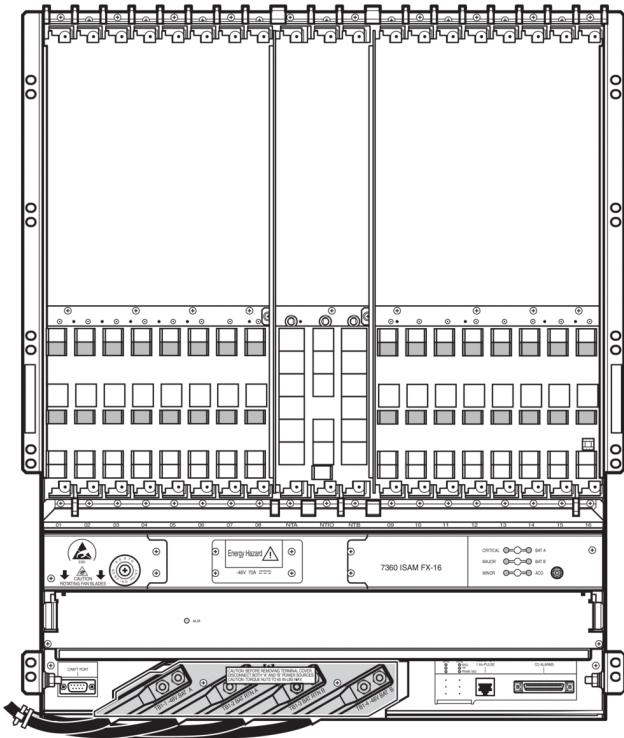
18.5.1.2 Power cable routing and connection

The power cable is routed from the FWPC-A at the front of the 7360 ISAM WM, through the left side of the rack, and connected to the power terminals at the bottom of the 7360 ISAM FX-16 shelf. See Figure 205 for the location of power terminals on the 7360 ISAM FX-16, and see Figure 206 for the cabling routing from the 7360 ISAM WM shelf the FX-16 shelf.



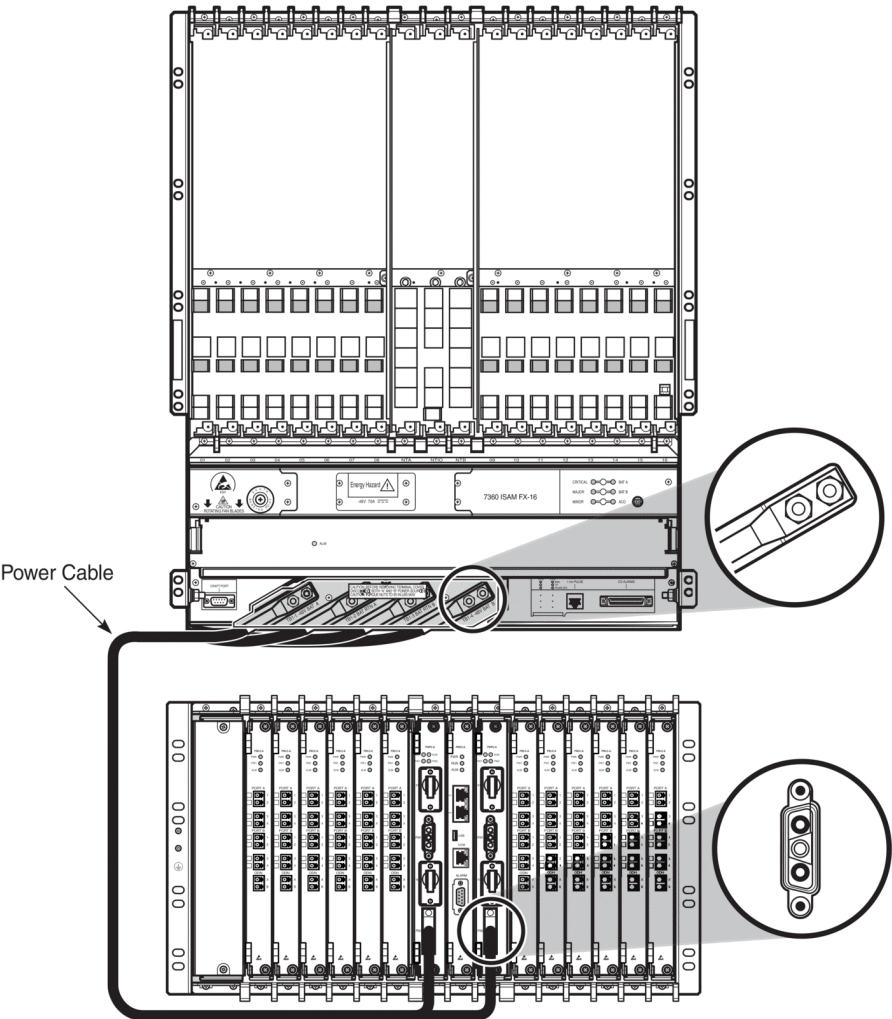
**Note —** The 7360 ISAM WM can also be installed in a rack with a 7360 ISAM FX-8 or 7360 ISAM FX-4 shelf, with similar cabling procedures. Contact your Nokia representative for more information.

**Figure 205** Power cable routing through the bottom of the 7360 ISAM FX-16 shelf



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**Figure 206** Power cable routing from the 7360 ISAM WM to the 7360 ISAM FX-16 shelf



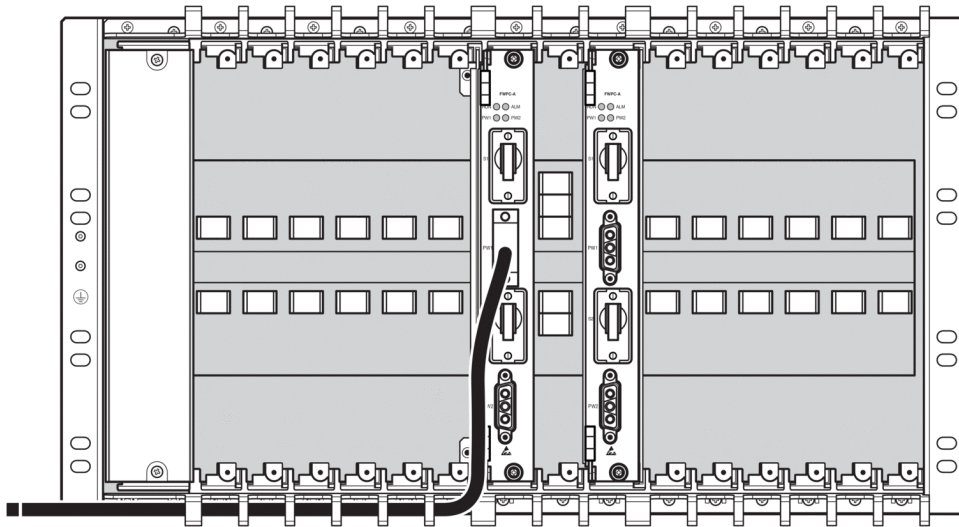
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## Procedure 75 Connecting the power cables

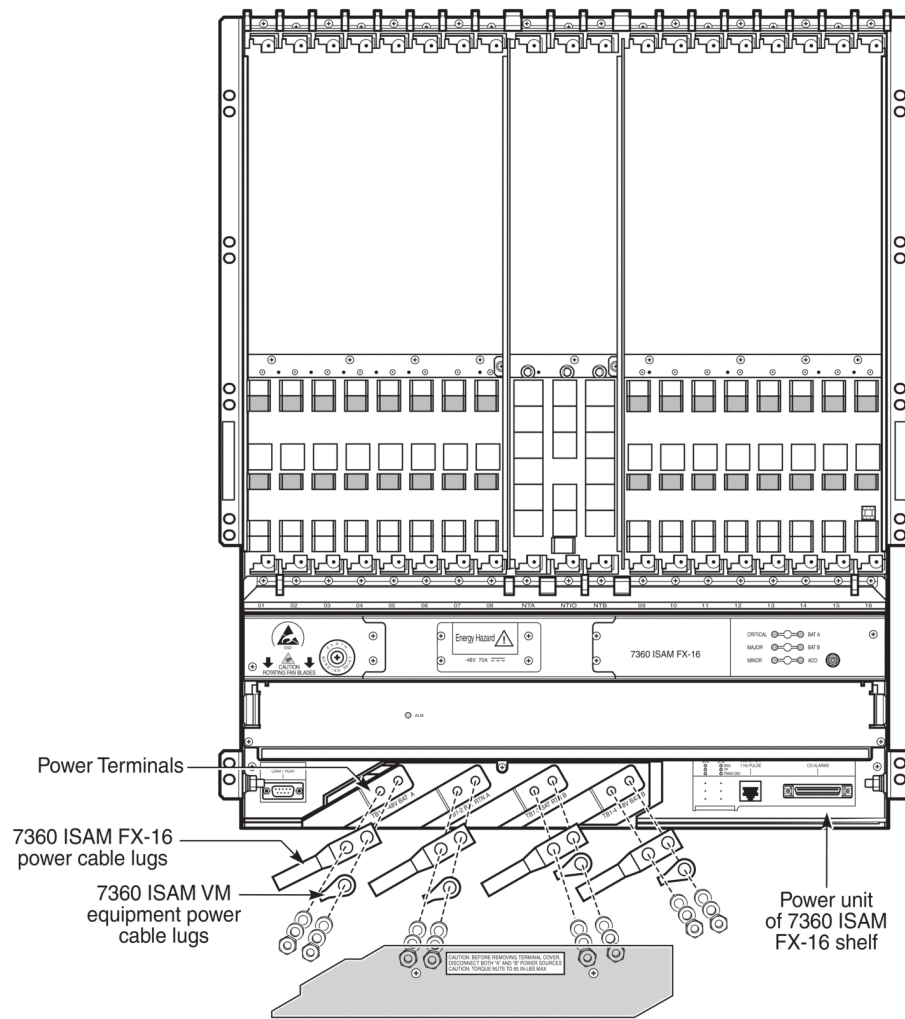
Proceed as follows to connect the 7360 ISAM WM power cable:

- 1 Connect the power cables to the 7360 ISAM FX-16; see routing from the 7360 ISAM WM in Figure 207 and cable connection in Figure 208.

**Figure 207 Routing the power cable**



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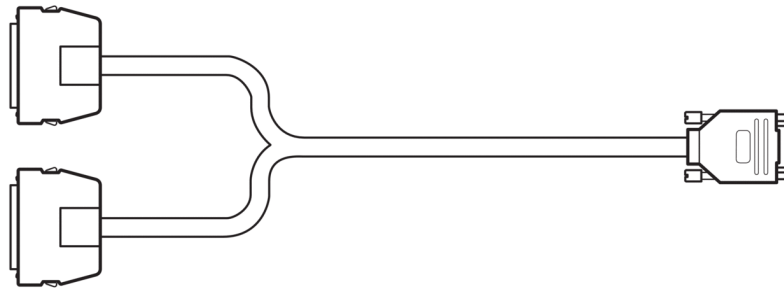
**Figure 208** Connecting the power cable

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- 2 Tighten the nuts with a torque of 10 Nm (maximum 12 Nm).

## 18.6 Alarm cable

The 7360 ISAM WM external alarm cable has male and female DB50 connectors, as well as a SUB-B 9-pin male connector. See Figure 209 for a view of the alarm cable.

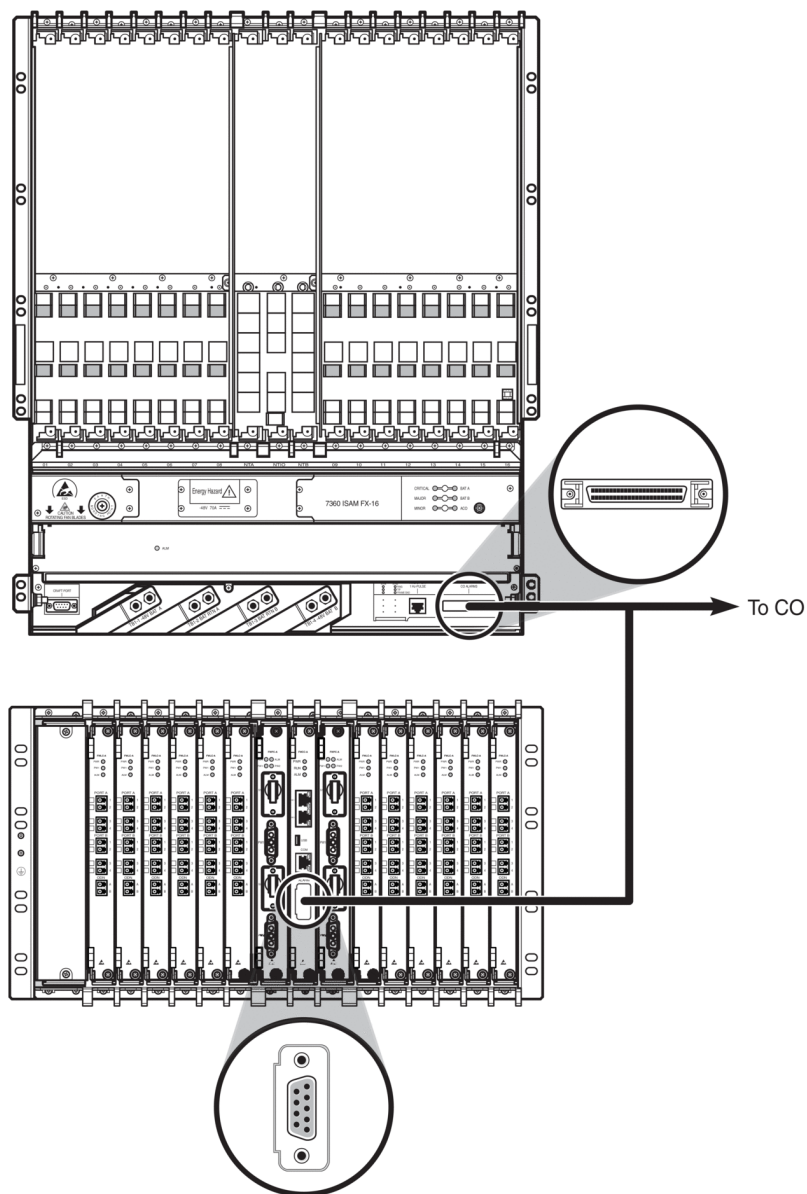
**Figure 209 7360 ISAM WM alarm cable**

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### 18.6.1 Alarm cable routing connection

The alarm cable is routed from the FWPC-A at the front of the 7360 ISAM WM, through the right side of the rack, and connected to the alarm connector on the right side of the 7360 ISAM FX-16 shelf; see [Figure 210](#).

The male DB50 connector should be connected to the alarm connector of the 7360 ISAM FX-16, and the female DB50 connector should be connected to the rack CO alarm cable.

**Figure 210** CO external alarm connector on 7360 ISAM WM

25796

For a description of the CO external alarm cable connector pinning, see Appendix [27.5](#).





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# 19 Installing cards in the 7360 ISAM Active WM shelf

## 19.1 Overview

## 19.2 Shelf areas and slot positions

## 19.3 Dummy front panels

## 19.4 Recommended tools

## 19.5 Guideline for card installation

## 19.6 Installation procedures

## 19.1 Overview

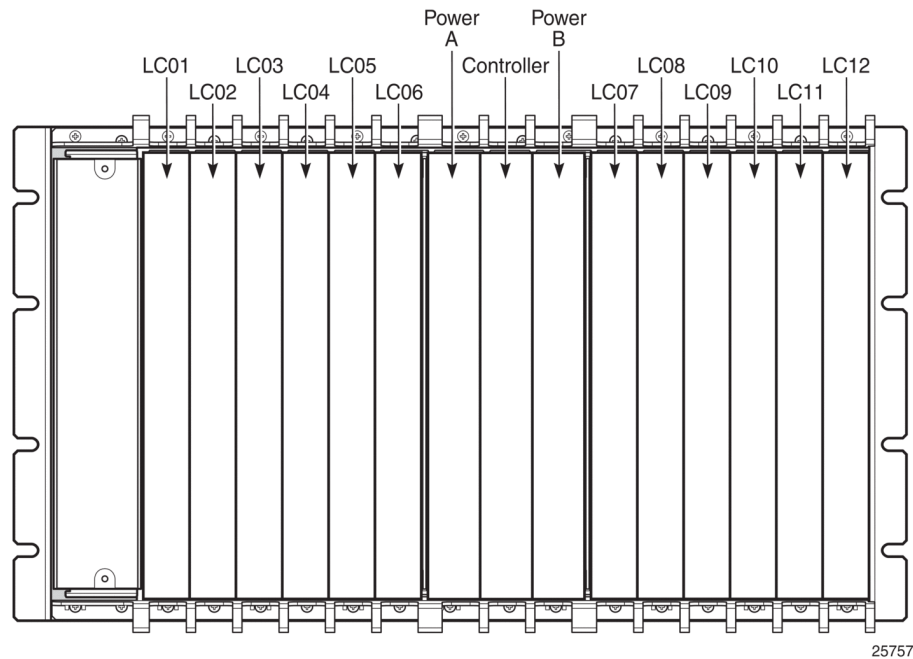
This chapter provides the procedures to install field-replaceable units (FRUs) in a 7360 ISAM WM shelf.



**Note** — For an overview of the supported cards, see the *7360 ISAM FX Product Information Guide*.

## 19.2 Shelf areas and slot positions

Figure 211 shows the line card, power card, and controller card slot positions in a 7360 ISAM WM shelf.

**Figure 211 Card slot positions on 7360 ISAM WM**

The 7360 ISAM WM can be equipped with a maximum of 12 line cards, 2 power cards, and 1 controller card.

## 19.3 Dummy front panels

Dummy front panels must be installed in any unused slot of a shelf to:

- ensure EMC compliance
- ensure thermal compliance through correct airflow in the shelf
- ensure safety by avoiding direct contact with backplane connectors

At slot deployment, the dummy front panel is replaced by the appropriate card and the optical cables are connected to the card.

For more information on specific dummy front panels, see the *7360 ISAM FX Product Information Guide*.

### 19.3.1 For 7360 ISAM WM power cards

A dummy front panel must be used when a second power card is not installed in the 7360 ISAM WM shelf. Figure 212 shows the dummy front panel for the 7360 ISAM WM power card slot.

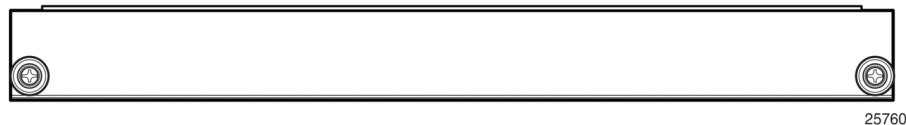
**Figure 212** Dummy front panel for 7360 ISAM WM power card slots



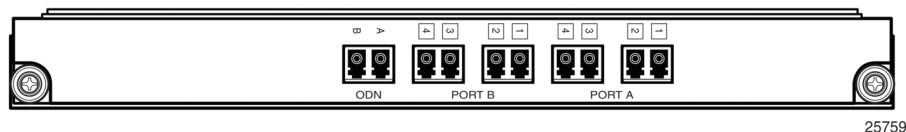
### 19.3.2 For 7360 ISAM WM line cards

A dummy front panel must be used whenever a line card is not installed in any of the line card slots of the 7360 ISAM WM shelf. Figure 213 shows the dummy front panel to be used when the LC slot does not require pre-cabling. Figure 214 shows the dummy front panel to be used when the LC slot does require pre-cabling.

**Figure 213** Dummy front panel for 7360 ISAM WM line card slots



**Figure 214** Dummy front panel with pre-cabling for 7360 ISAM WM line card slots



## 19.4 Recommended tools

The following tools are recommended:

- screwdriver to secure cards
- antistatic wrist strap for handling cards with ESD sensitive devices
- ohmmeter to check connection of wrist strap to earth bounding point

---

## 19.5 Guideline for card installation

This section provides a general guideline for the correct installation of a card in a shelf.

### Procedure 76 Installing a card

To install a card:

- 1 Gently plug the card in the shelf until the front panel of the card touches the shelf. Guide the card to the right of the slot in the shelf card guides, while taking care that the SMD components of the card do not touch the card mounted below.
  - 2 Pull back the ejector handles.
  - 3 Place one thumb at the left on the front panel next to the mnemonic label and place the other thumb on the front panel below the top ejector handle.
  - 4 Push with the lower thumb and guide with the top thumb, which should cause the ejector handles to move in.
  - 5 Push both ejector handles simultaneously to completely insert the card in the shelf slot.
  - 6 Lock the card in place by fastening the fixation screws.
- 

## 19.6 Installation procedures

This section describes the following card installation procedures:

- [To install power cards](#)
- [To install controller cards](#)
- [To install line cards](#)
- [To remove cards](#)

## 19.6.1 General

The line card and power card dummy front panels (or filler plates) must be installed in any unused, unpopulated line card or power card slot in order to maintain proper operation. Filler plate units have no electronic components; they are mechanical units used to provide ESD/EMI seal and thermal seal in the 7360 ISAM WM.

## 19.6.2 Rules for handling cards

Observe the following:



**Warning 1** — Units contain ESD sensitive devices. These devices are susceptible to ESD damage in unconnected circuit conditions. Appropriate ESD procedures should always be followed when installing or removing cards.

Units or assemblies with ESD sensitive components are labeled or tagged with the ESD awareness symbol; see Figure 215.

**Warning 2** — Keep the card in its original container until the card is ready to be installed. This is necessary to protect it from damage caused by ESD.

**Warning 3** — Always store and transport cards in original packing material when available. Materials must be in static-safe packaging or containers that are marked with an industry-standard static awareness symbol.

**Warning 4** — Keep all static-generating materials, such as plastics, away from all cards.

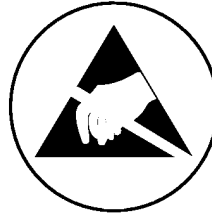
**Warning 5** — Use only dissipative materials for shipment. Shielding is not required unless specified.

**Warning 6** — Whenever possible and reasonable, maintain relative humidity above 40%.

See the *7356 ISAM FTTB*, *7360 ISAM FX*, *7363 ISAM MX*, *7367 ISAM SX/DX Safety Manual* for more information about safety standard compliance.

### 19.6.2.1 ESD sensitive cards

Cards or assemblies with ESD sensitive devices are labeled or tagged with the ESD awareness symbol shown in Figure 215.

**Figure 215 ESD awareness symbol**

22390



**Warning** — Risk of damage to equipment with ESD sensitive devices.

Most cards and powered equipment contain devices that are susceptible to ESD. ESD could damage these or other devices in unconnected circuit conditions.

Carefully follow these rules when handling ESD sensitive cards:

- transport and store cards in ESD protective bags or boxes
- make sure to wear a grounded wrist strap before handling
- connect the wrist strap to the earth bonding point at the bottom of the shelf; it carries the label shown in Figure 216
- test the ESD wrist strap with the ohmmeter to ensure effectiveness; it must measure 1 M $\Omega$  +/-20% to ground
- do not touch circuit traces or components on the card
- handle cards at the front and side edges only

Figure 216 shows the label for the earth bonding point.

**Figure 216 Label for earth bonding point**

25789

## 19.6.2.2 Cards with optical fiber connectors

Observe the following.



**Danger** — Risk of eye damage or skin burns by laser emission.

When installing optical cards or handling optical fibers, never look inside connectors of cards or fibers when these are not connected.

Put end caps on open connectors to protect against unexpected emission.



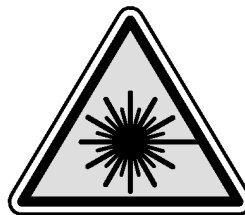
**Caution** — Risk of damage by ESD when card is not connected.

This card contains devices that are susceptible to damage caused by ESD in unconnected circuit conditions.

Carefully follow ESD safety precautions.

Figure 217 shows a laser caution label.

**Figure 217** Laser caution label



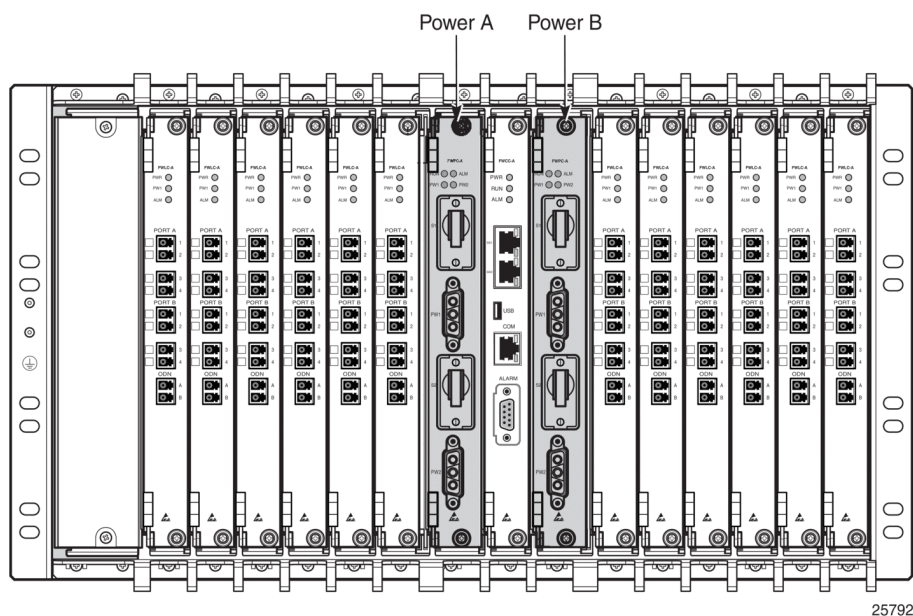
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### Procedure 77 To install power cards

Each 7360 ISAM WM shelf can contain one power card, or up to a maximum of two power cards. Proceed as follows to install a 7360 ISAM WM power card:

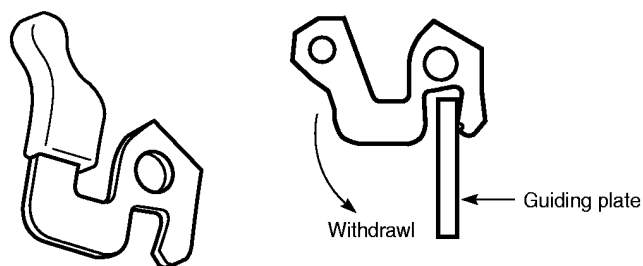
- 1 Remove the power card from its ESD protective bag. Make sure to wear the antistatic wrist strap.
- 2 Insert the power card in the Power A slot of the of the 7360 ISAM WM, and if required, also insert a second power card in the Power B slot of the 7360 ISAM WM; see Figure 218.

**Figure 218** 7360 ISAM WM power card slots



- 3 Use the ejector handles to engage the card connectors in the backplane, see Figure 219.

**Figure 219** Ejector handles for 7360 ISAM WM cards



- 4 Lock the card in place with the fixation screws located at the top and bottom of the faceplate of the card. The maximum torque is 0.3 Nm.



**Note** — Once the card is mounted in its slot, the green PWR LED lights up.

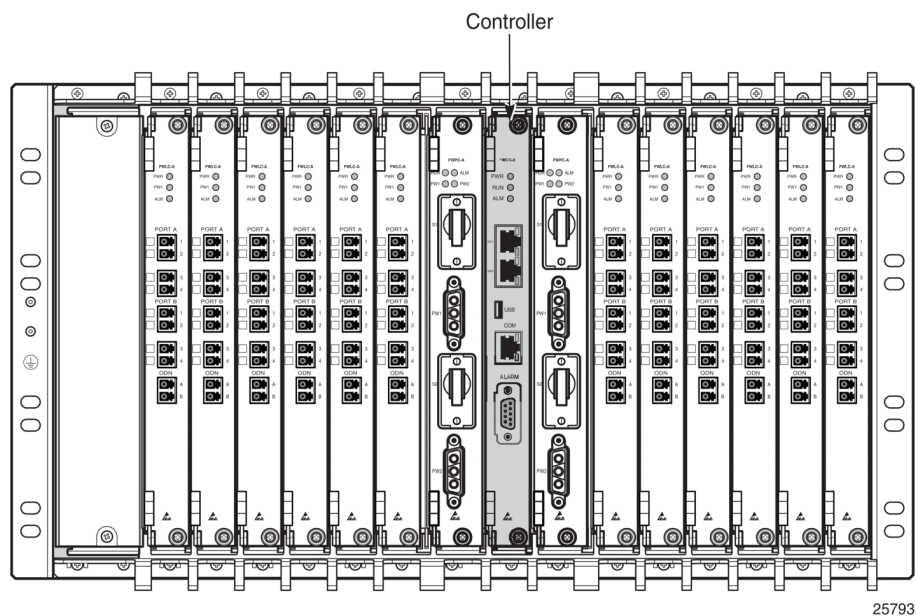


## Procedure 78 To install controller cards

Each 7360 ISAM WM shelf contains one controller card. Proceed as follows to install the 7360 ISAM WM controller card:

- 1 Remove the controller card from its ESD protective bag. Make sure to wear the antistatic wrist strap.
- 2 Insert the controller card in the controller slot of the of the 7360 ISAM WM; see Figure 220.

**Figure 220 7360 ISAM WM controller card slot**



- 3 Use the ejector handles to engage the card connectors in the backplane, see Figure 219.
- 4 Lock the card in place with the fixation screws located at the top and bottom of the faceplate of the card. The maximum torque is 0.3 Nm.



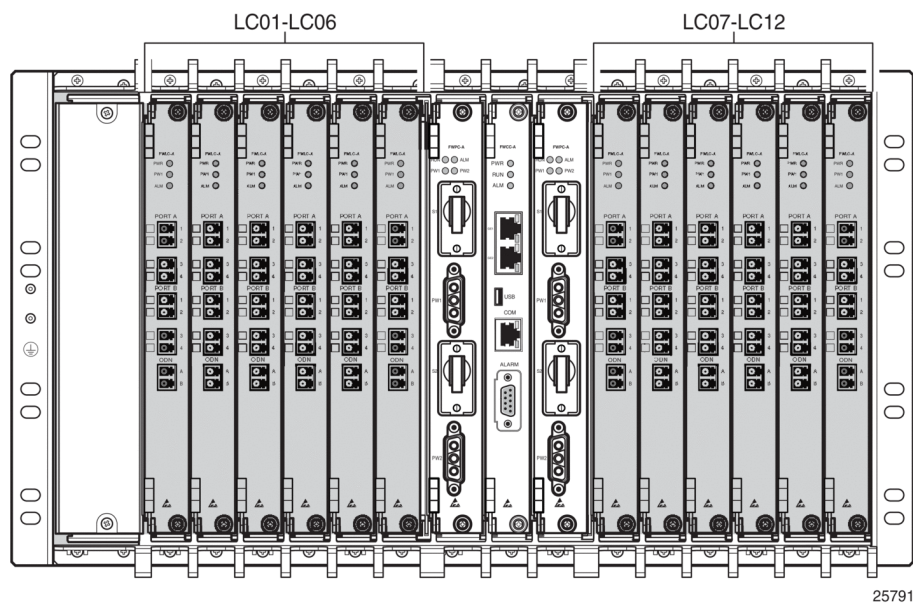
**Note** — Once the card is mounted in its slot, the green PWR LED lights up.

## Procedure 79 To install line cards

Each 7360 ISAM WM shelf can contain up to a maximum of 12 line cards. Proceed as follows to install a 7360 ISAM WM line card:

- 1 Remove the line card from its ESD protective bag. Make sure to wear the antistatic wrist strap.
- 2 Insert the line card in the available line card slot; see Figure 220.

**Figure 221 7360 ISAM WM line card slots**



- 3 Use the ejector handles to engage the card connectors in the backplane, see Figure 219.
- 4 Lock the card in place with the fixation screws located at the top and bottom of the faceplate of the card. The maximum torque is 0.3 Nm.



**Note** — Once the card is mounted in its slot, the green PWR LED lights up.

---

**Procedure 80 To remove cards**

Use the following procedure to remove a cards.

- 
- 1** Put on the antistatic wrist strap and connect it to the earth bonding point at the bottom of the 7360 ISAM WM shelf; see Figure [216](#).

---

  - 2** Test the ESD wrist strap with the ohmmeter to ensure effectiveness; it must measure 1 MΩ +/-20% to ground.

---

  - 3** Loosen the fixation screws located at the top and bottom of the front panel of the card.

---

  - 4** Use the ejector handles to disengage the card connectors from the backplane. Figure [218](#) shows the ejector handles for 7360 ISAM WM cards.

---

  - 5** Remove the card from its slot and place it in an ESD protective bag.

---

  - 6** STOP. This procedure is complete.
-



## 20 Fiber optic cable management in the 7360 ISAM Active WM shelf

### 20.1 Overview

### 20.2 Managing fiber optic cables

### 20.3 Routing fiber optic cables

## 20.1 Overview

This chapter describes the fiber optic cable management for the 7360 ISAM WM shelf.

The fiber optic cable management strategy is based on the following concepts:

- 1 To route the fiber optic cables out of the rack toward the vertical cable channels located on both sides of the front of the rack.
- 2 To route the fiber optic cables within the 7360 ISAM WM shelf toward the dedicated fiber outlets of the shelf.
- 3 To protect the fiber optic cables using optional bending protection items.



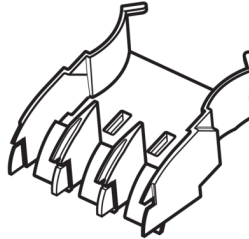
**Note** — see Appendix [29 “Fiber optic handling and acceptance criteria”](#) for more information.

The 7360 ISAM WM fiber optic cable management strategy incorporates the following hardware:

- Fiber management guides to provide proper fiber optic cable handling, support and control.

Figure [222](#) shows a view of the 7360 ISAM WM fiber guiding elements of the fiber management kit.

**Figure 222** Fiber guiding elements of the 7360 ISAM WM optical fiber management kit



25788

## 20.2 Managing fiber optic cables

This section describes how to fiber optic cables for line cards in the 7360 ISAM WM shelf.

### 20.2.1 General safety and operations information

This section provides general safety and operations information. See the *7360 ISAM FX Safety Manual* for more information.



**Danger** — Non-terminated optical connectors may emit invisible laser radiation. Serious eye damage may occur if the laser beam is viewed directly or with improper optical instruments. Avoid direct exposure to the laser beam.



**Warning 1** — Do not use nylon cable ties for securing fiber optic cable.



**Warning 2** — During card installation, proper fiber management is crucial. Improper fiber placement can cause the fibers to crimp and become damaged.

**Caution 1** — When working with optical fiber cable, it is essential to use caution to avoid breaking the fibers. Do not pull, kink, or twist the optical fiber cable. If the cable is kinked, pulled, twisted, or otherwise damaged, it must be discarded and replaced with another cable.

**Caution 2** — Avoid sharp bends in cables. Use the proper bend radius when installing cables. The minimum bending radius of fiber optic cable is 1.5 in. (38 mm), or 20 times the cable diameter, whichever is greater.

## 20.2.2 Optical modules

WM line cards are populated with a customer-defined combination of pluggable optical modules that provide the bandwidth required by the specific 7360 ISAM FX system deployment; see the local plans for more information.

The number of optical modules depends on the card type. Each of the connectors has a Tx port and an Rx port. Depending on the type of optical module, one or two optical fibers are required to connect to the optical module.



**Warning** — Do not use unauthorized SFPs or XFPs. This can adversely affect the system requiring operator intervention.



**Note 1** — For an overview of the supported SFP modules, see the *7360 ISAM FX Product Information Guide*.

**Note 2** — Nokia recommends protecting any SFP cage that is not equipped with an SFP modules with a dust cover in order to prevent dust intrusion.

**Note 3** — The type of optical fibers must match the particular SFP to guarantee the overall optical budget in the system and its correct operation of the system. Loss of optical power as a result of a mismatch in materials must be avoided.

## 20.2.3 Fiber cables

Standard single-mode fiber cables with LC connectors are connected to the SFP optical modules for transmit (Tx) and receive (Rx) purposes.

GPON SFPs require an SC/UPC connector.

## 20.2.4 Routing fiber optic cables in the rack

Fiber optic cables must be routed upward towards the top of the 7360 ISAM WM shelf using the cable guides.

## 20.2.5 Fiber management kit

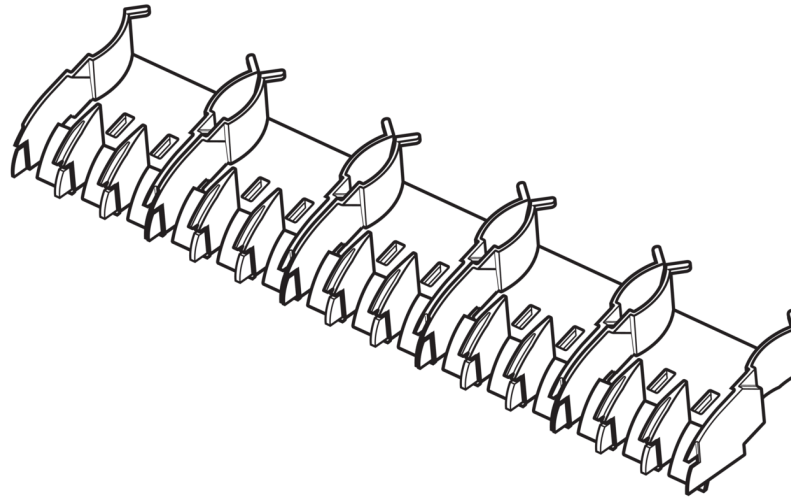
Fiber management guides are recommended for installment on the 7360 ISAM WM shelves to provide proper fiber optic cable handling. The kit contains:

- fiber management guides for the line cards
- fiber management guide for the power and controller cards

One fiber management guide is required for every three cards.

Figure 223 shows an example of a fiber management guide.

**Figure 223** Fiber management guide for 7360 ISAM WM



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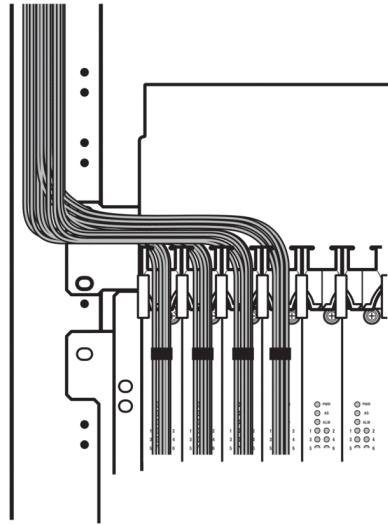
## 20.3 Routing fiber optic cables

This section provides procedures for mounting fiber management guides, for routing and connecting fiber optic cables to the line cards of the 7360 ISAM WM, and for installing optical modules.

Figure 224 shows an example of the fiber optic routing and cable management, with the use of a fiber management guide for the 7360 ISAM WM shelf.



**Figure 224** Fiber routing with a fiber management guide for the 7360 ISAM WM



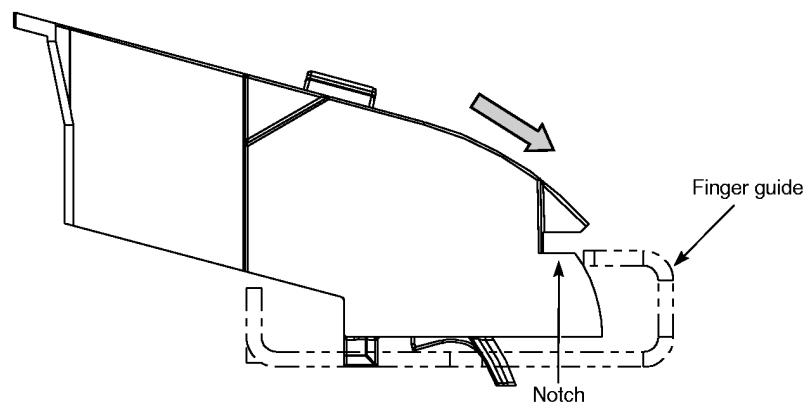
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### Procedure 81 To mount the fiber management guide

Use the following procedure to mount the fiber management guide onto the 7360 ISAM WM shelf.

- 1 Align the pre-assembled fiber management bracket and fiber guiding elements with the finger guides located on the top of the shelf; see Figure 225.

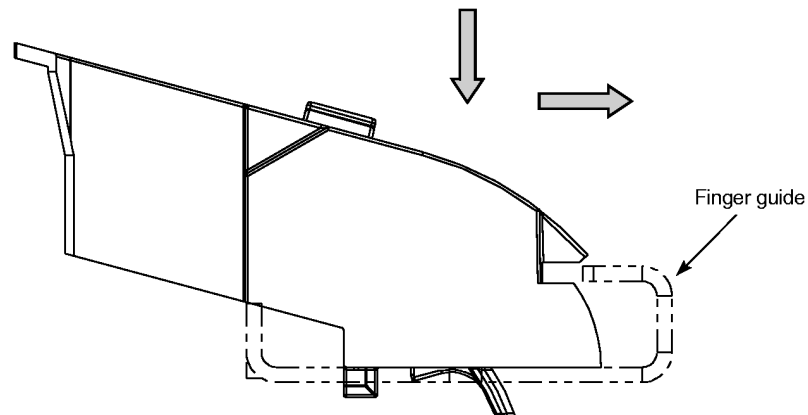
**Figure 225** Alignment of 7360 ISAM WM fiber management guide



22203

- 
- 2 Push down on the pre-assembled fiber management bracket and slide it forward onto the finger guides of the cable management bracket on the shelf until it locks into place; see Figure 226.

**Figure 226 Mount the 7360 ISAM WM fiber management guide**



- 
- 3 STOP. This procedure is complete.
- 

## Procedure 82 To route fiber cables to line cards

Use the following procedure to route and connect 7360 ISAM WM fiber cables to 7360 ISAM WM line cards.

- 
- 1 To route fiber cables to line cards, proceed as follows:
    - a If routing fiber cables using a fiber management guide, mount the fiber management guide. See Procedure 81.
    - b If routing fiber cables without using a fiber management guide, continue to step 2.
  - 2 Prepare fiber optic cables for the equipped line cards.
  - 3 Label both ends of each cable with the following information, for future identification:
    - card connection name
    - Tx or Rx, depending on which port is used for the connection
  - 4 Route the fiber cables from the source to the top of the rack.
-

- 
- 5 If using a fiber management guide, route the fiber cables through the fiber management guide, and toward the line cards. Otherwise, route the fiber cables, maintaining a proper bend radius, toward the line cards:
    - a Route to the left for:
      - Line cards in slots 01 to 06
    - b Route to the right for:
      - Line cards in slots 07 to 12
- 
- 6 Insert the fiber cables into the appropriate optical modules located on the front panels of the line cards. If optical modules must first be installed, see Procedure [83](#).
- 
- 7 Route and connect the other end of the fiber cables as per site practices.
- 
- 8 STOP. This procedure is complete.
- 

## Procedure 83 Installing an optical module



**Caution —** It is important to install optical modules prior to connecting power to a 7360 ISAM WM shelf.

To install optical modules, proceed as follows:

- 
- 1 Put on an antistatic wrist strap and connect it to a grounding point.
- 
- 2 Install an optical module as follows:
    - i Align the optical module with an optical module port and slide it into the port until it clicks into place.
    - ii Remove the rubber cap from the optical module.



**Note —** The optical module can only be removed when the pull-down bar is released.

- 
- 3 STOP. This procedure is complete.
-

---

# 7360 ISAM Passive WM shelf installation

[21 Installing a 7360 ISAM Passive WM shelf](#)

[22 Installing modules in the 7360 ISAM 7360 ISAM Passive WM shelf](#)

[23 Fiber optic cable management in the 7360 ISAM Passive WM shelf](#)



# 21 Installing a 7360 ISAM Passive WM shelf

## 21.1 Overview

### 21.2 Mounting the 7360 ISAM Passive WM in a 23 in. rack

## 21.1 Overview

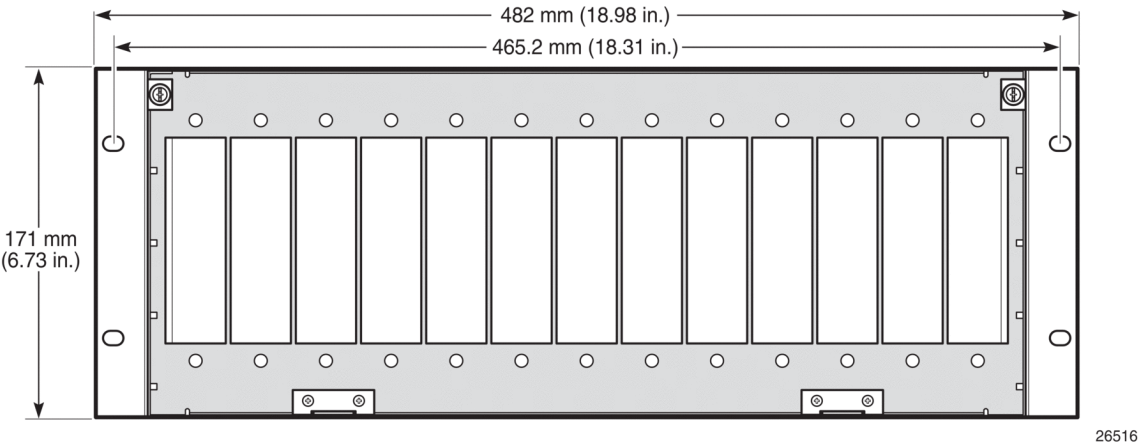
The 7360 ISAM Passive WM shelf can be mounted in a 19 in. rack with standard brackets. For mounting in a 23 in. rack, the standard brackets must be replaced with 23 in. brackets. Table 17 shows the supported 23 in. rack configuration and lists the required brackets.

**Table 17** Supported 23 in. rack configuration with 7360 ISAM Passive WM shelves

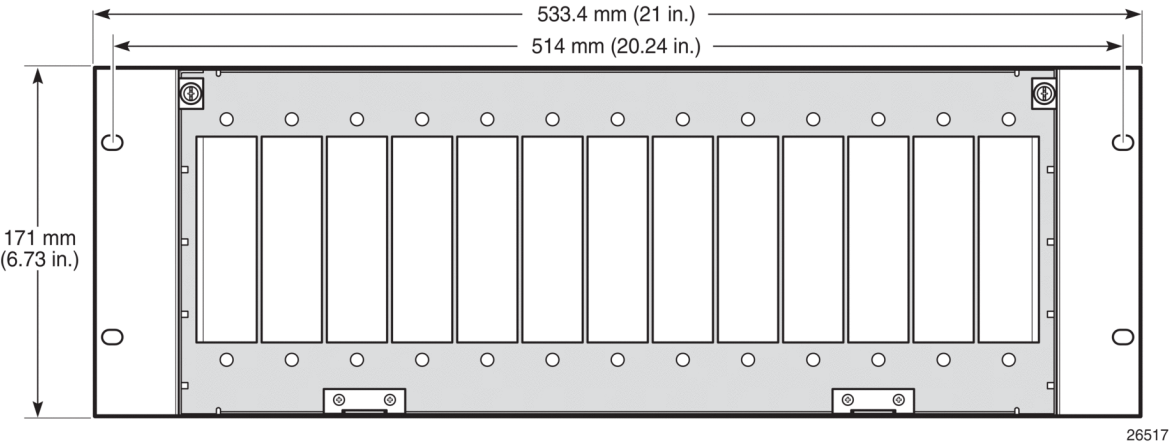
Configuration	Bracket kit code	Number of brackets in the kit	Number of kits to be ordered per shelf
23 in. rack	3FE 74289 AB	2	1

Figures 227, 228 and 229 show the mounting dimensions for the different brackets.

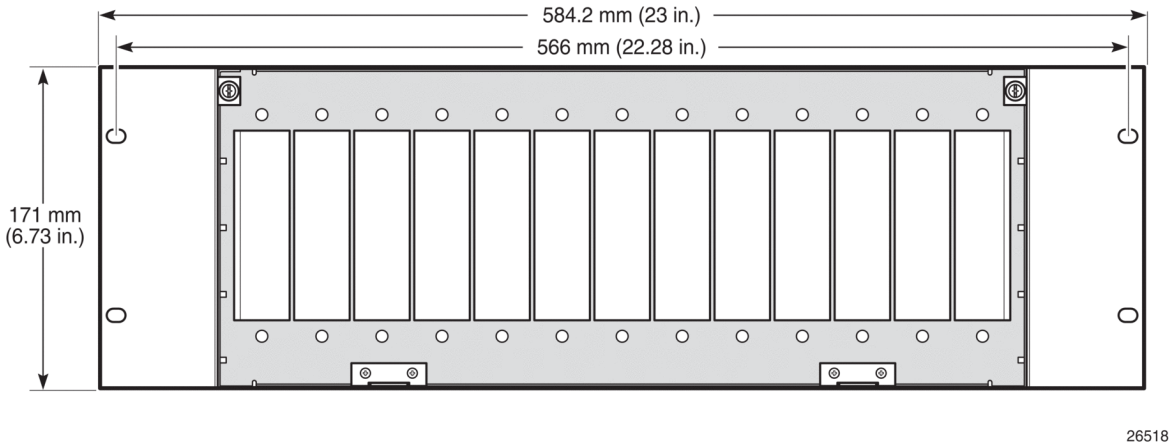
**Figure 227** 7360 ISAM Passive WM with standard 19 in. brackets



**Figure 228    7360 ISAM Passive WM with 21 in. brackets**



**Figure 229    7360 ISAM Passive WM with 23 in. brackets**



## 21.2    Mounting the 7360 ISAM Passive WM in a 23 in. rack

This section provides procedures for mounting the 7360 ISAM Passive WM in a 23 in. rack.



## 21.2.1 Rack configurations

The 7360 ISAM Passive WM shelf can be installed together with a 7360 ISAM FX-16 shelf. The 7360 ISAM Passive WM does not require a power supply. See Table 18 for an overview of the possible rack configurations with the 7360 ISAM Passive WM shelf.

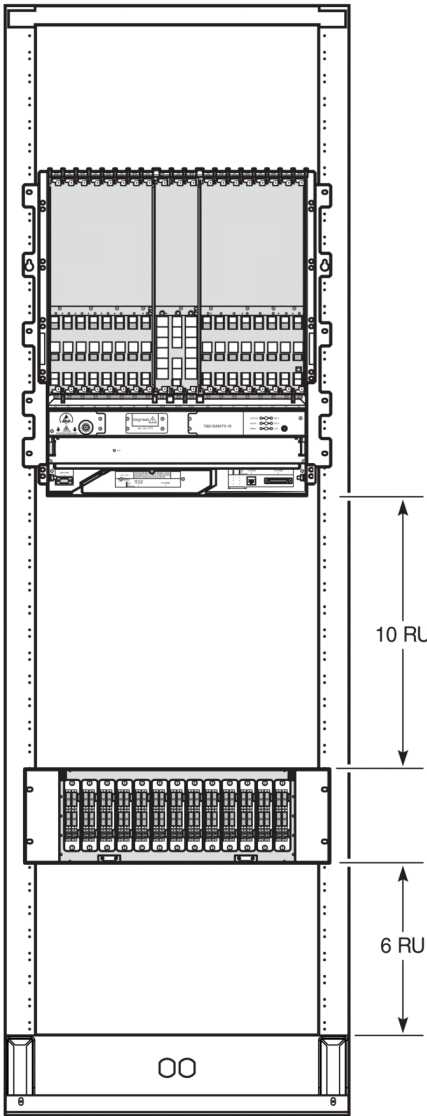
**Table 18** Supported Rack Configurations with 7360 ISAM Passive WM shelves

	Configuration
23 in. rack	1AD 01412 0044
7360 ISAM Passive WM shelf	PWMS-A 3FE 73554 AA
FX-16 shelf	NFXS-D 3FE 65209 BA
Fan Unit	BFAN-H (with dust filter) 3FE 66546 AA

The 7360 ISAM Passive WM shelf includes standard 19 in. brackets for mounting in a 19 in. rack.

A 23 in. mounting kit is required for installation in a 23 in. rack. See Figure 230 for the supported 23 in. configuration and positioning.

Figure 230 7360 ISAM Passive WM rack configuration



26519

Table 19 shows the mounting positions of the shelves in the rack.

**Table 19 7360 ISAM Passive WM shelf mounting positions**

Shelf	First upper fixing position in the shelf upright	Fixing positions in the rack upright
PWMS-A	1	63
NFXS-D	1	21

## 21.2.2 Parts list

The following parts are required:

- One 7360 ISAM Passive WM shelf
- One 23 in. mounting kit including 2 brackets
- 4 self-tapping screws M6 x 10 mm

## 21.2.3 Recommended tools

The following tools are recommended:

- Torque wrench with M6 attachment
- Protective gloves.

### Procedure 84 Mounting the 7360 ISAM Passive WM shelf in a 23 in. rack

Proceed as follows to install a 7360 ISAM Passive WM shelf:

- 1 Unpack and visually inspect the shelf for physical damage.
- 2 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.



**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 3 If nothing is missing or damaged, replace the left and right shelf mounting brackets on the 7360 ISAM Passive WM shelf, reusing the screws (maximum torque: 3.0 Nm  $\pm$  10%).

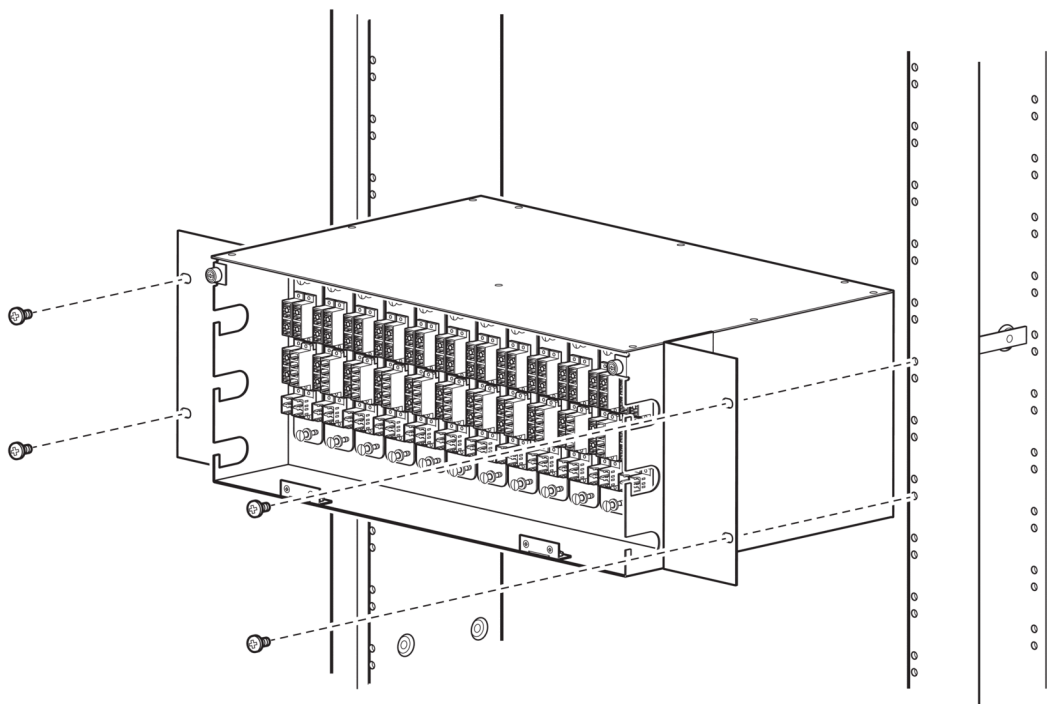
- 
- 4 Mount the shelf below the FX-16 shelf. The distance is 10RU between 7360 ISAM Passive WM shelf and FX-16 shelf. Attach the shelf to the uprights with 4 screws M6 x 10 mm provided in the bag labeled: 'Use these screws to mount shelf to equipment rack' (maximum torque: 5.0 Nm  $\pm$  10%).



**Warning** — Risk of physical harm or damage when lifting shelf.

The shelf has to be lifted by two persons. Pay attention to possible sharp edges, when handling. It is advisable to wear protective gloves.

**Figure 231** Mounting a 7360 ISAM Passive WM shelf in a 23 in. rack



26520

- 
- 5 STOP. This procedure is complete.
-

---

## 22 Installing modules in the 7360 ISAM 7360 ISAM Passive WM shelf

### 22.1 Introduction

### 22.2 Shelf areas and slot positions

### 22.3 Recommended tools

### 22.4 Guideline for module installation

### 22.5 Installation procedures

## 22.1 Introduction

This chapter describes the procedures to install Field Replaceable Units (FRUs) in a 7360 ISAM Passive WM shelf.

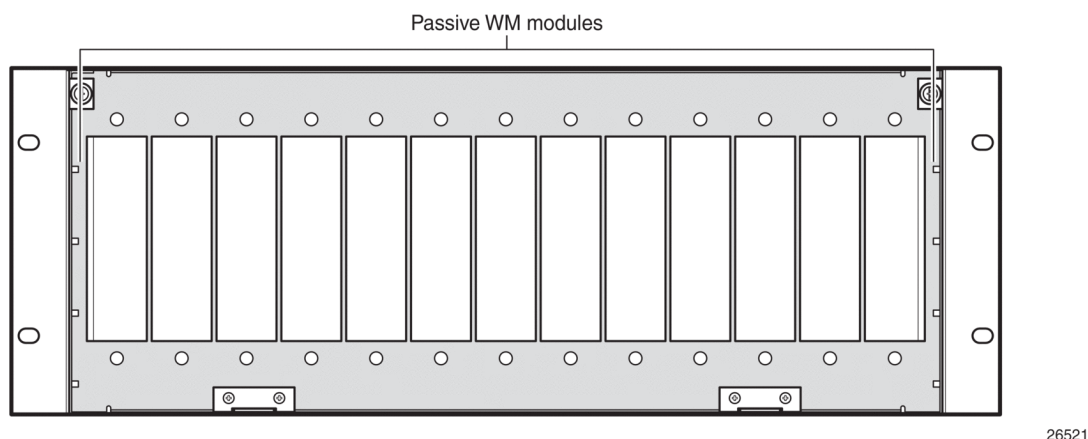


**Note** — For an overview of the supported modules, refer to the *7360 ISAM FX Product Information*.

## 22.2 Shelf areas and slot positions

Figure [232](#) shows the slot positions in a 7360 ISAM Passive WM shelf.

**Figure 232** Slot positions in 7360 ISAM Passive WM



The 7360 ISAM Passive WM shelf can be equipped with a maximum of 13 7360 ISAM Passive WM modules.

## 22.3 Recommended tools

The following tools are recommended:

- Screwdriver to secure modules

## 22.4 Guideline for module installation

This section provides a guideline for the correct installation of a module in the shelf:

### Procedure 85 Installing a 7360 ISAM Passive WM module

Proceed as follows to install a module:

- 1 Gently insert a module into the slot of a shelf, until the front panel of the module makes contact with the shelf.
- 2 Place one thumb at the bottom left of the front panel, next to the mnemonic label, and place the other thumb on the front panel below the top screw.
- 3 Push with both thumbs simultaneously to completely insert the module in the shelf slot.

---

4 Lock the module in place by fastening the fixation screws.

---

5 STOP. This procedure is complete.

---

## 22.5 Installation procedures

This section describes the following card installation procedures:

- [Installing the 7360 ISAM Passive WM modules](#)
- [Removing modules](#)

### 22.5.1 Rules on handling modules

#### 22.5.1.1 Cards with optical fiber connectors



**Danger** — Risk of eye damage or skin burns by LASER emission.

When installing optical cards or handling optical fibers, never look inside connectors of cards or fibers when these are not connected.

Put end caps on open connectors to protect against unexpected emission.

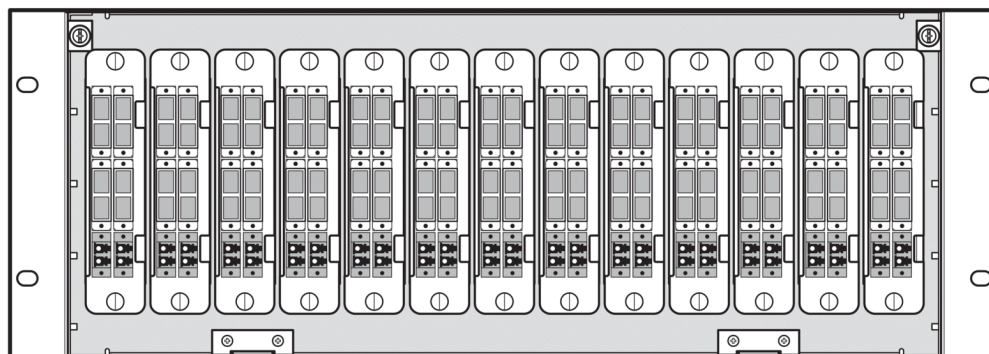
---

## Procedure 86 Installing the 7360 ISAM Passive WM modules

The 7360 ISAM Passive WM shelf can house up to 13 modules. Proceed as follows to install modules in the 7360 ISAM Passive WM shelf:

- 
- 1 Locate the free module slots for mounting the modules; see Figure 233.

**Figure 233** 7360 ISAM Passive WM modules in 7360 ISAM Passive WM shelf



26522

- 
- 2 Remove the module from its protective bag.
- 
- 3 Slide the module in a free slot.
- 
- 4 Lock the module in place with the fixation screws located at the top and the bottom of the faceplate of the module; see Figure 233. Maximum torque: 0.3 Nm.
- 
- 5 Install all required modules using these steps.
- 
- 6 STOP. This procedure is complete.
- 

## Procedure 87 Removing modules

Proceed as follows to remove a module from the 7360 ISAM Passive WM shelf:

- 
- 1 Loosen the fixation screws located at the top and the bottom of the faceplate of the module to be removed.
- 
- 2 Use the screws to pull the module out of the slot.
-



---

**3** Remove the module from its slot.

---

**4** STOP. This procedure is complete.

---



## 23 Fiber optic cable management in the 7360 ISAM Passive WM shelf

### 23.1 Introduction

### 23.2 Managing fiber optic cables

### 23.3 Routing fiber optic cables

## 23.1 Introduction

This chapter describes the fiber optic cable management for the 7360 ISAM Passive WM shelf.

It is based on the following assumptions:

- Vertical fiber routing of the optical fibers out of the rack, toward overhead fiber cable trays, is foreseen in the 2 vertical fiber cable channels located at the front left and front right side of the rack
- Fiber routing and management within the 7360 ISAM Passive WM shelf is toward the dedicated fiber outlets of the shelf
- Fiber protection and bending protection is optional, but desired



**Note** — For more information on the handling of fiber optic devices, see Appendix 29 [“Fiber optic handling and acceptance criteria”](#).

## 23.2 Managing fiber optic cables

This section provides the steps to route and connect fiber optic cables between FWLT-A or FWLT-B cards in the 7360 ISAM FX-16 shelf, and the modules in the 7360 ISAM Passive WM shelf.

## 23.2.1 Fiber cable types

### 23.2.1.1 General

Standard single mode fiber cables with UPC or APC connectors, depending on the type of module used, are connected to the 7360 ISAM Passive WM modules for transmit (Tx) and receive (Rx) purposes. APC connectors are green, and UPC connectors are blue.

The type of optical fibers must be selected in line with the particular pluggable optical module to guarantee the overall optical budget in the system and its correct functioning. Loss of optical power as a result of a mismatch in material must be avoided at all cost.

### 23.2.2 Routing fiber optic cables in the rack

Fiber optic cables must be routed through the cable area and then up to the top of the shelf.



**Caution** — When installing the fiber optic cables, pay attention that these cables do not obstruct the airflow in the shelf.



**Note** — The fiber cables must be routed in front of the other cables in the cable area.

To avoid interference, it is advisable to deploy the fiber optic cables from the side to the middle of a shelf.

It is also recommended to use protection tubes in the rack cabling areas to clearly separate the fiber optic cables from the other cabling.

See the optical cable routing instructions of the 7360 ISAM FX-16 shelf for details how to route and guide the optical cables connected to the 7360 ISAM FX-16 shelf.



**Caution** — When routing the fiber optic cables, care must be taken that the airflow is not obstructed.

It is advisable to use additional cable management accessories to route and fix the fiber optic cables.

---

## 23.3 Routing fiber optic cables

This section describes the procedures for:

- routing and connecting the fiber cables to the modules

The same optical cable routing and guiding instructions for the 7360 ISAM FX-16 shelf are applicable for the 7360 ISAM Passive WM shelf.

### Procedure 88 Routing fiber cables to the 7360 ISAM Passive WM modules

Proceed as follows to route and connect the fiber cables to the modules:

- 
- 1 Prepare fiber optic cables for the equipped modules.
  - 2 Label each cable for future identification, at both ends, with the following information:
    - the card connection name
    - the portname, depending on which port is used for the connection
  - 3 Inside the rack, run the fibers from the top.
  - 4 Run the fibers left or right, or in both directions, through cable inlets and ducts:
    - i to the left fiber duct for:
      - LT cards in slots 01 to 08
    - ii to the right fiber duct for:
      - LT cards in slots 09 to 16
  - 5 Run the fibers straight down to the card(s).
- 

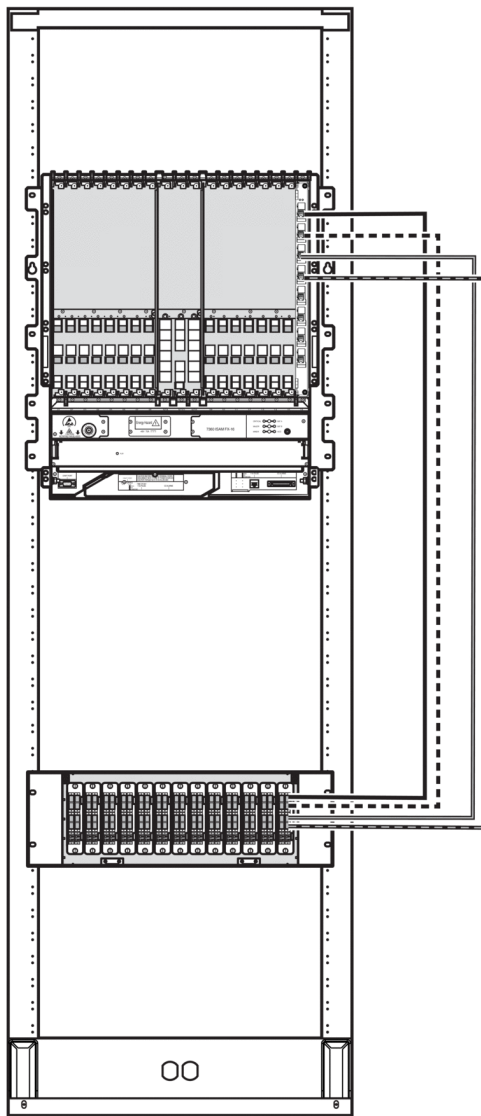


**Note** — 90° fiber connector strain relief boots are required.

- 
- 6 On the front panel of each card, connect the fibers into the appropriate SFP.

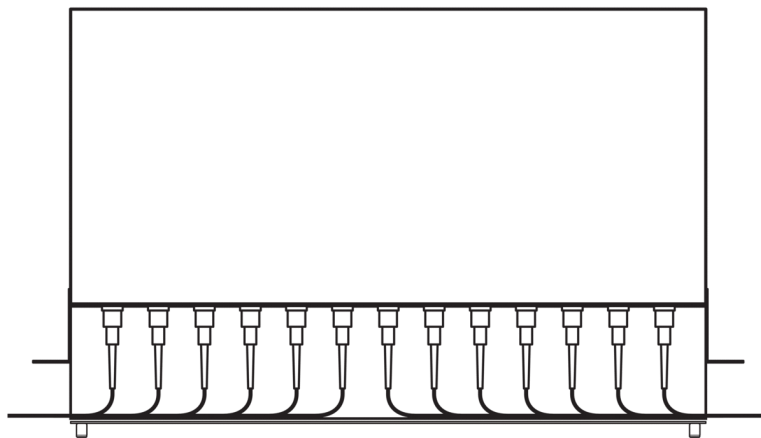
Route the fiber cables between FWLT-A or FWLT-B and 7360 ISAM Passive WM modules as shown in Figure [234](#) and Figure [235](#).

**Figure 234** Fiber routing between FWLT-A or FWLT-B and 7360 ISAM  
Passive WM modules



26523

**Figure 235** 7360 ISAM Passive WM fiber routing at the 7360 ISAM Passive WM modules (top view)



26524

**7** STOP. This procedure is complete.





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# WDM Subrack Installation

[24 Installing the WDM shelf](#)

[25 Installing modules in the WDM shelf](#)

[26 Fiber optic cable management in the WDM shelf](#)



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# 24 Installing the WDM shelf

## 24.1 Overview

### 24.2 Mounting the WDM shelf in combination with the 7360 ISAM FX-16

### 24.3 Mounting the WDM shelf in combination with the 7360 ISAM FX-8

### 24.4 Mounting the WDM shelf in combination with the 7360 ISAM FX-4

## 24.1 Overview

The WDM shelf (WDMS-A) is shipped with 19 in. mounting brackets pre-installed on the shelf. However, if installation in a 21 in. or 23 in. rack is desired, bracket kits are available to support these configurations.



**Note** — Not all combinations of the WDMS-A, 7360 ISAM FX shelf, and rack width are supported. Please read the rest of this chapter for clarification on supported combinations and see the, *7360 ISAM FX Product Information Guide* for ordering information.

## 24.2 Mounting the WDM shelf in combination with the 7360 ISAM FX-16

This chapter provides information on installing the WDM shelf in combination with the 7360 ISAM FX-16 shelf.

### 24.2.1 Rack Configurations

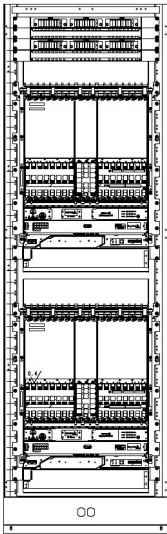
The WDM shelf can be installed in combination with a vertically mounted 7360 ISAM FX-16 shelf. See Table 20 for an overview of the supported combinations.

See Figure 236 for an example of the WDMS-A installed above a 7360 ISAM FX-16 shelf in an ANSI rack.

**Table 20**      **Supported combinations — WDM shelf installed above a 7360 ISAM FX-16 shelf**

Rack size	Orientation of 7360 ISAM FX-16 shelf
23 in.	vertically mounted

**Figure 236**      **WDMS-A installed above 7360 ISAM FX-16**

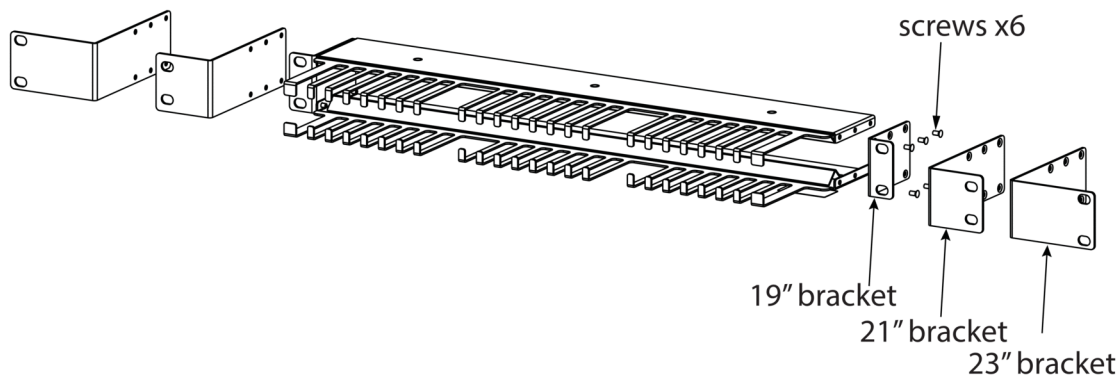


**24.2.2    Parts List**

The following parts are required:

- Kit - WDM shelf and cabling hook
  - includes 8 self-tapping screws M6 x 10 mm
- Kit - Brackets for installation in 23 in. rack

See Figure 237 for a view of the cabling hook and different brackets.

**Figure 237** WDM cabling hook and brackets

30577

### 24.2.3 Recommended Tools

The following tools are recommended:

- Torque wrench with M6 attachment
- Protective gloves

---

**Procedure 89    Mounting the WDM shelf above a vertically mounted 7360 ISAM FX-16 shelf**

This procedure describes the installation of a WDMS-A shelf, above an already vertically installed 7360 ISAM FX-16 shelf:



**Note** — When used in combination with a 7360 ISAM FX-16 shelf, either one or two WDMS-A shelves and accompanying cabling hooks can be installed and used. This depends on the number of WDMM-A modules that are required. This procedure describes the installation procedure for installing only one shelf and one cabling hook.

- 
- 1    Unpack and visually inspect the WDMS-A shelf for physical damage.
- 
- 2    If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.



**Warning** — Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

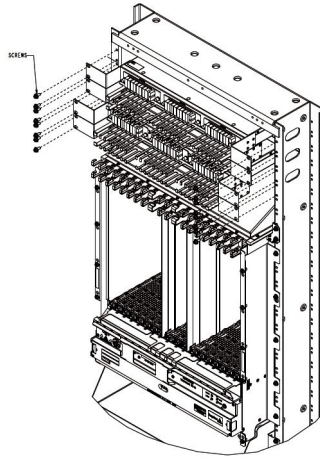
- 
- 3    If nothing is missing or damaged, remove both the left and right side 19 in. brackets from the WDMS-A and from the cabling hook. Retain the screws that held the 19 in. brackets in place.
- 
- 4    Attach both the left and right side 23 in. brackets to the sides of the WDMS-A and the cabling hook, using the screws that had held the 19 in. brackets in place.
- 
- 5    Install the WDMS-A shelf and the cabling hook on the rack using a torque wrench and a self-tapping screw in each bracket cut-out; see Figure 238.



**Warning** — Risk of physical harm or damage when lifting shelf.

Pay attention to possible sharp edges, when handling. It is advisable to wear protective gloves.

**Figure 238** Mounting a WDMS-A shelf above the 7360 ISAM FX-16



---

6 STOP. This procedure is complete.

---

## 24.3 Mounting the WDM shelf in combination with the 7360 ISAM FX-8

This chapter provides information on installing the WDM shelf in combination with the 7360 ISAM FX-8 shelf.

### 24.3.1 Rack Configurations

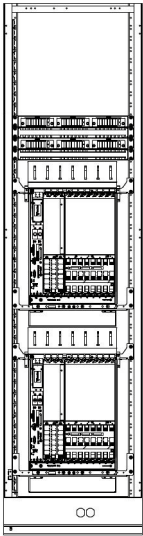
The WDM shelf can be installed in combination with a vertically or horizontally mounted 7360 ISAM FX-8 shelf, in a number of different ANSI racks. See Table 21 for an overview of the supported combinations.

See Figures 239 and 240 for examples of the WDMS-A installed above a 7360 ISAM FX-8 shelf in an ANSI rack.

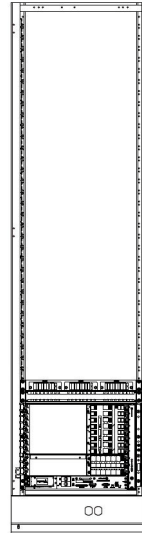
**Table 21** Supported combinations — WDM shelf installed above a 7360 ISAM FX-8 shelf

Rack size	Orientation of 7360 ISAM FX-8 shelf
23 in.	vertically mounted horizontally mounted
EIA standard 19 in. rack (17.75 in. I.D.)	vertically mounted horizontally mounted
Seismic 19 in. rack (17.5 in. I.D.)	vertically mounted

**Figure 239** WDMS-A installed above vertically mounted 7360 ISAM FX-8





**Figure 240** WDMS-A installed above horizontal 7360 ISAM FX-8

### 24.3.2 Parts List

The following parts are required:

- Kit - WDM shelf and cabling hook
  - includes 8 self-tapping screws M6 x 10 mm
- Kit - Brackets for installation in 23 in. rack

See Figure [237](#) for a view of the cabling hook and different brackets.

### 24.3.3 Recommended Tools

The following tools are recommended:

- Torque wrench with M6 attachment
- Protective gloves

---

## Procedure 90 Mounting the WDM shelf above an already installed 7360 ISAM FX-8 shelf

This procedure describes the installation of a WDMS-A shelf above an already (vertically or horizontally) installed 7360 ISAM FX-8 shelf:



**Note** — When used in combination with a 7360 ISAM FX-8 shelf, either one or two WDMS-A shelves and accompanying cabling hooks can be installed and used. This depends on the number of WDMM-A modules that are required. This procedure describes the installation procedure for installing only one shelf and one cabling hook.

- 
- 1   Unpack and visually inspect the WDMS-A shelf for physical damage.
  - 2   If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.



**Warning** — Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

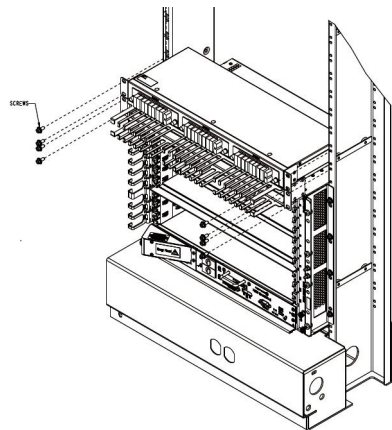
- 
- 3   If nothing is missing or damaged, proceed as follows:
    - a   If installing the WDMS-A shelf and the cabling hook on a 19 in. rack, leave the pre-installed brackets on the shelf and cabling hook. Continue to Step 4.
    - b   If installing the WDMS-A shelf and the cabling hook on a 23 in. rack, remove both the left and right side 19 in. brackets from the WDMS-A shelf and from the cabling hook. Retain the screws that held the 19 in. brackets in place.
    - c   Attach both the left and right side 23 in. brackets to the sides of the WDMS-A and the cabling hook, using the screws that had held the 19 in. brackets in place.
  - 4   Install the WDMS-A shelf and the cabling hook on the rack using a torque wrench and a self-tapping screw in each bracket cut-out; see Figure 241.



**Warning** — Risk of physical harm or damage when lifting shelf.

Pay attention to possible sharp edges, when handling. It is advisable to wear protective gloves.

**Figure 241**    Mounting a WDMS-A shelf above the 7360 ISAM FX-8



**5**    STOP. This procedure is complete.

## 24.4    Mounting the WDM shelf in combination with the 7360 ISAM FX-4

This chapter provides information on installing the WDM shelf in combination with the 7360 ISAM FX-4 shelf.

### 24.4.1    Rack Configurations

The WDM shelf can be installed in combination with a vertically or horizontally mounted 7360 ISAM FX-4 shelf, in a number of different ANSI racks. See Table 22 for an overview of the supported combinations.

See Figures 242 and 243 for examples of the WDMS-A installed above a 7360 ISAM FX-4 shelf in an ANSI rack.

**Table 22**    Supported combinations — WDM shelf installed above a 7360 ISAM FX-4 shelf

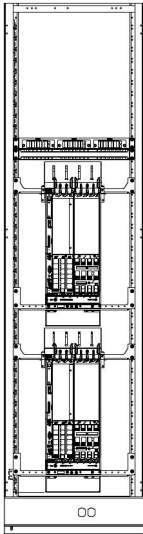
Rack size	Orientation of 7360 ISAM FX-4 shelf
23 in.	vertically mounted horizontally mounted

(1 of 2)

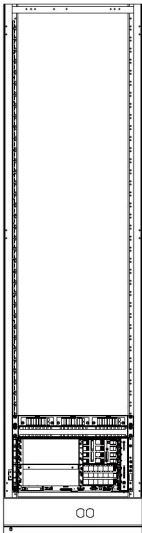
Rack size	Orientation of 7360 ISAM FX-4 shelf
EIA standard 19 in. rack (17.75 in. I.D.)	vertically mounted horizontally mounted
Seismic 19 in. rack (17.5 in. I.D.)	vertically mounted

(2 of 2)

**Figure 242**    WDMS-A installed above a vertically mounted 7360 ISAM FX-4



**Figure 243**    WDMS-A installed above a horizontally mounted 7360 ISAM FX-4



## 24.4.2 Parts List

The following parts are required:

- Kit - WDM shelf and cabling hook
  - includes 8 self-tapping screws M6 x 10 mm
- Kit - Brackets for installation in 23 in. rack

See Figure 237 for a view of the cabling hook and different brackets.

## 24.4.3 Recommended Tools

The following tools are recommended:

- Torque wrench with M6 attachment
- Protective gloves

### Procedure 91 Mounting the WDM shelf above an already installed 7360 ISAM FX-4 shelf

This procedure describes the installation of a WDMS-A shelf above an already (vertically or horizontally) installed 7360 ISAM FX-4 shelf:



**Note** — When used in combination with a 7360 ISAM FX-4 shelf, either one or two WDMS-A shelves and accompanying cabling hooks can be installed and used. This depends on the number of WDMM-A modules that are required. This procedure describes the installation procedure for installing only one shelf and one cabling hook.

- 
- 1    Unpack and visually inspect the WDMS-A shelf for physical damage.
- 
- 2    If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.



**Warning** — Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

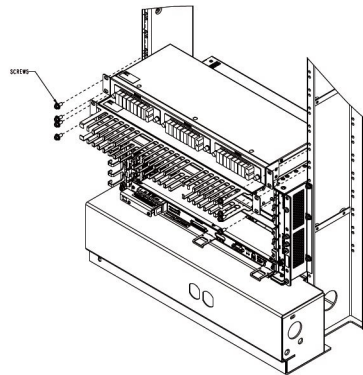
- 
- 3** If nothing is missing or damaged, proceed as follows:
- a** If installing the WDMS-A shelf and the cabling hook on a 19 in. rack, leave the pre-installed brackets on the shelf and cabling hook. Continue to Step 4.
  - b** If installing the WDMS-A shelf and the cabling hook on a 23 in. rack, remove both the left and right side 19 in. brackets from the WDMS-A shelf and from the cabling hook. Retain the screws that held the 19 in. brackets in place.
  - c** Attach both the left and right side 23 in. brackets to the sides of the WDMS-A and the cabling hook, using the screws that had held the 19 in. brackets in place.
- 
- 4** Install the WDMS-A shelf and the cabling hook on the rack using a torque wrench and a self-tapping screw in each bracket cut-out; see Figure 244.



**Warning —** Risk of physical harm or damage when lifting shelf.

Pay attention to possible sharp edges, when handling. It is advisable to wear protective gloves.

**Figure 244** Mounting a WDMS-A shelf above the 7360 ISAM FX-4



- 
- 5** STOP. This procedure is complete.
-

# 25 Installing modules in the WDM shelf

## 25.1 Introduction

## 25.2 WDM shelf slot positions

## 25.3 Dummy front panels

## 25.4 Recommended tools

## 25.5 Installing and removing a WDMM-A module

## 25.1 Introduction

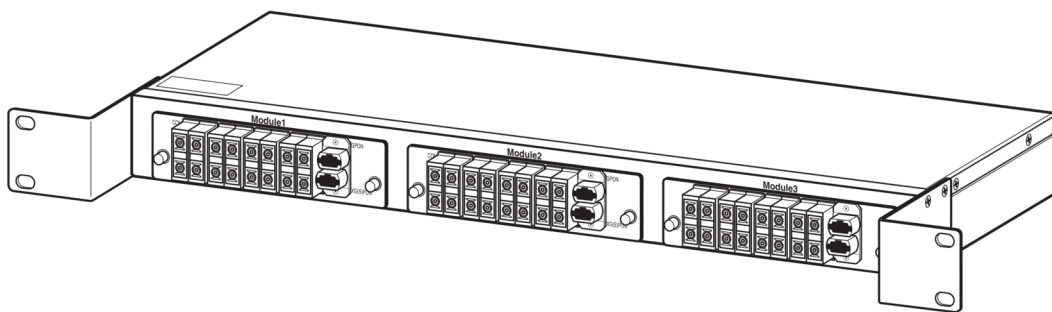
This chapter provides information on installing the WDM module (WDMM-A) in a WDM shelf (WDMS-A).

## 25.2 WDM shelf slot positions

The WDMS-A can be equipped with a maximum of 3 WDMM-A modules. See Figure 245 for a view of the module slot positions in the WDMS-A, populated with WDMM-A modules.

See Table 23 for information on supported WDM modules.

**Figure 245** Module slot positions in WDMS-A - WDMM-A installed



30727

**Table 23** Supported WDM module

Part number	Module	Description	Connector type
3FE 74997 AA	WDMM-A	Wavelength Division Multiplexer (WDM) Module - version A. A 16-port WDM module.	SC/UPC and MTP connectors

## 25.3 Dummy front panels

The WDMS-A is delivered with three dummy front panels (also called dummy boards) installed in its three available slots. These dummy front panels are labeled to show the interfaces of the WDMS-A, in order to aid with future fanout fiber cable connection.

Whenever one of these slots is not occupied by a WDM module, a dummy front panel must be installed in its place, to guarantee safety compliance. In addition to assisting with port mapping, through the inclusion of interface labels, the dummy front panel provides dust resistance for the shelf.



**Note** — The installation and removal of a dummy front panel follows the same processes as the installation and removal of a WDMM-A module; see Chapter [25.5 “Installing and removing a WDMM-A module”](#).

## 25.4 Recommended tools

There are no tools recommended for this procedure, because the WDMM-A is manually inserted through the use of pushpins.

## 25.5 Installing and removing a WDMM-A module

This section provides procedures for the correct installation and removal of the WDMM-A.



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**Procedure 92 Installing a WDM-A module in the WDMS-A shelf**

Proceed as follows to install a WDM-A module:

- 
- 1 Unpack and visually inspect the WDMS-A shelf for physical damage.

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  - 2 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.

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**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

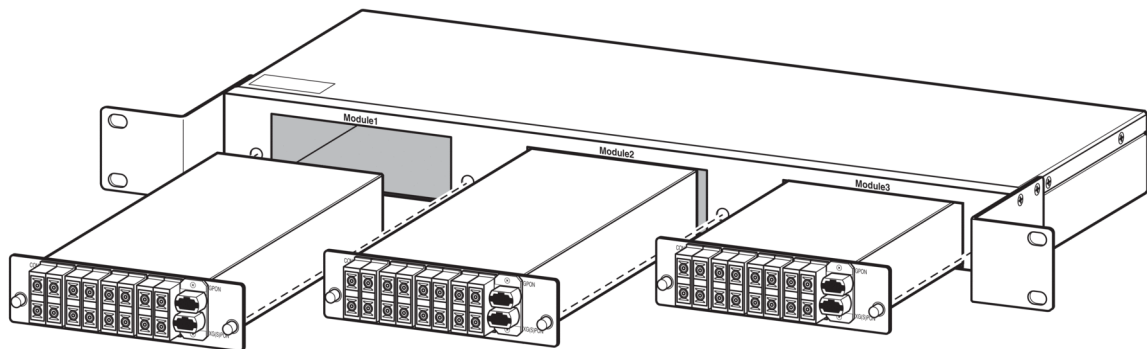
- 
- 3 Gently press the module into the open shelf slot, until the front panel of the module makes contact with the shelf.

---

  - 4 Simultaneously push the left and right pushpins of the WDM-A with two thumbs to lock the module in place, in the front panel of the WDMS-A; see Figure 246 for a view of the WDM-A modules ready for insertion.

---

**Figure 246 WDM-A modules ready for insertion in WDM shelf**



30736

- 
- 5 STOP. This procedure is complete.
-

---

**Procedure 93    Removing a WDMM-A module from the WDMS-A**

Proceed as follows to remove a WDMM-A module:

- 
- 1**    Gently pull the left and right pushpins to unlock the WDMM-A from the front panel of the WDMS-A.
- 
- 2**    STOP. This procedure is complete.
-

---

# 26 Fiber optic cable management in the WDM shelf

## 26.1 Introduction

## 26.2 Managing fiber optic cables

## 26.3 Installing and routing fiber optic cables

### 26.1 Introduction

This chapter describes fiber optic cable management and routing for the WDM shelf (WDMS-A).

It is based on the following assumptions:

- that vertical fiber routing of the optical fibers out of the rack toward overhead fiber cable trays is foreseen in the 2 vertical fiber cable channels located at the front left and front right sides of the rack
- that fiber routing and management within the WDM shelf, towards the dedicated fiber outlets of the shelf, is required
- that fiber protection and bending protection items are optional

### 26.2 Managing fiber optic cables

This Chapter provides information on how to route and connect fiber optic cables:

- between either the FGLT-B (16-port GPON LT) or NGLT-C (8-port GPON LT) cards, and the WDM shelf
- between the FWLT-B (XGS-PON LT) and the WDM shelf



**Note 1** — The FGLT-B, NGLT-C, and FWLT-B cards are all located in a 7360 ISAM FX shelf, and the WDMM-A module is located in a WDMS-A shelf.

**Note 2** — The procedure for cabling a vertically mounted WDMS-A is the same regardless of whether the WDMS-A shelf is working in conjunction with a 7360 ISAM FX-16 shelf, a 7360 ISAM FX-8 shelf, or a 7360 ISAM FX-4 shelf.

## 26.2.1 Fiber cable types

### 26.2.1.1 General

For WDM shelf cabling, there are three types of fiber fanout cables.

### 26.2.1.2 Fiber fanout cable Type 1

This is a fiber fanout cable used to connect the FGLT-B (16-port GPON LT) and the WDMM-A. It is 1.8 m (5.91 ft) in length.

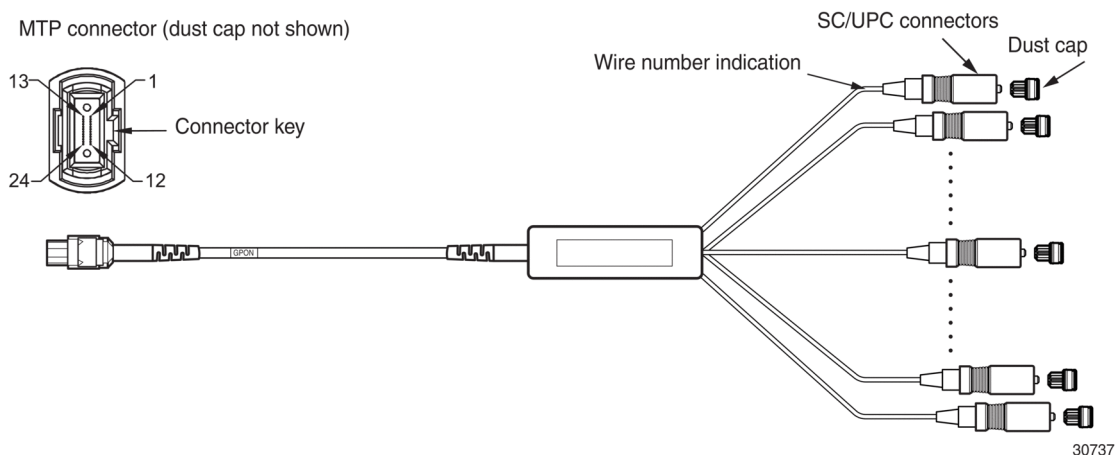
The MTP connector of this cable corresponds to the GPON interface of the WDMM-A. The 16 SC/UPC connectors of this cable correspond to the GPON ports of the FGLT-B.

The MTP connector color of this cable is yellow, and corresponds to the GPON interface label on the faceplate of the WDMM-A, which is also yellow.

The numbering of the cable's SC/UPC connectors should be aligned with the COM ports of the WDMM-A module. For example, if the "1" SC/UPC connector of this cable is connected to the first port of the FGLT-B, the cable should also be connected to the COM1 port of the WDMM-A. See Figure 247 for a view of this cable.

Optionally, a longer fiber fanout cable can be used. Please contact your Nokia representative for more information.

**Figure 247 View of fiber fanout cable - Type 1**



### 26.2.1.3 Fiber fanout cable Type 2

This is a fiber fanout cable used to connect the NGLT-C (8-port GPON LT) and the WDM-A. It is 1.8 m (5.91 ft) in length.

The MTP connector of this cable corresponds to the GPON interface of the WDM-A. The 16 SC/UPC connectors of this cable correspond to the GPON ports of two NGLT-C cards.



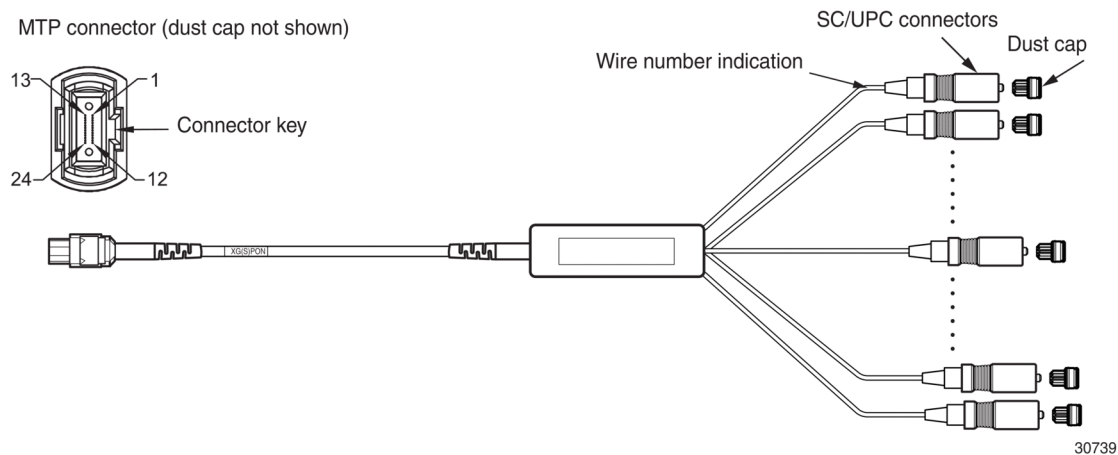
**Note —** The odd-numbered connectors are to be used for the first NGLT-C card, and the even-numbered connectors are to be used for the second NGLT-C card.

The MTP connector color of this cable is yellow, and corresponds to the GPON interface label on the faceplate of the WDM-A, which is also yellow.

The numbering of the cable's SC/UPC connectors should be aligned with the COM ports of the WDM-A module. For example, if the "1" SC/UPC connector of this cable is connected to the first port of the NGLT-C, the cable should also be connected to the COM1 port of the WDM-A. See Figure 248 for a view of this cable.

Optionally, a longer fiber fanout cable can be used. Please contact your Nokia representative for more information.

**Figure 248 View of fiber fanout cable - Type 2**



### 26.2.1.4 Fiber fanout cable Type 3

This is a fiber fanout cable used to connect the FWLT-B (8-port XGS-PON LT) and the WDM-A. It is 1.8 m (5.91 ft) in length.

The MTP connector of this cable corresponds to the XGS-PON interface of the WDM-A. The 16 SC/UPC connectors of this cable correspond to the XGS-PON ports of two FWLT-B cards.



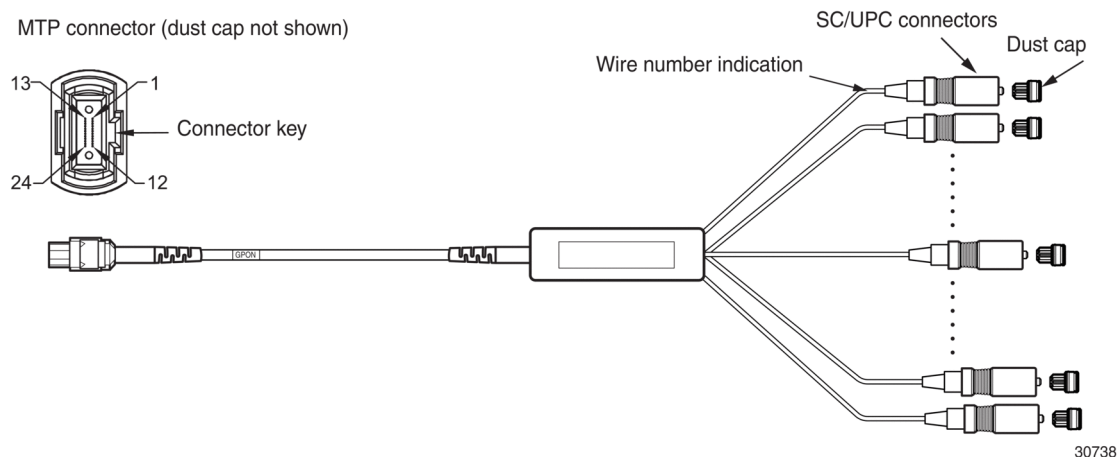
**Note —** The odd-numbered connectors are to be used for the first FWLT-B card, and the even-numbered connectors are to be used for the second FWLT-B card.

The MTP connector color of this cable is green, and corresponds to the XGS-PON interface label on the faceplate of the WDM-A, which is also green.

The numbering of the cable's SC/UPC connectors should be aligned with the COM ports of the WDM-A module. For example, if the "1" SC/UPC connector of this cable is connected to the first port of the FWLT-B, the cable should also be connected to the COM1 port of the WDM-A. See Figure 249 for a view of this cable.

Optionally, a longer fiber fanout cable can be used. Please contact your Nokia representative for more information.

**Figure 249 View of fiber fanout cable - Type 3**



## 26.2.2 Fiber management

The cabling hook that is necessary for fiber management of WDMS-A cables is included with the same kit that contains the WDMS-A shelf.

## 26.2.3 Special tools

The WDM-A is a high density module, and it may not be convenient to manually remove the tightly compacted fiber cables from the COM ports in the front panel of the WDM-A, particularly when the maximum 16 fiber cables are connected.

For this reason, Nokia recommends the use of a special tool to remove fiber cables from the WDM-A. One example of a special tool that would work for this purpose is the MILLER 80860. For information on procuring this tool, visit [www.ripley-tools.com](http://www.ripley-tools.com).

Alternatively, contact your Nokia representative for more information.

## 26.2.4 Routing fiber optic cables in the rack

Fiber optic cables must be routed through the cable area and then up to the top of the shelf.



**Caution —** When installing the fiber optic cables, pay attention that these cables do not obstruct airflow in the shelf.



**Note —** The fiber cables must be routed in front of the other cables in the cable area.

To avoid interference, it is advisable to deploy the fiber optic cables from the side to the middle of a shelf.

It is also recommended to use protection tubes in the rack cabling areas to clearly separate the fiber optic cables from the other cabling.



**Caution —** When routing the fiber optic cables, care must be taken that the airflow is not obstructed.

It is advisable to use additional cable management accessories to route and fix the fiber optic cables.

## 26.3 Installing and routing fiber optic cables

This chapter describes the procedures for:

- installing fanout fiber cables between LT cards and the WDM-A
- routing fanout fiber cables in the rack

For cable installation and routing, see Procedure [94 “Installing fanout fiber cables between LT cards and the WDM-A”](#).

---

**Procedure 94 Installing fanout fiber cables between LT cards and the WDMM-A**

Proceed as follows to route and connect the fiber cables to the modules:

- 
- 1 Unpack and visually inspect the fanout fiber cables for physical damage.
  - 2 If anything is missing or damaged, notify the transportation carrier and Nokia immediately. Photograph all the damaged equipment. Keep all the inspection and packing documents as a reference.
- 

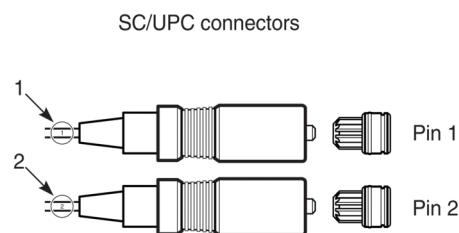


**Warning —** Possibility of equipment damage.

Do not install damaged equipment, as it can adversely affect other equipment.

- 
- 3 Prepare the GPON fanout fiber cable: make sure the dust caps are present for both SC connectors and MTP connector; see Chapter 26.2.1 “Fiber cable types” for information on which fanout fiber cable to use.
  - 4 Remove the dust caps and connect the SC/UPC connectors of the cable to the 7360 ISAM FX LT card connectors; see Figure 250.
    - a If connecting to the FGLT-B card, connect cable connectors 1-16 to ports 1-16 of the FGLT-B.
    - b If connecting to NGLT-C cards, connect odd-numbered cable connectors to ports 1-8 of the first NGLT-C card, and connect even-numbered cable connectors to ports 1-8 of the second NGLT-C card.
- 

**Figure 250 SC/UPC connectors**



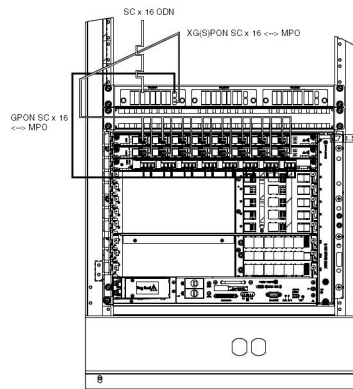
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- 
- 5 If there is excessive cable length that might obstruct airflow in the 7360 ISAM FX shelf, loop and secure the fiber cables into a fiber bundle, and position the fiber bundle in the fiber cable channels of the rack.



- 
- 6** Connect the yellow MTP connector of the fanout fiber cable to the yellow GPON interface of the WDMM-A, after feeding the fanout fiber cable through the cabling hook; see Figure 251 for a view of fanout fiber cable routing between a WDM shelf and 7360 ISAM FX shelf.

**Figure 251 WDM shelf fanout fiber cable routing**



- 
- 7** Prepare the XGS-PON fanout fiber cable: make sure the dust caps are present for both SC connectors and the MTP connector; see Chapter 26.2.1 “Fiber cable types” for information on which fanout fiber cable to use.
- 
- 8** Remove the dust caps and connect the SC/UPC connectors of the cable to the FWLT-B card.
- a** Connect odd-numbered cable connectors to ports 1-8 of the first FWLT-B card.
  - b** Connect even-numbered cable connectors to ports 1-8 of the first FWLT-B card.
- 
- 9** If there is excessive cable length that might obstruct airflow in the 7360 ISAM FX shelf, loop and secure the fiber cables into a fiber bundle, and position the fiber bundle in the fiber cable channels of the rack.
- 
- 10** Connect the green MTP connector of the fanout fiber cable to the green XGS-PON interface of the WDMM-A, after feeding the fanout fiber cable through the cabling hook.

- 
- 11** Connect the SC/UPC connectors of the ODN to the COM ports of the WDMM-A, ensuring that COM1-COM16 correspond to port 1-port 16 of the GPON/XGS-PON LT card.



**Note —** 90° fiber connector strain relief boots are required.

- 
- 12** STOP. This procedure is complete.
-

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# Appendices

[27 Connector pinning of the external interfaces](#)

[28 Connector pinning on NT card](#)

[29 Fiber optic handling and acceptance criteria](#)



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# 27 Connector pinning of the external interfaces

## 27.1 Overview

### 27.2 BITS interface connections

### 27.3 ToD/1 Hz connector

### 27.4 Remote craft port connector

### 27.5 CO external alarm connector

### 27.6 MDF CHAMP100 cable connector

## 27.1 Overview

This section describes the pinning of the external interfaces on the 7360 ISAM FX shelf units.

- [BITS interface connections](#)
- [ToD/1 Hz connector](#)
- [Remote craft port connector](#)
- [CO external alarm connector](#)
- [MDF CHAMP100 cable connector](#)



**Note** — For CO external alarm connector pinning information, see your Nokia representative.

## 27.2 BITS interface connections

Table [24](#) describes the BITS interface pinning for the 7360 ISAM FX-4 and 7360 ISAM FX-8 shelves.

**Table 24** BITS interface pinning for 7360 ISAM FX-4, 7360 ISAM FX-8, and 7360 ISAM FX 12

Signal name	Type	Pin number	Description
NTB_BITSIN_R	Input	1	BITS signal going to NT-B
NTB_BITSIN_T	Input	2	BITS signal going to NT-B
FG	Input	3	Frame ground ESD
FG	Input	4	Frame ground ESD
NTA_BITSIN_R	Input	5	BITS signal going to NT-A
NTA_BITSIN_T	Input	6	BITS signal going to NT-A

Table 25 describes the BITS interface pinning for the 7360 ISAM FX-16 shelf.

**Table 25** BITS interface pinning for 7360 ISAM FX-16

Signal name	Type	Pin number	Description
NTB_BITS_RING	Input	X225	BITS signal going to NT-B
NTB_BITS_TIP	Input	X226	BITS signal going to NT-B
NTA_BITS_RING	Input	X227	BITS signal going to NT-A
NTA_BITS_TIP	Input	X228	BITS signal going to NT-A
Frame_GND	Input	X229	Frame ground
Frame_GND	Input	X230	Frame ground

## 27.3 ToD/1 Hz connector

Table 26 describes the ToD and 1 Hz pinning for the 7360 ISAM FX-16 shelf.

**Table 26** ToD/1 Hz pinning for the 7360 ISAM FX-16

Signal name	Type	Pin number	Description
Not connected	—	1	No contact
Not connected	—	2	No contact
1HZ_RING	Input	3	1 Hz signal ring input
SIG_GND	Input	4	Electrical ground

(1 of 2)

Signal name	Type	Pin number	Description
SIG_GND	Input	5	Electrical ground
1HZ_TIP	Input	6	1 Hz signal tip input
TOD_RING	Input	7	Time of day ring input
TOD_TIP	Input	8	Time of day tip input
FG	Input	9	Frame ground
FG	Input	10	Frame ground

(2 of 2)

## 27.4 Remote craft port connector

Table 27 describes the remote craft port pinning for the 7360 ISAM FX-4, 7360 ISAM FX-8, and 7360 ISAM FX-16 shelves.

**Table 27 Remote craft port pinning for 7360 ISAM FX shelves**

Signal name	Type	Pin number	Description
DCD	Input	1	Data carrier detect
RXD	Input	2	Receive data
TXD	Output	3	Transmit data
DTR	Output	4	Data terminal ready
Signal Ground	Input	5	Signal ground
DSR	Input	6	Data set ready
RTS	Output	7	Request to send
CTS	Input	8	Clear to send
RI	Input	9	Ring indicator

## 27.5 CO external alarm connector

Table 28 describes the CO external alarm pinning for the 7360 ISAM FX-4 and 7360 ISAM FX-8 shelves.

**Table 28 External Alarm Cable**

Signal Name	Type	Connectors		Description
		shelf side pin number	CO side cable color	
MISC1_ALA_A	1	1	Blue	Miscellaneous Alarm 1 (A wire)
MISC1_ALA_B	1	9	White	Miscellaneous Alarm 1 (B wire)
MISC2_ALA_A	1	2	Orange	Miscellaneous Alarm 2 (A wire)
MISC2_ALA_B	1	10	White	Miscellaneous Alarm 2 (B wire)
MISC3_ALA_A	1	3	Green	Miscellaneous Alarm 3 (A wire)
MISC3_ALA_B	1	11	White	Miscellaneous Alarm 3 (B wire)
MISC4_ALA_A	1	4	Brown	Miscellaneous Alarm 4 (A wire)
MISC4_ALA_B	1	12	White	Miscellaneous Alarm 4 (B wire)
MISC5_ALA_A	1	5	Grey	Miscellaneous Alarm 5 (A wire)
MISC5_ALA_B	1	13	White	Miscellaneous Alarm 5 (B wire)
MISC1_OUT_A	0	6	Blue	Miscellaneous Alarm Output 1 (A wire)
MISC1_OUT_B	0	14	Red	Miscellaneous Alarm Output 1 (B wire)
MISC2_OUT_A	0	7	Orange	Miscellaneous Alarm Output 2 (A wire)
MISC2_OUT_B	0	15	Red	Miscellaneous Alarm Output 2 (B wire)
		8	-	Not connected
FG		16	-	Frame ground
FG		17	-	Frame ground

Table 30 describes the CO external alarm pinning for the 7360 ISAM FX-16 shelf.

**Table 29 CO external alarm pinning for 7360 ISAM FX-16**

Signal name	Type	Pin number	Color	Description
EXT_ALM0_00	Input	1	White/tan	External alarm input 1 (A terminal)
EXT_ALM0_01		26	Tan/white	External alarm input 1 (B terminal)
EXT_ALM0_10	Input	2	White/brown	External alarm input 2 (A terminal)
EXT_ALM0_11		27	Brown/white	External alarm input 2 (B terminal)
EXT_ALM0_20	Input	3	White/pink	External alarm input 3 (A terminal)
EXT_ALM0_21		28	Pink/white	External alarm input 3 (B terminal)
EXT_ALM0_30	Input	4	White/orange	External alarm input 4 (A terminal)
EXT_ALM0_31		29	Orange/white	External alarm input 4 (B terminal)

(1 of 3)



Signal name	Type	Pin number	Color	Description
EXT_ALM0_40	Input	5	White/yellow	External alarm input 5 (A terminal)
EXT_ALM0_41		30	Yellow/white	External alarm input 5 (B terminal)
EXT_ALM0_50	Input	6	White/green	External alarm input 6 (A terminal)
EXT_ALM0_51		31	Green/white	External alarm input 6 (B terminal)
EXT_ALM0_60	Input	7	White/blue	External alarm input 7 (A terminal)
EXT_ALM0_61		32	Blue/white	External alarm input 7 (B terminal)
EXT_ALM0_70	Input	8	White/violet	External alarm input 8 (A terminal)
EXT_ALM0_71		33	Violet/white	External alarm input 8 (B terminal)
EXT_ALM0_80	Input	9	White/gray	External alarm input 9 (A terminal)
EXT_ALM0_81		34	Gray/white	External alarm input 9 (B terminal)
EXT_ALM0_90	Input	10	Tan/brown	External alarm input 10 (A terminal)
EXT_ALM0_91		35	Brown/tan	External alarm input 10 (B terminal)
EXT_ALM0_100	Input	11	Tan/pink	External alarm input 11 (A terminal)
EXT_ALM0_101		36	Pink/tan	External alarm input 11 (B terminal)
EXT_ALM0_110	Input	12	Tan/orange	External alarm input 12 (A terminal)
EXT_ALM0_111		37	Orange/tan	External alarm input 12 (B terminal)
EXT_ALM0_120	Input	13	Tan/yellow	External alarm input 13 (A terminal)
EXT_ALM0_121		38	Yellow/tan	External alarm input 13 (B terminal)
EXT_ALM0_130	Input	14	Tan/green	External alarm input 14 (A terminal)
EXT_ALM0_131		39	Green/tan	External alarm input 14 (B terminal)
EXT_ALM0_140	Input	15	Tan/blue	External alarm input 15 (A terminal)
EXT_ALM0_141		40	Blue/tan	External alarm input 15 (B terminal)
EXT_ALM0_150	Input	16	Tan/violet	External alarm input 16 (A terminal)
EXT_ALM0_151		41	Violet/tan	External alarm input 16 (B terminal)
EXT_ALM0_160	Input	17	Tan/gray	External alarm input 17 (A terminal)
EXT_ALM0_161		42	Gray/tan	External alarm input 17 (B terminal)
EXT_ACO_A	Input	18	Brown/pink	External ACO switch (A terminal)
EXT_ACO_B		43	Pink/brown	External ACO switch (B terminal)
VIS_MIN_A	Output	19	Brown/orange	Minor alarm external visual indicator (relay Contact A)
VIS_MIN_B		44	Orange/brown	Minor alarm external visual indicator (relay Contact B)
VIS_MAJ_A	Output	20	Brown/yellow	Major alarm external visual indicator (relay Contact A)
VIS_MAJ_B		45	Yellow/brown	Major alarm external visual indicator (relay Contact B)

(2 of 3)

Signal name	Type	Pin number	Color	Description
VIS_CRI_A	Output	21	Brown/green	Critical alarm external visual indicator (relay Contact A)
VIS_CRI_B		46	Green/brown	Critical alarm external visual indicator (relay Contact B)
AUD_MIN_A	Output	22	Brown/blue	Minor alarm external audible indicator (relay Contact A)
AUD_MIN_B		47	Blue/brown	Minor alarm external audible indicator (relay Contact B)
AUD_MAJ_A	Output	23	Brown/violet	Major alarm external audible indicator (relay Contact A)
AUD_MAJ_B		48	Violet/brown	Major alarm external audible indicator (relay Contact B)
AUD_CRI_A	Output	24	Brown/gray	Critical alarm external audible indicator (relay Contact A)
AUD_CRI_B		49	Gray/brown	Critical alarm external audible indicator (relay Contact B)
Not connected	—	25	—	No contact
Not connected	—	50	—	No contact

(3 of 3)

Table 30 describes the CO external alarm pinning for the 7360 ISAM WM shelf.

**Table 30** CO external alarm pinning for 7360 ISAM WM

Signal name	Type	Pin number	Color	Description
EXT_ALM_00	Input	1	White/tan	External alarm input 1 (A terminal)
EXT_ALM_01		26	Tan/white	External alarm input 1 (B terminal)
EXT_ALM_10	Input	2	White/brown	External alarm input 2 (A terminal)
EXT_ALM_11		27	Brown/white	External alarm input 2 (B terminal)
EXT_ALM_20	Input	3	White/pink	External alarm input 3 (A terminal)
EXT_ALM_21		28	Pink/white	External alarm input 3 (B terminal)
EXT_ALM_30	Input	4	White/orange	External alarm input 4 (A terminal)
EXT_ALM_31		29	Orange/white	External alarm input 4 (B terminal)
EXT_ALM_40	Input	5	White/yellow	External alarm input 5 (A terminal)
EXT_ALM_41		30	Yellow/white	External alarm input 5 (B terminal)
EXT_ALM_50	Input	6	White/green	External alarm input 6 (A terminal)
EXT_ALM_51		31	Green/white	External alarm input 6 (B terminal)
EXT_ALM_60	Input	7	White/blue	External alarm input 7 (A terminal)
EXT_ALM_61		32	Blue/white	External alarm input 7 (B terminal)
EXT_ALM_70	Input	8	White/violet	External alarm input 8 (A terminal)
EXT_ALM_71		33	Violet/white	External alarm input 8 (B terminal)
EXT_ALM_80	Input	9	White/gray	External alarm input 9 (A terminal)
EXT_ALM_81		34	Gray/white	External alarm input 9 (B terminal)
EXT_ALM_90	Input	10	Tan/brown	External alarm input 10 (A terminal)
EXT_ALM_91		35	Brown/tan	External alarm input 10 (B terminal)
EXT_ALM_100	Input	11	Tan/pink	External alarm input 11 (A terminal)
EXT_ALM_101		36	Pink/tan	External alarm input 11 (B terminal)
EXT_ALM_110	Input	12	Tan/orange	External alarm input 12 (A terminal)
EXT_ALM_111		37	Orange/tan	External alarm input 12 (B terminal)
EXT_ALM_120	Input	13	Tan/yellow	External alarm input 13 (A terminal)
EXT_ALM_121		38	Yellow/tan	External alarm input 13 (B terminal)
EXT_ALM_130	Input	14	Tan/green	External alarm input 14 (A terminal)
EXT_ALM_131		39	Green/tan	External alarm input 14 (B terminal)
EXT_ALM_140	Input	15	Tan/blue	External alarm input 15 (A terminal)
EXT_ALM_141		40	Blue/tan	External alarm input 15 (B terminal)
EXT_ALM_150	Input	16	Tan/violet	External alarm input 16 (A terminal)
EXT_ALM_151		41	Violet/tan	External alarm input 16 (B terminal)

(1 of 2)

Signal name	Type	Pin number	Color	Description
EXT_ALM_160	Input	17	Tan/gray	External alarm input 17 (A terminal)
EXT_ALM_161		42	Gray/tan	External alarm input 17 (B terminal)
EXT_ACO_A	Input	18	Brown/pink	External ACO switch (A terminal)
EXT_ACO_B		43	Pink/brown	External ACO switch (B terminal)
VIS_MIN_A	Output	19	Brown/orange	Minor alarm external visual indicator (relay Contact A)
VIS_MIN_B		44	Orange/brown	Minor alarm external visual indicator (relay Contact B)
VIS_MAJ_A	Output	20	Brown/yellow	Major alarm external visual indicator (relay Contact A)
VIS_MAJ_B		45	Yellow/brown	Major alarm external visual indicator (relay Contact B)
VIS_CRI_A	Output	21	Brown/green	Critical alarm external visual indicator (relay Contact A)
VIS_CRI_B		46	Green/brown	Critical alarm external visual indicator (relay Contact B)
AUD_MIN_A	Output	22	Brown/blue	Minor alarm external audible indicator (relay Contact A)
AUD_MIN_B		47	Blue/brown	Minor alarm external audible indicator (relay Contact B)
AUD_MAJ_A	Output	23	Brown/violet	Major alarm external audible indicator (relay Contact A)
AUD_MAJ_B		48	Violet/brown	Major alarm external audible indicator (relay Contact B)
AUD_CRI_A	Output	24	Brown/gray	Critical alarm external audible indicator (relay Contact A)
AUD_CRI_B		49	Gray/brown	Critical alarm external audible indicator (relay Contact B)
Not connected	—	25	—	No contact
Not connected	—	50	—	No contact

(2 of 2)



**Note 1** — The input alarms are implemented using normally closed (NC) relays (that is, closed when no power is applied).

The output alarms are indicated by a short circuit.

**Note 2** — The following applies for the external CO alarm signals:

- maximum current drain is 100 mA
- voltage is determined by supply voltage (–48 V)
- BATRET voltage of the alarm wire is different from the power BATRET voltage (due to the voltage drop in the feeding cables)

Nokia strongly advises adding extra in-line 100 mA fuses in the BATRET connections to comply in a safe way with the maximum current drain of 100 mA in the BATRET wire.

## 27.6 MDF CHAMP100 cable connector

This section describes line number and color designations, and the pinning of the CHAMP100 MDF cable.

### 27.6.1 Cable colors

The following designations are used for the cable colors:

**Table 31** Cable color designations

Designation	Color
BK	black
BL	blue
BN	brown
GN	green
OR	orange
RD	red
SL	slate
V	violet
WH	white
WH-BL	white-blue
YE	yellow

### 27.6.2 Line number

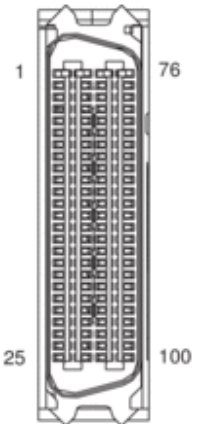
The following designations are used for the line number:

- T: tip
- R: ring
- NC: not connected

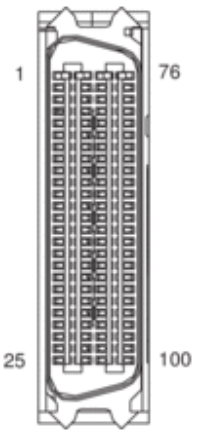
### 27.6.3 Connector pinning

Table 32 shows the pinning for the CHAMP100 MDF cable.

**Table 32**      **Wiring list for CHAMP100 MDF cable**

Pin	Line number	Wire color	Pin number	Line number	Wire color	Binder group	Connector layout	Pin	Line number	Wire color	Pin number	Line number	Wire color	Binder group
1	NC	—	26	NC	—	Orange		51	NC	—	76	NC	—	Blue
2	37T	BK/GN	27	36T	BK/OR	Orange		52	13T	BK/GN	77	12T	BK/OR	Blue
3	37R	GN/BK	28	36R	OR/BK	Orange		53	13R	GN/BK	78	12R	OR/BK	Blue
4	38T	BK/BN	29	35T	BK/BL	Orange		54	14T	BK/BN	79	11T	BK/BL	Blue
5	38R	BN/BK	30	35R	BL/BK	Orange		55	14R	BN/BK	80	11R	BL/BK	Blue
6	39T	BK/SL	31	34T	RD/SL	Orange		56	15T	BK/SL	81	10T	RD/SL	Blue
7	39R	SL/BK	32	34R	SL/RD	Orange		57	15R	SL/BK	82	10R	SL/RD	Blue
8	40T	YE/BL	33	33T	RD/BN	Orange		58	16T	YE/BL	83	09T	RD/BN	Blue
9	40R	BL/YE	34	33R	BN/RD	Orange		59	16R	BL/YE	84	09R	BN/RD	Blue
10	41T	YE/OR	35	32T	RD/GN	Orange		60	17T	YE/OR	85	08T	RD/GN	Blue
11	41R	OR/YE	36	32R	GN/RD	Orange		61	17R	OR/YE	86	08R	GN/RD	Blue

(1 of 2)

Pin	Line number	Wire color	Pin number	Line number	Wire color	Binder group	Connector layout	Pin	Line number	Wire color	Pin number	Line number	Wire color	Binder group
12	42T	YE/GN	37	31T	RD/OR	Orange		62	18T	YE/GN	87	07T	RD/OR	Blue
13	42R	GN/YE	38	31R	OR/RD	Orange		63	18R	GN/YE	88	07R	OR/RD	Blue
14	43T	YE/BN	39	30T	RD/BL	Orange		64	19T	YE/BN	89	06T	RD/BL	Blue
15	43R	BN/YE	40	30R	BL/RD	Orange		65	19R	BN/YE	90	06R	BL/RD	Blue
16	44T	YE/SL	41	29T	WH/SL	Orange		66	20T	YE/SL	91	05T	WH/SL	Blue
17	44R	SL/YE	42	29R	SL/WH	Orange		67	20R	SL/YE	92	05R	SL/WH	Blue
18	45T	V/BL	43	28T	WH/BN	Orange		68	21T	V/BL	93	04T	WH/BN	Blue
19	45R	BL/V	44	28R	BN/WH	Orange		69	21R	BL/V	94	04R	BN/WH	Blue
20	46T	V/OR	45	27T	WH/GN	Orange		70	22T	V/OR	95	03T	WH/GN	Blue
21	46R	OR/V	46	27R	GN/WH	Orange		71	22R	OR/V	96	03R	GN/WH	Blue
22	47T	V/GN	47	26T	WH/OR	Orange		72	23T	V/GN	97	02T	WH/OR	Blue
23	47R	GN/V	48	26R	OR/WH	Orange		73	23R	GN/V	98	02R	OR/WH	Blue
24	48T	V/BN	49	25T	WH/BL	Orange		74	24T	V/BN	99	01T	WH/BL	Blue
25	48R	BN/V	50	25R	BL/WH	Orange		75	24R	BN/V	100	01R	BL/WH	Blue

(2 of 2)





## 28 Connector pinning on NT card

### 28.1 Overview

### 28.2 1PPS-TTL interface signal

### 28.3 10 MHz-GPS interface signal

### 28.4 ToD/PPS interface signal

### 28.5 Local craft interface

## 28.1 Overview

This section describes the following connector signals and pinnings for the 7360 ISAM FX NT cards:

- [1PPS-TTL interface signal](#)
- [10 MHz-GPS interface signal](#)
- [ToD/PPS interface signal](#)
- [Local craft interface](#)

## 28.2 1PPS-TTL interface signal

Table 33 describes the signal from the 1PPS-TTL interface on the SMA connector.

**Table 33** 1PPS-TTL interface signal list

Signal name	Type	Description
1PPS-TTL	Output	1PPS output, PTP slave mode (single-ended, 50Ω)
	Input	1PPS input, PTP master mode (single-ended, 50Ω)
Shield	Input	Frame ground

## 28.3 10 MHz-GPS interface signal

Table 34 describes the signal for the 10 MHz GPS interface on the SMA connector.

**Table 34** 10 MHz GPS interface signal list

Signal name	Type	Description
10M_GPS-IN	Input	10 MHz GPS timing reference (sine wave, 50Ω, transformer coupled)
Shield	Input	Frame ground

## 28.4 ToD/PPS interface signal

Table 35 describes signal and pinning of the ToD/PPS connector on the validation pulse input interface.

**Table 35** ToD/PPS signal list and pinning

Signal name	Type	Pin number	Description
ToD_UART_T/F	Output	8	ToD UART TX, PTP master mode (differential pair, 100Ω)
	Input	7	ToD UART RX, PTP slave mode (differential pair, 100Ω)
ToD_1PPS_T/F	Output	6	1 PPS output, PTP master mode (differential pair, 100Ω)
	Input	3	1 PPS input, PTP slave mode (differential pair, 100Ω)
EG	REF	4,5	Electrical ground
FG	REF	CASE	Frame ground
NC	—	1,2	Not connected

## 28.5 Local craft interface

Table 36 provides the signals and pinning for the local craft interface connector.

**Table 36** Local craft interface signal list and pinning

Local craft port (RJ45)					Typical pinout for DB9 interface <sup>(1)</sup>	
Signal name	Description	Type	Pin number	Technology	Pin number	Signal name
LCMI_RI_DSR	Local-craft-mgt-itf "data-set-ready"	Output	1	EIA/TIA-562	6	DSR
					9	RI
LCMI_DCD	Local-craft-mgt-itf "data-carrier-detect"	Output	2	EIA/TIA-562	1	CD
LCMI_DTR	Local-craft-mgt-itf "data-terminal-ready"	Input	3	EIA/TIA-562	4	DTR
EG	Electrical ground or "signal ground"	REF	4	Ref.	5	GND
LCMI_RXD	Local-craft-mgt-itf related serial receive-data	Output	5	EIA/TIA-562	2	RXD
LCMI_TXD	Local-craft-mgt-itf related serial transmit-data	Input	6	EIA/TIA-562	3	TXD
LCMI_CTS	Local-craft-mgt-itf "clear-to-send"	Output	7	EIA/TIA-562	8	CTS
LCMI_RTS	Local-craft-mgt-itf "request-to-send"	Input	8	EIA/TIA-562	7	RTS

## Notes

- <sup>(1)</sup> DB9 cabling and pinning is dependent on the device connected to the local craft interface, and therefore may not be exactly as shown. Contact your Nokia representative for more information.



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## 29 Fiber optic handling and acceptance criteria

### 29.1 Overview

### 29.2 Handling considerations

### 29.3 Acceptance criteria for fiber optic device inspections

### 29.4 Fiber optic jumper cable care

### 29.5 Inspection of fiber optic devices

## 29.1 Overview

This section describes the handling of fiber optic devices and acceptance criteria for fiber optic device inspections.

Fiber optic connectors and receptacles must be clean and free of cracks, scratches, pits, and other surface distortions, for the connections to perform properly.

Observe the following:



**Danger** — Never look into the end of an optical fiber while optical power is being applied to the fiber. When cleaning or taking measurements, avoid eye exposure to open-ended fibers and optical connectors. The fibers and connectors may be connected to a laser transmitter. Use a microscope and video monitor when inspecting the end-face.



**Warning 1** — Always inspect and, if necessary, clean the fiber optic connectors before connecting them to any equipment.

**Warning 2** — Always use the proper cleaning materials, otherwise the fiber optic equipment may become contaminated.

**Warning 3** — Clean fiber optic receptacles only when the receptacles are connected for the first time, or if there is evidence of contamination.

**Warning 4** — While cleaning a fiber optic connector, do not touch the surface of the connector with your fingers.

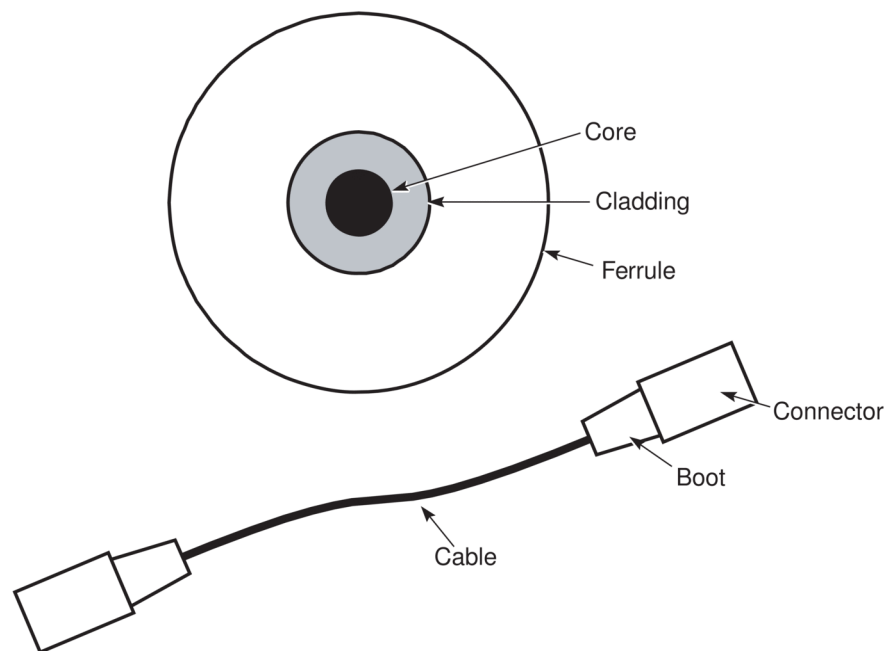


**Note** — In a fiber distribution network, it is an industry best practice to use APC-based connections or spliced connections to avoid any potential network problems. Nokia recommends that the unused ports of splitters be terminated into an APC-based connector.

## 29.2 Handling considerations

Figure 252 shows the main parts of a fiber optic cable.

**Figure 252** Parts of a fiber optic cable



29987

Consider the following when handling fiber optic devices and accessories:

- ensure the bend radius for single-mode optical fiber cable is not less than 4 in. (102 mm), and the bend radius for multimode optical fiber cable is not less than 6 in. (152 mm)
- handle cables with care; avoid twisting the cable while turning its connectors or routing the cable during installation
- connect or disconnect a connector by holding the sides of the connector and pulling gently
- do not pull on the boot of the connector
- do not touch the fiber cable end-faces

- do not expose the cable to excessive heat
- do not allow connectors to strike or drag across work surfaces, including the floor
- do not allow cables to support any weight
- do not use cable ties to secure fiber optic cables
- do not crush or damage fibers by placing objects on top of a cable or a connector, or by rough handling while mounting other nearby devices
- keep dust and contaminants away from fiber optic surfaces
- keep dust caps on connectors and input/output plugs on receptacles until just prior to installation
- store unused dust caps and plugs in an anti-static, zipper-locked plastic bag for future use
- replace dust caps and plugs if they:
  - fall on the floor
  - are cracked or damaged in any way
  - are dirty or exposed to dust in the environment

## 29.3 Acceptance criteria for fiber optic device inspections

Fiber optic connectors and receptacles must be visually inspected before every connection, including the first-time installation of components still in their original packaging. After the fiber optic devices pass inspection and the connection is made, it is not necessary to disassemble the connection for inspection.

To perform inspections, use a video microscope, a video monitor, and accessories.

The following guidelines apply to acceptance criteria.

- Loose contamination of any kind is not acceptable and must be cleaned from the end-face.
- For inspection purposes, pits are to be treated the same as non-removable contamination.
- When measuring oddly shaped contamination (non-round shapes), use the largest dimension.
- If contamination falls across more than one zone, use the acceptance criteria of the most stringent zone.
- For multi-fiber cable, each end-face must meet the inspection criteria.

### 29.3.1 Acceptance criteria

Acceptance criteria for single-mode end-faces are provided in Table 37. The zones referred to in Table 37 are shown in Figure 253.

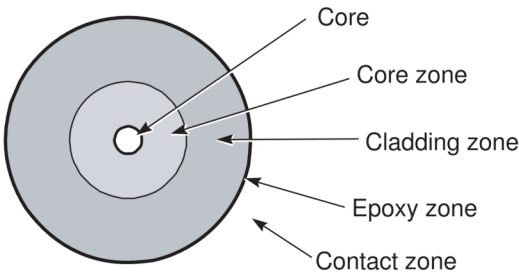
The result of an inspection can be one of three conditions:

- preferred
- acceptable
- unacceptable

**Table 37** Single-mode end-face inspection acceptance criteria

Zone	Diameter	Acceptance criteria (number and size)	
		Non-removable (contamination of pits)	Scratches
Core	9 μm	None	None
Core zone	<50 μm	None	None
Cladding zone	50 to 120 μm	Quantity: 3 max. Diameter: 5 μm max.	Quantity: 2 max. Width: 2 μm max.
Epoxy zone	120 to 130 μm	Quantity: no limit Diameter: 10 μm	No limit
Contact zone	130 to 250 μm	Quantity: no limit Diameter: 10 μm	No limit

**Figure 253** Single-mode end-face zones

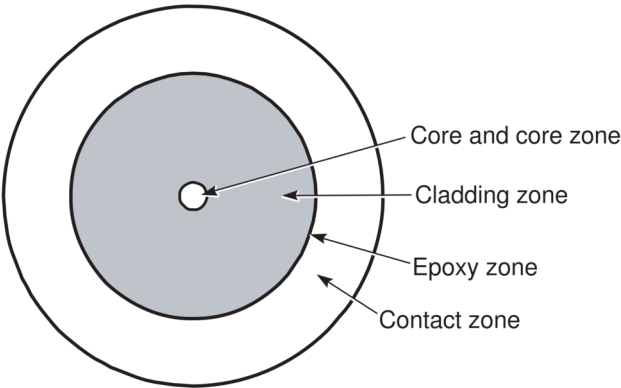


29988

The preferred condition of an end-face is shown in Figure 254. There should be no evidence of contamination, scratches, or any defect. Figure 254 also identifies the end-face zones shown in Figure 253. For clarity, the zones are not shown to scale, and the core and core zones are shown as one zone.



Figure 254 Preferred condition of fiber optic end-face




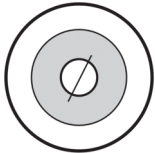
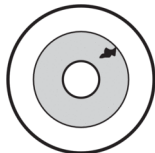

29989

Table 38 describes acceptable and unacceptable conditions.

Table 38 Acceptable and unacceptable conditions for fiber optic end-faces

Criteria	Acceptable		Unacceptable	
Contamination, particles, or pits in single-mode fiber	Contamination within cladding zone, but outside core zone Diameter is < 5 µm		Contamination in core zone	
	Contamination in contact zone Diameter is < 10 µm		Contamination (large particle) in cladding zone Diameter is > 10 µm	
	—	—	Removable contamination (oil)	

(1 of 2)

Criteria	Acceptable		Unacceptable	
Scratches in single-mode fiber	One scratch in cladding zone, or multiple scratches in a contact zone		One scratch through core	
Contamination particles or pits in multi-mode fiber	Contamination in cladding or epoxy zone Diameter is < 10 µm		Contamination, large particle in cladding zone Diameter is > 10 µm	

(2 of 2)

## 29.4 Fiber optic jumper cable care

Use the following guidelines to care for fiber optic jumper cables:

- store all unused fiber optic jumper cables in a cabinet
- hang all unused fiber jumper optic cables on a cable rack, or lay them flat in a cupboard
- ensure there is no tension on the fiber optic cable, or any sharp bending, twisting, or kinks (micro-bends)
- ensure that the radius of the bend meets the specifications of the manufacturer, or is at least 1.5 in. (38 mm)
- cover the end connectors with dust caps when the fiber-optic jumper cable is not in use

## 29.5 Inspection of fiber optic devices

You need the following items to perform an inspection of fiber optic devices (receptacles, cable jacket, ferrule, and connectors):

- 200x video microscope
- video monitor
- adapters for connectors and receptacles
- instructions for the use of the kit components

- items for cleaning:
  - optical grade stick cleaners (swabs) that have a tightly wrapped tip (1.25 mm, 2.50 mm, and 4.0 mm)
  - cassette cleaner (reel type or equivalent), or lint-free, nonabrasive cloths
  - pure optical-grade isopropyl alcohol for cleaning connector end-faces
  - a can of contaminant-free compressed air (dry nitrogen) for removing dust from the receptacles or the connectors (ferrule and end-face surfaces)



**Note** — Do not use commercially compressed air or house air.

## Procedure 95 Inspection of fiber optic devices

Follow this procedure to inspect fiber optic devices.

- 
- 1 Disconnect any power to the fiber optic device before inspection or cleaning.



**Danger** — Never look into the end of an optical fiber while optical power is being applied to the fiber. When cleaning or taking measurements, avoid eye exposure to open-ended fibers and optical connectors. The fibers and connectors may be connected to a laser transmitter. Use a microscope and video monitor when inspecting the end-face.

- 
- 2 If this is not a first-time inspection, gently disconnect the fiber optic connector from the receptacle.

- 
- 3 Using the inspection kit, inspect the receptacle.

If the receptacle is contaminated (that is, it does not pass acceptance criteria in [“Acceptance criteria for fiber optic device inspections”](#)), clean the receptacle (see Procedure [“Clean the fiber optic receptacles”](#)).

- 
- 4 Inspect the cable jacket for nicks, cuts, bends, kinks, or other signs of damage.



**Note** — Do not use the cable if there is damage.

- 
- 5 Inspect the ferrule for signs of damage, for example scratches, cracks, or damaged guide holes (badly worn or out-of-round).



**Note —** Do not use the device if there is damage.

- 
- 6 Using the inspection kit, inspect the connector.

If the connector does not pass acceptance criteria in [“Acceptance criteria for fiber optic device inspections”](#), clean the connector (see Procedure [“Clean the fiber optic cable connectors”](#)).

- 
- 7 Reconnect the connector and receptacle, and check for proper function.



**Note 1 —** Do not use optical devices that do not function properly.

**Note 2 —** In a fiber distribution network, it is an industry best practice to use APC-based connections or spliced connections to avoid any potential network problems. Nokia recommends that the unused ports of splitters be terminated into an APC-based connector.

- 
- 8 STOP. This procedure is complete.
- 

## Procedure 96 Clean the fiber optic receptacles

Follow this procedure to clean the fiber optic receptacles.

- 
- 1 Ensure that the receptacle has been inspected.
- 
- 2 Clean the receptacle using an optical grade dry stick cleaner (swab) with a tightly wrapped tip (1.25 mm, 2.50 mm, and 4.0 mm).
- i Insert the stick in the receptacle and gently rotate it, making three full rotations and using a lifting/plucking motion each time you stop to re-grip the stick.
  - ii Use a new stick for each port.
  - iii Re-inspect the receptacle.

- 
- 3 If the receptacle fails the inspection, and it appears the contaminant can be dislodged using canned compressed air, apply a short burst of air to the end-face to remove the contaminant.



**Note —** Do not allow the extension tube of the can to touch the bottom surface of the receptacle.

- 
- 4 Re-inspect the receptacle. If the receptacle fails the inspection, repeat step 2 and step 3 several times.
- 
- 5 If the receptacle still fails the inspection, clean the receptacle using a stick cleaner saturated with optical-grade isopropyl alcohol.
- i Put the stick in the receptacle and gently rotate it, as described in step 2.
  - ii Remove any alcohol residue using a dry stick cleaner.
  - iii Re-inspect the receptacle.
- 
- 6 If necessary, repeat cleaning and inspecting several times or until the receptacle passes the inspection as described in [“Acceptance criteria for fiber optic device inspections”](#).



**Note —** Do not use a receptacle that does not pass inspection.

- 
- 7 STOP. This procedure is complete.
- 

## Procedure 97 Clean the fiber optic cable connectors

Follow this procedure to clean the fiber optic cable connectors.

- 
- 1 Ensure the fiber optic cable connector has been inspected.
- 
- 2 Clean the connector by gently wiping the ferrule and end-face surfaces using a cleaner cassette or a dry lint-free cloth.
- 
- 3 Re-inspect the connector.
-

- 
- 4 If the connector fails the inspection, clean the connector by gently wiping the ferrule and end-face surfaces using a cleaner cassette that has a drop of optical-grade isopropyl alcohol applied to it. Alternately, use a lint-free cloth that has a drop of optical-grade isopropyl alcohol applied to it.



**Note —** You may need to open the cleaner cassette window by hand to apply the alcohol to the cassette.

- 
- 5 Remove any alcohol residue by gently wiping the ferrule and end-face surfaces with a dry section of cleaner cassette, or a lint-free cloth.
- 
- 6 Re-inspect the connector.
- 
- 7 If necessary, repeat step 2 through step 6 until the connector passes the inspection.
- 
- 8 If the connector continues to fail inspection after several attempts at cleaning, use the canned, compressed air to remove any dust or debris.



**Note —** Do not allow the extension tube of the can to touch the fiber.

- 
- 9 Re-inspect the connector.
- 
- 10 If the connector fails the inspection, repeat step 2 through step 6 again.
- 
- 11 Re-inspect the connector.



**Note —** Typically you should not use a cable that does not pass inspection. However, only a live test informs you if a connector cannot be used.

- 
- 12 STOP. This procedure is complete.
-

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