HUNGERFORD & TERRY, INC.

Manufacturers of Water Treating Equipment
226 Atlantic Avenue
Clayton, NJ 08312-0650
Phone (856) 881-3200 Fax (856) 881-6859

DOCUMENT TRANSMITTAL

URGENT ATTENTION REQUIRED!

File No.: SUB_M345-03

To: Steckbeck Engineering & Surveying, Inc.
279 N. Zinns Mill Road
Lebanon, PA 17042

Date: March 25, 2024
Page: 1 of 2
H&T Contract No.: M-345

Attention: Paul Lutzkanin, PE, CSE
Email: plutzkanin@steckbeck.net

Job: Fredericksburg Sewer & Water Auth.
Fredericksburg, PA

We are:

[✓] Submitting for approval
[ ] Resubmitting for approval
[ ] Sending for your information
[ ] Sending as requested
[ ] _____

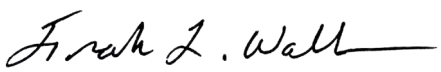
The following [✓] enclosed [ ] under separate cover

Format	Dwg. No.	Rev.	Title or Description
PDF	33552-AE01	0	Filter Control Panel "FCP" PLC Architecture
	-AE02	0	Filter Control Panel "FCP" Exterior Views
	-AE03	0	Filter Control Panel "FCP" Interior Views
	-AE04	0	Filter Control Panel "FCP" Electrical Wiring Diagram (Sheet "A")
	-AE05	0	Filter Control Panel "FCP" Electrical Wiring Diagram (Sheet "B")
	-AE06	0	Filter Control Panel "FCP" Electrical Wiring Diagram (Sheet "C")
Remarks:			

[✓] Please return to us, as soon as possible, one copy of each drawing with your approval and or comments noted.
[ ] Fabrication is proceeding in accordance with these drawings.
[✓] Fabrication is being held pending return of approved prints. Delay in returning drawings will extend the delivery schedule.
[ ] Fabrication of major equipment is proceeding in accordance with these drawings.
[ ] Minor Equipment is being held pending return of approved prints.

REPRESENTATIVE:

HUNGERFORD & TERRY, INC.



Frank L. Walls
Manager, Electrical Department
fwalls@hungerfordterry.com

Contract\M-345\Eng.\SUB_M345-03

Format	Dwg. No.	Rev.	Title or Description
PDF	33552-AE07	0	Filter Control Panel "FCP" Electrical Wiring Diagram (Sheet "D")
	-AE08	0	Filter Control Panel "FCP" Electrical Wiring Diagram (Sheet "E")
	-AE09	0	Filter Control Panel "FCP" Electrical Wiring Diagram (Sheet "F")
	-AE10	0	Filter Control Panel "FCP" Electrical Wiring Diagram (Sheet "G")
	-AE11	0	Filter Control Panel "FCP" Electrical Wiring Diagram (Sheet "H")
	-AE12	0	Filter Control Panel "FCP" Electrical Wiring Diagram (Sheet "I")
	-AE13	0	Filter Control Panel "FCP" Electrical Wiring Diagram (Sheet "J")
	-AE14	0	Filter Control Panel "FCP" Electrical Wiring Diagram (Sheet "K")
	-AE18	0	Filter Skid Junction Box Details
	-AE19	0	Air Blower No. 1 & No. 2 Motor Starter Details
	-AE25	0	Filter No. 1 Ladder Logic Diagram
	-AE26	0	Filter No. 2 Ladder Logic Diagram
	-AE27	0	Filter No. 3 Ladder Logic Diagram
	-AE28	0	Filter No. 4 Ladder Logic Diagram
	-AE29	0	Filters Common & Wash Sequencer Ladder Logic Diagram
	-AE30	0	Air Blowers Ladder Logic Diagram
	-AE31	0	Alarms Ladder Logic Diagram
	-AE32	0	General Notes, Sequence & Coil Location Charts
	-CE01	0	Filter System Electrical Equipment List
	-CE02	0	I/O Load Calculation
	-CE03	0	24VDC Power Supply Load Calculation
			Product Data Sheets

HUNGERFORD & TERRY, INC.

Manufacturers of Water Treating Equipment

P.O. BOX 650
CLAYTON, NEW JERSEY 08312-0650
856-881-3200
FAX 856-881-6859
www.hungerfordterry.com

Steckbeck Engineering & Surveying, Inc.
279 N. Zinns Mill Road
Lebanon, PA 17042

March 25, 2024

Reference: Fredericksburg Sewer & Water Authority
Fredericksburg, PA
H&T Contract #M-345

Dear Mr. Paul Lutzkanin, PE, CSE

Hungerford & Terry is submitting our electrical drawing package for the Filter Control Panel "FCP" and the Air Blower Motor Starters. As requested, an electronic version of the submittal is provided. Please note the following comments regarding the submittal:

A. As shown on drawing #33552-AE01, H&T has selected the Ethernet IP Addresses for the equipment provided inside the Filter Control Panel "FCP". It is our understanding that there will be a SCADA Panel supplied; please have the Systems Integrator confirm these IP Addresses are acceptable.
   See GES Automation Technology responses in email body.
B. Due to extremely long lead times, H&T respectfully request permission to proceed with ordering all of the materials required for the Filter Control Panel "FCP" and the Air Blower Motor Starters; including the enclosure as soon as possible.
   Order parts as you see necessary.
C. As shown on drawing numbers 33552-AE02 & AE03, we have designed the Filter Control Panel "FCP" to receive all field wiring through the TOP of the panel. Please confirm that this is acceptable for this project.
   TOP feed is ACCEPTABLE and preferred.
D. H&T will submit a set of OIT screens for information after receiving approval for these hardware drawings.
   We will be happy to review them, when available.
E. H&T has shown on drawing number 33552-AE29 the required data to be received from the SCADA panel and requested data forwarded to the SCADA panel via the Ethernet/IP data link.
   Forwarded to GES Automation Technology. They are not working on this as an active project, yet.

Should there be any questions or comments, please do not hesitate to contact me at 1-856-881-3200, ext. 219.

Sincerely,
HUNGERFORD & TERRY, INC.

Frank L. Walls
Manager of Electrical Department

ELECTRICAL DRAWINGS

FOR: Fredericksburg Sewer & Water Authority
Fredericksburg, PA

☒ REVIEWED ☐ REVISE AND RESUBMIT

☐ REJECTED ☐ FURNISH AS CORRECTED

Corrections or comments on shop drawings during this review do not relieve the Contractor from compliance with the drawings and/or specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. The contractor is responsible for: confirming and correlating all dimensions and quantities; selecting fabrication processes and techniques of construction; coordinating his work with that or all other trades; and performing his work in a safe and satisfactory manner.

Date: March 27, 2023 **By:** Paul Lutzkanin, P.E.

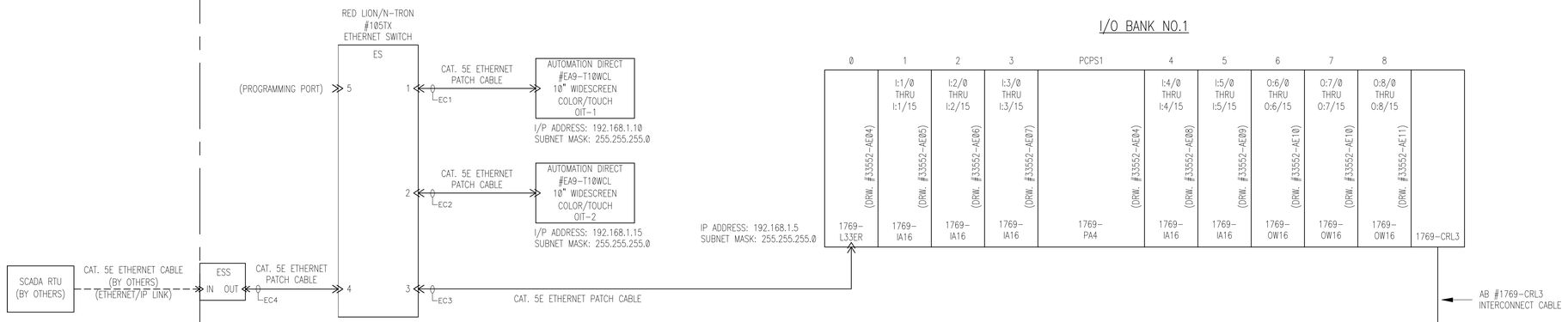
STECKBECK ENGINEERING & SURVEYING, INC.

HUNGERFORD & TERRY, INC.
226 Atlantic Avenue
Clayton, New Jersey

Contract No.: **M-345**
Drawing Series No.: **33552**
Submitted: **March 25, 2024**

FIELD

FILTER CONTROL PANEL "FCP"
PLC SYSTEM ARCHITECTURE



NOTE: ALL ANALOG SHALL BE 4-20mA TYPE.

NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

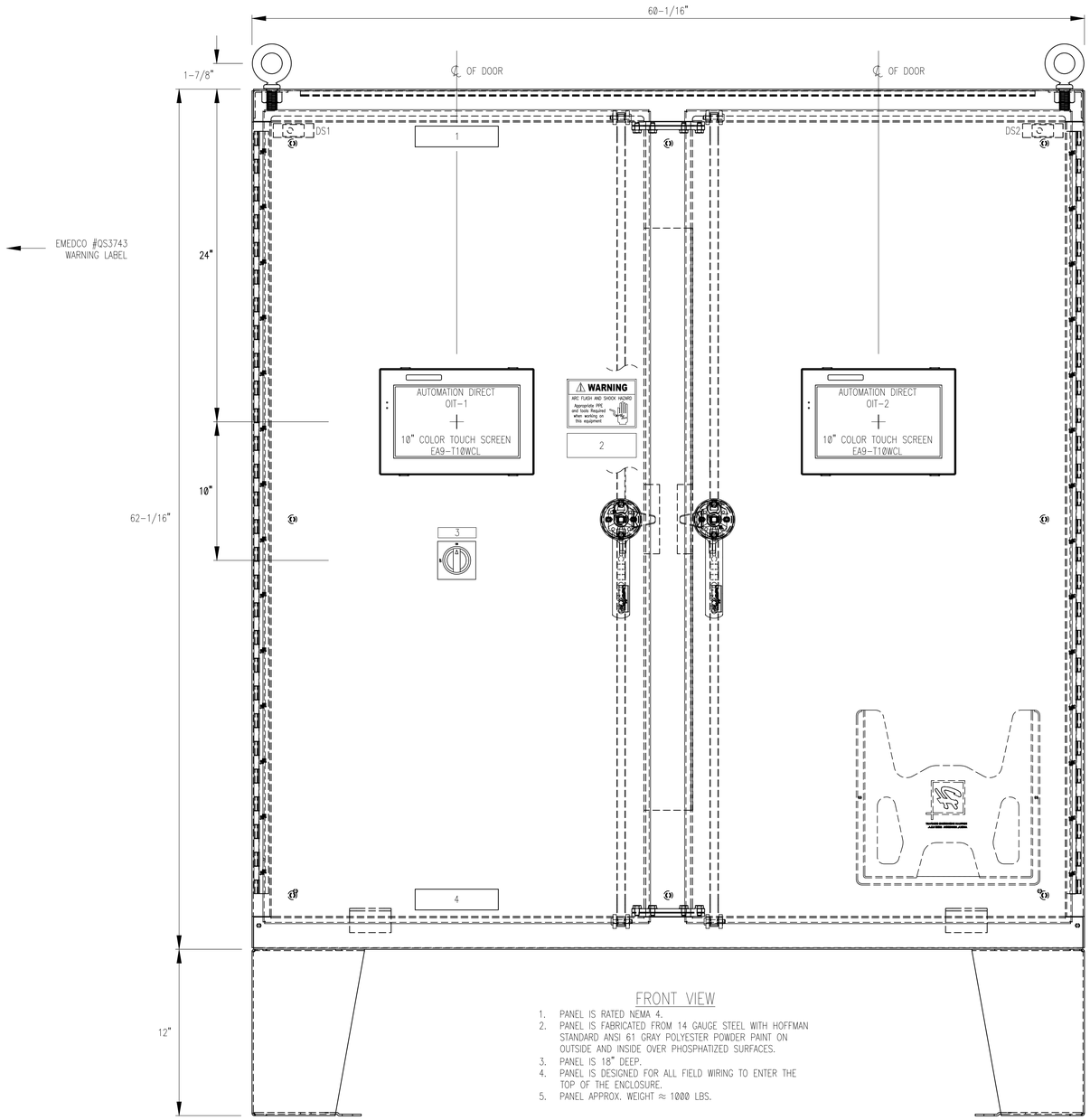
FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER CONTROL PANEL "FCP"
PLC ARCHITECTURE

DATE		
STARTED	12-11-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-23	FLW
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE01	0



FRONT VIEW

1. PANEL IS RATED NEMA 4.
2. PANEL IS FABRICATED FROM 14 GAUGE STEEL WITH HOFFMAN STANDARD ANSI 61 GRAY POLYESTER POWDER PAINT ON OUTSIDE AND INSIDE OVER PHOSPHATIZED SURFACES.
3. PANEL IS 18" DEEP.
4. PANEL IS DESIGNED FOR ALL FIELD WIRING TO ENTER THE TOP OF THE ENCLOSURE.
5. PANEL APPROX. WEIGHT ≈ 1000 LBS.

N/P NO.	NO. REQ'D	NAMEPLATE INSCRIPTION	SIZE
1	1	FILTER CONTROL PANEL "FCP"	1-1/2" X 6"
2	1	WARNING! MULTIPLE SOURCES OF ELECTRICAL POWER WITHIN THIS ENCLOSURE	1-3/4" X 5"
3	1	INCOMING 120V POWER DISCONNECT	3/4" X 2-3/4"
4	1	H & T, INC.	1-1/2" X 6"

NOTES:
1. NAMEPLATE MATERIAL TO BE WHITE GRAVOPLY ENGRAVING STOCK WITH MATTE FINISH, BLACK LETTERING AND ATTACHED WITH "3M" ADHESIVE TAPE.
2. ALL TEXT SHALL BE 3/16"H X 1/8"W, EXCEPT FOR N/P #1 TEXT SHALL BE 3/8"H X 1/4"W.
3. N/P #2 SHALL BE RED GRAVOPLY ENGRAVING STOCK WITH WHITE LETTERING.

CONSTRUCTION NOTES:

1. ALL INTERNAL CONTROL PANEL WIRE SHALL BE AS FOLLOWS:
   - POWER, CONTROL AND SIGNAL #14AWG TYPE THNN, EXCEPT AS NOTED.
   - ALL SHIELDED CABLE SHALL BE ALPHA #2432C, 300V, #16AWG.
   - ALL EXPOSED DRAIN WIRES SHALL BE PROTECTED WITH SHRINK TUBING.
   - ALL WIRING GOING TO DOOR SHALL BE PROTECTED BY SPIRAL WRAP.
2. ALL WIRING SHALL BE RUN IN WIRE DUCT, WHEREVER PRACTICAL.
3. WIRE SLEEVES SHALL BE HEAT-SHRINKABLE, PANDUIT OR PHOENIX CONTACT WHITE WIRE MARKERS.
4. ALWAYS LOCATE EQUIPMENT TERMINALS BY MARKING (WHEN MARKED), NOT LOCATION.
5. ALL CHASSIS & POWER GROUNDS SHALL BE INDIVIDUALLY TIED ONTO A GROUND BUS.
6. ALL BROKEN LINE WIRING (ALL FIELD WIRING, CONDUIT/FITTINGS & WIRE TERMINATIONS) IS REMOTE FROM PANEL AND BY ELECTRICAL CONTRACTOR.
7. ALL INTERNAL LABELS SHALL BE WHITE GRAVOPLY ENGRAVING STOCK WITH MATTE FINISH AND 3/16" HIGH, BLACK LETTERING AND ATTACHED WITH "3M" ADHESIVE TAPE.
8. NUMBERS AND/OR LETTERS IN ▭ ARE TERMINAL BLOCKS IN FILTER CONTROL PANEL.
9. NUMBERS AND/OR LETTERS IN ▭ ARE KNIFE DISCONNECTS IN FILTER CONTROL PANEL.
10. NUMBERS AND/OR LETTERS IN ▭ ARE FUSIBLE DISCONNECTS IN FILTER CONTROL PANEL.
11. NUMBERS AND/OR LETTERS OVER ● ARE EQUIPMENT TERMINALS.
12. PANEL TO HAVE AN UL-508A SERIALIZED LABEL FOR TYPE 4.
13. VALVE INDICATOR INPUTS WILL BE ENERGIZED WHEN VALVE IS IN FULL CLOSED OR IN FULL OPEN POSITION.
14. WIRING DIAGRAMS ARE SHOWN WITH POWER OFF.

WIRE COLOR CODE

L1_____BLACK
L2_____WHITE
GROUND_____GREEN
CIRCUITS POWERED
FROM REMOTE SOURCE___YELLOW
DC_____BLUE
ALL OTHERS_____RED

ANALOG SHIELDED CABLE:
(+)_____RED
(-)_____BLACK

NO.	REVISIONS	DATE	CK'D

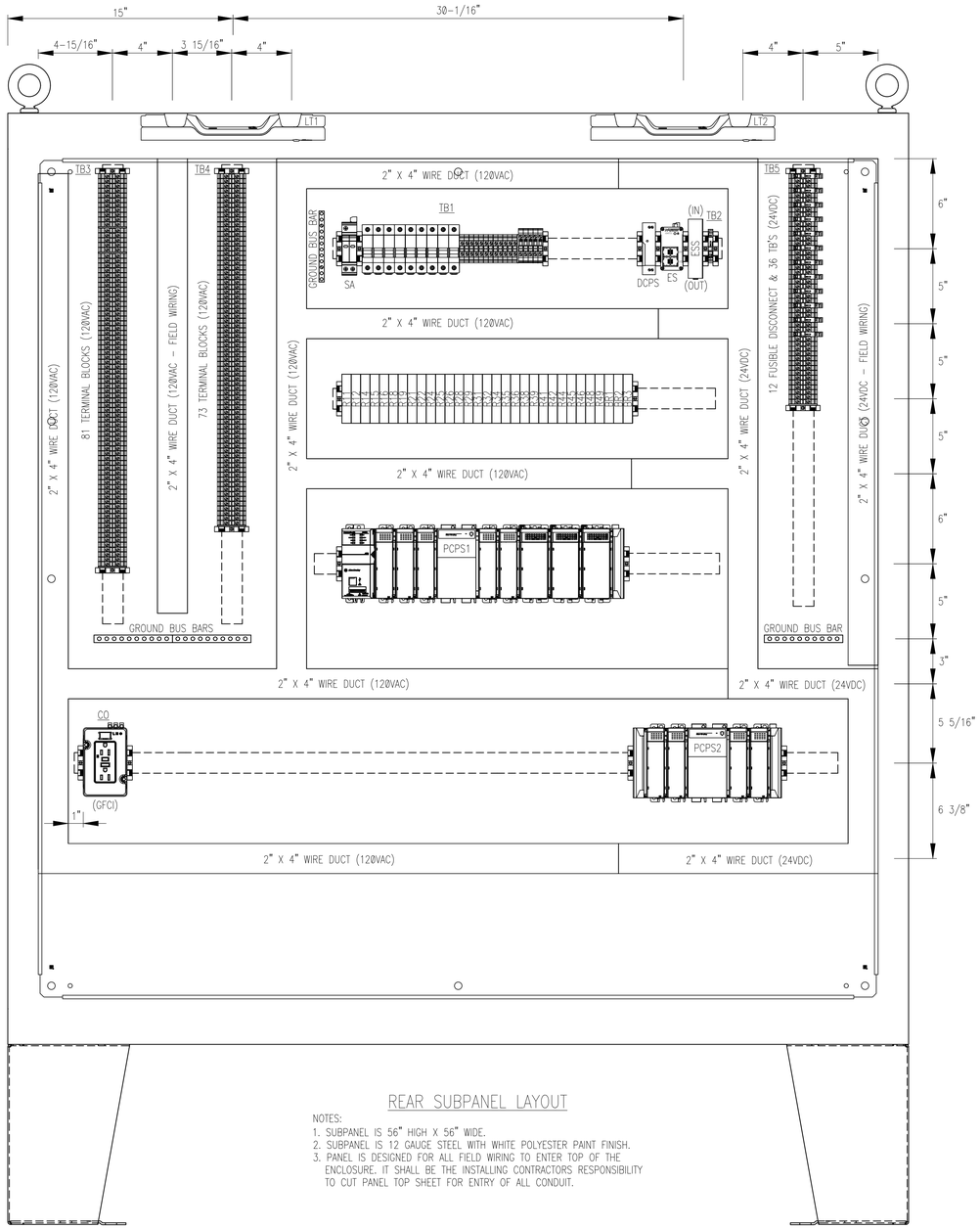
HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER CONTROL PANEL "FCP"
EXTERIOR VIEWS

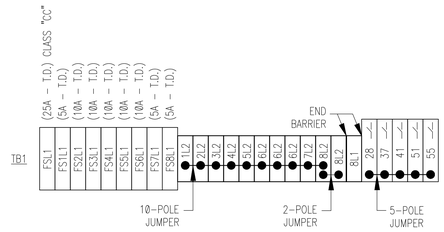
DATE		SCALE	1/4"=0"-1"
STARTED	12-11-23 JMF	FORM NO.	
FINISHED	3-18-24 JMF	CONT NO.	M-345
CHECKED	3-22-24 FLW		
APPROVED			

DRAWING NO.	REV.
33552-AE02	0

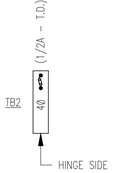


REAR SUBPANEL LAYOUT

NOTES:
1. SUBPANEL IS 56" HIGH X 56" WIDE.
2. SUBPANEL IS 12 GAUGE STEEL WITH WHITE POLYESTER PAINT FINISH.
3. PANEL IS DESIGNED FOR ALL FIELD WIRING TO ENTER TOP OF THE ENCLOSURE. IT SHALL BE THE INSTALLING CONTRACTORS RESPONSIBILITY TO CUT PANEL TOP SHEET FOR ENTRY OF ALL CONDUIT.

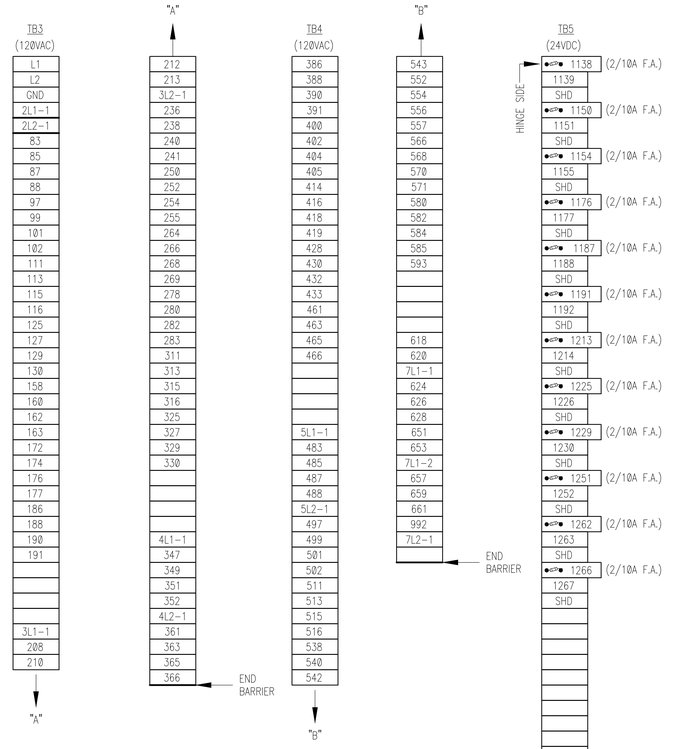


(1 - 120VAC CLASS "CC" FUSE HOLDER)
(8 - 120VAC MIDGET FUSE HOLDERS)
(12 - 120VAC TERMINAL BLOCKS)
(5 - 120VAC KNIFE DISCONNECTS)



(1 - 24VDC FUSIBLE DISCONNECT)

TERMINAL BLOCK DETAILS



NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER CONTROL PANEL "FCP"
INTERIOR VIEWS

DATE		
STARTED	12-11-23	JJF
FINISHED	3-16-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

SCALE 1/4"=0"-1"
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE03	0

FIELD

FILTER CONTROL PANEL "FCP"

120V/1PH/60H, 30A BRANCH CIRCUIT PROTECTED POWER SUPPLY FROM POWER PANEL "XX", CKT #X (10K A.I.C.)

N — L2 — L2 (#10AWG)

L — L1 — L1 (#10AWG) — FSL1 (25A) — L1A (#10AWG) — PDS (MOUNTED ON PANEL DOOR) — L1B (#10AWG)

CONTROL POWER OFF / ON / OX

G — GND — (#10AWG)

8L2, 7L2, 6L2, 5L2, 4L2, 3L2, 2L2, 1L2

FS1L1 (5A) — 1L1 — 1L2

PE, L1, N — (#10 AWG)

11, 14 — SA — SURGE ARRESTOR

FS2L1 (10A) — 2L1 — 2L2 — (120VAC) — CONTINUED ON DRAWING NO. 33552-AE05

FS3L1 (10A) — 3L1 — 3L2 — (120VAC) — CONTINUED ON DRAWING NO. 33552-AE05

FS4L1 (10A) — 4L1 — 4L2 — (120VAC) — CONTINUED ON DRAWING NO. 33552-AE06

FS5L1 (10A) — 5L1 — 5L2 — (120VAC) — CONTINUED ON DRAWING NO. 33552-AE07

FS6L1 (10A) — 6L1 — 6L2

FS7L1 (5A) — 7L1 — 7L2 — (120VAC) — CONTINUED ON DRAWING NO. 33552-AE08

FS8L1 (5A)

LED LIGHT W/ MOTION SENSOR — LT1 — (5W)

LED LIGHT W/MOTION SENSOR — LT2 — (5W)

8L1 — 8L2

GFCI — L, N — CO

8L1 — 8L2

G — (FOR LAPTOP PROGRAMMER)

DC POWER SUPPLY (72VA) — AC — L, N — DCPS

28 — 28 — 6L2

31 — (+) 24VDC OUT (-) — 31A — (30W MAX)

(1/2A) — 40 — 40

RED LION/N-TRON 105TX ETHERNET SWITCH — (+) (215mA) — ES — (-) — GND (CHASSIS)

OPERATOR INTERFACE TERMINAL EA9-T10WCL COLOR/TOUCH (MOUNTED ON PANEL DOOR) — OIT-2 — (68VA MAX) — AC — L, N — GND — AC POWER ADAPTER — ETHERNET

41 — 41 — 6L2

IP ADDRESS: 192.168.1.15
SUBNET MASK: 255.255.255.0

CAT. 5E ETHERNET PATCH CABLE (BLUE) — 2 — EC2

OPERATOR INTERFACE TERMINAL EA9-T10WCL COLOR/TOUCH (MOUNTED ON PANEL DOOR) — OIT-1 — (68VA MAX) — AC — L, N — GND — AC POWER ADAPTER — ETHERNET

55 — 55 — 6L2

IP ADDRESS: 192.168.1.10
SUBNET MASK: 255.255.255.0

SCADA RTU (BY OTHERS) — (ETHERNET/IP LINK) (CABLE BY OTHERS) — ESS — (IN) (OUT) — CAT. 5E ETHERNET PATCH CABLE (BLUE) — EC4 — 4

(PROGRAMMING PORT) — 5

CAT. 5E ETHERNET PATCH CABLE (BLUE) — 1 — EC1

CAT. 5E ETHERNET PATCH CABLE (BLUE) — 3 — EC3

I/O BANK NO. 2 — PCPS2 — PA4 — (200VA) — 120/240 VAC, VAC COM, CHASSIS GROUND

37 — 37 — 6L2

#1769-CRL3

I/O BANK NO. 1 — PCPS1 — PA4 — (200VA) — 120/240 VAC, VAC COM, CHASSIS GROUND

51 — 51 — 6L2

CPU — ETHERNET PORT #1 — ETHERNET PORT #2 — L33ER — MODULE 0

IP ADDRESS: 192.168.1.5
SUBNET MASK: 255.255.255.0

NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

H&T INC. PURE WATER

HUNGERFORD & TERRY, INC.

MANUFACTURERS OF WATER TREATING EQUIPMENT

CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER CONTROL PANEL "FCP"
ELECTRICAL WIRING DIAGRAM (SHEET "A")
POWER DISTRIBUTION
(LINES 1 THRU 75)

DATE		
STARTED	12-12-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE04	0

FILTER NO. 1 SKID

FILTER CONTROL PANEL "FCP"

FILTER NO. 1 INLET VALVE CV-11

FILTER NO. 1 JUNCTION BOX

CONTINUED FROM DRAWING NO. 33552-AE04 (120VAC) 2L1 2L2

DIGITAL INPUT 16-POINT 1769-IA16 MODULE NO. 1

7 FULL OPEN C D FULL CLOSED A B G COM 1 OPEN 2 CLOSE 3

2L1-1 83 85 87 88 2L2-1

R11 14 11 12

0 I:1/0 1 I:1/1

(0.6 FLA/1.0 LRA)

FILTER NO. 1 OUTLET VALVE CV-12

97 99 101 102

R12

2 I:1/2 3 I:1/3

(0.6 FLA/1.0 LRA)

FILTER NO. 1 BACKWASH OUTLET VALVE CV-14

2L1-1A 111 113 115 116 2L2-1A

R14

4 I:1/4 5 I:1/5

(1.0 FLA/2.1 LRA)

FILTER NO. 1 RINSE VALVE CV-15

125 127 129 130

R15

6 I:1/6 7 I:1/7

(0.6 FLA/1.0 LRA)

"A" "B"

CONTINUED ON THIS DRAWING

CONTINUED ON THIS DRAWING

2L1 2L2 (120VAC)

CONTINUED ON THIS DRAWING

FILTER NO. 1 SKID

FILTER CONTROL PANEL "FCP"

FILTER NO. 1 JUNCTION BOX

CONTINUED FROM THIS DRAWING "A" "B"

FILTER NO. 1 AIR PRESSURIZING VALVE CV-16

2L1-1B 158 160 162 163 2L2-1B

R16

(0.6 FLA/1.0 LRA)

FILTER NO. 1 AIR WASH INLET VALVE CV-18

172 174 176 177

R18

(0.6 FLA/1.0 LRA)

FILTER NO. 1 DRAINDOWN VALVE CV-19

2L1-1C 186 188 190 191 2L2-1C

R19

(0.6 FLA/1.0 LRA)

"C" "D" "E" "F"

CONTINUED ON DRAWING NO. 33552-AE12

CONTINUED FROM THIS DRAWING (120VAC) 2L1 2L2

CONTINUED FROM DRAWING NO. 33552-AE10

CONTINUED FROM THIS DRAWING

DIGITAL INPUT 16-POINT 1769-IA16 MODULE NO. 1

8 I:1/8 9 I:1/9 10 I:1/10 11 I:1/11 12 I:1/12 13 I:1/13 14 I:1/14 15 I:1/15 AC COM AC COM

FILTER NO. 2 SKID

FILTER NO. 2 INLET VALVE CV-21

FILTER NO. 2 JUNCTION BOX

3L1-1 208 210 212 213 3L2-1

R21

(0.6 FLA/1.0 LRA)

"G" "H" "I" "J"

CONTINUED ON DRAWING NO. 33552-AE06

CONTINUED FROM DRAWING NO. 33552-AE04 (120VAC) 3L1 3L2

3L1 3L2 (120VAC)

CONTINUED ON DRAWING NO. 33552-AE06

NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.

MANUFACTURERS OF WATER TREATING EQUIPMENT

CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER CONTROL PANEL "FCP" ELECTRICAL WIRING DIAGRAM (SHEET "B") I/O MODULE NO. 1 (LINES 76 THRU 225)

DATE		
STARTED	12-12-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE05	0

FILTER NO. 2 SKID

FILTER CONTROL PANEL "FCP"

FILTER NO. 2 JUNCTION BOX

CONTINUED FROM DRAWING NO. 33552-AE05

CONTINUED FROM DRAWING NO. 33552-AE05 (120VAC) 3L1 3L2

DIGITAL INPUT 16-POINT 1769-IA16 MODULE NO. 2

FILTER NO. 2 OUTLET VALVE CV-22

FULL OPEN C D

FULL CLOSED A B

OPEN 2

CLOSE 3

G COM 1

(0.6 FLA/1.0 LRA)

236 238 240 241

R22 14 11 12

0 I:2/0 1 I:2/1

FILTER NO. 2 BACKWASH OUTLET VALVE CV-24

3L1-1A 250 252 254 255 3L2-1A

(1.0 FLA/2.1 LRA)

R24

2 I:2/2 3 I:2/3

FILTER NO. 2 RINSE VALVE CV-25

264 266 268 269

(0.6 FLA/1.0 LRA)

R25

4 I:2/4 5 I:2/5

FILTER NO. 2 AIR PRESSURIZING VALVE CV-26

3L1-1B 278 280 282 283 3L2-1B

(0.6 FLA/1.0 LRA)

R26

6 I:2/6 7 I:2/7

"G" "H" "I" "J" "K" "L" "M" "N"

CONTINUED ON THIS DRAWING

CONTINUED ON THIS DRAWING

CONTINUED ON THIS DRAWING

FILTER NO. 2 SKID

FILTER NO. 2 JUNCTION BOX

CONTINUED FROM THIS DRAWING

FILTER NO. 2 AIR WASH INLET VALVE CV-28

311 313 315 316

(0.6 FLA/1.0 LRA)

R28

8 I:2/8 9 I:2/9

FILTER NO. 2 DRAINDOWN VALVE CV-29

3L1-1C 325 327 329 330 3L2-1C

(0.6 FLA/1.0 LRA)

R29

10 I:2/10 11 I:2/11

"O" "P" "Q" "R"

CONTINUED ON DRAWING NO. 33552-AE12

FILTER NO. 3 SKID

FILTER NO. 3 INLET VALVE CV-31

FILTER NO. 3 JUNCTION BOX

4L1-1 347 349 351 352 4L2-1

(0.6 FLA/1.0 LRA)

R31

12 I:2/12 13 I:2/13

FILTER NO. 3 OUTLET VALVE CV-32

361 363 365 366

(0.6 FLA/1.0 LRA)

R32

14 I:2/14 15 I:2/15

"S" "T"

CONTINUED ON DRAWING NO. 33552-AE07

CONTINUED FROM THIS DRAWING

CONTINUED FROM THIS DRAWING (120VAC) 3L1 3L2

CONTINUED FROM DRAWING NO. 33552-AE10

CONTINUED FROM DRAWING NO. 33552-AE04 (120VAC) 4L1 4L2

CONTINUED ON DRAWING NO. 33552-AE07

AC COM AC COM

NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

H&T INC. PURE WATER

HUNGERFORD & TERRY, INC.

MANUFACTURERS OF WATER TREATING EQUIPMENT

CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER CONTROL PANEL "FCP"
ELECTRICAL WIRING DIAGRAM (SHEET "C")
I/O MODULE NO. 2
(LINES 226 THRU 375)

DATE		
STARTED	12-12-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE06	0

FILTER NO. 3 SKID

FILTER NO. 3 JUNCTION BOX

CONTINUED FROM DRAWING NO. 33552-AE06

"S" "T"

FILTER NO. 3 BACKWASH OUTLET VALVE CV-34

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

4L1-1A 386 388 390 391 4L2-1A

(1.0 FLA/2.1 LRA)

FILTER NO. 3 RINSE VALVE CV-35

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

400 402 404 405

(0.6 FLA/1.0 LRA)

FILTER NO. 3 AIR PRESSURIZING VALVE CV-36

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

4L1-1B 414 416 418 419 4L2-1B

(0.6 FLA/1.0 LRA)

FILTER NO. 3 AIR WASH INLET VALVE CV-38

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

428 430 432 433

(0.6 FLA/1.0 LRA)

"U" "V"

CONTINUED ON THIS DRAWING

FILTER CONTROL PANEL "FCP"

CONTINUED FROM DRAWING NO. 33552-AE06

(120VAC) 4L1 4L2

DIGITAL INPUT 16-POINT 1769-IA16 MODULE NO. 3

386	386	0 I:3/0
388	388	1 I:3/1
390	390	R34 14 11 12
391	391	
400	400	2 I:3/2
402	402	3 I:3/3
404	404	R35 14 11 12
405	405	
414	414	4 I:3/4
416	416	5 I:3/5
418	418	R36 14 11 12
419	419	
428	428	6 I:3/6
430	430	7 I:3/7
432	432	R38 14 11 12
433	433	

4L1 4L2 (120VAC)

CONTINUED ON THIS DRAWING

CONTINUED ON THIS DRAWING

FILTER NO. 3 SKID

FILTER NO. 3 JUNCTION BOX

CONTINUED FROM THIS DRAWING

"U" "V"

FILTER NO. 3 DRAINDOWN VALVE CV-39

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

4L1-1C 461 463 465 466 4L2-1C

(0.6 FLA/1.0 LRA)

"W" "X" "Y" "Z"

CONTINUED ON DRAWING NO. 33552-AE12

FILTER CONTROL PANEL "FCP"

CONTINUED FROM THIS DRAWING

(120VAC) 4L1 4L2

DIGITAL INPUT 16-POINT 1769-IA16 MODULE NO. 3

461	461	8 I:3/8
463	463	9 I:3/9
465	465	R39 14 11 12
466	466	

4L1 4L2 (120VAC)

CONTINUED ON DRAWING NO. 33552-AE10

FILTER NO. 4 SKID

FILTER NO. 4 INLET VALVE CV-41

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

5L1-1 483 485 487 488 5L2-1

(0.6 FLA/1.0 LRA)

FILTER NO. 4 JUNCTION BOX

FILTER NO. 4 OUTLET VALVE CV-42

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

497 499 501 502

(0.6 FLA/1.0 LRA)

FILTER NO. 4 BACKWASH OUTLET VALVE CV-44

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

5L1-1A 511 513 515 516 5L2-1A

(1.0 FLA/2.1 LRA)

"AA" "BB" "CC" "DD"

CONTINUED ON DRAWING NO. 33552-AE08

CONTINUED FROM DRAWING NO. 33552-AE04

(120VAC) 5L1 5L2

5L1-1	5L1-1	
483	483	10 I:3/10
485	485	11 I:3/11
487	487	R41 14 11 12
488	488	
5L2-1	5L2-1	
497	497	12 I:3/12
499	499	13 I:3/13
501	501	R42 14 11 12
502	502	
511	511	14 I:3/14
513	513	15 I:3/15
515	515	R44 14 11 12
516	516	
	AC	COM
	AC	COM

5L1 5L2 (120VAC)

CONTINUED ON DRAWING NO. 33552-AE08

NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

H&T INC. PURE WATER

HUNGERFORD & TERRY, INC.

MANUFACTURERS OF WATER TREATING EQUIPMENT

CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER CONTROL PANEL "FCP"
ELECTRICAL WIRING DIAGRAM (SHEET "D")
I/O BANK, MODULE NO. 3
(LINES 376 THRU 525)

DATE		
STARTED	12-12-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE07	0

FILTER NO. 4 SKID

FILTER NO. 4 JUNCTION BOX

CONTINUED FROM DRAWING NO. 33552-AE07

"AA" "BB" "CC" "DD"

FILTER NO. 4 RINSE VALVE CV-45

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

(0.6 FLA/1.0 LRA)

FILTER NO. 4 AIR PRESSURIZING VALVE CV-46

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

(0.6 FLA/1.0 LRA)

FILTER NO. 4 AIR WASH INLET VALVE CV-48

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

(0.6 FLA/1.0 LRA)

FILTER NO. 4 DRAINDOWN VALVE CV-49

7 FULL OPEN C D FULL CLOSED A B OPEN 2 CLOSE 3 G COM 1

(0.6 FLA/1.0 LRA)

DIFFERENTIAL PRESSURE SWITCH

DPS-01 C NO

(CLOSE HIGH @ 10 PSI)

538 540 542 543 556 557 566 568 570 571 580 582 584 585 593

5L1-1B 552 554 5L2-1B 5L1-1C 5L2-1C

"EE" "FF"

CONTINUED ON DRAWING NO. 33552-AE12

FILTER CONTROL PANEL "FCP"

CONTINUED FROM DRAWING NO. 33552-AE07

(120VAC) 5L1 5L2

DIGITAL INPUT 16-POINT 1769-IA16 MODULE NO. 4

0	I:4/0	538
1	I:4/1	540
2	I:4/2	552
3	I:4/3	554
4	I:4/4	566
5	I:4/5	568
6	I:4/6	580
7	I:4/7	582
8	I:4/8	593

R45 R46 R48 R49 (14 / 12 / 11)

5L1 5L2 (120VAC)

CONTINUED ON DRAWING NO. 33552-AE10

CONTINUED ON THIS DRAWING

FIELD

BRANCH CIRCUIT PROTECTED 15A, 480V-3PH-60HZ POWER SUPPLY FROM PANEL "XX", CKT #XX, XX, XX

AIR BLOWER NO. 1 B-1 A-C-L MOTOR STARTER PANEL 512M-BFB-A2E-3-4R-6P-24R-90

L1 L2 L3 (6A) 1FU (3/4A) 2FU (3/4A) (80VA) X1 X2 FU (1A) XF 618 612A R 2 M 3 612 HAND OFF AUTO XOO OOX 618 620 7L1-1 624 626 628 96 O.L'S 95 A2 A1 M 620B 620A (1.0-5.0A) T1 T2 T3 7L1 13 15 4 5 97 O.L 98

2 HP

AIR BLOWER NO. 1 B-1 (≈ 2.93 FLA) S.F.=1.25 NOTE: USE #12AWG WIRE FOR MOTOR TO MOTOR STARTER

(SEE DETAILS TO THE RIGHT)

BRANCH CIRCUIT PROTECTED 15A, 480V-3PH-60HZ POWER SUPPLY FROM PANEL "XX", CKT #XX, XX, XX

AIR BLOWER NO. 2 B-2 A-C-L MOTOR STARTER PANEL 512M-BFB-A2E-3-4R-6P-24R-90

L1 L2 L3 (6A) 1FU (3/4A) 2FU (3/4A) (80VA) X1 X2 FU (1A) XF 651 645A R 2 M 3 645 HAND OFF AUTO XOO OOX 651 653 7L1-2 657 659 661 96 O.L'S 95 A2 A1 M 653B 653A (1.0-5.0A) T1 T2 T3 7L1 13 15 4 5 97 O.L 98

2 HP

AIR BLOWER NO. 2 B-2 (≈ 2.93 FLA) S.F.=1.25 NOTE: USE #12AWG WIRE FOR MOTOR TO MOTOR STARTER

(SEE DETAILS TO THE RIGHT)

FILTER CONTROL PANEL "FCP"

CONTINUED FROM DRAWING NO. 33552-AE04

(120VAC) 7L1 7L2

CONTINUED FROM THIS DRAWING

DIGITAL INPUT 16-POINT 1769-IA16 MODULE NO. 4

9	I:4/9	624
10	I:4/10	626
11	I:4/11	628
12	I:4/12	657
13	I:4/13	659
14	I:4/14	661
15	I:4/15	(SPARE)
AC	COM	
AC	COM	

618 620 7L1-1 624 626 628 651 653 7L1-2 657 659 661

BR1 BR2 (11 / 14)

7L1 7L2 (120VAC)

CONTINUED ON DRAWING NO. 33552-AE09

DECK CLOSEST TO ACTUATOR

DECK FARTHEST FROM ACTUATOR

5 6 7 8 13 14 15 16

BACK OF STARTER SWITCH DETAIL

T4 T5 T6 T7 T8 T9 T1 T2 T3 T1 T2 T3

AIR BLOWER MOTOR TERMINATION DETAIL

NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

H&T INC. FIRE WATER

HUNGERFORD & TERRY, INC.

MANUFACTURERS OF WATER TREATING EQUIPMENT

CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER CONTROL PANEL "FCP"
ELECTRICAL WIRING DIAGRAM (SHEET "E")
I/O BANK, MODULE NO. 4
(LINES 526 THRU 675)

DATE		
STARTED	12-12-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE08	0

FIELD

FILTER CONTROL PANEL "FCP"

CONTINUED FROM DRAWING NO. 33552-AE08

(120VAC)

7L1 — 7L2

DIGITAL INPUT 16-POINT 1769-IA16 MODULE NO. 5

(SPARE)	0	I:5/0
(SPARE)	1	I:5/1
(SPARE)	2	I:5/2
(SPARE)	3	I:5/3
(SPARE)	4	I:5/4
(SPARE)	5	I:5/5
(SPARE)	6	I:5/6
(SPARE)	7	I:5/7

7L1 — 7L2

(120VAC)

CONTINUED ON THIS DRAWING

CONTINUED ON THIS DRAWING

FIELD

FILTER CONTROL PANEL "FCP"

CONTINUED FROM THIS DRAWING

(120VAC)

7L1 — 7L2

CONTINUED FROM THIS DRAWING

DIGITAL INPUT 16-POINT 1769-IA16 MODULE NO. 5

(SPARE)	8	I:5/8
(SPARE)	9	I:5/9
(SPARE)	10	I:5/10
(SPARE)	11	I:5/11
(SPARE)	12	I:5/12
(SPARE)	13	I:5/13
(SPARE)	14	I:5/14
(SPARE)	15	I:5/15
	AC	COM
	AC	COM

7L1 — 7L2

(120VAC)

CONTINUED ON DRAWING NO. 33552-AE11

NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.

MANUFACTURERS OF WATER TREATING EQUIPMENT

CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER CONTROL PANEL "FCP"
ELECTRICAL WIRING DIAGRAM (SHEET "F")
I/O MODULE NO. 5
(LINES 676 THRU 825)

DATE		
STARTED	12-12-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE09	0

FILTER CONTROL PANEL "FCP"

CONTINUED FROM DRAWING NO. 33552-AE05

RELAY OUTPUT MODULE 16-POINT 1769-OW16 MODULE NO. 6

(120VAC) 2L1 2L2

VAC-VDC	1		
O:6/0	0	833	FILTER NO. 1 INLET V. CV-11 — 87, 88
O:6/1	1	836	FILTER NO. 1 OUTLET V. CV-12 — 101, 102
O:6/2	2	839	FILTER NO. 1 BACKWASH OUTLET V. CV-14 — 115, 116
O:6/3	3	842	FILTER NO. 1 RINSE V. CV-15 — 129, 130
O:6/4	4	845	FILTER NO. 1 AIR PRESSURIZING V. CV-16 — 162, 163
O:6/5	5	848	FILTER NO.1 AIR WASH INLET V. CV-18 — 176, 177
O:6/6	6	851	FILTER NO.1 DRAINDOWN V. CV-19 — 190, 191
O:6/7	7	(SPARE)	

CONTINUED FROM DRAWING NO. 33552-AE06

(120VAC) 3L1 3L2

VAC-VDC	2		
O:6/8	8	870	FILTER NO. 2 INLET V. CV-21 — 212, 213
O:6/9	9	873	FILTER NO. 2 OUTLET V. CV-22 — 240, 241
O:6/10	10	876	FILTER NO. 2 BACKWASH OUTLET V. CV-24 — 254, 255
O:6/11	11	879	FILTER NO. 2 RINSE V. CV-25 — 268, 269
O:6/12	12	882	FILTER NO. 2 AIR PRESSURIZING V. CV-26 — 282, 283
O:6/13	13	885	FILTER NO. 2 AIR WASH INLET V. CV-28 — 315, 316
O:6/14	14	888	FILTER NO. 2 DRAINDOWN V. CV-29 — 329, 330
O:6/15	15	(SPARE)	

FIELD

FILTER CONTROL PANEL "FCP"

CONTINUED FROM DRAWING NO. 33552-AE07

RELAY OUTPUT MODULE 16-POINT 1769-OW16 MODULE NO. 7

(120VAC) 4L1 4L2

VAC-VDC	1		
O:7/0	0	908	FILTER NO. 3 INLET V. CV-31 — 351, 352
O:7/1	1	911	FILTER NO. 3 OUTLET V. CV-32 — 365, 366
O:7/2	2	914	FILTER NO. 3 BACKWASH OUTLET V. CV-34 — 390, 391
O:7/3	3	917	FILTER NO. 3 RINSE V. CV-35 — 404, 405
O:7/4	4	920	FILTER NO. 3 AIR PRESSURIZING V. CV-36 — 418, 419
O:7/5	5	923	FILTER NO.3 AIR WASH INLET V. CV-38 — 432, 433
O:7/6	6	926	FILTER NO.3 DRAINDOWN V. CV-39 — 465, 466
O:7/7	7	(SPARE)	

CONTINUED FROM DRAWING NO. 33552-AE08

(120VAC) 5L1 5L2

VAC-VDC	2		
O:7/8	8	945	FILTER NO. 4 INLET V. CV-41 — 487, 488
O:7/9	9	948	FILTER NO. 4 OUTLET V. CV-42 — 501, 502
O:7/10	10	951	FILTER NO. 4 BACKWASH OUTLET V. CV-44 — 515, 516
O:7/11	11	954	FILTER NO. 4 RINSE V. CV-45 — 542, 543
O:7/12	12	957	FILTER NO. 4 AIR PRESSURIZING V. CV-46 — 556, 557
O:7/13	13	960	FILTER NO. 4 AIR WASH INLET V. CV-48 — 570, 571
O:7/14	14	963	FILTER NO. 4 DRAINDOWN V. CV-49 — 584, 585
O:7/15	15	(SPARE)	

FIELD

NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.

MANUFACTURERS OF WATER TREATING EQUIPMENT

CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

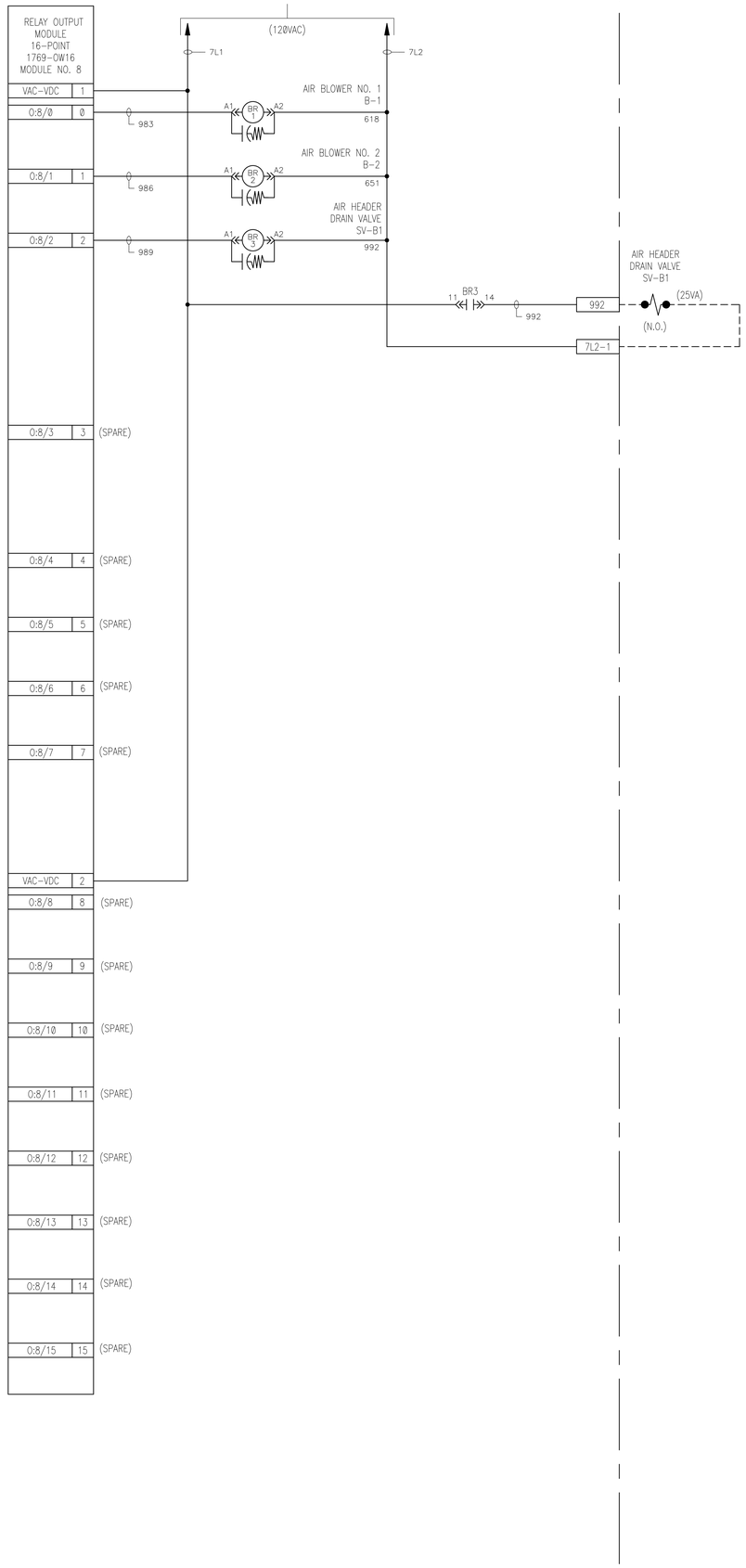
FILTER CONTROL PANEL "FCP"
ELECTRICAL WIRING DIAGRAM (SHEET "G")
I/O MODULES NO. 6 & NO. 7
(LINES 826 THRU 975)

DATE		
STARTED	12-12-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE10	0

FILTER CONTROL PANEL "FCP"



FIELD

FILTER CONTROL PANEL "FCP"

(FOR FUTURE USE)

FIELD

NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.

MANUFACTURERS OF WATER TREATING EQUIPMENT

CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

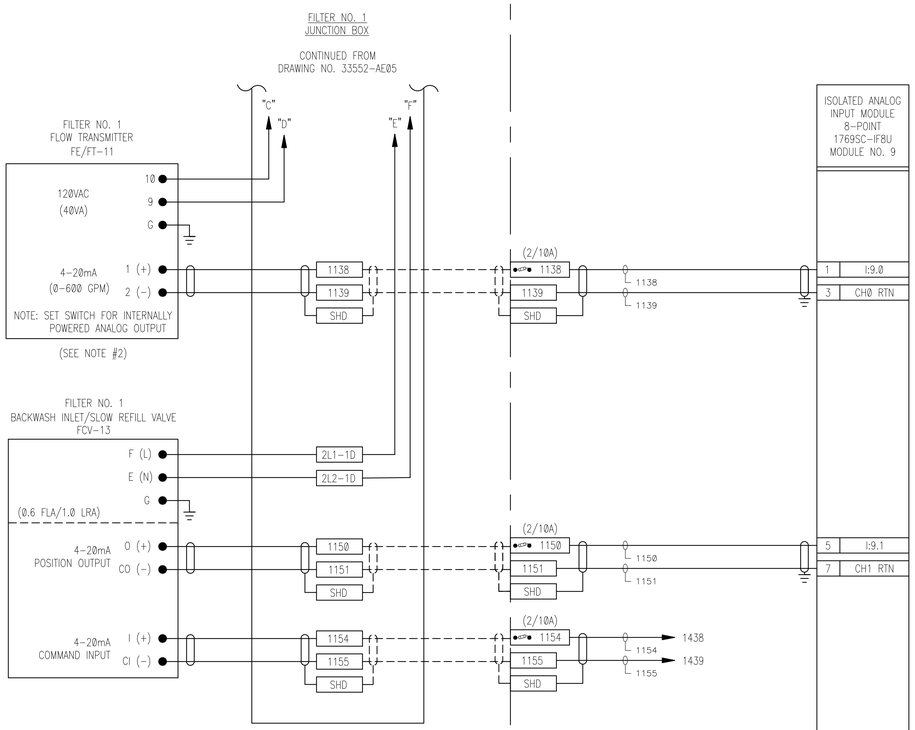
FILTER CONTROL PANEL "FCP"
ELECTRICAL WIRING DIAGRAM (SHEET "H")
I/O MODULE NO. 8
(LINES 976 THRU 1125)

DATE		
STARTED	12-12-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

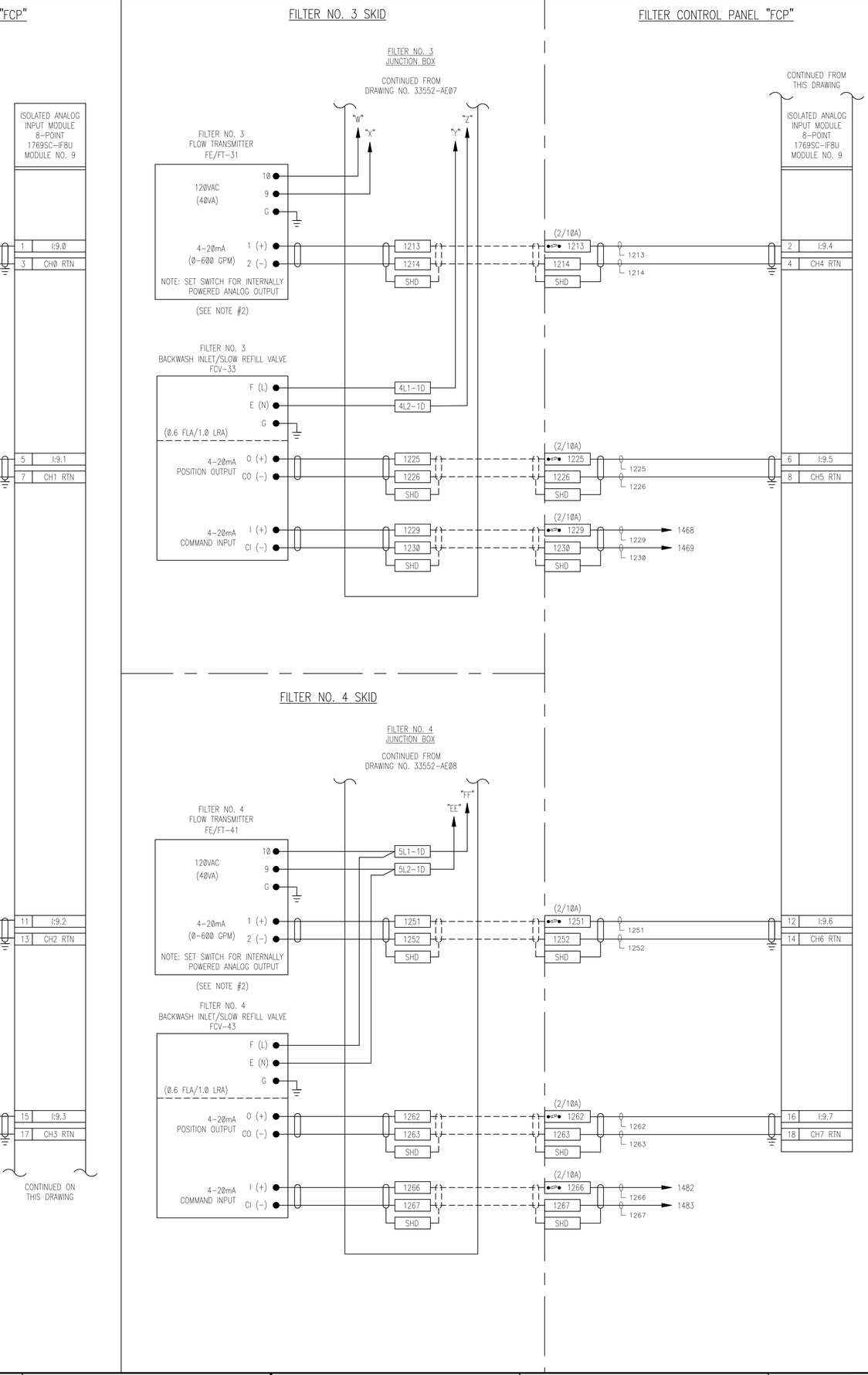
SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE11	0

FILTER NO. 1 SKID



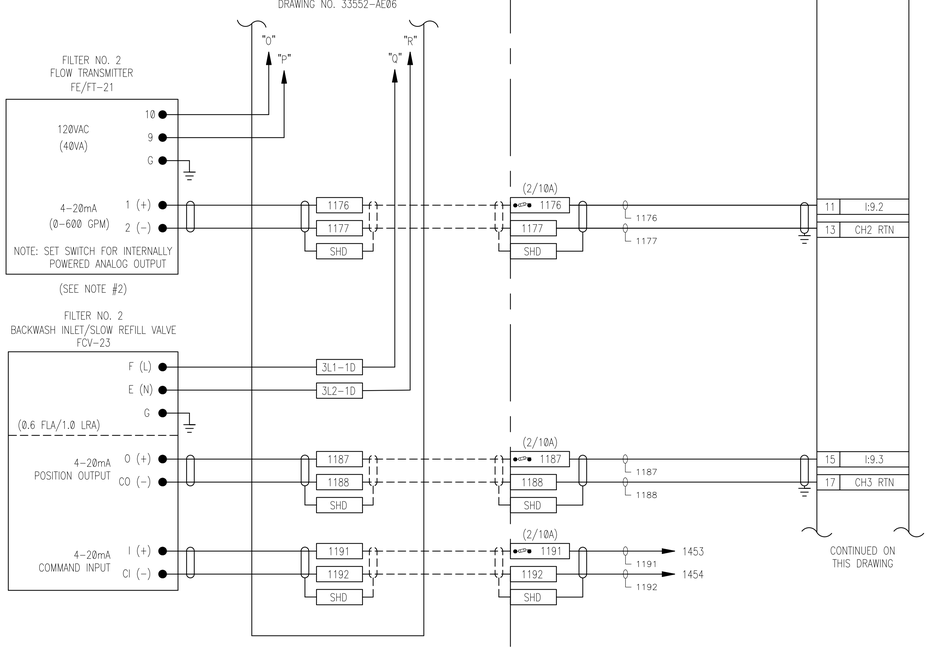
FILTER CONTROL PANEL "FCP"



FILTER NO. 3 SKID

FILTER CONTROL PANEL "FCP"

FILTER NO. 2 SKID



FILTER NO. 4 SKID

NOTES:
1. FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.
2. SEE ROSEMOUNT O&M FOR PROPER INSTALLATION & WIRING OF GROUNDING DISCS.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

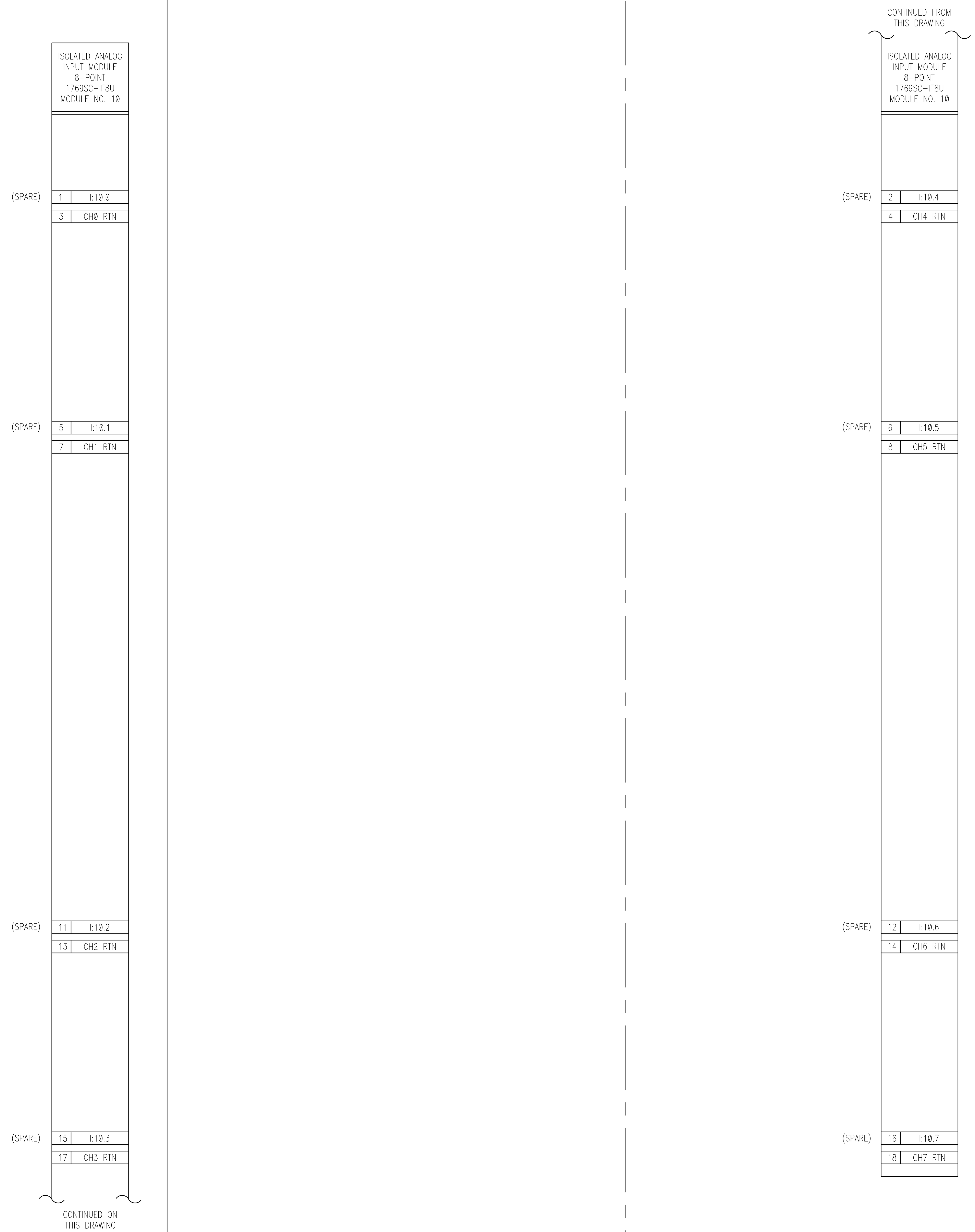
FILTER CONTROL PANEL "FCP"
ELECTRICAL WIRING DIAGRAM (SHEET "I")
I/O MODULE NO. 9
(LINES 1126 THRU 1275)

DATE		
STARTED	12-12-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE12	0

FIELD	FILTER CONTROL PANEL "FCP"	FIELD	FILTER CONTROL PANEL "FCP"



NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER CONTROL PANEL "FCP"
ELECTRICAL WIRING DIAGRAM (SHEET "J")
I/O MODULE NO. 10
(LINES 1276 THRU 1425)

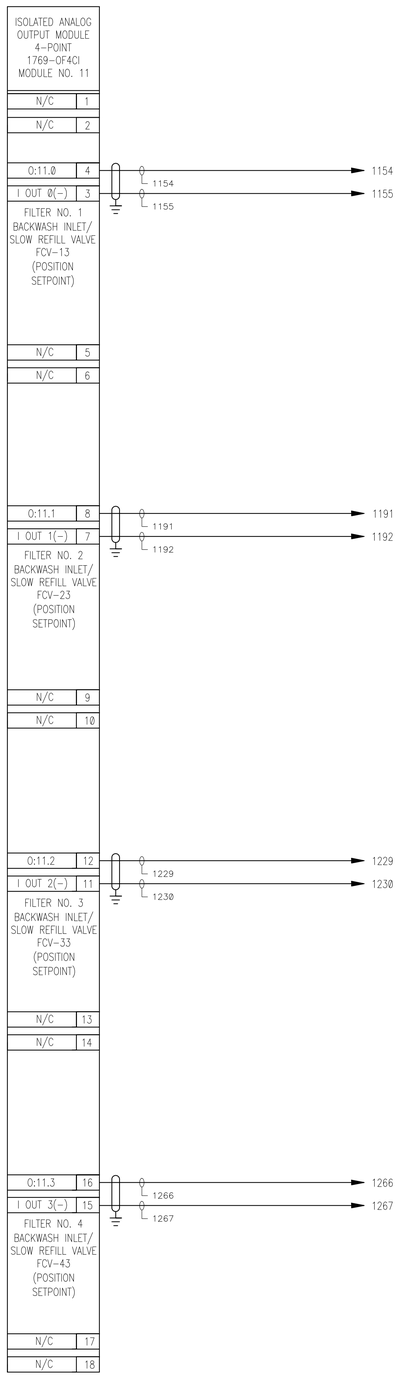
	DATE	
STARTED	12-12-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE13	0

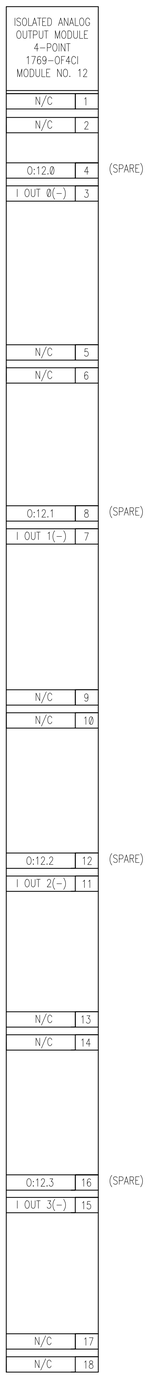
FILTER CONTROL PANEL "FCP"

FIELD



FILTER CONTROL PANEL "FCP"

FIELD



NOTE: FOR CONSTRUCTION NOTES, SEE H&T, INC. DRAWING NO. 33552-AE02.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.

MANUFACTURERS OF WATER TREATING EQUIPMENT

CLAYTON, NEW JERSEY

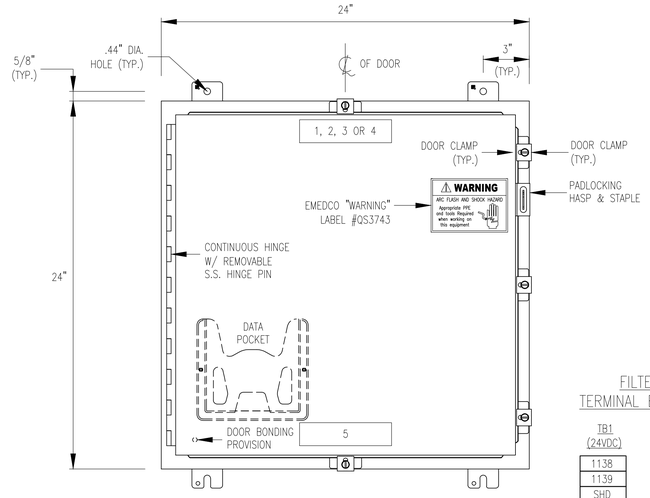
FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER CONTROL PANEL "FCP"
ELECTRICAL WIRING DIAGRAM (SHEET "K")
I/O MODULES NO. 11 & NO. 12
(LINES 1426 THRU 1575)

DATE		
STARTED	12-12-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	FLW
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE14	0



FRONT VIEW

1. BOX IS FABRICATED FROM 16 GAUGE STEEL.
2. BOX FINISH IS HOFFMAN STANDARD ANSI 61 GRAY POLYESTER POWDER PAINT ON OUTSIDE AND INSIDE OVER PRETREATED SURFACES.
3. BOX IS 8" DEEP (NOM).
4. BOX SHALL HAVE UL LABEL FOR TYPE 4.
5. BOX APPROX WEIGHT@75LB'S.

N/P NO.	NO. REQ'D	NAMEPLATE INSCRIPTION	SIZE
1	1	FILTER NO. 1 JUNCTION BOX	1-1/2" X 6"
2	1	FILTER NO. 2 JUNCTION BOX	
3	1	FILTER NO. 3 JUNCTION BOX	
4	1	FILTER NO. 4 JUNCTION BOX	
5	4	H & T INC.	

NOTES:
1. NAMEPLATE MATERIAL TO BE WHITE GRAVOPLY ENGRAVING STOCK WITH MATTE FINISH AND BLACK LETTERING.
2. NAMEPLATE TEXT SHALL BE 3/8"H. X 1/4" W. LETTERING.
3. ALL NAMEPLATES SHALL BE ATTACHED WITH 3M DOUBLE SIDED TAPE.

CONSTRUCTION NOTES:

1. ALL WIRING SHALL BE RUN IN WIRE DUCT, WHEREVER PRACTICAL.
2. WIRE SLEEVES SHALL BE HEAT-SHRINKABLE, PANDUIT OR PHOENIX CONTACT WHITE WIRE MARKERS.
3. ALWAYS LOCATE EQUIPMENT TERMINALS BY MARKING (WHEN MARKED), NOT LOCATION.
4. ALL CHASSIS & POWER GROUNDS SHALL BE INDIVIDUALLY TIED ONTO A GROUND BUS.
5. ALL BROKEN LINE WIRING (ALL FIELD WIRING, CONDUIT/FITTINGS & WIRE TERMINATIONS) IS REMOTE FROM PANEL AND BY ELECTRICAL CONTRACTOR.
6. ALL INTERNAL LABELS SHALL BE WHITE GRAVOPLY ENGRAVING STOCK WITH MATTE FINISH AND 3/16" HIGH, BLACK LETTERING AND ATTACHED WITH "3M" DOUBLE SIDED ADHESIVE TAPE.
7. NUMBERS AND/OR LETTERS IN ▭ ARE TERMINAL BLOCKS IN FILTER CONTROL PANEL.
8. NUMBERS AND/OR LETTERS OVER ● ARE EQUIPMENT TERMINALS.
9. JUNCTION BOXES TO HAVE AN UL-508A SERIALIZED LABEL FOR TYPE 4.
11. WIRING DIAGRAMS ARE SHOWN WITH POWER OFF.
12. ALL WIRING EXTERNAL TO JUNCTION BOX SHALL BE INSTALLED IN UL LISTED HOT-DIPPED GALVANIZED RIGID STEEL CONDUIT (3/4" MIN.) AND UL LISTED LIQUIDTITE FLEXIBLE CONDUIT-1/2" MIN. (4 FT. MAX). CONDUIT SYSTEM SHALL BE WATERTIGHT.
13. ALL WIRING EXTERNAL TO FILTER JUNCTION BOXES (IN CONDUIT) SHALL BE AS FOLLOWS:
    -AC POWER & CONTROL SHALL BE #14AWG TYPE THHN/THWN STRANDED COPPER.
    -SHIELDED CABLE SHALL BE ALPHA #2432C, #16 AWG, 300V, 2-COND.
    -ALL EXPOSED DRAIN WIRES SHALL BE PROTECTED WITH SHRINK TUBING.
14. ALL RIGID CONDUIT AND FLEXIBLE SEALTIGHT SHALL BE PROPERLY SUPPORTED PER NEC REQUIREMENTS.
15. CONDUIT OUTLET BODIES SHALL BE THREADED MALLEABLE IRON, KILLARK DURALOY S SERIES OR EQUAL. ALL RIGID CONDUIT SHALL ENTER BOX THROUGH MYERS (OR T&B) BULLET HUBS WITH GROUNDING LUG. ALL FLEXIBLE CONDUIT FITTINGS SHALL BE T&B #53XX SERIES. USE T&B #52XX SERIES SEALING RINGS WHERE REQUIRED.
16. ALL CONDUIT THREADS CUT DURING ASSEMBLY SHALL BE CLEANED & COLD-GALVANIZED SPRAYED. ALL CONDUIT THREADS SHALL BE COATED WITH T&B KORP-COAT COATING COMPOUND.
17. JUNCTION BOXES ARE ON FILTER SKIDS, SEE H&T, INC. DRAWING NO. 33552-A04.

WIRE COLOR CODE

L1_____BLACK
L2_____WHITE
GROUND_____GREEN
ALL OTHERS_____RED

ANALOG SHIELDED CABLE:
(+)_____RED
(-)_____BLACK

FILTER NO. 1
TERMINAL BLOCK DETAILS

TB1 (24VDC)	TB2 (120VAC)	
1138	2L1-1	5-POLE JUMPER
1139	2L1-1A	
SHD	2L1-1B	
1150	2L1-1C	
1151	2L1-1D	END BARRIER
SHD	2L2-1	5-POLE JUMPER
1154	2L2-1A	
1155	2L2-1B	
SHD	2L2-1C	
	2L2-1D	END BARRIER
	83	
END BARRIER	85	
	87	
	88	
	97	
	99	
	101	
	102	
	111	
	113	
	115	
	116	
	125	
	127	
	129	
	130	
	158	
	160	
	162	
	163	
	172	
	174	
	176	
	177	
	186	
	188	
	190	
	191	
		END BARRIER

SEE DRAWING NO. 33552-AE12 FOR WIRING DIAGRAM

SEE DRAWING NO. 33552-AE05 & AE12 FOR WIRING DIAGRAM

FILTER NO. 2
TERMINAL BLOCK DETAILS

TB1 (24VDC)	TB2 (120VAC)	
1176	3L1-1	5-POLE JUMPER
1177	3L1-1A	
SHD	3L1-1B	
1187	3L1-1C	
1188	3L1-1D	END BARRIER
SHD	3L2-1	5-POLE JUMPER
1191	3L2-1A	
1192	3L2-1B	
SHD	3L2-1C	
	3L2-1D	END BARRIER
	208	
END BARRIER	210	
	212	
	213	
	236	
	238	
	240	
	241	
	250	
	252	
	254	
	255	
	264	
	266	
	268	
	269	
	278	
	280	
	282	
	283	
	311	
	313	
	315	
	316	
	325	
	327	
	329	
	330	
		END BARRIER

SEE DRAWING NO. 33552-AE12 FOR WIRING DIAGRAM

SEE DRAWING NO. 33552-AE05, AE06 & AE12 FOR WIRING DIAGRAM

FILTER NO. 3
TERMINAL BLOCK DETAILS

TB1 (24VDC)	TB2 (120VAC)	
1213	4L1-1	5-POLE JUMPER
1214	4L1-1A	
SHD	4L1-1B	
1225	4L1-1C	
1226	4L1-1D	END BARRIER
SHD	4L2-1	5-POLE JUMPER
1229	4L2-1A	
1230	4L2-1B	
SHD	4L2-1C	
	4L2-1D	END BARRIER
	347	
END BARRIER	349	
	351	
	352	
	361	
	363	
	365	
	366	
	386	
	388	
	390	
	391	
	400	
	402	
	404	
	405	
	414	
	416	
	418	
	419	
	428	
	430	
	432	
	433	
	461	
	463	
	465	
	466	
		END BARRIER

SEE DRAWING NO. 33552-AE12 FOR WIRING DIAGRAM

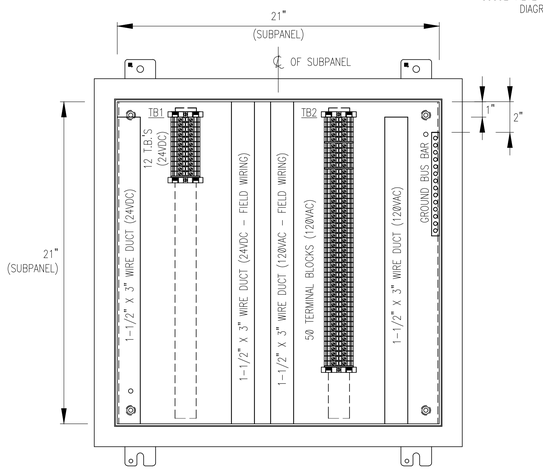
SEE DRAWING NO. 33552-AE06, AE07 & AE12 FOR WIRING DIAGRAM

FILTER NO. 4
TERMINAL BLOCK DETAILS

TB1 (24VDC)	TB2 (120VAC)	
1251	5L1-1	5-POLE JUMPER
1252	5L1-1A	
SHD	5L1-1B	
1262	5L1-1C	
1263	5L1-1D	END BARRIER
SHD	5L2-1	5-POLE JUMPER
1266	5L2-1A	
1267	5L2-1B	
SHD	5L2-1C	
	5L2-1D	END BARRIER
	483	
END BARRIER	485	
	487	
	488	
	497	
	499	
	501	
	502	
	511	
	513	
	515	
	516	
	538	
	540	
	542	
	543	
	552	
	554	
	556	
	557	
	566	
	568	
	570	
	571	
	580	
	582	
	584	
	585	
	593	
		END BARRIER

SEE DRAWING NO. 33552-AE12 FOR WIRING DIAGRAM

SEE DRAWING NO. 33552-AE07, AE08 & AE12 FOR WIRING DIAGRAM



SUBPANEL LAYOUT

1. SUBPANEL IS 21" H. X 21" W.
2. SUBPANEL FINISH IS WHITE POLYESTER POWDER PAINT.
3. SUBPANEL IS FABRICATED FROM 12 GAUGE STEEL.

NO.	REVISIONS	DATE	CK'D

H&T INC. PURE WATER

HUNGERFORD & TERRY, Inc.

MANUFACTURERS OF WATER TREATING EQUIPMENT

CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER SKID
JUNCTION BOX DETAILS

DATE		SCALE	1/4"=0"-1"
STARTED	12-11-23 JJF	FORM NO.	
FINISHED	3-18-24 JJF	CONT NO.	M-345
CHECKED	3-22-24 FLW		
APPROVED			

DRAWING NO.	REV.
33552-AE18	0

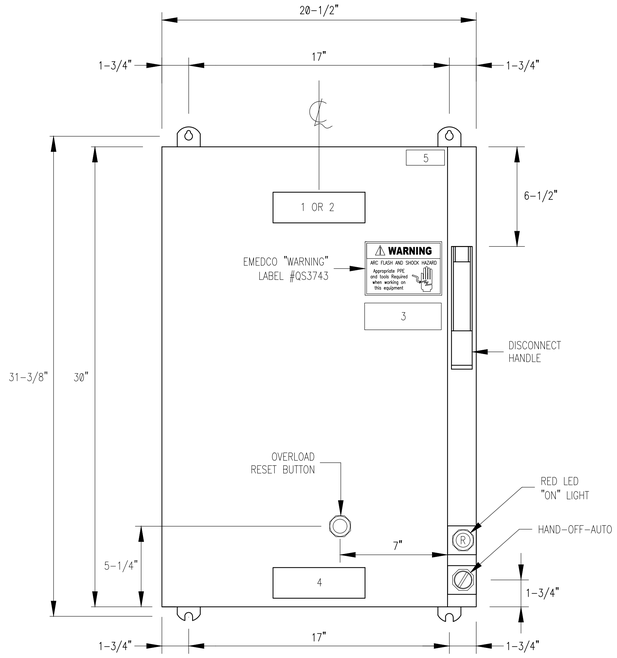
N/P NO.	NO. REQ'D	NAMEPLATE INSCRIPTION	SIZE
1	1	AIR BLOWER NO. 1 B-1 MOTOR STARTER	1-1/2" X 6"
2	1	AIR BLOWER NO. 2 B-2 MOTOR STARTER	1-1/2" X 6"
3	2	WARNING! MULTIPLE SOURCES OF ELECTRICAL POWER WITHIN THIS ENCLOSURE	1-3/4" X 5"
4	2	H & T	1-1/2" X 6"
5	2	SCCR = 10ØKA @ 48Ø VOLTS AC	1" X 2-1/2"

NOTE:
NAMEPLATE MATERIAL TO BE WHITE GRAVOPLY ENGRAVING STOCK WITH MATTE FINISH, BLACK LETTERING AND ATTACHED WITH "3M" DOUBLE SIDED TAPE. ALL TEXT SHALL BE 3/16"H X 1/8"W, EXCEPT FOR N/P#1 TEXT SHALL BE 3/8"H X 1/4"W.

N/P #3 SHALL BE RED GRAVOPLY ENGRAVING STOCK WITH WHITE LETTERING.

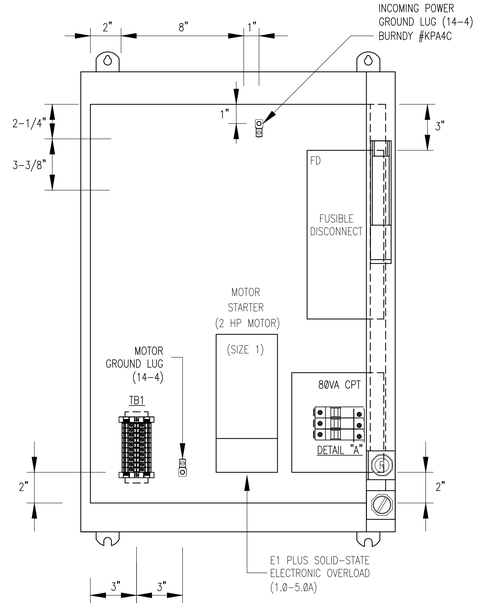
FUSE CHART

FD = TRS6R (6A)
1FU = ATQR3/4 (3/4A)
2FU = ATQR3/4 (3/4A)
FU = TRM1 (1A)



MOTOR STARTER FRONT VIEW

1. ENCLOSURE IS FABRICATED FROM PAINTED STEEL.
2. ENCLOSURE HAS A NEMA 3R/4 RATING.
3. ENCLOSURE IS 1Ø.19" DEEP W/O HANDLE & 15.75" DEEP W/HANDLE FULLY EXTENDED.
4. ESTIMATED PANEL WEIGHT IS 9Ø LBS.

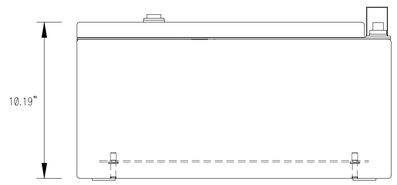


DETAIL "A"

(3/4A)	1FU
(3/4A)	2FU
(1A)	FU

MOTOR STARTER SUBPANEL LAYOUT

1. MOTOR STARTER SHALL BE MOUNTED BY H&T ON BLOWER SKID & WIRED TO THE MOTOR.
2. STARTER SHALL BE ALLEN BRADLEY #512M-BFB-A2E-3-4R-6P-24R-9Ø.



BOTTOM VIEW

AIR BLOWER NO. 1
B-1
TERMINAL BLOCK DETAILS

TB1

618
62Ø
7L1-1
624
626
628

NOTE: DRAWING #33552-AEØ8 FOR WIRING DETAILS

AIR BLOWER NO. 2
B-2
TERMINAL BLOCK DETAILS

TB1

651
653
7L1-2
657
659
661

END BARRIER

NOTE: DRAWING #33552-AEØ8 FOR WIRING DETAILS

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

AIR BLOWER NO.1 & NO.2
MOTOR STARTER DETAILS

DATE		SCALE	1/4"=Ø'-1"
STARTED	12-11-23 JJF	FORM NO.	
FINISHED	3-18-24 JJF	CONT NO.	M-345
CHECKED	3-22-24 FLW		
APPROVED			

DRAWING NO.	REV.
33552-AE19	Ø

FILTER NO. 1

INLET VALVE CV-11

OUTLET VALVE CV-12

BACKWASH INLET/SLOW REFILL VALVE FCV-13

BACKWASH OUTLET VALVE CV-14

RINSE VALVE CV-15

DRAINDOWN VALVE CV-19

AIR PRESSURIZING VALVE CV-16

AIR WASH INLET VALVE CV-18

CONTACT LOCATION CROSS-REFERENCE
(UNDERLINED NUMBERS INDICATE CLOSED CONTACTS)

1CR - 2005, 2010, 2015, 2030, 3750, 3753
2CR - 2117, 2142
3CR - 2005, 2010, 2015, 2119, 2171, 2173, 2178, 2217, 2247, 2282, 2317, 2347, 3825, 3935, 3965

NOTE: FOR GENERAL NOTES, SEE H&T, INC. DRAWING NO. 33552-AE32.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

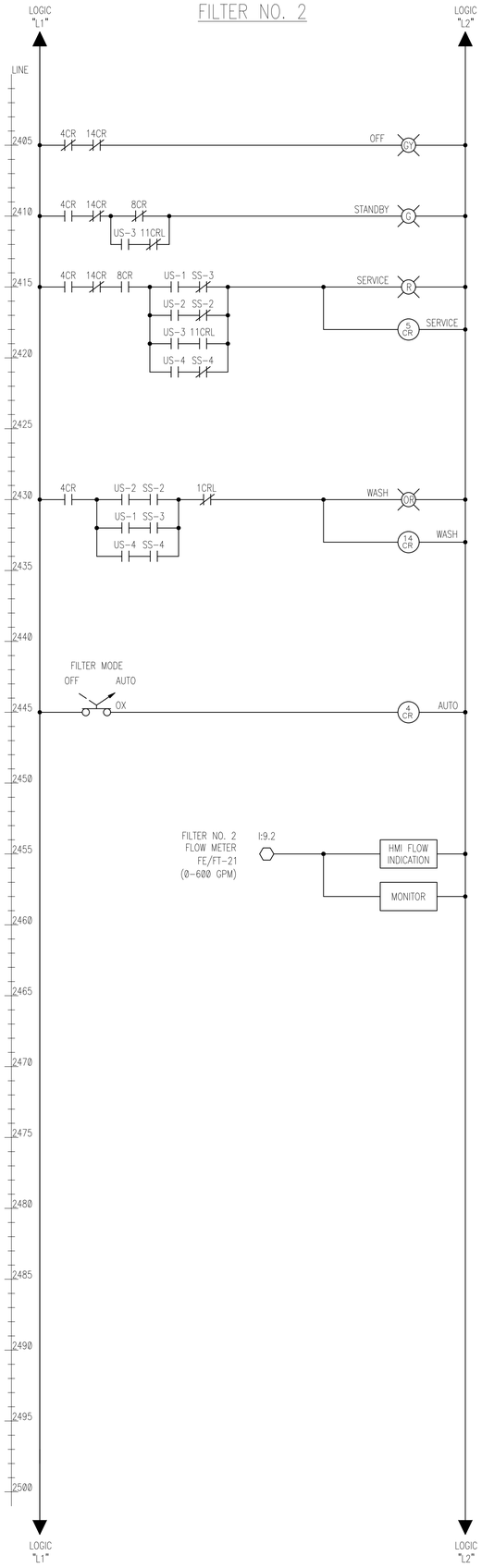
FILTER NO. 1
LADDER LOGIC DIAGRAM
(LINES 2001 THRU 2400)

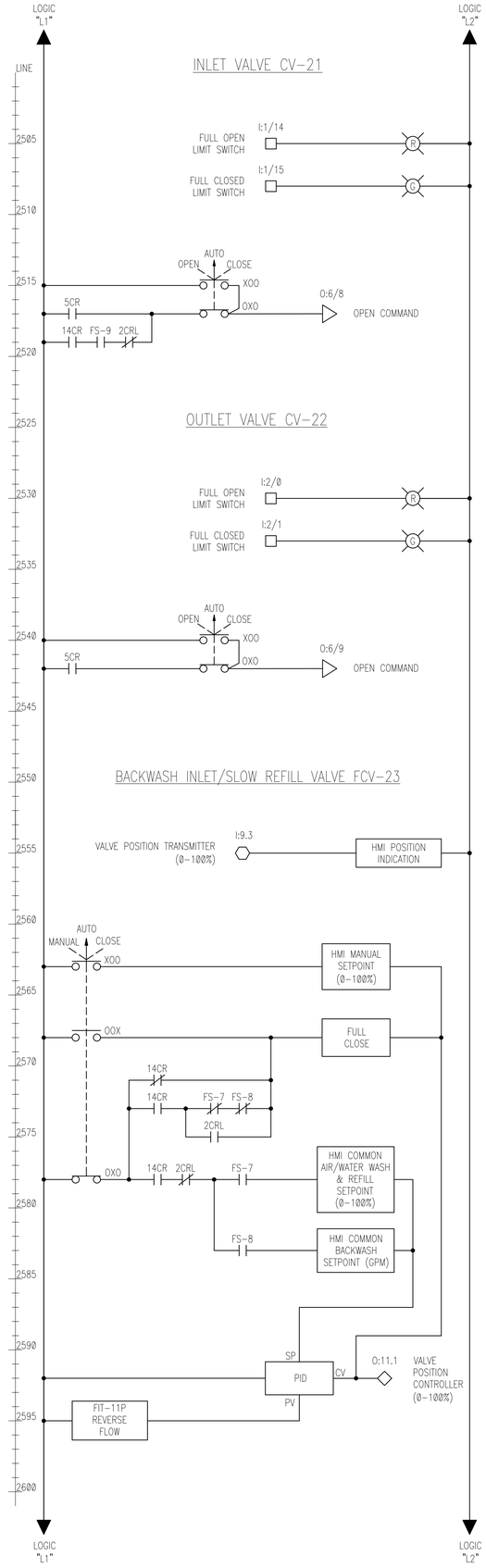
DATE		
STARTED	12-14-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	BMC
APPROVED		

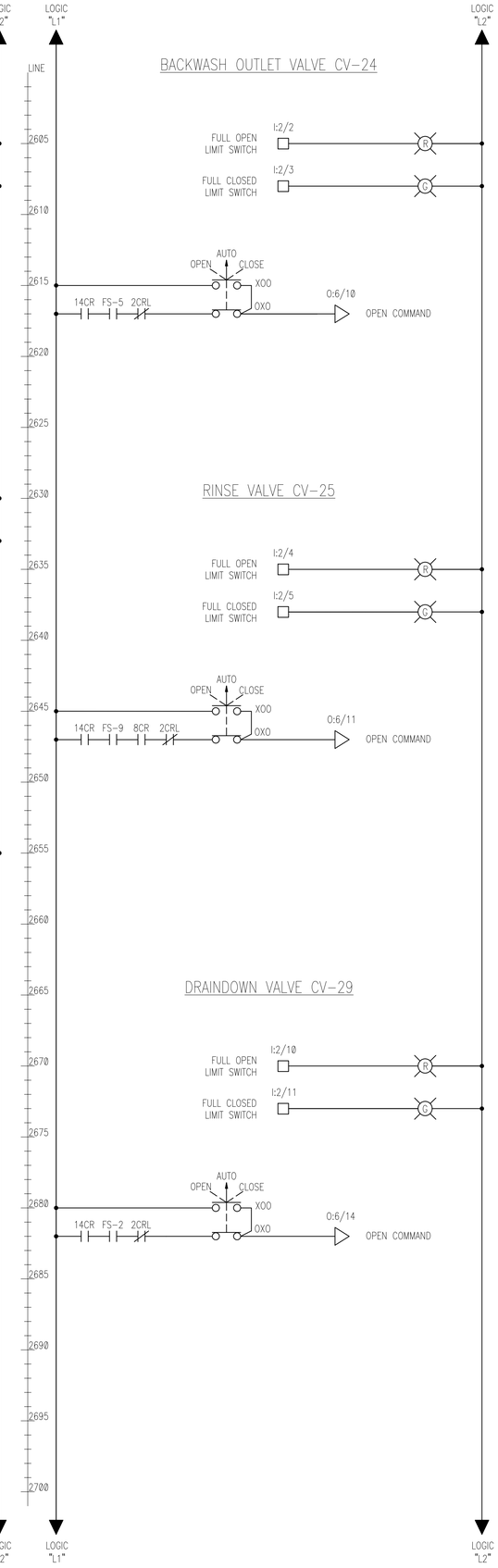
SCALE NONE
FORM NO.
CONT NO. M-345

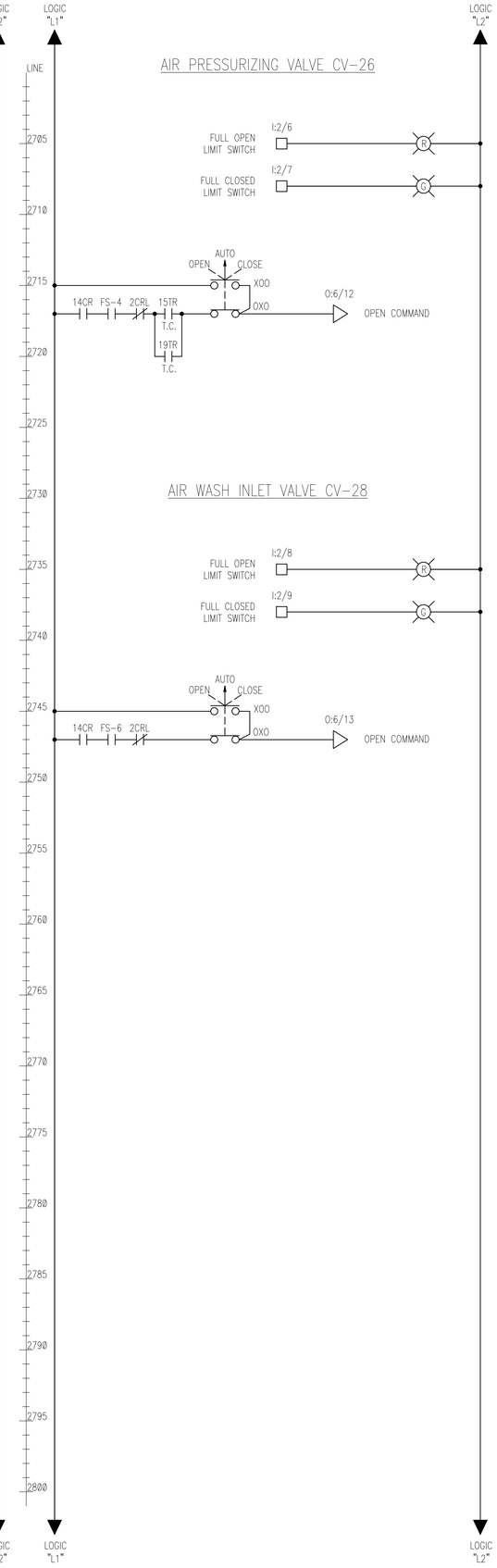
DRAWING NO.	REV.
33552-AE25	0

FILTER NO. 2









CONTACT LOCATION CROSS-REFERENCE
(UNDERLINED NUMBERS INDICATE CLOSED CONTACTS)

5CR – 2517, 2542
4CR – 2405, 2410, 2415, 2430, 3750, 3756
14CR – 2405, 2410, 2415, 2519, 2571, 2573, 2578, 2617, 2647, 2682, 2717, 2747, 3827, 3941, 3971

NOTE: FOR GENERAL NOTES, SEE H&T, INC. DRAWING NO. 33552-AE32.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER NO. 2
LADDER LOGIC DIAGRAM
(LINES 2401 THRU 2800)

DATE		
STARTED	12-14-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	BMC
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE26	0

FILTER NO. 3

LOGIC "L1" / LOGIC "L2"

LINE

2805 — 6CR 15CR — OFF (GY)

2810 — 6CR 15CR 8CR — US-4 11CRL — STANDBY (G)

2815 — 6CR 15CR 8CR US-1 SS-4 — US-2 SS-3 — US-3 SS-2 — US-4 11CRL — SERVICE (R); SERVICE (7CR)

2830 — 6CR US-1 SS-4 1CRL — US-2 SS-3 — US-3 SS-2 — WASH (GY); WASH (15CR)

2840 — FILTER MODE OFF AUTO — OX — AUTO (6CR)

2855 — FILTER NO. 3 FLOW METER FE/FT-31 (0-600 GPM) — I:9.4 — HMI FLOW INDICATION; MONITOR

2960 — AUTO MANUAL CLOSE — XOO — HMI MANUAL SETPOINT (0-100%)

2965 — OOX — FULL CLOSE

2970 — 15CR; 15CR FS-7 FS-8; 2CRL

2980 — OXO — 15CR 2CRL FS-7 — HMI COMMON AIR/WATER WASH & REFILL SETPOINT (0-100%)

2985 — FS-8 — HMI COMMON BACKWASH SETPOINT (GPM)

2990 — SP; PID; CV — O:11.2 — VALVE POSITION CONTROLLER (0-100%); PV

2995 — FIT-31P REVERSE FLOW

2900 / 2955 — VALVE POSITION TRANSMITTER (0-100%) — I:9.5 — HMI POSITION INDICATION

INLET VALVE CV-31

2905 — FULL OPEN LIMIT SWITCH — I:2/12 — (R)

2910 — FULL CLOSED LIMIT SWITCH — I:2/13 — (G)

2915 — AUTO OPEN CLOSE — XOO — OXO — 7CR — O:7/0 — OPEN COMMAND

2920 — 15CR FS-9 2CRL

OUTLET VALVE CV-32

2930 — FULL OPEN LIMIT SWITCH — I:2/14 — (R)

2935 — FULL CLOSED LIMIT SWITCH — I:2/15 — (G)

2940 — AUTO OPEN CLOSE — XOO — OXO — 7CR — O:7/1 — OPEN COMMAND

BACKWASH OUTLET VALVE CV-34

3005 — FULL OPEN LIMIT SWITCH — I:3/0 — (R)

3010 — FULL CLOSED LIMIT SWITCH — I:3/1 — (G)

3015 — AUTO OPEN CLOSE — XOO — OXO — 15CR FS-5 2CRL — O:7/2 — OPEN COMMAND

RINSE VALVE CV-35

3030 — FULL OPEN LIMIT SWITCH — I:3/2 — (R)

3035 — FULL CLOSED LIMIT SWITCH — I:3/3 — (G)

3040 — AUTO OPEN CLOSE — XOO — OXO — 15CR FS-9 8CR 2CRL — O:7/3 — OPEN COMMAND

DRAINDOWN VALVE CV-39

3070 — FULL OPEN LIMIT SWITCH — I:3/8 — (R)

3075 — FULL CLOSED LIMIT SWITCH — I:3/9 — (G)

3080 — AUTO OPEN CLOSE — XOO — OXO — 15CR FS-2 2CRL — O:7/6 — OPEN COMMAND

AIR PRESSURIZING VALVE CV-36

3105 — FULL OPEN LIMIT SWITCH — I:3/4 — (R)

3110 — FULL CLOSED LIMIT SWITCH — I:3/5 — (G)

3115 — AUTO OPEN CLOSE — XOO — OXO — 15CR FS-4 2CRL 15TR T.C. — 19TR T.C. — O:7/4 — OPEN COMMAND

AIR WASH INLET VALVE CV-38

3135 — FULL OPEN LIMIT SWITCH — I:3/6 — (R)

3140 — FULL CLOSED LIMIT SWITCH — I:3/7 — (G)

3145 — AUTO OPEN CLOSE — XOO — OXO — 15CR FS-6 2CRL — O:7/5 — OPEN COMMAND

2900 / 2955 / 3000 / 3055 / 3100 / 3155 / 3200 — LOGIC "L1" / LOGIC "L2"

CONTACT LOCATION CROSS-REFERENCE
(UNDERLINED NUMBERS INDICATE CLOSED CONTACTS)

6CR – 2805, 2810, 2815, 2830, 3750, 3759
7CR – 2917, 2942
15CR – 2805, 2810, 2815, 2919, 2971, 2973, 3017, 3047, 3082, 3117, 3147, 3829, 3947, 3977

NOTE: FOR GENERAL NOTES, SEE H&T, INC. DRAWING NO. 33552-AE32.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTER NO. 3
LADDER LOGIC DIAGRAM
(LINES 2801 THRU 3200)

DATE		
STARTED	12-14-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	BMC
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE27	0

FILTER NO. 4

LOGIC "L1" / LOGIC "L2"

LINE

3205 10CR 16CR — OFF (GY)

3210 10CR 16CR 8CR US-1 11CRL — STANDBY (G)

3215 10CR 16CR 8CR US-1 11CRL US-2 SS-4 US-3 SS-3 US-4 SS-2 — SERVICE (R); 11CR — SERVICE

3230 10CR US-2 SS-4 US-3 SS-3 US-4 SS-2 1CRL — WASH (GY); 18CR — WASH

3240 FILTER MODE OFF AUTO OX

3245 18CR — AUTO

FILTER NO. 4 FLOW METER FE/FT-41 (0-600 GPM) I:9.6 — HMI FLOW INDICATION; MONITOR

INLET VALVE CV-41

3305 FULL OPEN LIMIT SWITCH I:3/10 (R)

3310 FULL CLOSED LIMIT SWITCH I:3/11 (G)

3315 AUTO OPEN CLOSE XOO OXO — 11CR 16CR FS-9 2CRL — 0:7/8 OPEN COMMAND

OUTLET VALVE CV-42

3330 FULL OPEN LIMIT SWITCH I:3/12 (R)

3335 FULL CLOSED LIMIT SWITCH I:3/13 (G)

3340 AUTO OPEN CLOSE XOO OXO — 11CR — 0:7/9 OPEN COMMAND

BACKWASH INLET/SLOW REFILL VALVE FCV-43

VALVE POSITION TRANSMITTER (0-100%) I:9.7 — HMI POSITION INDICATION

3360 AUTO MANUAL CLOSE XOO — HMI MANUAL SETPOINT (0-100%)

3365 OOX — FULL CLOSE

3370 16CR; 16CR FS-7 FS-8; 2CRL

3375 OXO — 16CR 2CRL FS-7 — HMI COMMON AIR/WATER WASH & REFILL SETPOINT (0-100%)

3380 FS-8 — HMI COMMON BACKWASH SETPOINT (GPM)

3390 SP PID CV — O:11.3 VALVE POSITION CONTROLLER (0-100%); PV

3395 FIT-41P REVERSE FLOW

BACKWASH OUTLET VALVE CV-44

3405 FULL OPEN LIMIT SWITCH I:3/14 (R)

3410 FULL CLOSED LIMIT SWITCH I:3/15 (G)

3415 AUTO OPEN CLOSE XOO OXO — 16CR FS-5 2CRL — 0:7/10 OPEN COMMAND

RINSE VALVE CV-45

3435 FULL OPEN LIMIT SWITCH I:4/0 (R)

3440 FULL CLOSED LIMIT SWITCH I:4/1 (G)

3445 AUTO OPEN CLOSE XOO OXO — 16CR FS-9 8CR 2CRL — 0:7/11 OPEN COMMAND

DRAINDOWN VALVE CV-49

3470 FULL OPEN LIMIT SWITCH I:4/6 (R)

3475 FULL CLOSED LIMIT SWITCH I:4/7 (G)

3480 AUTO OPEN CLOSE XOO OXO — 16CR FS-2 2CRL — 0:7/14 OPEN COMMAND

AIR PRESSURIZING VALVE CV-46

3505 FULL OPEN LIMIT SWITCH I:4/2 (R)

3510 FULL CLOSED LIMIT SWITCH I:4/3 (G)

3515 AUTO OPEN CLOSE XOO OXO — 16CR FS-4 2CRL 15TR T.C. 19TR T.C. — 0:7/12 OPEN COMMAND

AIR WASH INLET VALVE CV-48

3535 FULL OPEN LIMIT SWITCH I:4/4 (R)

3540 FULL CLOSED LIMIT SWITCH I:4/5 (G)

3545 AUTO OPEN CLOSE XOO OXO — 16CR FS-6 2CRL — 0:7/13 OPEN COMMAND

3300 3355 3400 3455 3500 3555 3600

CONTACT LOCATION CROSS-REFERENCE
(UNDERLINED NUMBERS INDICATE CLOSED CONTACTS)

10CR – 3205, 3210, 3215, 3230, 3750, 3762
11CR – 3317, 3342
16CR – 3205, 3210, 3215, 3319, 3371, 3373, 3378, 3417, 3447, 3482, 3517, 3547, 3831, 3953, 3983

NOTE: FOR GENERAL NOTES, SEE H&T, INC. DRAWING NO. 33552-AE32.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

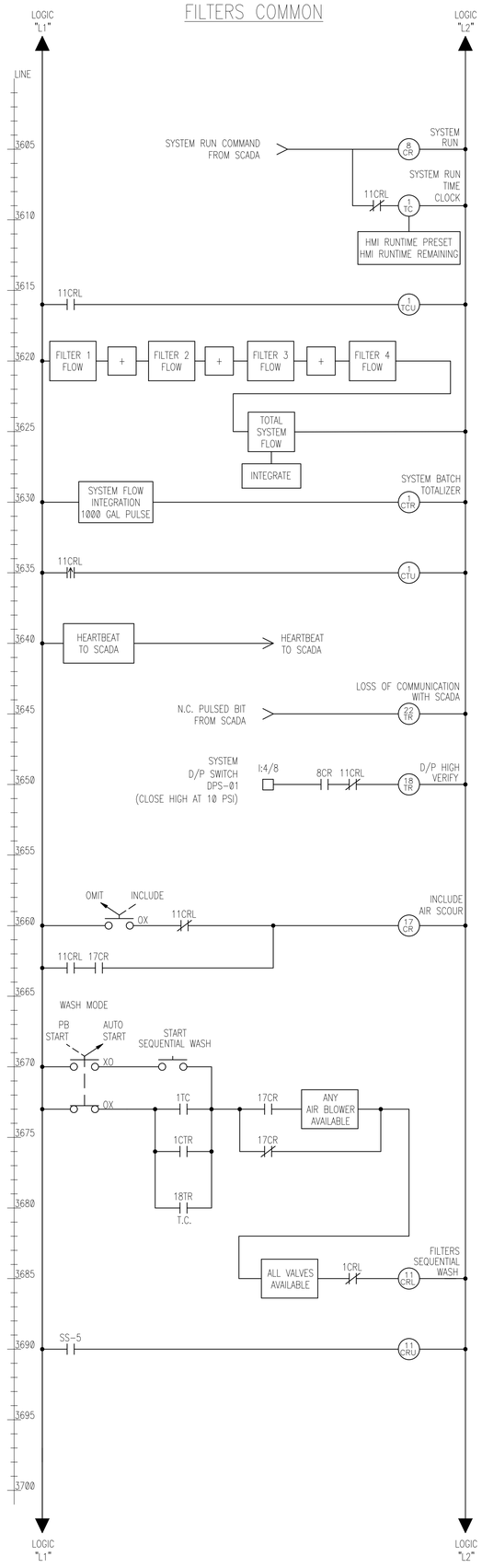
FILTER NO. 4
LADDER LOGIC DIAGRAM
(LINES 3201 THRU 3600)

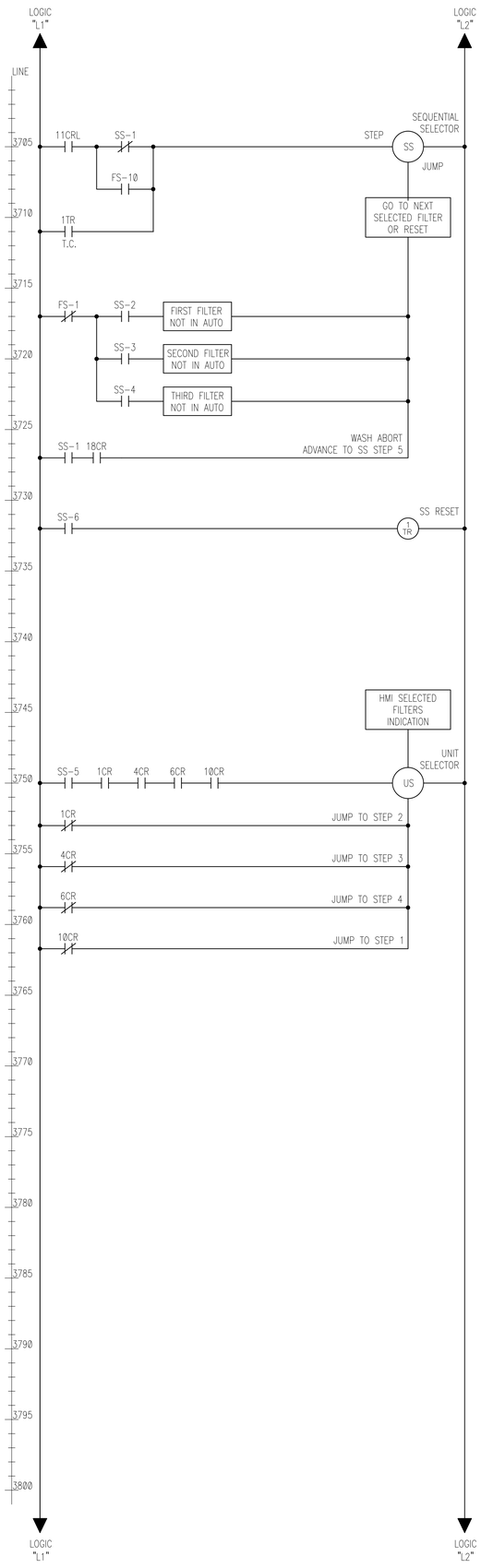
DATE		
STARTED	12-14-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	BMC
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

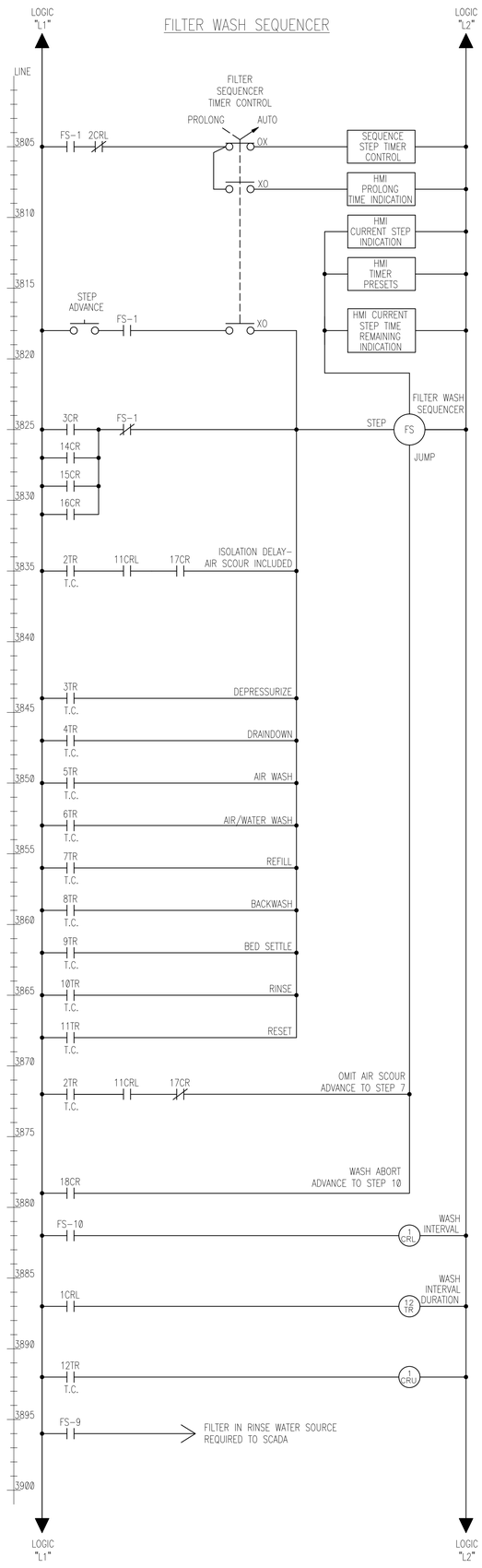
DRAWING NO.	REV.
33552-AE28	0

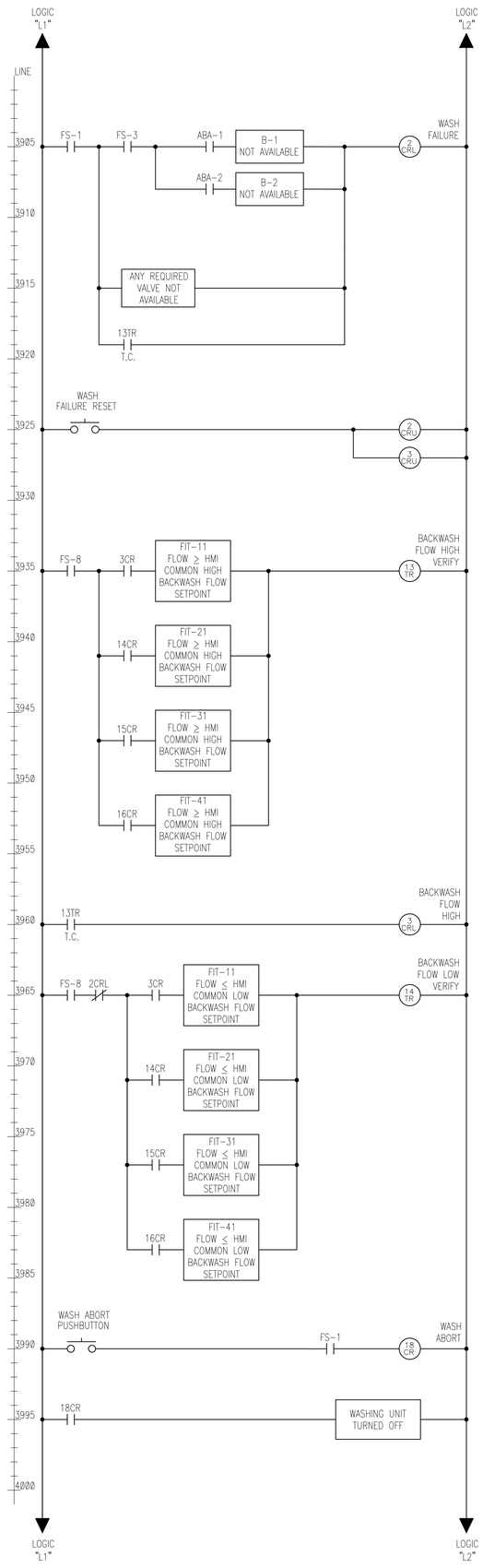
FILTERS COMMON





FILTER WASH SEQUENCER





CONTACT LOCATION CROSS-REFERENCE
(UNDERLINED NUMBERS INDICATE CLOSED CONTACTS)

1TR – 3711
12TR – 3892
13TR – 3919, 3960
14TR – 4490
18TR – 3680, 4415
22TR – 4510

8CR – 2010, 2015, 2247, 2410, 2415, 2647, 2810, 2815, 3047, 3210, 3215, 3447, 3650, 4440
17CR – 3663, 3673, 3676, 3835, 3872
18CR – 3727, 3879, 3995

1CRL – 2030, 2430, 2830, 3230, 3685, 3887
2CRL – 2119, 2175, 2178, 2217, 2247, 2282, 2317, 2347, 2519, 2575, 2578, 2617, 2647, 2682, 2717, 2747, 2919, 2975, 2978, 3017, 3047, 3082, 3117, 3147, 3319, 3375, 3378, 3417, 3447, 3482, 3517, 3547, 3805, 3965, 4140, 4240, 4495
3CRL – 4485
11CRL – 2012, 2017, 2412, 2419, 2812, 2821, 3212, 3215, 3609, 3616, 3635, 3650, 3660, 3663, 3705, 3835, 3872

1TC – 3673, 4405

1CTR – 3676, 4410

NOTE: FOR GENERAL NOTES, SEE H&T, INC. DRAWING NO. 33552-AE32.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

FILTERS COMMON & WASH SEQUENCER
LADDER LOGIC DIAGRAM
(LINES 3601 THRU 4000)

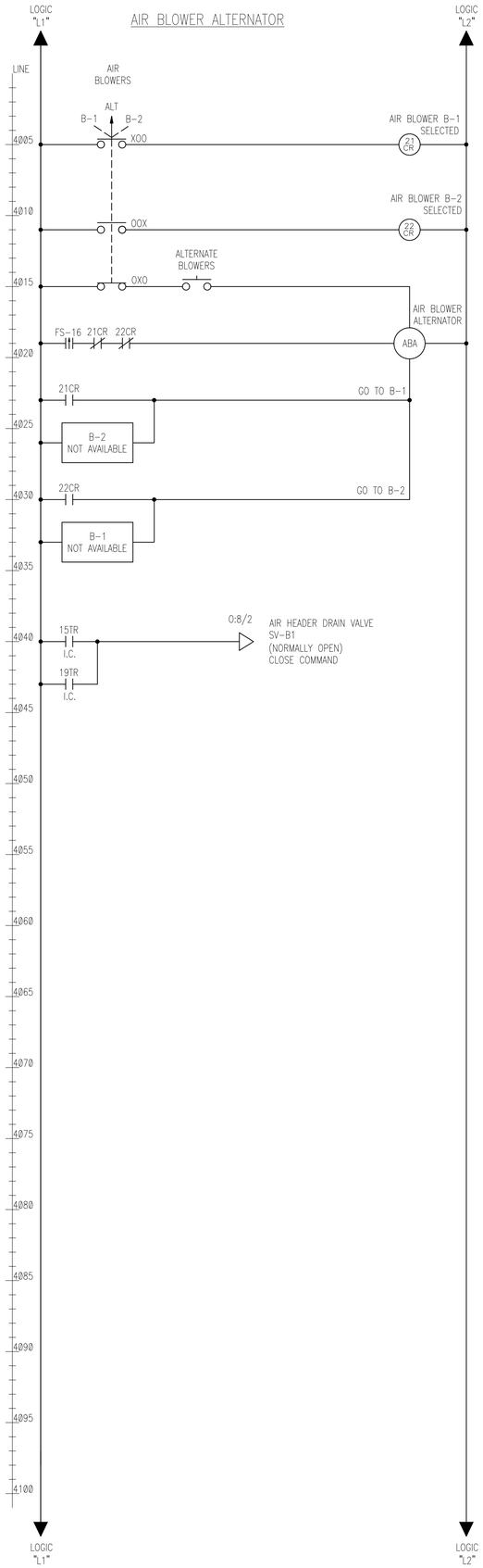
DATE		
STARTED	12-14-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	BMC
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

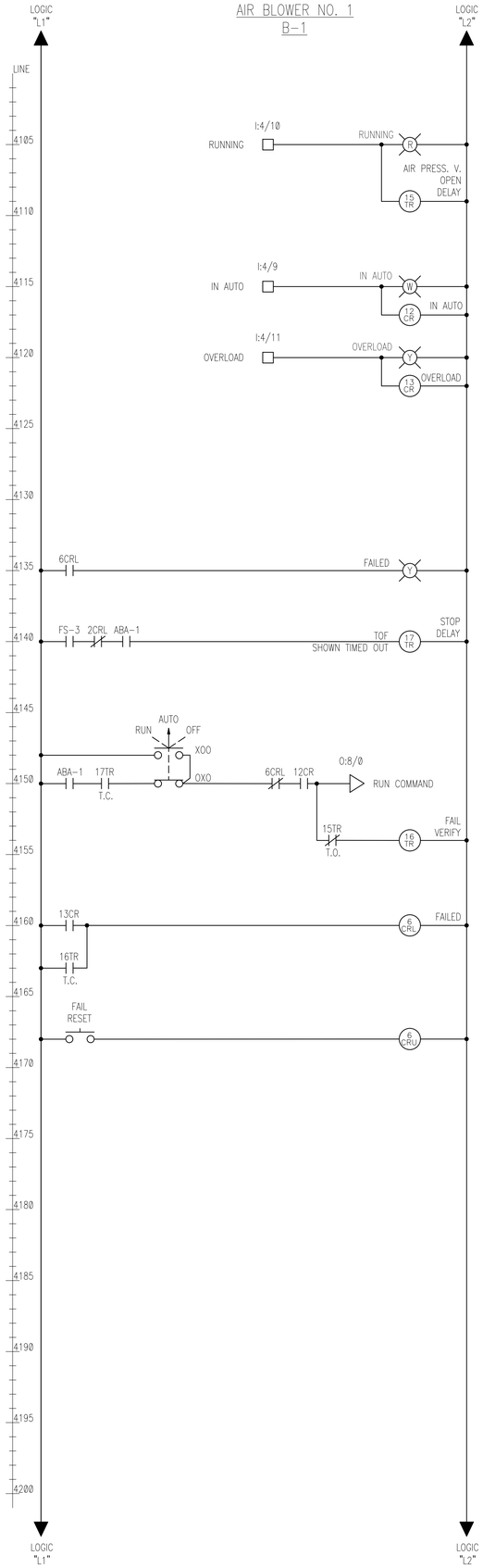
DRAWING NO.	REV.
33552-AE29	0

AIR BLOWERS

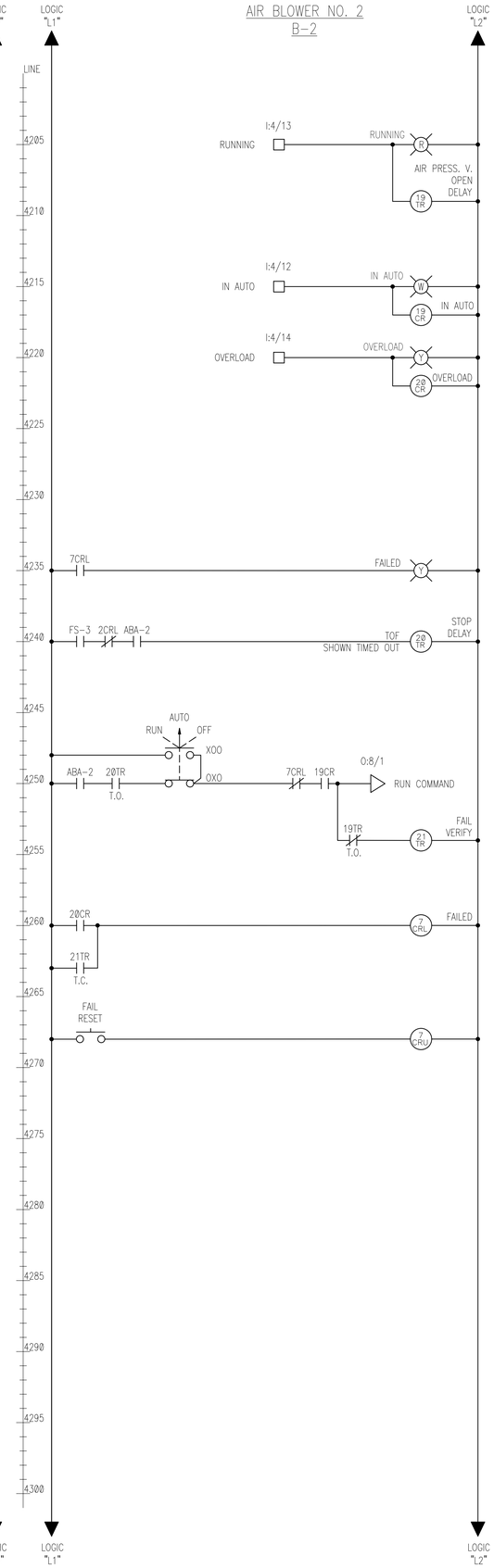
AIR BLOWER ALTERNATOR

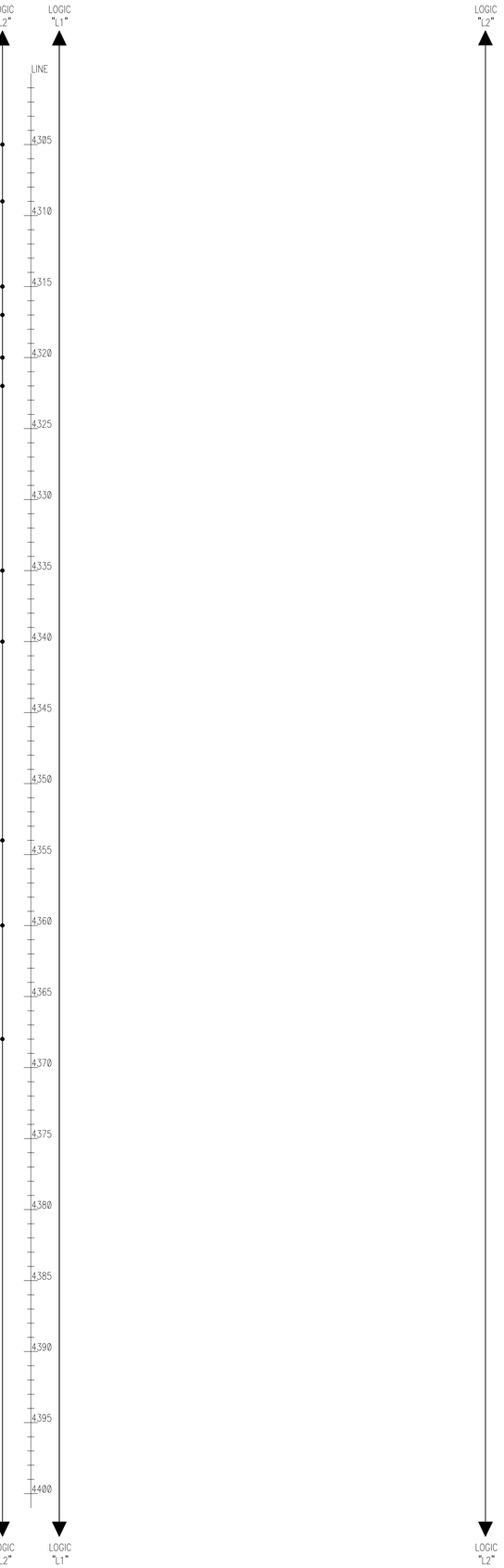


AIR BLOWER NO. 1 B-1



AIR BLOWER NO. 2 B-2





CONTACT LOCATION CROSS-REFERENCE
(UNDERLINED NUMBERS INDICATE CLOSED CONTACTS)

12CR – 4150, 4455
13CR – 4160, 4445
19CR – 4250, 4475
20CR – 4260, 4465
21CR – 4019, 4023
22CR – 4019, 4030

15TR – 2317, 2717, 3117, 3517, 4040, 4154
19TR – 2320, 2720, 3120, 3520, 4043, 4254
16TR – 4163
17TR – 4150
20TR – 4250
21TR – 4263

6CRL – 4135, 4150, 4450
7CRL – 4235, 4250, 4470

NOTE: FOR GENERAL NOTES, SEE H&T, INC. DRAWING NO. 33552-AE32.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

AIR BLOWERS
LADDER LOGIC DIAGRAM
(LINES 4001 THRU 4400)

DATE		
STARTED	12-14-23	JJF
FINISHED	3-18-23	JJF
CHECKED	3-22-23	BMC
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE30	0

ALARMS

LOGIC "L1"

LINE

4405 — 1TC — WASH MODE NOT AUTO START — RUNTIME EXCEEDED SEQUENTIAL WASH REQUIRED – WASH MODE NOT AUTO START

4410 — 1CTR — WASH MODE NOT AUTO START — BATCH THROUGHPUT EXCEEDED SEQUENTIAL WASH REQUIRED – WASH MODE NOT AUTO START

4415 — 18TR T.C. — WASH MODE NOT AUTO START — SYSTEM D/P HIGH WASH REQUIRED WASH MODE NOT IN AUTO START

4420 — FILTER NO. 1 ANY VALVE NOT AVAILABLE — FILTER NO. 1 ANY VALVE NOT AVAILABLE INDIVIDUALLY ALARMED

4425 — FILTER NO. 2 ANY VALVE NOT AVAILABLE — FILTER NO. 2 ANY VALVE NOT AVAILABLE INDIVIDUALLY ALARMED

4430 — FILTER NO. 3 ANY VALVE NOT AVAILABLE — FILTER NO. 3 ANY VALVE NOT AVAILABLE INDIVIDUALLY ALARMED

4435 — FILTER NO. 4 ANY VALVE NOT AVAILABLE — FILTER NO. 4 ANY VALVE NOT AVAILABLE INDIVIDUALLY ALARMED

4440 — FS-9 8CR — WASH HALTED NO RUN COMMAND DURING RINSE

4445 — 13CR — AIR BLOWER NO. 1 B-1 MOTOR OVERLOAD

4450 — 6CRL — AIR BLOWER NO. 1 B-1 FAILED

4455 — FS-3 12CR ABA-1 — AIR BLOWER NO. 1 B-1 LOCAL SWITCH NOT IN REMOTE

4460 — FS-3 ABA-1 — B-1 HMI SWITCH NOT IN AUTO — AIR BLOWER NO. 1 B-1 HMI SWITCH NOT IN AUTO

4465 — 20CR — AIR BLOWER NO. 2 B-2 MOTOR OVERLOAD

4470 — 7CRL — AIR BLOWER NO. 2 B-2 FAILED

4475 — FS-3 19CR ABA-2 — AIR BLOWER NO. 2 B-2 LOCAL SWITCH NOT IN REMOTE

4480 — FS-3 ABA-2 — B-2 HMI SWITCH NOT IN AUTO — AIR BLOWER NO. 2 B-2 HMI SWITCH NOT IN AUTO

4485 — 3CRL — BACKWASH FLOW HIGH

4490 — 14TR T.C. — BACKWASH FLOW LOW

4495 — 2CRL — WASH FAILURE

4500

LOGIC "L1"

LOGIC "L2"

LOGIC "L2"

LINE

4505 — WASH START INHIBITED — WASH START INHIBITED

4510 — 22TR T.C. — LOSS OF COMMUNICATION WITH SCADA

4515 4520 4525 4530 4535 4540 4545 4550 4555 4560 4565 4570 4575 4580 4585 4590 4595 4600

LOGIC "L1"

LOGIC "L2"

LOGIC "L1"

LINE

4605 4610 4615 4620 4625 4630 4635 4640 4645 4650 4655 4660 4665 4670 4675 4680 4685 4690 4695 4700

LOGIC "L2"

LOGIC "L1"

LOGIC "L2"

LINE

4705 4710 4715 4720 4725 4730 4735 4740 4745 4750 4755 4760 4765 4770 4775 4780 4785 4790 4795 4800

LOGIC "L2"

NOTE: FOR GENERAL NOTES, SEE H&T, INC. DRAWING NO. 33552-AE32.

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.

MANUFACTURERS OF WATER TREATING EQUIPMENT

CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY WTP
FREDERICKSBURG, PA

ALARMS
LADDER LOGIC DIAGRAM
(LINES 4401 THRU 4800)

DATE		
STARTED	12-14-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	BMC
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE31	0

NUMBER	FUNCTION	LINE LOCATION
1TR	SS – RESET	3732
2TR	FS – ISOLATION DELAY	----
3TR	FS – DEPRESSURIZE	----
4TR	FS – DRAINDOWN	----
5TR	FS – AIR WASH	----
6TR	FS – AIR/WATER WASH	----
7TR	FS – REFILL	----
8TR	FS –BACKWASH	----
9TR	FS – BED SETTLE	----
10TR	FS – RINSE	----
11TR	FS – RESET	----
12TR	WASH INTERVAL DURATION	3887
13TR	BACKWASH FLOW HIGH VERIFY	3935
14TR	BACKWASH FLOW LOW VERIFY	3965
15TR	AIR BLOWER B-1 AIR PRESS. V. OPEN DELAY	4109
16TR	AIR BLOWER B-1 FAIL VERIFY	4154
17TR	AIR BLOWER B-1 STOP DELAY	4140
18TR	SYSTEM D/P HIGH VERIFY	3650
19TR	AIR BLOWER B-2 AIR PRESS. V. OPEN DELAY	4209
20TR	AIR BLOWER B-2 STOP DELAY	4240
21TR	AIR BLOWER B-2 FAIL VERIFY	4254
22TR	LOSS OF COMMUNICATION WITH SCADA	3645

NUMBER	FUNCTION	LINE LOCATION
1CR	FILTER NO. 1 AUTO	2045
2CR	FILTER NO. 1 SERVICE	2018
3CR	FILTER NO. 1 WASH	2033
4CR	FILTER NO. 2 AUTO	2445
5CR	FILTER NO. 2 SERVICE	2418
6CR	FILTER NO. 3 AUTO	2845
7CR	FILTER NO. 3 SERVICE	2818
8CR	SYSTEM RUN	3605
9CR		
10CR	FILTER NO. 4 AUTO	3245
11CR	FILTER NO. 4 SERVICE	3218
12CR	AIR BLOWER B-1 IN AUTO	4117
13CR	AIR BLOWER B-1 OVERLOAD	4122
14CR	FILTER NO. 2 WASH	2433
15CR	FILTER NO. 3 WASH	2833
16CR	FILTER NO. 4 WASH	3233
17CR	INCLUDE AIR SCOUR	3660
18CR	WASH ABORT	3990
19CR	AIR BLOWER B-2 IN AUTO	4216
20CR	AIR BLOWER B-2 OVERLOAD	4222
21CR	AIR BLOWER B-1 SELECTED	4005
22CR	AIR BLOWER B-2 SELECTED	4011

NUMBER	FUNCTION	LINE LOCATION
FS	FILTER WASH SEQUENCER	3825
SS	SEQUENTIAL SELECTOR	3705
US	UNIT SELECTOR	3750

NUMBER	FUNCTION	LINE LOCATION
1TC 1TCU	SYSTEM RUN TIME CLOCK	3609 3616

NUMBER	FUNCTION	LINE LOCATION
1CTR 1CTU	SYSTEM BATCH TOTALIZER	3630 3635

NUMBER	FUNCTION	LINE LOCATION
1CRL 1CRU	WASH INTERVAL	3882 3892
2CRL 2CRU	WASH FAILURE	3905 3925
3CRL 3CRU	BACKWASH FLOW HIGH	3960 3927
4CRL 4CRU		
5CRL 5CRU		
6CRL 6CRU	AIR BLOWER B-1 FAILED	4160 4168
7CRL 7CRU	AIR BLOWER B-2 FAILED	4260 4268
8CRL 8CRU		
9CRL 9CRU		
10CRL 10CRU		
11CRL 11CRU	FILTERS SEQUENTIAL WASH	3685 3690

CONTACT LOCATION CROSS-REFERENCE
(UNDERLINED NUMBERS INDICATE CLOSED CONTACTS)

SS-1 – 3705, 3727
SS-2 – 2015, 2030, 2417, 2430, 2819, 2834, 3221, 3234, 3717
SS-3 – 2021, 2034, 2415, 2432, 2817, 2832, 3219, 3232, 3720
SS-4 – 2019, 2032, 2421, 2434, 2815, 2830, 3217, 3230, 3723
SS-5 – 3690, 3750
SS-6 – 3732

SEQUENCE STEPS		SEQUENCER ENABLE SS-1	FIRST FILTER SS-2	SECOND FILTER SS-3	THIRD FILTER SS-4	RESET SS-5	
1	FIRST FILTER	●	●				1
2	SECOND FILTER	●		●			2
3	THIRD FILTER	●			●		3
4	RESET	●				●	4
5	HOME						5

SS–SEQUENTIAL SELECTOR CHART

●CONTACT CHANGES STATE (FROM POSITION SHOWN IN SCHEMATIC)

CONTACT LOCATION CROSS-REFERENCE
(UNDERLINED NUMBERS INDICATE CLOSED CONTACTS)

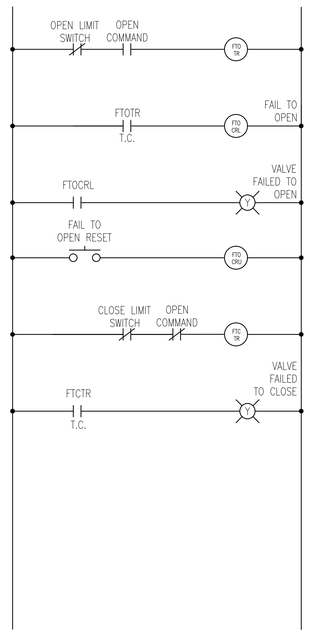
US-1 – 2015, 2030, 2415, 2432, 2815, 2830, 3212, 3215
US-2 – 2012, 2017, 2417, 2430, 2817, 2832, 3217, 3230
US-3 – 2019, 2032, 2412, 2419, 2819, 2834, 3219, 3232
US-4 – 2021, 2034, 2421, 2434, 2812, 2821, 3221, 3234

SEQUENCE STEPS		US-1: 1: FILTER NO. 1, 2: FILTER NO. 2, 3: FILTER NO. 3	US-2: 1: FILTER NO. 2, 2: FILTER NO. 3, 3: FILTER NO. 4	US-3: 1: FILTER NO. 3, 2: FILTER NO. 4, 3: FILTER NO. 1	US-4: 1: FILTER NO. 4, 2: FILTER NO. 1, 3: FILTER NO. 2	
1	FILTERS NO. 1, 2, 3	●				1
2	FILTERS NO. 2, 3, 4		●			2
3	FILTERS NO. 3, 4, 1			●		3
4	FILTERS NO. 4, 1, 2				●	4

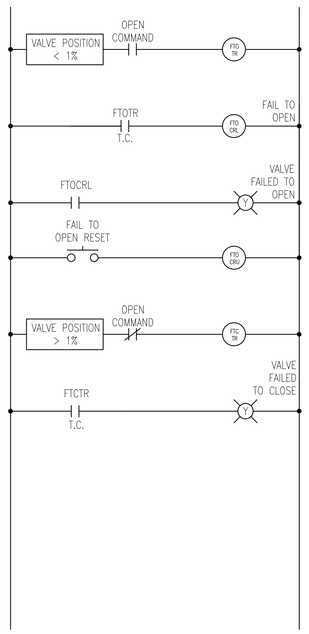
US–UNIT SELECTOR

●CONTACT CHANGES STATE (FROM POSITION SHOWN IN LADDER LOGIC)

TYPICAL OPEN/CLOSE VALVE FAILURE

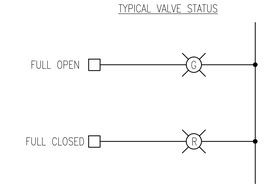


TYPICAL MODULATING VALVE FAILURE



GENERAL NOTES:
1. THE LOGIC CIRCUITS SHOWN IN THE LADDER LOGIC DRAWINGS INDICATE FUNCTIONAL OPERATION AND DISPLAY OF THE EQUIPMENT ONLY. THEY DO NOT INDICATE THE ACTUAL PROGRAM IN THE PROGRAMMABLE CONTROLLER OR HMI, NOR DO THEY DEPICT THE ACTUAL SCREEN DISPLAY ON THE HMI.
2. ALL STATUS INDICATION, INDICATORS, PUSH BUTTONS & SELECTORS ARE A PART OF OIT SCREENS.
3. ALL COILS AND SEQUENCERS ARE PART OF THE PROGRAMMABLE CONTROLLER.
4. ALL "TR" COILS ARE "TDE" UNLESS OTHERWISE NOTED.
5. THE SYMBOL □ INDICATES PROGRAMMABLE CONTROLLER DIGITAL INPUTS.
6. THE SYMBOL ▷ INDICATES PROGRAMMABLE CONTROLLER DIGITAL OUTPUTS.
7. THE SYMBOL ◇ INDICATES PROGRAMMABLE CONTROLLER ANALOG INPUTS.
8. THE SYMBOL ◇ INDICATES PROGRAMMABLE CONTROLLER ANALOG OUTPUTS.
9. THE SYMBOL ≻ INDICATES INPUT SIGNAL FROM SCADA.
10. THE SYMBOL ≻ INDICATES OUTPUT SIGNAL TO SCADA.
11. LADDER LOGIC IS SHOWN WITH POWER OFF.

TYPICAL VALVE STATUS



CONTACT LOCATION CROSS-REFERENCE
(UNDERLINED NUMBERS INDICATE CLOSED CONTACTS)

FS-1 – 3717, 3805, 3818, 3825, 3905, 3990
FS-2 – 2282, 2682, 3082, 3482
FS-3 – 3905, 4140, 4240, 4455, 4460, 4475, 4480
FS-4 – 2317, 2717, 3117, 3517
FS-5 – 2217, 2617, 3017, 3417
FS-6 – 2347, 2747, 3147, 3547
FS-7 – 2173, 2178, 2573, 2578, 2973, 2978, 3373, 3378
FS-8 – 2173, 2183, 2573, 2583, 2973, 2983, 3373, 3383, 3935, 3965
FS-9 – 2119, 2247, 2519, 2647, 2919, 3047, 3319, 3447, 3896, 4440
FS-10 – 3708, 3882
FS-16 – 4019

WASHING STEPS		ADVANCE TO NEXT STEP ON	CONTACT	SEQUENCER ENABLE FS-1	DRAINDOWN V. FS-2	AIR BLOWER FS-3	AIR PRESSURIZING V. FS-4	BACKWASH OUTLET V. FS-5	AIR WASH INLET V. FS-6	BACKWASH INLET V. – AIR/WATER WASH SETPOINT FS-7	BACKWASH INLET V. – BACKWASH SETPOINT FS-8	RINSE & INLET V.'S FS-9	RESET FS-10	
1	ISOLATION DELAY	2TR		●										1
2	DEPRESSURIZE	3TR		●	●									2
3	DRAINDOWN	4TR		●	●	●	●							3
4	AIR WASH	5TR		●		●		●	●					4
5	AIR/WATER WASH	6TR		●		●		●	●	●				5
6	REFILL	7TR		●						●				6
7	BACKWASH	8TR		●				●			●			7
8	BED SETTLE	9TR		●										8
9	RINSE	10TR		●								●		9
10	RESET	11TR		●									●	10
11	HOME	WASH INITIATION												11

FS–FILTER WASH SEQUENCE CHART

●CONTACT CHANGES STATE (FROM POSITION SHOWN IN LADDER LOGIC)

NO.	REVISIONS	DATE	CK'D

HUNGERFORD & TERRY, INC.
MANUFACTURERS OF WATER TREATING EQUIPMENT
CLAYTON, NEW JERSEY

FREDERICKSBURG SEWER & WATER AUTHORITY
FREDERICKSBURG, PA

GENERAL NOTES, SEQUENCE, AND COIL LOCATION CHARTS

DATE		
STARTED	12-14-23	JJF
FINISHED	3-18-24	JJF
CHECKED	3-22-24	BMC
APPROVED		

SCALE NONE
FORM NO.
CONT NO. M-345

DRAWING NO.	REV.
33552-AE32	0

FILTER SYSTEM ELECTRICAL EQUIPMENT LIST

TAG	QTY	MANUFACTURER	DESCRIPTION	MODEL No.
			FILTER CONTROL PANEL "FCP"	
BR, R	31	ALLEN BRADLEY	RELAY SOCKET	700-HN221
BR, R	31	ALLEN BRADLEY	PLUG-IN RELAY, SPDT, 120 VAC COIL	700-HK36A1
BR, R	31	ALLEN BRADLEY	RC SURGE SUPPRESSOR	700-AR2
PCPS1, PCPS2	2	ALLEN BRADLEY	POWER SUPPLY	1769-PA4
	1	ALLEN BRADLEY	PROCESSOR, 2 MB USER MEMORY	1769-L33ER
	5	ALLEN BRADLEY	INPUT MODULE, 16 PT., 120 VAC	1769-IA16
	3	ALLEN BRADLEY	RELAY OUTPUT MODULE, 16 PT.	1769-OW16
	2	ALLEN BRADLEY	ISOLATED ANALOG OUTPUT MODULE, 4-PT.	1769-OF4CI
	1	ALLEN BRADLEY	RIGHT END CAP	1769-ECR
	1	ALLEN BRADLEY	I/O BANK INTERCONNECT CABLE, RIGHT-TO-LEFT, 3 FT. LG.	1769-CRL3
CO	1	ALLEN BRADLEY	GFCI DUPLEX RECEPTACLE, 15A	1492-REC15G
	8	AUTOMATION DIRECT	DIN RAIL	DN-R35S1
	22	AUTOMATION DIRECT	DIN ANCHOR	DN-EB35
OIT-1, OIT-2	2	AUTOMATION DIRECT	C-MORE OPERATOR INTERFACE, 10 IN. WIDESCREEN TFT COLOR, TOUCH, ETHERNET	EA9-T10WCL
OIT-1, OIT-2	2	AUTOMATION DIRECT	AC POWER ADAPTER, 1.5A, 24 VDC OUTPUT	EA-AC
OIT-1, OIT-2	2	AUTOMATION DIRECT	SD CARD, 2GB	EA-SD-CARD
PDS	1	C3 CONTROLS	NON-FUSIBLE DISCONNECT, 40A	DDS2-340-DHMRY
PDS	1	C3 CONTROLS	LOAD SIDE SHIELD	DS2TS60
	1	EMEDCO	ARC FLASH WARNING LABEL	QS3743
	1	HOFFMAN	2-DOOR ENCLOSURE, NEMA 4, ANSI 61 GRAY	A62H6018LP3PT
	1	HOFFMAN	SUB-PANEL, PAINTED WHITE	A60P60
	1	H&T, INC.	"FOR SERVICE" NAMEPLATE	NP-ELECTRICAL
	4	ILSCO	GROUND BUS BAR	D167-10

FILTER SYSTEM ELECTRICAL EQUIPMENT LIST

FILTER CONTROL PANEL "FCP" (cont'd)

TAG	QTY	MANUFACTURER	DESCRIPTION	MODEL No.
FSL1	1	MERSEN/FERRAZ	AC FUSE HOLDER w/BLOWN FUSE INDICATOR, CLASS "CC"	USCC1I
FS1L1 THRU FS8L1	8	MERSEN/FERRAZ	AC FUSE HOLDER w/BLOWN FUSE INDICATOR, MIDGET	USM1I
FSL1	1	MERSEN/FERRAZ	25A TIME DELAY CLASS "CC" FUSE	ATDR25
FS2L1 THRU FS6L1	5	MERSEN/FERRAZ	10A TIME DELAY MIDGET FUSE	TRM10
FS1L1, FS7L1, FS8L1	3	MERSEN/FERRAZ	5A TIME DELAY MIDGET FUSE	TRM5
FS40	1	MERSEN/FERRAZ	1/2A TIME DELAY GLASS FUSE	GDL1/2
ANALOG	12	MERSEN/FERRAZ	2/10A FAST ACTING GLASS FUSE	GGC2/10
	36 FT.	PANDUIT	2 IN. X 4 IN. TYPE "G" WIRE DUCT, GRAY PVC	G2x4LG6
	36 FT.	PANDUIT	2 IN. TYPE "C" WIRE DUCT COVER, GRAY PVC	C2LG6
DCPS	1	PHOENIX CONTACT	24VDC POWER SUPPLY, 30W, UNO-PS/1AC/24DC/30W	2902991
SA	1	PHOENIX CONTACT	AC SURGE ARRESTOR, VAL-US-120/40/1+1-FM	2910349
	202	PHOENIX CONTACT	TERMINAL BLOCK, 600V, 50A, UT-6	3044131
	5	PHOENIX CONTACT	KNIFE-DISCONNECT TERMINAL BLOCK, UT 6-MT	3064069
	5	PHOENIX CONTACT	END COVER, D-UT 2.5/10	3047028
	13	PHOENIX CONTACT	24 VDC LEVER-TYPE FUSE TERMINAL BLOCK, UT 6-HESILED 24 w/LED	3046414
	1	PHOENIX CONTACT	PLUG-IN BRIDGE, 2-POLE, FBS 2-8	3030284
	1	PHOENIX CONTACT	PLUG-IN BRIDGE, 5-POLE, FBS 5-8	3030310
	1	PHOENIX CONTACT	PLUG-IN BRIDGE, 10-POLE, FBS 10-8	3030323
ESS	1	PHOENIX CONTACT	ETHERNET LINE SURGE PROTECTOR, DT-LAN-CAT.6+	2881007
	8	PHOENIX CONTACT	BLANK MARKER CARD, WHITE, 56 MARKERS, UC-TM8	0818072
ES	1	RED LION / N-TRON	ETHERNET SWITCH, 5-PORT	105TX
	2	SPECTRUM CONTROLS	ISOLATED ANALOG INPUT MODULE, 8-PT.	1769SC-IF8U
LT1, LT2	2	STEGO	120VAC LED LIGHT w/MOTION SENSOR	025410-01
LT1, LT2	2	STEGO	120VAC INPUT CONNECTOR	264057
EC4	1	TRIPP-LITE	CAT 5E ETHERNET PATCH CABLE, 1 FT., BLUE	N001-001-BL
EC3	1	TRIPP-LITE	CAT 5E ETHERNET PATCH CABLE, 7 FT., BLUE	N001-007-BL
EC1, EC2	2	TRIPP-LITE	CAT 5E ETHERNET PATCH CABLE, 10 FT., BLUE	N001-010-BL

FILTER SYSTEM ELECTRICAL EQUIPMENT LIST

TAG	QTY	MANUFACTURER	DESCRIPTION	MODEL No.
FILTER No. 1 THRU 4 JUNCTION BOXES				
	4	AUTOMATION DIRECT	DIN RAIL	DN-R35S1
	16	AUTOMATION DIRECT	DIN ANCHOR	DN-EB35
	4	EMEDCO	ARC FLASH WARNING LABEL	QS3743
	4	HOFFMAN	ENCLOSURE, NEMA 4, ANSI 61 GRAY	A24H24BLP
	4	HOFFMAN	SUB-PANEL, PAINTED WHITE	A24P24
	4	H & T INC.	"FOR SERVICE" NAMEPLATE	NP-ELECTRICAL
	4	ILSCO	GROUND BUS BAR	D167-14
	36 FT.	PANDUIT	1-1/2 IN. x 3 IN. TYPE "G" WIRE DUCT, GRAY PVC	G1.5x3LG6
	36 FT.	PANDUIT	1-1/2 IN. TYPE "C" WIRE DUCT COVER, GRAY PVC	C1.5LG6
	248	PHOENIX CONTACT	TERMINAL BLOCK, 600V, 50A, UT-6	3044131
	16	PHOENIX CONTACT	END COVER, D-UT 2.5/10	3047028
	9	PHOENIX CONTACT	BLANK MARKER CARD, WHITE, 56 MARKERS, UC-TM 8	0818072
	8	PHOENIX CONTACT	PLUG-IN BRIDGE, 5-POLE, FBS 5-8	3030310

FILTER SYSTEM ELECTRICAL EQUIPMENT LIST

TAG	QTY	MANUFACTURER	DESCRIPTION	MODEL No.
AIR BLOWER B-1 & B-2 MOTOR STARTERS				
	2	ALLEN BRADLEY	NEMA SIZE 1 A-C-L MOTOR STARTER w/FUSIBLE DISCONNECT, H-O-A SWITCH, RED INDICATOR LIGHT, 480/120V CPT (80VA), ELECTRIC OVERLOAD (1.0 - 5.0A) & 1 N.O. AUX. CONTACT, TYPE 4 PAINTED STEEL ENCLOSURE	512M-BFB-A2E-3-4R-6P-24R-90
	2	ALLEN BRADLEY	1 N.O./1 N.C. AUX CONTACT	800T-XA
	1	AUTOMATION DIRECT	DIN RAIL	DN-R35S1
	4	AUTOMATION DIRECT	DIN ANCHOR	DN-EB35
	4	BURNDY	SCRULUG GROUND LUG, #14-4 AWG	KPA4C
	2	EMEDCO	ARC FLASH WARNING LABEL	QS3743
	6	MERSEN/FERRAZ	6A TIME DELAY FUSE, CLASS "R"	TRS6R
	20	PHOENIX CONTACT	TERMINAL BLOCK, 600V/50A, UT-6	3044131
	2	PHOENIX CONTACT	END BARRIER/COVER, D-UT, 2.5/10	3047028
	1	PHOENIX CONTACT	BLANK MARKER CARD, WHITE, 56-MARKERS, UC-TM8	0818072
SPARE PARTS				
	5	MERSEN/FERRAZ	25A TIME DELAY CLASS "CC" FUSE	ATDR25
	5	MERSEN/FERRAZ	10A TIME DELAY MIDGET FUSE	TRM10
	4	MERSEN/FERRAZ	6A TIME DELAY FUSE, CLASS "R"	TRS6R
	5	MERSEN/FERRAZ	5A TIME DELAY MIDGET FUSE	TRM5
	5	MERSEN/FERRAZ	1/2A TIME DELAY GLASS FUSE	GDL1/2
	5	MERSEN/FERRAZ	2/10A FAST ACTING GLASS FUSE	GGC2/10

HUNGERFORD & TERRY, INC.

CLAYTON, NEW JERSEY

MADE BY	JJF
DATE	12-14-23
SCALE	NONE
CHECKED	3-22-24
APPROVED	FLW

TITLE I/O LOAD CALCULATION

FORM No.

I/O BANK NO. 1

MODULE NO.	MODEL NO.	5VDC LOAD	24VDC LOAD
0	1769-L33ER	500mA	225mA
1	1769-IA16	115mA	0mA
2	1769-IA16	115mA	0mA
3	1769-IA16	115mA	0mA
4	1769-IA16	115mA	0mA
5	1769-IA16	115mA	0mA
6	1769-OW16	205mA	180mA
7	1769-OW16	205mA	180mA
8	1769-OW16	205mA	180mA
TOTAL:		1690mA (8.45W)	765mA (18.36W)

I/O BANK NO. 2

MODULE NO.	MODEL NO.	5VDC LOAD	24VDC LOAD
9	1769SC-IF8U	150mA	45mA
10	1769SC-IF8U	150mA	45mA
11	1769-OF4CI	145mA	120mA
12	1769-OF4CI	145mA	120mA
	1769-ECR	5mA	0mA
TOTAL:		595mA (2.975W)	330mA (7.92W)

H&T WILL USE POWER SUPPLY #1769-PA4 FOR EACH BANK OF I/O.
1769-PA4 PROVIDES A MAX. OUTPUT OF: 4A @ 5VDC
2A @ 24VDC

FORM No.

NO.	REVISIONS	DATE	CK'D

SK 33552-CE02

CONT. No. M-345

HUNGERFORD & TERRY, INC.

CLAYTON, NEW JERSEY

MADE BY JJF
DATE 12-14-23
SCALE NONE
CHECKED 3-22-24
APPROVED FLW

TITLE 24VDC POWER SUPPLY LOAD CALCULATION

FORM No.

ITEM	LOAD
ES	215mA

TOTAL LOAD: 215mA (0.215A) [X 100% SPARE = 0.43A]

NOTE:

H&T, INC. WILL USE PHOENIX CONTACT #UNO-PS/1AC/24DC/30W (2902991) FOR THE DCPS 24VDC POWER SUPPLY. THIS DC SUPPLY WILL PROVIDE A 30W/1.3A OUTPUT

JAWENIO

FORM No.

NO.	REVISIONS	DATE	CK'D

SK 33552-CE03

CONT. No. M-345

FILTER SYSTEM
ELECTRICAL EQUIPMENT LIST
PRODUCT DATA SHEETS

FOR: Fredericksburg Sewer & Water Authority
Fredericksburg, PA

☒ REVIEWED ☐ REVISE AND RESUBMIT

☐ REJECTED ☐ FURNISH AS CORRECTED

Corrections or comments on shop drawings during this review do not relieve the Contractor from compliance with the drawings and/or specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. The contractor is responsible for: confirming and correlating all dimensions and quantities; selecting fabrication processes and techniques of construction; coordinating his work with that or all other trades; and performing his work in a safe and satisfactory manner.

Date: March 27, 2023 **By:** Paul Lutzkanin, P.E.

STECKBECK ENGINEERING & SURVEYING, INC.

HUNGERFORD & TERRY, INC.
226 Atlantic Avenue
Clayton, New Jersey

Contract No.: **M-345**
Drawing Series No.: **33552**
Submitted: **March 25, 2024**

MOTOR STARTERS (B-1 & B-2)

NEMA Combination Non-Reversing Starters with Extra Panel Space

Disconnect Type (Fusible with Class R Fuse Clips) (Non-Fusible)

Bulletin 512M

- NEMA starter sizes 1...2
- Overload relays: Eutectic supplied as standard, solid-state available as an option
- Fusible or non-fusible disconnect switch
- Painted metal extra capacity enclosures: Type 3R/4/12
- Stainless steel extra capacity enclosures: Type 4/4X
- Modifications — factory installed
- Accessories — field installed
- Service entrance rated

A Bulletin 512M combination non-reversing starter consists of a Bulletin 509 starter and a disconnect switch (fused or unfused) mounted in a common enclosure with extra panel space.

Table of Contents

Standards Compliance

UL 508
CSA 22.2, No. 14

Certifications

Fusible Versions
cULus Listed (File No. E125316, Guide No. NKJH, NKJH7)
Non-Fusible Versions
cULus Listed (File No. E3125, Guide No. NLDX, NLDX7)
American Bureau of Shipping

Heater Elements — Starters with eutectic alloy overload relay require 3 heater elements. Located on page 1-177.

NEMA Size	Continuous Ampere Rating [A]	Maximum Horsepower Rating Full Load Current Must Not Exceed Continuous Ampere Rating — Motor Voltage 60 Hz 200V	60 Hz 230V	50 Hz 380...415V	60 Hz 460...575V	Line Voltage [V]	Fuse Clip Rating Amperes [A] Fuses not included. Select per NEC	Type 3R/4/12 Rainproof, Waterproof, Dusttight Cat. No.*❊	Type 3R/4/12 Rainproof, Waterproof, Dusttight (Door Safety Hardware) Cat. No.*❊	Type 4/4X Watertight, Corrosion-Resistant, Stainless Steel Cat. No.*❊
1	27	7-1/2	7-1/2	—	—	208...240	30	**512M-BF⊗-✪-24R**	**512M-BJ⊗-✪-24R**	**512M-BC⊗-✪-24R**
							60	**512M-BF⊗-✪-25R**	**512M-BJ⊗-✪-25R**	**512M-BC⊗-✪-25R**
		—	—	10	10	480...600	30	**512M-BF⊗-✪-24R**	**512M-BJ⊗-✪-24R**	**512M-BC⊗-✪-24R**
							60	**512M-BF⊗-✪-25R**	**512M-BJ⊗-✪-25R**	**512M-BC⊗-✪-24R**
2	45	10	15	—	—	208...240	60	**512M-CF⊗-✪-25R**	**512M-CJ⊗-✪-25R**	**512M-CC⊗-✪-25R**
							100	**512M-CF⊗-✪-26J**	**512M-CJ⊗-✪-26J**	**512M-CC⊗-✪-26J**
		—	—	25	25	480...600	30	**512M-CF⊗-✪-24R**	**512M-CJ⊗-✪-24R**	**512M-CC⊗-✪-24R**
							60	**512M-CF⊗-✪-25R**	**512M-CJ⊗-✪-25R**	**512M-CC⊗-✪-25R**
							100	**512M-CF⊗-✪-26J**	**512M-CJ⊗-✪-26J**	**512M-CC⊗-✪-26J**

⊗ Coil Voltage Code

The cat. no. as listed is incomplete. Select a Coil Voltage Code from the table below to complete the cat. no.
Example: **Cat. No. 512M-BF⊗-✪-24R** becomes **Cat. No. 512M-BFB-✪-24R**. For other values, consult your local Rockwell Automation sales office or Allen-Bradley distributor.

	[V]	208	230...240	460...480	575...600
Common Control	AC, 60 Hz	H	A	B	C
Transformer Control (See page 1-72 Note)		AD	AD	CD	CD
120V Separate Control (without transformer)					

✪ Overload Relay Code

Use to order solid-state overload relay. Do not use when ordering eutectic alloy overload relay. The cat. no. as listed is incomplete. Select an overload relay code from page 1-169 to complete the cat. no.
Example: **Cat. No. 512M-BJB-✪-24R** becomes **Cat. No. 512M-BJB-A2D-24R**.

*Non-Fusible Disconnect Type

Cat. nos. listed above include a fusible disconnect switch with Class R or J fuse clips. To order a non-fusible disconnect switch, eliminate the fuse clip code from the cat. no. Example: **Cat. No. 512M-BFB-24R** becomes **Cat. No. 512M-BFB**.

❊ Class H fuse clips can be supplied. Example: **Cat. No. 512M-BA✪-24R** becomes **Cat. No. 512M-BA✪-24**.
Class J fuse clips can be supplied. Example: **Cat. No. 512M-BA✪-24R** becomes **Cat. No. 512M-BA✪-24J**.
Class HRC form II fuse clips can be supplied. Example: **Cat. No. 512M-BA✪-24R** becomes **Cat. No. 512M-BA✪-24E**.

512M-BFB-A2E-3-4R-6P-24R-90

Overload Relay Code Selection

For Application on Bulletin 500 Line Starters and NEMA Pump Panels

Starters Without Overload Relays for Field Assembly of Starters Using Bulletin 592 Overload Relays +❖♠11

These products are intended for field installation of Bulletin 592 Eutectic, or 592 solid-state overload relays. (Select Bulletin 592 overload relays from page 1-180...page 1-182.) They ship in a starter carton with provisions for mounting the overload relay (includes a starter mounting plate, screws/bolts and instructions).

Eutectic Alloy Overload Relays — Overload relay codes do not apply. Use Cat. No. as listed in product selection tables. Select heater elements from page 1-188. Starter Cat. Nos. marked in blue with eutectic alloy overload relays are part of the AB Express Program. Starters with solid-state overload relays are not presently part of the AB Express Program.

+ All Sizes — No overload relay.
❖ Bulletins 520, 522, and 523 require two overload relays.
♠ Bulletins 530, 1282, and 1283 require two overload relays. When selecting the proper solid-state overload relay or heater, divide motor nameplate full load amperes by 2.00. Use this value to select the proper overload relays.
11 Bulletins 540, 1242, and 1243 have one overload relay. When selecting the proper solid-state overload relay or heater, divide motor nameplate full load amperes by 1.73. Use this value to select the proper overload relays.

E1 Plus Solid-State Overload Relay (Selectable Class 10, 20, or 30) (Automatic/Manual Reset)

For use with Bulletins 505, 505V, 506, 507, 509, 512, 512M, 513, 520, 522, 523, 530, 532, 533, 540, 542, 543, 570, 572, 573, 1232X, 1233X, 1242, 1243, 1272, 1273, 1282, and 1283.♣➢⌘

NEMA Size	Full Load Current Adjustment Range (A)	Overload Relay Code
		Class 20
00	0.1...0.5	A2A
	0.2...1.0	A2C
	1.0...5.0	A2D
	1.0...5.0	A2E
	3.2...16	A2F
0, 1 1PW 1YD	0.2...1.0	A2B
	0.2...1.0	A2C
	1.0...5.0	A2D
	1.0...5.0	A2E
	3.2...16	A2F
	5.4...27	A2G
1	9...45	A2H
2 2PW 2YD	5.4...27	A2G
	9...45	A2H
	9...45	A2J
3 3PW 3YD	9...45	A2J
	18...90	A2K
	18...90	A2L
4 4PW 4YD	30...150	A2K
	30...150	A2L
	30...150	A2M
5 5PW 5YD	60...300	A2N
6 6PW 6YD	120...600	A2R
7+	256...810	§
8+	384...1215	
9+	800...2250	

♣ Bulletins 520, 522, and 523 require two overload relay codes to complete the Cat. No. The first code will denote the high speed overload relay and the second code will denote the low speed overload relay.
➢ Bulletins 530, 532, 533, 1282, and 1283 have two overload relays and require two overload relay codes to complete the Cat. No. When selecting the proper SMP overload relay, divide motor nameplate full load amperes by 2.00. Use this value to select the proper overload relay codes.
⌘ Bulletins 540, 542, 543, 1242, and 1243 have one overload relay. When selecting the proper SMP overload relay, divide motor nameplate full load amperes by 1.73. Use this value to select the proper overload relay code.
+ These solid-state overload relays have an interposing relay with a 120V AC coil.
§ Order by description.

E3 Solid-State Overload Relay: 2 Inputs/1 Output

For use with Bulletins 505, 505V, 506, 507, 509, 512, 512M, 513, 520, 522, 523, 530, 532, 533, 540, 542, 543, 570, 572, 573, 1232X, 1233X, 1242, 1243, 1272, 1273, 1282, and 1283.*

NEMA Size	Full Load Current Adjustment Range (A)	Overload Relay Code※
00	1...5	EC1A
	3...15	EC1B
0...2	1...5	EC1A
	3...15	EC1B
	5...25	EC1C
	9...45	EC1D
3	9...45	EC1D
	18...90	EC1E
4	28...140	EC1F
5	60...302	EC1H
6	125...630	EC1K

E3 Plus Solid-State Overload Relay: 4 Inputs/2 Outputs, Built-In Ground Fault Sensor, PTC Thermistor Input

For use with Bulletins 505, 505V, 506, 507, 509, 512, 512M, 513, 520, 522, 523, 530, 532, 533, 540, 542, 543, 570, 572, 573, 1232X, 1233X, 1242, 1243, 1272, 1273, 1282, and 1283.*

NEMA Size	Full Load Current Adjustment Range (A)	Overload Relay Code※
00	1...5	EC2A
	3...15	EC2B
0...2	1...5	EC2A
	3...15	EC2B
	5...25	EC2C
	9...45	EC2D
3	9...45	EC2D
	18...90	EC2E
4	28...140	EC2F
5	60...302	EC2H

* Bulletin 520 requires two overload relay codes to complete the cat. no. The first code will denote the high speed overload relay and the second code will denote the low speed overload relay.
※ Rockwell Automation recommends using 120 or 240V AC coils on all NEMA Starters with E3 solid-state overload relays. When using coil voltages other than 120 or 240V AC, consult your local Rockwell Automation distributor.

MOTOR STARTERS (B-1 & B-2)

Modifications — Factory Installed

NEMA Combination Contactors/Starters

For Use on Bulletins 502, 502L, 503, 503L, 506, 506X, 507, 507X, 512, 512H, 512M, 512V, 513, 513H, 513M, 513V, 522, 522E, 522F, 522G, 523, 523E, 523F, 523G, 530, 532, 533, 540, 542, 543, 570, 572, 573, 1242, 1243, 1272, 1273, 1232X, 1232V, 1233X, and 1233V

Description of Modification			Suffix No.	Enclosure Type	NEMA Size 0	1	2	3	4	5	6	7
Pilot Devices in Cover or Flange												
Full Voltage Non-Reversing Single Speed Starters	START-STOP push button		**1**	1	A	A	A	A	A	A	NA	NA
			1	3R/4/12, 4/4X	A	A	A	A	A	A	A	A
			1	Bolted	A	A	A	A	A	A	NA	NA
			1	Unilock	A	A	A	A	A	A	NA	NA
	ON-OFF push button		**1E**	1	A	A	A	A	A	A	NA	NA
			1E	3R/4/12, 4/4X	A	A	A	A	A	A	A	A
			1E	Bolted	A	A	A	A	A	A	NA	NA
			1E	Unilock	A	A	A	A	A	A	NA	NA
	START-STOP illuminated push button		**1L**	1	A	A	A	A	A	A	NA	NA
			1L	3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA
	HAND-OFF-AUTO selector switch		**3**	1	A	A	A	A	A	A	NA	NA
			3	3R/4/12, 4/4X	A	A	A	A	A	A	A	A
			3	Bolted	A	A	A	A	A	A	NA	NA
			3	Unilock	A	A	A	A	A	A	NA	NA
	OFF-ON selector switch		**3E**	1	A	A	A	A	A	A	NA	NA
			3E	3R/4/12, 4/4X	A	A	A	A	A	A	A	A
			3E	Bolted	A	A	A	A	A	A	NA	NA
			3E	Unilock	A	A	A	A	A	A	NA	NA
	HAND-AUTO selector switch		**3H**	1	A	A	A	A	A	A	NA	NA
			3H	3R/4/12, 4/4X	A	A	A	A	A	A	A	A
			3H	Bolted	A	A	A	A	A	A	NA	NA
			3H	Unilock	A	A	A	A	A	A	NA	NA
	PILOT LIGHT	Transformer Type — incandescent bulb	**4*❄**	1, 3R/4/12, 4/4X, 3R	A	A	A	A	A	A	A	A
			4*❄	Bolted	A	A	A	A	A	A	NA	NA
			4*❄	Unilock	A	A	A	A	A	A	NA	NA
		Transformer Type—LED bulb	**4L*❄**	1, 3R/4/12, 4/4X, 3R	A	A	A	A	A	A	A	A
	PUSH-TO-TEST PILOT LIGHT Transformer—incandescent bulb		**5*❄**	1, 3R/4/12, 4/4X, 3R	A	A	A	A	A	A	A	A
			5*❄	Bolted	A	A	A	A	A	A	A	A
			5L*❄	1, 3R/4/12, 4/4X, 3R	A	A	A	A	A	A	A	A
	START-STOP push button and HAND-OFF-AUTO selector switch (unwired)		**13**	1	A	A	A	A	A	A	A	A
			13	3R/4/12, 4/4X	A	A	A	A	A	A	A	A
Full Voltage Reversing and Multi-Speed Starters	FOR-REV-STOP push button	Bulletin 506...507	**1**	1, 3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA
		Bulletin 507	**1**	Bolted (7 & 9)	A	A	A	A	A	A	NA	NA
	FOR-OFF-REV selector switch (Bulletin 506...507)		**3**	1, 3R/4X12, 4/4X, 3R	A	A	A	A	A	A	NA	NA
			3	Bolted	A	A	A	A	A	A	NA	NA
			3	Unilock	A	A	A	A	A	A	NA	NA
	HAND-AUTO		**3H**	1	A	A	A	A	A	A	NA	NA
			3H	3R/4/12, 4/4X,	A	A	A	A	A	A	NA	NA
			3H	Bolted	A	A	A	A	A	A	NA	NA
			3H	Unilock	A	A	A	A	A	A	NA	NA
	HIGH-LOW-STOP push button	Bulletin 522...523	**1**	1, 3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA
		Bulletin 523	**1**	Bolted	A	A	A	A	A	A	NA	NA
	HIGH-OFF-LOW selector switch	Bulletin 522...523	**3**	1, 3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA
		Bulletin 523	**3**	Bolted	A	A	A	A	A	A	NA	NA
	HIGH-LOW-OFF-AUTO selector switch		**3J**	1, 3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA
	PILOT LIGHT (2)	Transformer Type — Incandescent Bulb	**4❄‡**	1, 3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA
		Transformer Type—LED Bulb	**4L‡**	1, 3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA
	PUSH-TO-TEST PILOT LIGHT	Transformer— Incandescent Bulb	**5❄**	1, 3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA
		Transformer—LED Bulb	**5L***	1, 3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA

* "OFF" pilot lights for non-reversing and non-multi-speed applications require a normally closed auxiliary contact (-91).

❄ The suffix number is incomplete. Specify the lens with the following letters: **A** = Amber; **B** = Blue; **C** = Clear; **G** = Green; **W** = White.

‡ For multi-speed and reversing starters, one pilot light for each container. Add additional letter to identify two lens colors. The first letter specifies "FORWARD" or "HIGH", or "ON"; the second letter specifies "REVERSE" or "LOW" , or "OFF"; e.g. **4AG**.

A = Available, NA = Not Available

MOTOR STARTERS (B-1 & B-2)

Modifications — Factory Installed

NEMA Combination Contactors/Starters

For Use on Bulletins 502, 502L, 503, 503L, 506, 506X, 507, 507X, 512, 512H, 512M, 512V, 513, 513H, 513M, 513V, 522, 522E, 522F, 522G, 523, 523E, 523F, 523G, 530, 532, 533, 540, 542, 543, 570, 572, 573, 1242, 1243, 1272, 1273, 1232X, 1232V, 1233X, and 1233V, Continued

	Description of Modification		Suffix No.	Enclosure Type	NEMA Size 0	1	2	3	4	5	6	7
Control Circuit Transformers Includes 2 Primary Fuses and 1 Secondary Fuse	With standard capacity, 60 or 50 Hz		6P	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
	With standard capacity with fuse covers		6PC	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
	With standard capacity, 60 or 50 Hz		6P	Bolted*	A	A	A	A	A	A	NA	NA
	With standard capacity, 60 or 50 Hz		6P	Unilock※	A	A	A	A	A	A	NA	NA
	With 100 W extra capacity, 60 or 50 Hz		6XP	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
	With 100 W extra capacity with fuse covers		6XPC	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
	With 100 W extra capacity, 60 or 50 Hz		6XP	Bolted*	A	A	A	A	A	A	NA	NA
	With 100 W extra capacity, 60 or 50 Hz		6XP	Unilock※	A	A	A	A	A	A	NA	NA
	With 200VA capacity		6XXP	1, 3R/4X/12, 4/4X, 3R	A	A	A	NA	NA	NA	NA	NA
	With 200VA capacity with fuse covers		6XXPC	1, 3R/4X/12, 4/4X, 3R	A	A	A	NA	NA	NA	NA	NA
	With 200 W extra capacity, 60 or 50 Hz		6YP	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	NA	NA
	With 200 W extra capacity with fuse covers		6YPC	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	NA	NA
	With 300 W extra capacity, 60 or 50 Hz		6XYP	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	NA	NA
	With 300 W extra capacity with fuse covers		6XYPC	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	NA	NA
	With 400 W extra capacity, 60 or 50 Hz		6YYP	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	NA	NA
	With 400 W extra capacity with fuse covers		6YYPC	1, 3R/4X/12, 4/4X, 4X	A	A	A	A	A	A	NA	NA
Auxiliary Contacts	Auxiliary contact installed on contactors	N.O.	90‡	1, 3R/4X/12, 4/4X Bolted	A	A	A	A	A	A	A	A
		N.C.	91‡		A	A	A	A	A	A	NA	NA
	Auxiliary contact — contactor (four maximum) N.C. — late break		97	1, 3R/4/12, 4/4X, 3R	A	A	A	A	A	A	NA	NA
	Auxiliary contact installed on disconnect	N.O.	98	1, 3R/4/12, 4/4X, 3R	A	A	A	A	A	A	A	A
		N.C.	99	1, 3R/4/12, 4/4X, 3R	A	A	A	A	A	A	A	A
	Auxiliary contact installed on circuit breaker (external to breaker) to operate with handle (two maximum)	N.O.	98	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
		N.O.	98	Bolted*	A	A	A	A	A	A	NA	NA
		N.O.	98	Unilock※	A	A	A	A	A	A	NA	NA
		N.C.	99	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
		N.C.	99	Bolted*	A	A	A	A	A	A	NA	NA
		N.C.	99	Unilock※	A	A	A	A	A	A	NA	NA
Control Circuit	Control circuit fuse block less transformer	1 Fuse — Fuse Included	21	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
		1 Fuse with Protective Cover — Fuse Included	21C	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
		2 Fuses — Fuses Included	22	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
		2 Fuse with Protective Cover — Fuse Included	22C	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
	Surge suppression for 120V or 240V AC Coil		17	1, 3R/4X/12, 4/4X, 3R Bolted* Unilock※	A	A	A	A	A	A	NA	NA
	Terminal blocks (Cat No. 1492-HC6)	6-Point Block	TB6	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
	Terminal blocks (Cat No. 1492-HC12)	12-Point Block	TB12	1, 3R/4X/12, 4/4X, 3R	A	A	A	A	A	A	A	A
Overload Relays (Eutectic Alloy)	N.O. alarm contact adder (Bulletin 592)		9	1, 3R/4X/12, 4/4X, 3R Bolted* Unilock※	A	A	A	A	A	A	NA	NA
	N.C. alarm contact adder (Bulletin 592)		9A		A	A	A	A	A	A	NA	NA
	Omit three overload relays	For Bulletins 506, 506X, 507, 507X Deduct	23	1, 3R/4X/12, 4/4X, 3R Bolted* Unilock※	A	A	A	A	A	A	NA	NA
		For Bulletins 522, 523 Deduct	23		A	A	A	A	A	A	NA	NA
Accessories	3-phase Powermonitor (Timemark Model 258)		400	1, 3R/4X/12, 4/4X, 3R Bolted (3R, 7 & 9) Unilock (7 & 9)	A	A	A	A	A	A	A	A
	Bulletin 596 (used on Bulletin 500...509), 3-pole maximum	On Delay	87A		A	A	A	A	A	A	NA	NA
		Off Delay	87B		A	A	A	A	A	A	NA	NA
	Form A compelling relay (used on Bulletin 522...523)		70	1, 3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA
	Form B auto. seq. accelerating relay for each higher speed (used on Bulletin 522...523)		71	1, 3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA
	Form C auto. seq. decelerating relay for each higher speed (used on Bulletin 522...523)		72	1, 3R/4/12, 4/4X	A	A	A	A	A	A	NA	NA

* Bolted suitable for Type 7 & 9 or Type 3R, 7 & 9.

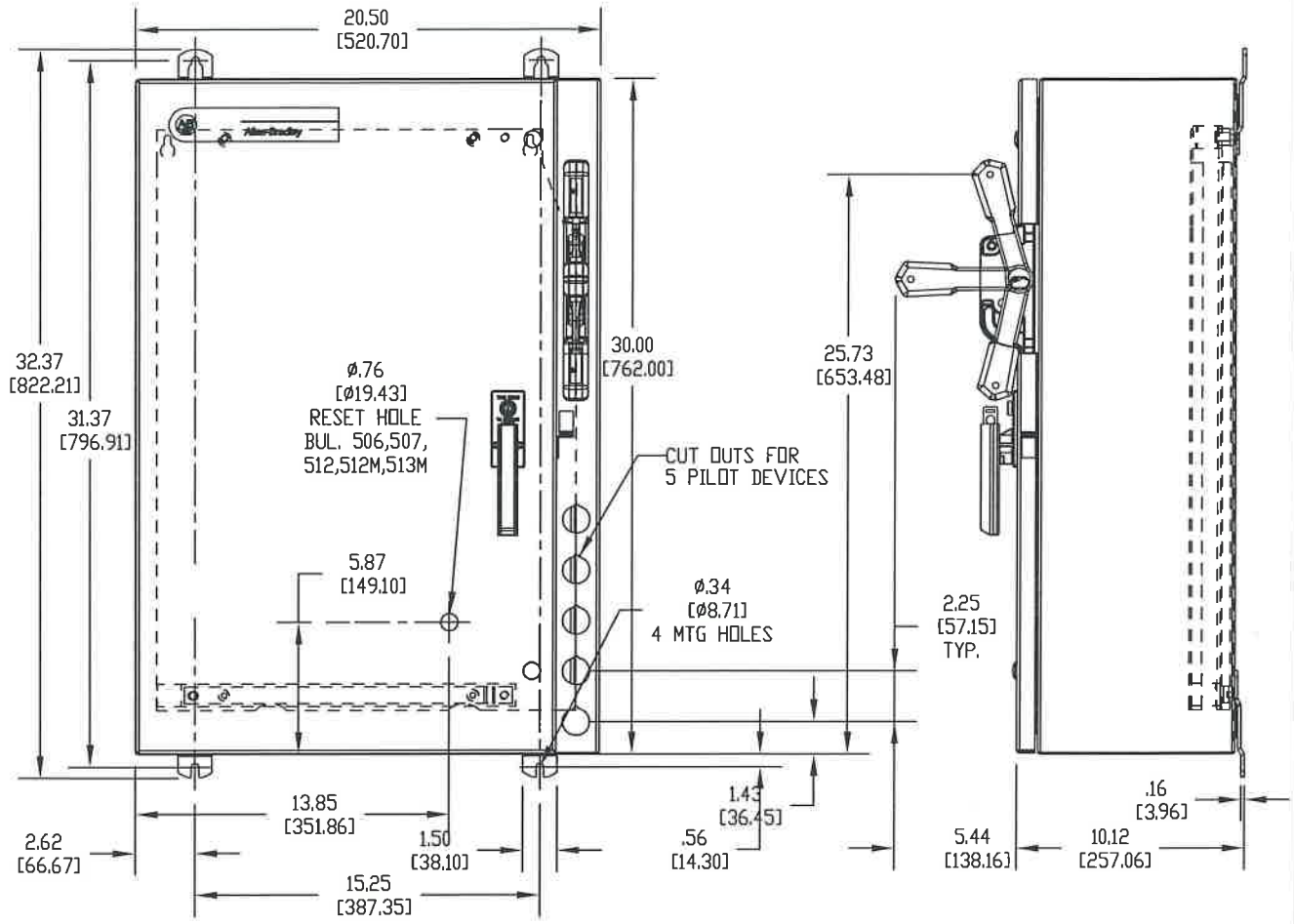
※ Unilock suitable for Type 7 & 9 or Type 3R, 7 & 9 with the addition of a drain or a breather and drain. White LED option not available, incandescent only.

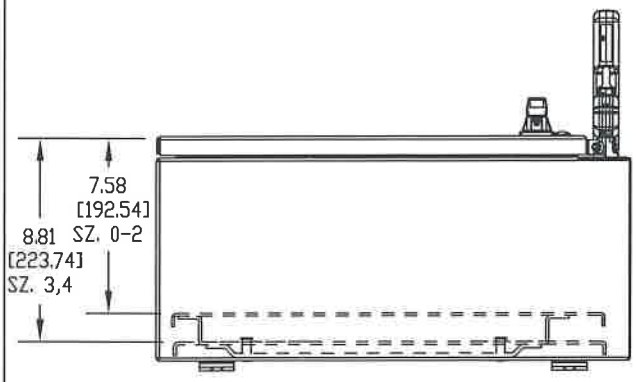
‡ For Bulletins 506, 507, 522 and 523 devices. One auxiliary contact is installed on each of the two contactors.

A = Available, NA = Not Available

MOTOR STARTERS (B-1 & B-2)

DRAWING FOR 20.50" X 30.00"
NEMA TYPE 12/3R/4 PAINTED ENCLOSURE





BOTTOM VIEW

THIS DWG APPLIES TO:

BUL. 506	- NEMA SIZE 0-1-2 100A-600V
BUL. 507	- NEMA SIZE 0-1-2
BUL. 512	- NEMA SIZE 2 100A-600V
BUL. 522	- NEMA SIZE 0-1-2
BUL. 523	- NEMA SIZE 0-1-2
BUL. 512M	- NEMA SIZE 1-2
BUL. 513M	- NEMA SIZES 1-2
BUL. 512	- NEMA SIZE 3
BUL. 513	- NEMA SIZE 3-4

NOTES:
1. ALL DIM'S. SHOWN IN PARENTHESES ARE IN MILLIMETERS.
2. ALL DIM'S. ARE APPROXIMATE AND NOT INTENDED FOR MANUFACTURING PURPOSES

MOTOR STARTERS (B-1 & B-2)

Contact Blocks

Packaged in kit form for field installation. All necessary mounting hardware is provided with each contact block kit. **Contact ratings are listed on page 10-4.**

Note: It is not recommended to mount more than four contact blocks on any one non-illuminated operator (maximum two blocks deep). Contact blocks cannot be stacked onto power modules, so illuminated operators are limited to two contact blocks. Sealed switch contact blocks are not stackable and are limited to two blocks per operator. Time delay contacts are only available as one circuit per operator.

Shallow Block

PenTUFF™ (Low Voltage) Contact Block

Logic Reed Block

Sealed Switch Block

Stackable Sealed Switch Block

Contact Type	Shallow Block∗❄		PenTUFF (Low Voltage) Block∗❄		Logic Reed Block‡		Sealed Switch Block‡		Stackable Sealed Switch Block‡	
	Cat. No.	Code	Cat. No.	Code	Cat. No.	Code	Cat. No.	Code	Cat. No.	Code
1 N.O.	**800T-XD1**	D	**800T-XD1V**	H	**800T-XD1R**	V	**800T-XD1P**	R	**800T-XD1Y**	5
1 N.C.	**800T-XD2**	E	**800T-XD2V**	U	**800T-XD2R**	W	**800T-XD2P**	S	**800T-XD2Y**	6
1 N.O.E.M.	**800T-XD3**	G	**800T-XD3V**	I	—	—	—	—	—	—
1 N.C.L.B.	**800T-XD4**	J	**800T-XD4V**	Q	—	—	—	—	—	—
1 N.O. - N.C.	**800T-XA**	A	**800T-XAV**	F	**800T-XAR**	T	**800T-XAP**	P	**800T-XAY**	7
2 N.O.	**800T-XA2§**	M	—	—	**800T-XA2R§**	Y	—	—	**800T-XA2Y**	8
2 N.C.	**800T-XA4**	N	—	—	**800T-XA4R**	Z	—	—	**800T-XA4Y**	9
1 N.C.L.B. - 1 N.O.	**800T-XA1**	B	—	—	—	—	—	—	—	—
1 N.C.L.B. - 1 N.C.	**800T-XA7**	C	—	—	—	—	—	—	—	—

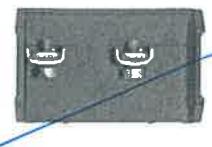
Note: Modular suffix codes can be used when specifying selector switches with multiple contact blocks.

Self Monitoring Contact Block

Contact Type	S.M.C.B.∗➢	
	Cat. No.	Code
1 N.C.L.B. (wired in series with 1 N.O. monitoring contact)	**800TC-XD4S**	3

Mini Block

Time Delay Block



MaxDuty Block

Contact Type	Mini Block∗		Time Delay Block♣	MaxDuty Block	
	Cat. No.	Code	Cat. No.	Cat. No.	Code
1 N.O.	**800T-XD5**	K	**800T-XT**	**800T-XD1M**	1
1 N.C.	**800T-XD6**	L	800T-XS	**800T-XD2M**	2
1 N.C.L.B.	—	—	—	**800T-XD4M**	4

Note: Modular suffix codes can be used when specifying selector switches with multiple contact blocks.

∗ Contact blocks with normally closed contacts meet direct drive positive opening standard requirements when properly fused to IEC 269-1 and 269-2. Shallow/mini contacts: 10 A gI or N type cartridge fuse. PenTUFF contacts: 6 A gI or N type cartridge fuse.
❄ Specify Bulletin 800TC for finger-safe contact blocks. Example: **Cat. No. 800T-XA** becomes **Cat. No. 800TC-XA**.
‡ 800T operator using sealed switch and logic reed contact blocks and installed in a suitable enclosure are UL Listed as suitable for use in Class I, Division 2/Zone 2 hazardous locations.
§ Additional contacts cannot be stacked on XA2 and XA2R contact blocks.
♣ For contact ratings, see page 10-4.
➢ For use with 2-position push-pull or push-pull/twist operators only. Must be mounted on the first level of the operator. The N.O. monitoring contact automatically closes when the S.M.C.B. is properly installed onto the operator. If the S.M.C.B. is separated from the operator, the N.O. monitoring contact automatically opens.

Shallow Contact Block Hardware

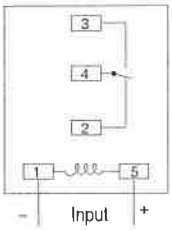
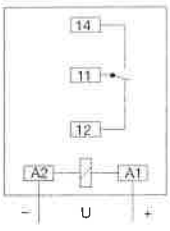
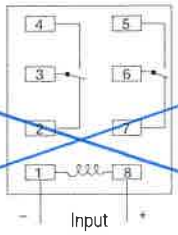
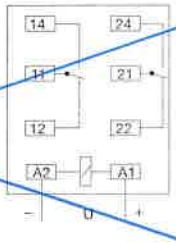
Description	Cat. No.
Contact Block Mounting Screw	**800T-N335**
Screw Retainer	**800T-N336**
Actuator Extender	**800T-N337**

10

BR, R

700-HK Slim Line Relay

- 8 A/16 A contact ratings
- DPDT/SPDT
- Plug-in blade-style terminals (2.5 x 0.5 mm)
- Retainer clip with sockets
- Options: LED, push-to-test and manual override, socket-mounted surge suppressor module, or timer module
- Standard ON/OFF flag indicator
- Relay faceplate accepts optional Bulletin1492 snap-in markers
- Choice of standard silver/nickel contacts or silver/nickel with gold plated contacts
- Maximum duty version available

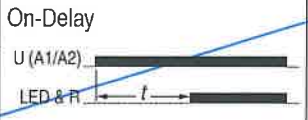
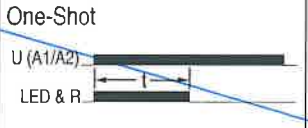
Photo	Description	Contact Rating	Wiring Diagrams		Coil Voltage	Cat. No.(1)
			U.S./Canada	International		
	SPDT 1-Pole 1 Form C AgNi Contacts	16 A			6V AC	700-HK36A06
					12V AC	700-HK36A12
					24V AC	700-HK36A24
					120V AC	700-HK36A1
					240V AC	700-HK36A2
					6V DC	700-HK36Z06
					12V DC	700-HK36Z12
					24V DC	700-HK36Z24
					48V DC	700-HK36Z48
	Socket		700-HN121, 700-HN221, 700-HN223	700-HN121, 700-HN221, 700-HN223	110V DC	700-HK36Z1
	DPDT 2-Pole 2 Form C AgNi Contacts	8 A			6V AC	700-HK32A06
					12V AC	700-HK32A12
					24V AC	700-HK32A24
					120V AC	700-HK32A1
					240V AC	700-HK32A2
					6V DC	700-HK32Z06
					12V DC	700-HK32Z12
					24V DC	700-HK32Z24
					48V DC	700-HK32Z48
	Socket		700-HN122, 700-HN222, 700-HN224	700-HN122, 700-HN222, 700-HN224	110V DC	700-HK32Z1

(1) **Options**
Pilot Light: Add suffix (-4) to the selected 700-HK Relay catalog number except for the 240V AC units, add (-4L).
Manual Operator and LED: Add suffix (-3-4) to the selected 700-HK Relay catalog number, except for the 240V AC units, add (-3-4L).
AgNi Contact with Gold plating: Replace "3" with "X" om catalog number. For example, if catalog number 700-HK36A1 is required with gold plating, the new catalog number is 700-HKX6A1.
For high inductive, Tungsten, or Capacitive load applications, replace the "3" with a "M" in the catalog number. Only available in a SPDT configuration and with 24V DC, 120V AC, or 240V AC coil voltages.

Accessories- 700-HK Relays

Photo	Description	Pkg. Qty.	Cat. No.
	**Screw Terminal Socket — Panel or DIN Rail Mounting** 5-blade miniature socket with 10 A rating for use with 1-pole, 700-HK relays. Accepts forked lug conductors. Socket includes a retainer clip.	10	700-HN121
	**Screw Terminal Socket — Panel or DIN Rail Mounting** 5-blade miniature socket with 16 A rating for use with 1-pole, 700-HK relays. Retainer clips are packaged separately with socket. Guarded terminal construction and compatible with optional plug-in module accessories.	10	700-HN221
	Spring Clamp Terminal Socket — Panel or DIN Rail Mounting 5-blade miniature socket for use with 1-pole, 700-HK relays.	10	700-HN223
	**Screw Terminal Socket — Panel or DIN Rail Mounting** 8-blade miniature socket with 5 A rating for use with 2-pole, 700-HK relays. Accepts forked lug conductors. This socket includes a retainer clip.	10	700-HN122
	**Screw Terminal Socket — Panel or DIN Rail Mounting** 8-blade miniature socket with 8 A rating for use with 2-pole, 700-HK relays. Retainer clips are packaged separately with socket. Guarded terminal construction and compatible with optional plug-in module accessories.	10	700-HN222
	Spring Clamp Terminal Socket — Panel or DIN Rail Mounting 8-blade miniature socket for use with 2-pole 700-HK relays.	10	700-HN224
	**Flange Mount Adapter** Used for panel-mounting bulletin 700-HK relays. Order must be for 10 adapters or multiples of 10.	10	700-HN226
	**35 mm Rail Mount Adapter** Mounts bulletin 700-HK relays to a 35 mm rail. Order must be for 10 adapters or multiples of 10.	10	700-HN227
	**Socket Retainer Clip and Ejection Lever** For use with 700-HN22, -HN222, -HN223, and -HN224 sockets. Orders must be for 10 clips or multiples of 10. ONE CLIP IS SUPPLIED W/ EACH SOCKET	10	700-HN229

Accessories - 700-HF Relays

Photo	Description		Pkg. Qty.	Cat. No.
	**Diode with LED Surge Suppressor** Voltage Range: 6...24V DC used with sockets that accept plug-in accessory modules.		10	700-ADL1
	Diode with LED Surge Suppressor Voltage Range: 28...60V DC used with sockets that accept plug-in accessory modules.		10	700-ADL2
	Diode with LED Surge Suppressor Voltage Range: 110...220V DC used with sockets that accept plug-in accessory modules.		10	700-ADL3
	Varistor with LED Surge Suppressor Voltage Range: 6...24V AC used with sockets that accept plug-in accessory modules.		10	700-AV1R
	Varistor with LED Surge Suppressor Voltage Range: 110...240V AC used with sockets that accept plug-in accessory modules.		10	700-AV3R
	RC Surge Suppressor Voltage Range: 6...24V AC/DC used with sockets that accept plug-in accessory modules.		10	700-AR1
	RC Surge Suppressor Voltage Range: 110...240V AC/DC used with sockets that accept plug-in accessory modules.		10	700-AR2
	**Timing Module** On-Delay or One-Shot selectable voltage range: 12...24V AC/DC used with sockets that accept plug-in accessory modules.		1	700-AT3
	Timing Module On-Delay or One-Shot selectable voltage range: 110...125V AC used with sockets that accept plug-in accessory modules.			700-AT3A1
	Timing Module On-Delay or One-Shot selectable voltage range: 230...240V AC used with sockets that accept plug-in accessory modules.			700-AT3A2

Socket, and Retainer Clip Reference

Relay Type	Cat. No. Socket	Cat. No. Retainer Clip
700-HF32	700-HN116 700-HN262	700-HN114
700-HF34	700-HN139 700-HN264	700-HN266

BR, R

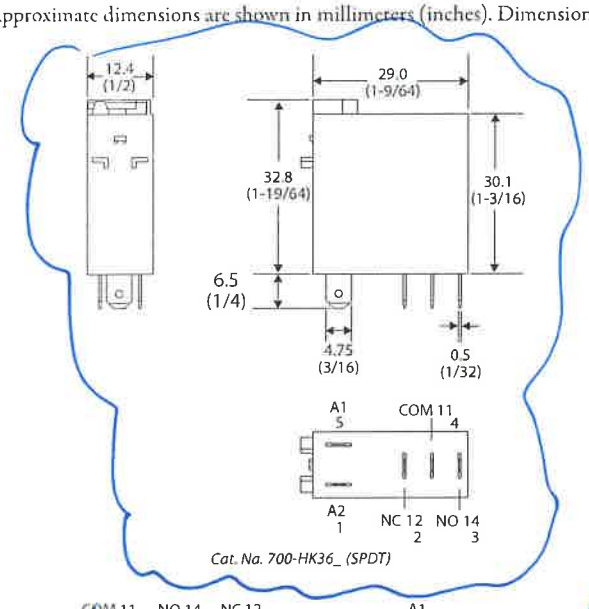
Specifications- 700-HK Relays

Attribute		700-HK			
Electrical Ratings					
Rated Thermal Current (I_{th})		1-Pole, 1 CO, SPDT — 16 A		2-Pole, 2 CO, DPDT — 8 A	
Rated Insulation Voltage (U_i)		250V IEC, 300V UL/CSA			
Contacts	Inductive V AC	120V AC	AC-15, 6.2 A B300 Pilot Duty, 3 A A300 (700-HKM_) 1/3 Hp (0.24 kW) 1-phase	120V AC	AC-15, 2.9 A B300 Pilot Duty, 3.0 A 1/4 Hp (0.18 kW), 1-phase
		240V AC	AC-15, 3.1 A B300 Pilot Duty, 1.5 A A300(700-HKM_) 3/4 Hp (0.55 kW), 1-phase	240V AC	AC-15, 1.4 A B300 Pilot Duty, 1.5 A 1/2 Hp (0.37 kW), 1-phase
		230V AC	0.55 kW, 1-phase	230V AC	0.37 kW, 1-phase
	Inductive V DC	24V DC	DC-13, 5.0 A	24V DC	DC-13, 3.0 A
		125V DC	DC-13, 0.2 A / R300 Pilot Duty, 0.22 A	125V DC	DC-13, 0.2 A / R300 Pilot Duty, 0.22 A
		250V DC	DC-13, 0.1 A / R300 Pilot Duty, 0.11 A	5 A, 250V AC	DC-13, 0.1 A / R300 Pilot Duty, 0.11 A
	Resistive	230V AC	AC-1, 16 A	230V AC	AC-1, 8 A
		277V AC	16 A, General Use	277V AC	8 A, General Use
	Make, Break, and Continuous	30V DC	DC-1, 12 A / 10 A, Resistive	30V DC	DC-1, 6 A / 6 A, Resistive
Min. Permissible Contact Ratings		300 mW (5V/60 mA or 60V/5 mA) for AgNi Contacts (700-HK3_) 50 mW (5V/10 mA or 25V/2 mA) for AgNi + Gold Contacts (700-HKX_) 500 mW (100V/5 mA or 5V/100 mA) for $AgSnO_2$ Contacts (700-HKM_)			
Permissible Coil Voltage Variation	Pickup: holding Voltage: Must Dropout Voltage:	80...110% of Nominal Voltage at 50/60 Hz, 73...110% of Nominal Voltage at DC 80% of Nominal V AC at 50/60 Hz, 40% of Nominal V DC 20% of Nominal V AC at 50/60 Hz, 10% Nominal V DC			
Power Consumption		1.2 V A (V AC Coils), 0.5 W (V DC Coils)			
Coil Voltages		See Overview/Product Selection			
Design Specification/Test Requirements					
Dielectric Withstand Voltage	Pole to Pole (VRMS) Contact to Coil (VRMS)	2000V AC 4000V AC			
Mechanical					
Degree of Protection		IP 20 (guarded terminal sockets), RT II — Flux-proof (Relay)			
Mechanical Life Operations		10×10^6			
Electrical Lifecycles		230V AC, 16 A Resistive: 100 000 min. 277V AC, 16 A Resistive: 30 000 min. 30V DC, 10 A Resistive: 30 000 min. B300, R300, Hp (kW): 6000 min. A300 (700-HKM_): 100,000 min.		230V AC, 8 A Resistive: 100 000 min. 277V AC, 8 A Resistive: 30 000 min. 30V DC, 6 A Resistive: 30 000 min. B300, R300, Hp (kW): 6000 min.	
Switching Frequency		Mechanical: 18,000 cycles/hr. Electrical: 900 cycles/hr.			
Operating Time at Nominal Voltage at 20 °C (ms)	Pickup	15 ms			
	Dropout	5 ms			
Vibration	Operational Non-Operational	10...2000 Hz, 0.76 mm (0.03 in.) 2.5 G 10...2000 Hz, 0.76 mm (0.03 in.) 5.0 G			
Shock	Operational Non-Operational	15 G 50 G			
Environmental					
Temperature	Operating Storage	−40...+70 °C (−40...+158 °F) −40...+85 °C (−40...+185 °F)			
Altitude		2000 m (6560 ft)			
Construction					
Insulating Material		Molded High Dielectric Material			
Enclosure		Transparent Dust Cover			
Contact Material		700-HK3_: Silver nickel (AgNi); 700-HKX_: Silver Nickel + Gold Plating (AgNi + Au); 700-HKM_: Silver Tin Oxide ($AgSnO_2$)			
Terminal Markings on Socket		In accordance with EN 50005			

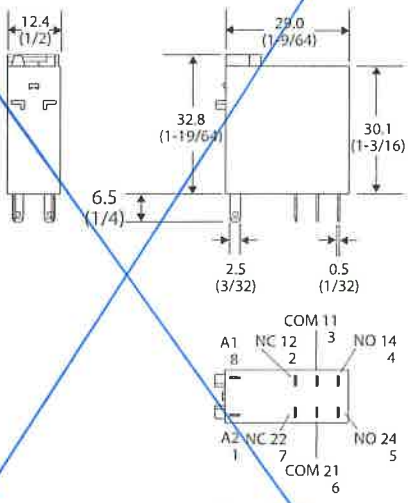
Attribute		700-HK	
		1-Pole	2-Pole
Sockets	Screw Terminal	~~700-HN121 (10 A @ 70 °C)~~ 700-HN221 (16 A @ 50 °C, 12 A @ 70 °C)	700-HN122 (2 x 5 A @ 70 °C) 700-HN222 (2 x 8 A @ 70 °C)
	Spring Clamp	~~700-HN223 (15 A @ 40 °C with 2 conductors per terminal)~~ (10 A @ 70 °C with 1 conductor per terminal)	700-HN224 (2 x 8 A@ 70 °C)
Approvals			
Certifications		CSA Certified, File 75088, UL Recognized, File E3125 Guide NLDX2/NLCX8, cULus Listed with Allen-Bradley sockets (File No. 3125 Guide NLDX/NLDX7), CE Marked	
Standards		EN61810-1, CSA 22.2 No. 14, UL 508	

Dimensions- 700-HK Relays

Approximate dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.



Cat. No. 700-HK36_ (SPDT)



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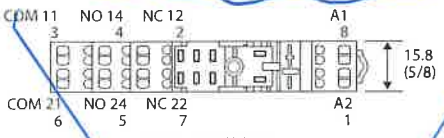

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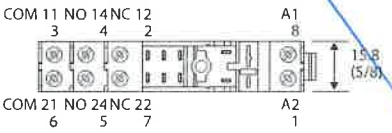

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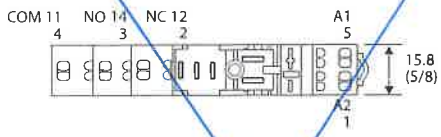

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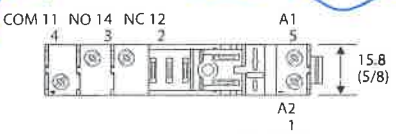
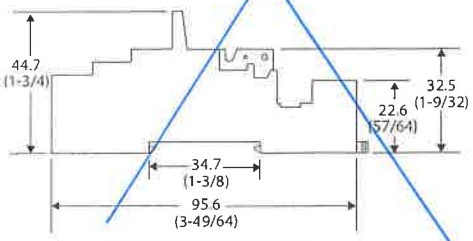
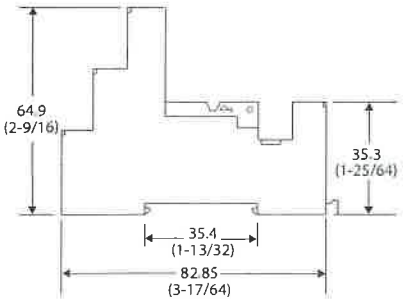


Cat. No. 700-HN221



Cat. No. 700-HN223, 700-HN224
Wire Size: 0.2 mm^2...1.5 mm^2 (#24 AWG...#14 AWG)
Either Solid or Stranded
Strip Length: 8 mm (5/16 in)



Cat. No. 700-HN221, ~~700-HN222~~
Wire Size: 0.2 mm^2...2.5 mm^2 (#24 AWG...#12 AWG)
Either Solid or Stranded
Strip Length: 8 mm (5/16 in), Torque: 0.8Nm (7.0 lb-in.)

PLC

PCPS1, PCPS2

CompactLogix Power Supplies

Select power supplies based on the controller and the number of additional I/O banks.

For a	Select
CompactLogix 5370 L3 controller	• One 1769 power supply for the controller and local I/O modules. • One 1769 power supply for each additional bank of I/O modules.
CompactLogix 5370 L2 controller	No power supply as it is integrated to the controller package.
CompactLogix 5370 L1 controller	No power supply as it is integrated to the controller package.
CompactLogix 5380 controller	None External power supplies must be used to transfer MOD power and SA power to the system. The external power supplies are connected to a MOD power RTB and an SA power RTB that is installed on the controller. IMPORTANT: When you use Compact GuardLogix 5380 controllers, you must use SELV/PELV-rated power supplies for MOD power and SA power. Additionally, you can only use DC SA power with Compact GuardLogix 5380 controllers.
Compact GuardLogix 5380 controller	
CompactLogix 5480	None External power supplies must be used to transfer MOD power and SA power to the system. The external power supplies are connected to a MOD power RTB and an SA power RTB that is installed on the controller. External uninterruptible power supply can be used to provide power to the UPS RTB that is installed on the controller. You can connect an external uninterruptible power supply (UPS) to the UPS RTB to save the program if power is lost. IMPORTANT: The UPS lets the controller save the program but not the state of the program. We recommend that you use a 1606 switched mode uninterruptible power supply, for example, the 1606-XLS240-UPS power supply.

Power Supplies

Cat. No.	Description	Voltage Category	Operating Voltage Range
1769-PA2 1769-PA2K(1)	1769 Compact I/O expansion power supply	120V/220V AC	85...265V AC
1769-PB2 1769-PB2K(1)		24V DC	19.2...31.2V DC
1769-PA4 1769-PA4K(1)		120V/220V AC	85...265V AC or 170...265V AC (switch selectable) 47...63 Hz
1769-PB4 1769-PB4K(1)		24V DC	19.2...31.2V DC

(1) Module has conformal coating.

For detailed specifications, see Compact Power Supplies Specifications Technical Data, publication 1769-TD008.

PLC CPU

CompactLogix 5370 L3 Controllers

The CompactLogix 5370 L3 controller comes with:

- Dual Ethernet ports for linear and ring topologies.
- USB port for firmware updates and programming.
- Support for 1769 Compact I/O.

Use the 1769-L30ER-NSE controller for mining applications. You can deplete the residual stored energy of the 1769-L30ER-NSE controller to 200 µJ or less before you transport it into or out of a mine. The 1769-L30ER-NSE controller does not maintain the real-time clock on power cycle.

Characteristic	1769-L30ER 1769-L30ERK	1769-L30ERM 1769-L30ERMK	1769-L30ER-NSE	1769-L33ER 1769-L33ERK	1769-L33ERM 1769-L33ERMK	1769-L36ERM	1769-L37ERM 1769-L37ERMK	1769-L38ERM 1769-L38ERMK
Available user memory	1 MB	1 MB	1 MB No capacitor	2 MB	2 MB	3 MB	4 MB	5 MB
Memory card	1784-SD1 (1 GB), shipped with controller 1784-SD2 (2 GB)							
Communication ports	2 EtherNet/IP 1 USB							
EtherNet/IP connections	256 EtherNet/IP 120 TCP							
EtherNet/IP nodes supported, max	16			32		48	64	80
Axes supported, max[1]	Not Applicable	100	Not Applicable	Not Applicable	100	100		
CIP Drive axes (position loop) supported, max	Not Applicable	4	Not Applicable	Not Applicable	8	16		
Module expansion capacity	8 1769 modules 1 bank of modules			16 1769 modules 2 banks of modules		30 1769 modules 3 banks of modules		
Battery	None							
Power supply distance rating	4 modules			4 modules		4 modules		
Programming software support	Version 20 - For controllers that use firmware revision 20. Version 21 or later - For controllers that use firmware revision 21 or later.						Version 31 or later	

(1) Any combination of CIP Drive, Virtual, Consumed, Regenerative AC/DC Converter and Non-Regenerative AC/DC Converter axis types.

These controllers replace previous catalog numbers.

New Controller[1] [2]	Replaces Previous Controller	Differences
1769-L30ER 1769-L30ERM 1769-L30ER-NSE	1769-L31 1769-L32C[3] 1769-L32E	Additional memory Integrated motion on EtherNet/IP support (1769-L30ERM, 1769-L33ERM, 1769-L36ERM) USB port instead of RS-232 port Dual-port EtherNet/IP support SD card instead of CompactFlash card
1769-L33ER 1769-L33ERM	1769-L35CR[3] 1769-L35E 1768-L43	
1769-L36ERM	1768-L45 Any previous 1769-L3x and 1769-L4x controller.	

(1) Typically, you can use any of the new controllers that are listed in each row as replacements for any of the previous controllers that are listed in the corresponding cell to the right. For example, you can replace a 1769-L32E controller with a 1769-L30ER, 1769-L30ERM, or 1769-L30ER-NSE controller.
In some rare cases, system configuration helps to prevent controller replacement as shown in the previous table. For example, if your system uses a 1769-L32E controller with 12 expansion modules, you cannot replace that controller with a 1769-L30ER, 1769-L30ERM, or 1769-L30ER-NSE controller. Those controllers support no more than eight expansion modules. You must replace the 1769-L32E controller with a 1769-L33ER, 1769-L33ERM, or 1769-L36ERM controller.
We recommend that before you upgrade your controllers, consider your application requirements to verify that the replacements that are listed previously apply.

(2) If you require Serial communication, consider a CompactLogix 5380 solution with the 5069-SERIAL module.
(3) Requires converting from ControlNet connections to EtherNet/IP connections.

PLC DI's

1769 AC Digital Modules

Cat. No.	Inputs/Outputs	Voltage Category	Operating Voltage Range	Backplane Current	Power Supply Distance Rating
1769-IA8I 1769-IA8IK[2]	8 inputs, individually isolated	100/120V AC	79...132V AC, 47...63 Hz	90 mA @ 5.1V[1]	8
1769-IA16 1769-IA16K[2]	16 inputs	100/120V AC	79...132V AC, 47...63 Hz	115 mA @ 5.1V	8
1769-IM12	12 inputs	200/240V AC	159...265V AC, 47...63 Hz	100 mA @ 5.1V	8
1769-OA8	8 outputs	100/240V AC	85...265V AC 47...63 Hz	145 mA @ 5.1V	8
1769-OA16 1769-OA16K[2]	16 outputs	100/240V AC	85...265V AC 47...63 Hz	225 mA @ 5.1V	8

(1) Maximum is 190 mA.

(2) Module has conformal coating.

1769 DC Digital Modules

Cat. No.	Inputs/Outputs	Voltage Category	Operating Voltage Range	Backplane Current	Power Supply Distance Rating
1769-IG16	16 inputs	5V DC TTL	4.5...5.5V DC	120 mA @ 5.1V	8
1769-IQ16 1769-IQ16K[1]	16 inputs	24V DC sink/source	10...30V DC @ 30 °C (86 °F) 10...26.4V DC @ 60 °C (140 °F)	115 mA @ 5.1V	8
1769-IQ16F	16 inputs, high speed	24V DC sink/source	10...30V DC @ 30 °C (86 °F) 10...26.4V DC @ 60 °C (140 °F)	100 mA @ 5.1V	8
1769-IQ32 1769-IQ32K[1]	32 inputs	24V DC sink/source	10...30V DC @ 30 °C (86 °F) 10...26.4V DC @ 60 °C (140 °F)	170 mA @ 5.1V	8
1769-IQ32T	32 inputs	24V DC sink/source	20.4...26.4V DC @ 60 °C (140 °F)	170 mA @ 5.1V	8
1769-IQ6XOW4	6 inputs 4 outputs	24V DC sink/source input AC/DC normally open relay contact outputs	10...30V DC @ 30 °C (86 °F) 10...26.4V DC @ 60 °C (140 °F)	105 mA @ 5.1V 50 mA @ 24V	8
1769-OB8 1769-OB8K[1]	8 outputs	24V DC source	20.4...26.4V DC	145 mA @ 5.1V	8
1769-OB16 1769-OB16K[1]	16 outputs	24V DC source	20.4...26.4V DC	200 mA @ 5.1V	8
1769-OB16P	16 outputs, protected	24V DC source	20.4...26.4V DC	160 mA @ 5.1V	8
1769-OB32 1769-OB32K[1]	32 outputs	24V DC source	20.4...26.4V DC	300 mA @ 5.1V	6
1769-OB32T	32 outputs	24V DC source	10.2...26.4V DC	220 mA @ 5.1V	8
1769-OG16	16 outputs	5V DC TTL	4.5...5.5V DC	200 mA @ 5.1V	8
1769-OV16	16 outputs	24V DC sink	20.4...26.4V DC	200 mA @ 5.1V	8
1769-OV32T	32 outputs	24V DC sink	10.2...26.4V DC	300 mA @ 5.1V	8

(1) Module has conformal coating.

1769 Contact Output Modules

Cat. No.	Inputs/Outputs	Operating Voltage Range	Backplane Current	Power Supply Distance Rating
1769-OW8	8 outputs	5...265V AC 5...125V DC	125 mA @ 5.1V 100 mA @ 24V	8
1769-OW8I 1769-OW8IK(1)	8 outputs, individually isolated	5...265V AC 5...125V DC	125 mA @ 5.1V 100 mA @ 24V	8
1769-OW16 1769-OW16K(1)	16 outputs	5...265V AC 5...125V DC	205 mA @ 5.1V 180 mA @ 24V	8

(1) Module has conformal coating.

1769 Analog Modules

Cat. No.	Inputs/Outputs	Range	Resolution	Backplane Current	Power Supply Distance Rating
1769-IF4 1769-IF4K(1)	4 inputs, differential or single-ended	±10V 0...10V 0...5V 1...5V 0...20 mA 4...20 mA	14 bits (unipolar) 14 bits plus sign (bipolar)	120 mA @ 5.1V 60 mA @ 24V	8
1769-IF4I 1769-IF4IK(1)	4 inputs, differential or single-ended, individually isolated	±10V 0...10V 0...5V 1...5V 0...20 mA 4...20 mA	16 bits (unipolar) 15 bits plus sign (bipolar)	145 mA @ 5.1V 125 mA @ 24V	8
1769-IF8 1769-IF8K(1)	8 inputs, differential or single-ended	±10V 0...10V 0...5V 1...5V 0...20 mA 4...20 mA	16 bits (unipolar) 15 bits plus sign (bipolar)	120 mA @ 5.1V 70 mA @ 24V	8
1769-IF16C 1769-IF16CK(1)	16 inputs, single-ended	0...20 mA 4...20 mA	16 bits (unipolar) 15 bits plus sign (bipolar)	190 mA @ 5.1V 70 mA @ 24V	8
1769-IF16V 1769-IF16VK(1)	16 inputs, single-ended	±10V 0...10V 0...5V 1...5V	16 bits (unipolar) 15 bits plus sign (bipolar)	190 mA @ 5.1V 70 mA @ 24V	8
1769-IF4XOF2 1769-IF4XOF2K(1)	4 inputs, differential or single-ended 2 outputs, single-ended	0...10V 0...20 mA	Input: 8 bits plus sign Output: 8 bits plus sign	120 mA @ 5.1V 160 mA @ 24V	8
1769-IF4FXOF2F	4 inputs, fast differential or single-ended 2 outputs, fast single-ended	±10V 0...10V 0...5V 1...5V 0...20 mA 4...20 mA	Input: 14 bits (unipolar) 14 bits plus sign (bipolar) Output: 13 bits (unipolar) 13 bits plus sign (bipolar)	220 mA @ 5.1V 120 mA @ 24V	8
1769-OF2 1769-OF2K(1)	2 outputs, single-ended	±10V 0...10V 0...5V 1...5V 0...20 mA 4...20 mA	14 bits (unipolar) 14 bits plus sign (bipolar)	120 mA @ 5.1V 120 mA @ 24V	8

PLC AO's

Cat. No.	Inputs/Outputs	Range	Resolution	Backplane Current	Power Supply Distance Rating
1769-OF4 1769-OF4K[1]	4 outputs, single-ended	±10V 0...10V 0...5V 1...5V 0...20 mA 4...20 mA	15 bits plus sign unipolar and bipolar	120 mA @ 5.1V 170 mA @ 24V	8
1769-OF4CI 1769-OF4CIK[1]	4 outputs, differential, individually isolated	0...20 mA 4...20 mA	16 bits (unipolar)	165 mA @ 5V 110 mA @ 24V	8
1769-OF4VI 1769-OF4VIK[1]	4 outputs, differential, individually isolated	±10V 0...10V 0...5V 1...5V	15 bits plus sign (bipolar)	145 mA @ 5.1V 75 mA @ 24V	8
1769-OF8C 1769-OF8CK[1]	8 outputs, single-ended	0...20 mA 4...20 mA	16 bits (unipolar)	140 mA @ 5.1V 145 mA @ 24V	8
1769-OF8V 1769-OF8VK[1]	8 outputs, single-ended	±10V 0...10V 0...5V 1...5V	16 bits plus sign (bipolar)	145 mA @ 5.1V 125 mA @ 24V	8

(1) Module has conformal coating.

1769 Analog RTD and Thermocouple Modules

Cat. No.	Inputs/Outputs	Sensors Supported	Backplane Current	Power Supply Distance Rating
1769-IR6 1769-IR6K[1]	6 RTD inputs	100, 200, 500, 1000 Ω Platinum 385 100, 200, 500, 1000 ΩPlatinum 3916 120 Ω Nickel 618 120 Ω Nickel 672 10 Ω Nickel-iron 518 0...150 Ω 0...500 Ω 0...1000 Ω 0...3000 Ω	100 mA @ 5.1V 45 mA @ 24V	8
1769-IT6 1769-IT6K[1]	6 thermocouple inputs	Thermocouple types B, C, E, J, K, N, R, S, T ±50V ±100V	100 mA @ 5.1V 45 mA @ 24V	8[2]

(1) Module has conformal coating.
(2) To reduce the effects of electrical noise, install the 1769-IT6 module at least two slots away from the AC power supplies.

PLC

1769 Communication and Specialty Modules

Cat. No.	Description	Backplane Current	Power Supply Distance Rating
1769-AENTR 1769-AENTRK[1]	The adapter connects 1769 Compact I/O modules to a linear or OLR network and uses two copper network ports to connect to the network.	500 mA @ 5V	5
1769-ARM	Use a 1769-ARM address reserve module to reserve module slots. After creating an I/O configuration and user program, you can remove and replace any I/O module in the system with a 1769-ARM module. You must first inhibit the removed module in the Logix Designer application.	60 mA @ 5.1V	8
1769-ASCII	The 1769-ASCII module, a general-purpose two-channel ASCII interface, provides a flexible network interface to a wide variety of RS-232, RS-485, and RS-422 ASCII devices. The module provides the communication connections to the ASCII device.	425 mA @ 5.1V	4
1769-BOOLEAN	Use the 1769-BOOLEAN module in applications that require repeatability, such as material handling and packaging, when there is a requirement to activate an output that is based on the transition of an input. If the Boolean expression is true, the output is directed to the ON state. If the Boolean expression is false, the output channel is directed to the OFF state. There are four operators that you can configure as OR, AND, XOR, or none.	220 mA @ 5.1V	8
1769-HSC	Use the 1769-HSC when you need: • A counter module that can react to high-speed input signals. • To generate rate and time-between-pulses (pulse interval) data. • As many as two channels of quadrature or four channels of pulse/count inputs.	245 mA @ 5.1V	4
1769-SM1	The Compact I/O to DPI™ or SCANport™ module connects to PowerFlex 7-class drives, other DPI-based host devices, and SCANport-based host devices such as 1305 and 1336 PLUS™ II drives.	280 mA @ 5.1V	6
1769-SM2	The Compact I/O to DSI/Modbus module connects to PowerFlex 4-class drives and to other Modbus RTU slave devices, such as PowerFlex 7-class drives with 20-COMM-H RS-485 HVAC adapters.	350 mA @ 5.1V	4

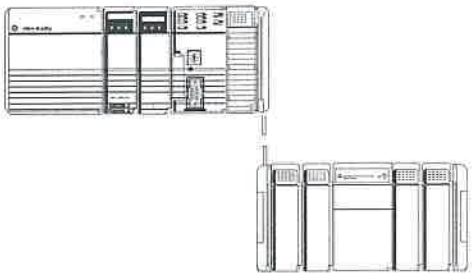
(1) Module has conformal coating.

1769 Expansion Cables

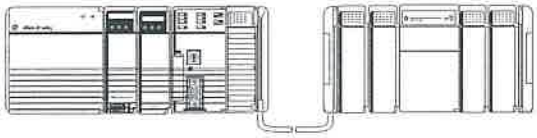
If you divide 1769 modules into multiple banks, make sure:

- Each bank needs its own power supply.
- To use expansion cables to connect the banks.
- The last I/O bank requires an end cap.

Vertical



Horizontal



How you orient I/O banks determines the expansion cables that you must connect the I/O banks.

If You Add a	And Connect the Chassis	Use This Cable[1]
Second bank	Right to left	1769-CRLx
	Right to right	1769-CRRx
Third bank	Right to left	1769-CRLx
	Right to right	1769-CRRx
	Left to left	1769-CLLx

(1) Where x = 1 for 1 ft (305 mm) or 3 for 3.28 ft (1 m).

1769 End Caps

The final 1769 Compact I/O bank requires an end cap on the end without the expansion cable. The CompactLogix 5370 L2 controller comes with a right-end cap, so you do not need to order one separately.

- Right end cap, catalog number 1769-ECR
- Right end cap with conformal coating, catalog number 1769-ECRK
- Left end cap, catalog number 1769-ECL
- Left end cap with conformal coating, catalog number 1769-ECLK

1769 Wiring Systems

As an alternative to buying removable terminal blocks (RTBs) and connecting the wires yourself, you can buy a wiring system of:

- Interface modules (IFMs) that provide the output terminal blocks for digital I/O modules. Use the prewired cables that match the I/O module to the IFM.
- Analog interface modules (AIFMs) that provide the output terminal blocks for analog I/O modules. Use the prewired cables that match the I/O module to the AIFM.
- I/O module-ready cables. One end of the cable assembly is an RTB that plugs into the front of the I/O module. The other end has individually color-coded conductors that connect to a standard terminal block.

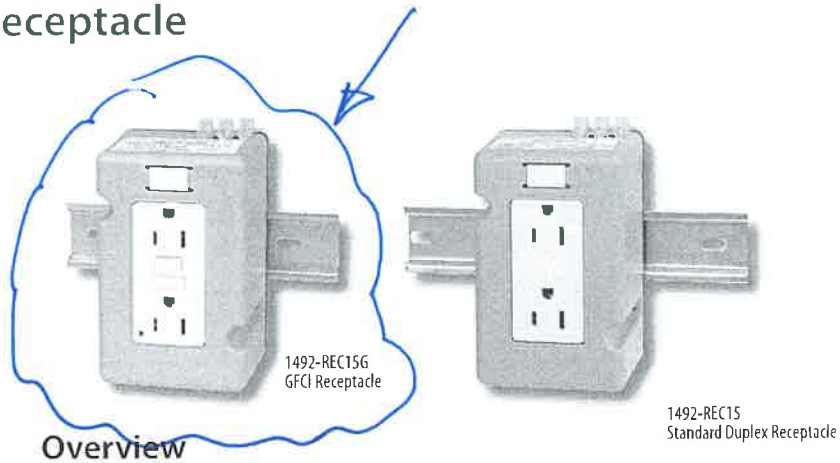
Removable Terminal Kits

You can order removable terminal kits with the CompactLogix 5370 L1 and L2 controllers separately. The kits are used to connect wiring to the controllers. The following table describes the kits.

Cat. Nos.	Controllers Supported	Description
1769-RTB45	CompactLogix 5370 L1	• Four 10-pin connectors that are used to connect wiring to the embedded digital I/O module of the controller. • One 5-pin connector that is used to connect an external 24V DC power source to the controller.
1769-RTB40DIO	CompactLogix 5370 L2	Four 10-pin connectors that are used to connect wiring to the embedded digital I/O module of the controller.
1769-RTB40AIO	1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B	Four 10-pin connectors that are used to connect wiring to the embedded analog I/O module of the controller.

CO

Bulletin 1492 DIN Rail Receptacle



Advantages

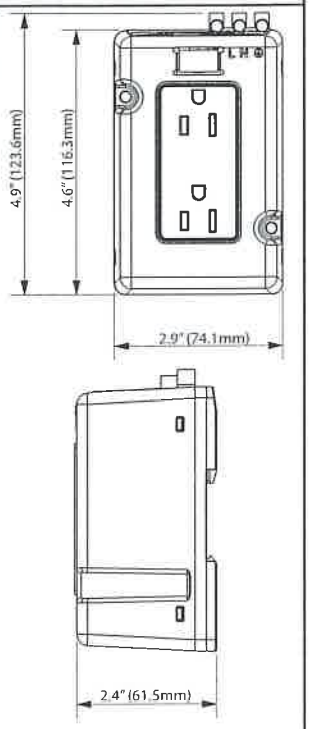
- Quick to snap on 35 mm DIN rail and easy to wire
- Available with ground fault circuit interrupter (GFCI) or standard duplex outlets
- Feature of visual indication of power included with GFCI receptacle

Overview

The Bulletin 1492 DIN rail receptacle is a convenient power outlet which is simple to snap onto DIN rail or mount on a panel. The receptacle is available in 15 A or 20 A versions and is an easy way to provide access to power in a panel.

Technical Specifications for the DIN Rail Receptacle				
	1492-REC15	1492-REC20	1492-REC15G	1492-REC20G
Mechanical Ratings				
	15 A Duplex	20 A Duplex	15 A GFCI	20 A GFCI
Operating Temperatures	-13°F to 140°F (-25°C to 60°C)			
Storage Temperatures, Short Term	-31°F to 176°F (-35°C to 80°C)			
Terminal Wire Sizes	#20 - #10 AWG solid or stranded			
Terminal Torque	7 lb.-in. (.79 Nm)			
Electrical Ratings				
Device Ratings	15 A, 125V	20 A, 125V	15 A, 125V	
Operating Frequency	50 - 60 Hz			
Dielectric Voltage	Withstands 2000V per UL498		Withstands 1500V per UL498	
Current Interrupting	N/A		10 kA	
Short-Circuit Current Rating	1492-REC15	1492-REC20	1492-REC15G	1492-REC20G
	10 kA		2 kA	
Trip Level	N/A		5±1 mA	
Material Listing				
Enclosure Cover, Flammability	PBT/polycarbonate blend, UL94 rating V0 @ .63mm			
Enclosure Base, Flammability	Polyamide 6/6 30% GF, UL94 rating V0 @ .63mm			
Spring	Stainless Steel			
Standards and Certifications				
	UL 508A (file # E54866)			
	cULus			
	UL498		UL 498, UL 943	
	NEMA WD-6			
	NEMA 5-15R			

Dimensions



	Cat. No.	Pkg. Qty.
Marking Systems Marker Card*:	1492-MS10x17 (40/card)	5

* A single marker is included with each DIN Rail Receptacle

LISTEN. THINK. SOLVE.

Allen-Bradley · Rockwell Software

Rockwell Automation

Publication 1492-PP023C-EN-E - April 2010

DINnectors Accessories

DIN rail

35 mm wide

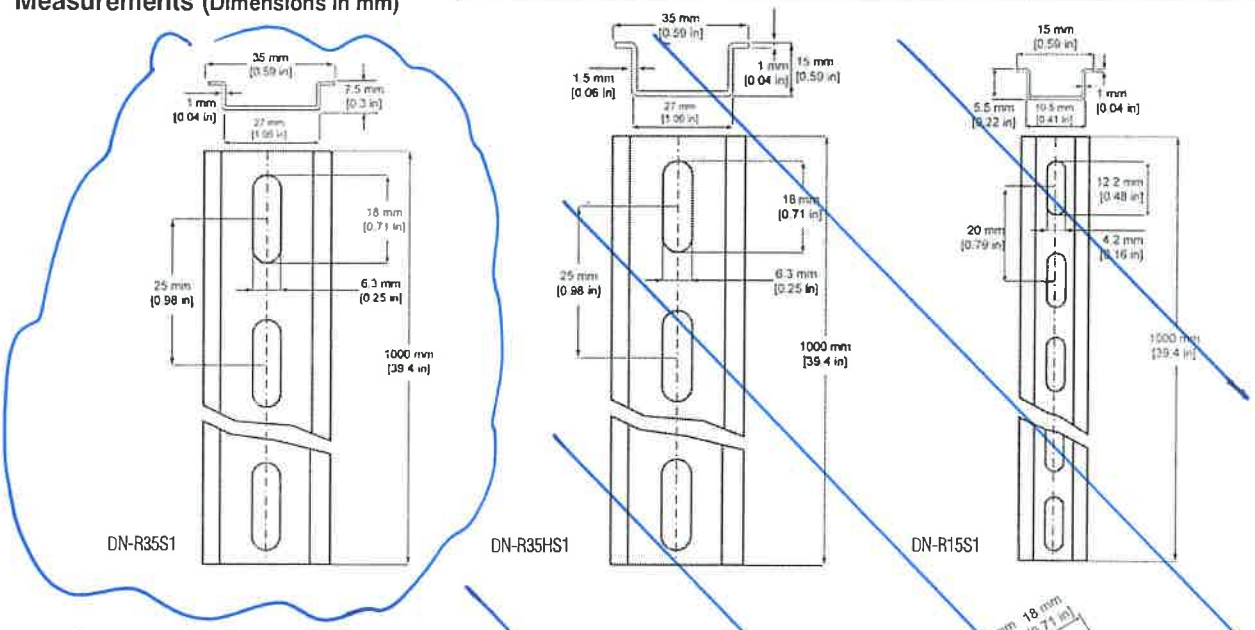
These quality DIN rails are provided in one-meter lengths and two heights, 7.5 mm and 15 mm. The 7.5 mm-high rails are primarily used to mount terminal blocks, relays, timers and small PLCs such as the DL05, DL06, DL105 and DL205. The 15 mm-high rails are for mounting larger and heavier components such as contactors and larger PLCs.

15 mm wide

The one-meter-long type DN-R15S1 DIN rail is used exclusively for mounting mini terminal blocks such as the DN-M10.

	Part#	Pcs/ Pkg	Price/ Pkg	Part#	Pcs/ Pkg	Price/ Pkg	Part#	Pcs/ Pkg	Price/ Pkg
DIN Rail	DN-R35S1	10	<--->	DN-R35HS1	10	<--->	DN-R15S1	10	<--->
DINnectors Accessories Specifications									
Description	Steel, slotted, 3'3" (1m) length, 7.5mm high			Steel, slotted, 3'3" (1m) length, 15mm high			Steel, slotted, 3'3" (1m) length, 5.5mm high		
Plating	silver-colored plating								
International Standards	CENELEC EN 50022, DIN 46277/3, RoHS			RoHS			CENELEC EN 50045, DIN 46277/2, RoHS		
Approximate Ampacity	65 Amps			125 Amps			35 Amps		
Suggested Mounting Screw Type	M6			M6			M4		

Measurements (Dimensions in mm)

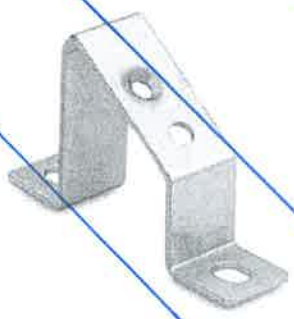


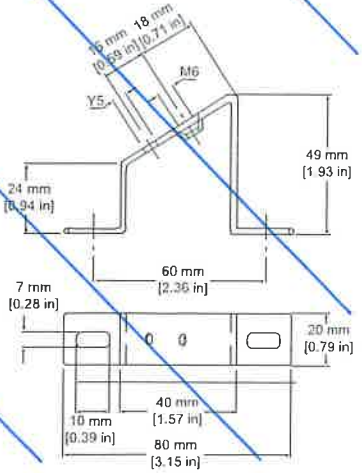
Angled support bracket

DN-ASB1 plated steel support brackets raise and tilt mounting rails for easier wiring.

Part#	Pcs/Pkg	Price Each
DN-ASB1	50	<--->
**Uses M6x1 metric fixing screw for mounting DIN rail to bracket*		

DN-ASB1





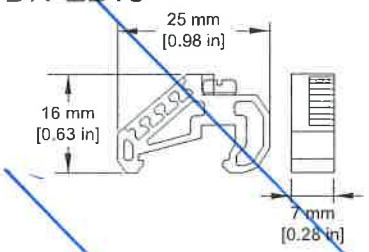
DINnectors Accessories

End Brackets

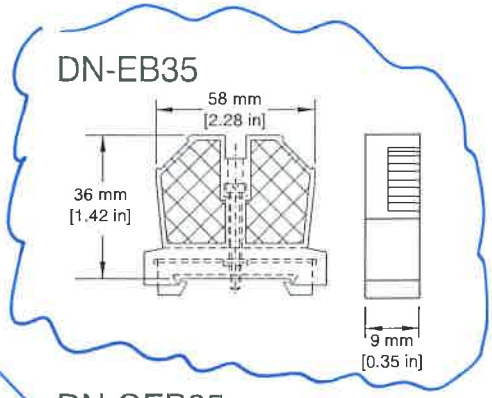
The DN-EB15 end brackets mount on 15 mm DIN rail, and DN-EB35 end brackets are designed to mount on 35 mm DIN rail. End brackets are used to prevent components from sliding along the rail.

Part #	Pcs/Pkg	Price Each
DN-EB15	100	<--->
DN-EB15MN	20	<--->
DN-EB35	50	<--->
DN-EB35MN	20	<--->
DN-EB35-A	50	<--->
DN-QEB35	50	<--->

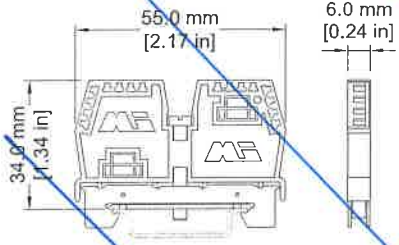
DN-EB15



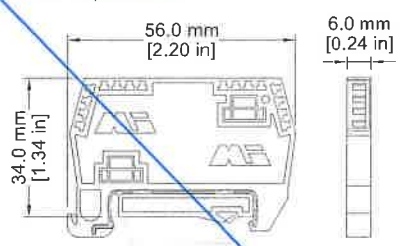
DN-EB35



DN-EB35-A



DN-QEB35



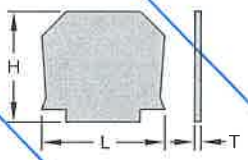
End Covers & Spacers

Certain end covers can be used with multiple terminal block parts to cover and insulate the open side, or to put more space between adjacent blocks.

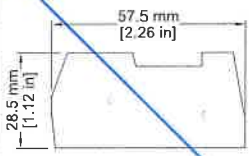
Part #	Purpose	For TBs:	Pcs/Pkg	Price Each
DN-EC1210	covers open side of TB	DN-T10 DN-T12	100	<--->
DN-EC1210MN	covers open side of TB		25	<--->
DN-EC86	covers open side of TB	DN-T8 DN-T6	100	<--->
DN-EC86MN	covers open side of TB		25	<--->
DN-EMXM1EC1	covers open side of TB	DN-EMXM1 DN-QEMXM1	25	<--->
DN-EMXM1EC2	covers closed side of TB			<--->
DN-EMXM1SPA1	spacer for either side of TB			<--->
DN-EMXDVEC1	covers open side of TB	DN-EMXDV DN-QEMXDV	25	<--->
DN-EMXDVEC2	covers closed side of TB			<--->
DN-EMXDVSPA1	spacer for either side of TB			<--->
DN-FESEP	covers open side of TB	DN-FEx DN-DISx	50	<--->
DN-FESPA	wider cover open side of TB			<--->

Note: End covers for DN-M10, DN-T4 and DN-KBD12 are found in their respective Accessories table.

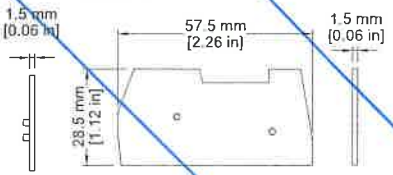
Part Number	Length	Height	Thickness
DN-EC1210	44 mm [1.73 in]	35 mm [1.38 in]	1.5 mm [0.06 in]
DN-EC1210MN			
DN-EC86	50 mm [1.97 in]	43 mm [1.69 in]	
DN-EC86MN			



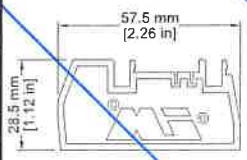
DN-EMXM1EC1



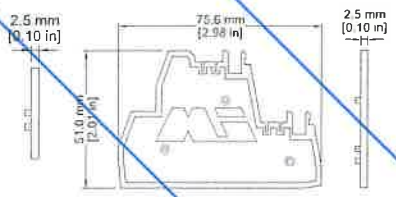
DN-EMXM1EC2



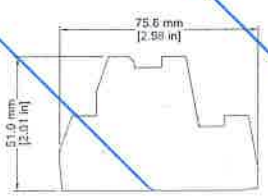
DN-EMXM1SPA1



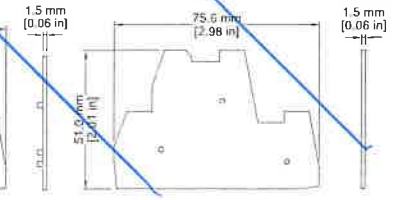
DN-EMDVSPA1



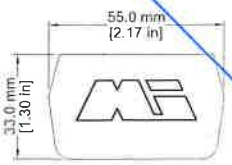
DN-EMDVEC1



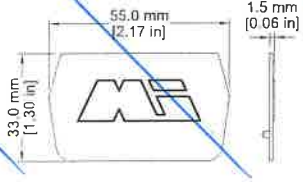
DN-EMDVEC2



DN-FESEP



DN-FESEPA



C-more Selection Guide & Specifications

OIT

Specification \ Model	8" TFT color w/ full features	10" TFT color w/ full features	10" TFT color Widescreen w/ full features
Part Number	EA9-T8CL	EA9-T10CL	EA9-T10WCL
Price	$1,383.00	$1,778.00	$986.00
Display Actual Size and Type	8.4" TFT color	10.4" TFT color	10.1" TFT color
Display Viewing Area	6.71" x 5.03" [170.4 mm x127.8mm]	8.31" x 6.24" [211.2 mm x 158.4 mm]	8.77" x 4.93" [222.7 mm x 125.3 mm]
Weight	2.93 lb [1330g]	4.19 lb [1900g]	2.43 lb [1100g]
Screen Pixel	800 x 600 (SVGA)		1024 x 600 (WSVGA)
Display Brightness	310 nits (typ)	280 nits (typ)	240 nits (typ)
LCD Panel Dot Pitch	0.213 mm x 0.213 mm	0.264 mm x 0.264 mm	0.218 mm x 0.209 mm
Color Scale	65,536 colors		
Backlight Average Lifetime*	50,000 hours @ 25°C		
Touch Panel Type**	Four-wire analog resistive, single touch		
Project Memory	26MB		
Number of Screens	Up to 999 screens – limited by project memory		
Realtime Clock	Realtime clock built into panel, backed up for 30 days at 25°C		
Calendar – Month / Day / Year	Yes - monthly deviation 60sec (Reference)		
Serial Port 1	15-pin D-sub female – RS232C, RS-422/485		
Serial Port 2	3-wire terminal block – RS-485		
Serial Port 3	RJ-12 modular jack – RS-232C		
USB Port – Type B	USB 2.0 High speed (480 Mbps) Type B – Download/Program – Max. cable length 15-feet		
USB Port – Type A	USB 2.0 High speed (480 Mbps) Type A – for USB device options – Max. cable length 15-feet – Bus Power – Less than 200mA at 5VDC		
Ethernet Port	10/100 Base-T, auto MDI/MDI-X		
Ethernet Port - Expansion Module	EA-ECOM		
Audio Line Out	3.5 mm mini jack – requires amplifier and speaker(s)		
Mic In (Future)	3.5 mm mini jack		
SD Card Slot	1 slot supports max 2GB (SD,) max 32GB (SDHC)		
HDMI Video Out	N/A		
Supply Power	10.2-26.4 VDC Class 2, Use Class2 and SELV (Safety Extra-Low Voltage) Circuit and Limited Energy Circuit (LEC), or use the AC/DC Power Adapter, EA-AC, to power the touch panel from a 100-240 VAC, 50/60 Hz power source. Reverse Polarity Protected		
Power Consumption	18.0 W 1.50 A @ 12VDC 0.75 A @ 24VDC		17.0W 1.42A @ 12 VDC 0.71A @ 24 VDC
Internal Fuse (non-replaceable)	6.3 A		
Altitude	Up to 2000m (6562ft)		
Operating Temperature	0 to 50°C (32 to 122°F) Maximum surrounding air temperature rating: 50°C (122°F) IEC 60068-2-14 (Test Nb, Thermal Shock)		
Storage Temperature	–20 to +60°C (–4 to +140°F) IEC 60068-2-1 (Test Ab, Cold) IEC 60068-2-2 (Test Bb, Dry Heat) IEC 60068-2-14 (Test Na, Thermal Shock)		
Humidity	5-95% RH (non-condensing)		
Environment	For use in Pollution Degree 2 environment, no corrosive gases permitted		
Noise Immunity	(EN61131-2), EN61000-4-2 (ESD), EN61000-4-3 (RFI), EN61000-4-4 (FTB), EN61000-4-5 (Serge), EN61000-4-6 (Conducted) EN61000-4-8 (Power f0requency magnetic field immunity) (Local Test) RFI, (145MHz, 440Mhz 10W @ 10cm), Impulse 1000V @ 1µs pulse		
Withstand Voltage	1000VAC, 1min. (FG to Power supply)		
Insulation Resistance	> 10M ohm @ 500VDC (FG to Power supply)		
Vibration	IEC60068-2-6 (Test Fc)		
Shock	IEC60068-2-27 (Test Ea)		
Emission	EN55011 Class A (Radiated RF emission)		
Enclosure	NEMA 250 type 4/4X indoor use only UL50 type 4X indoor use only IP-65 indoor use only (When mounted correctly)		
Agency Approvals	UL508, E157382 CE (EN61131-2), RoHS (2011/65/EU) CUL Canadian C22.2		

NOTES: ****The backlight average lifetime is defined as the average usage time it takes before the brightness becomes 50% of the initial brightness. The lifetime of the backlight depends on the ambient temperature. The lifetime will decrease under low or high temperature usage.***
*****The touchscreen is designed to respond to a single touch. If it is touched at multiple points at the same time, an unexpected object may be activated.***

OIT

C-more 10" Wide TFT Color Touch Panel - Full Model

EA9-T10WCL

C-more EA9 series touch screen interface panel, 10-inch widescreen color TFT (10.1 inch viewable screen), 64K colors, 1024 x 600 pixel WSVGA screen resolution, 800MHz CPU, 12-24 VDC powered, NEMA 4/4X, IP65 (when mounted correctly; for indoor use only), non-replaceable LED backlight. Includes (3) serial ports, USB 2.0 Type A and B ports and Ethernet port; supports SD memory card. Compatible with EA9-PGMSW programming software version 6.4 or later.

$986.00

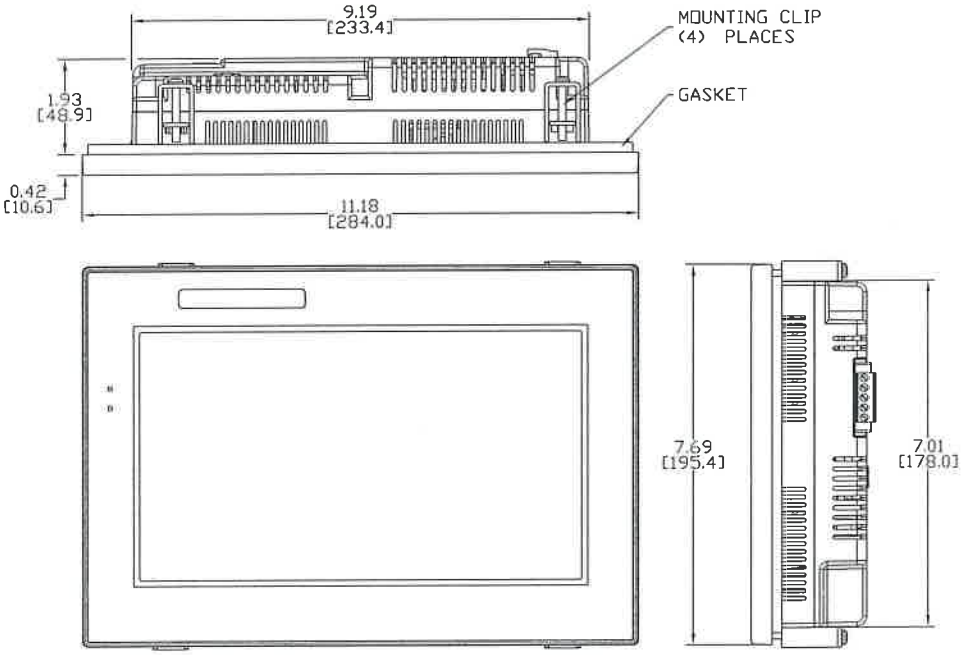
Features

- 10.1" diagonal color TFT (Thin Film Transistor) LCD display with 64K colors
- 1024 x 600 pixel resolution
- 240 NITS display brightness
- S0,000 hour average backlight half-life
- Analog resistive (1024 X 1024) touch screen allowing unlimited touch areas
- USB port B (program/download) and USB port A (USB device options)
- Ethernet 10/100 Base-T port (program/download & PLC communication
- Expansion Module Support
- Use EA-ECOM for second Ethernet Port
- Remote Internet access
- Serial PLC interface (RS-232/422/48S)
- One built-in SD memory card slot
- 12–24 VDC powered, 110VAC power adapter (optional)
- Audio Line Out, stereo - requires amplifier and speaker(s)
- 26MB project memory
- Data logging
- 0 to S0°C [32 to 122°F] operating temperature range
- NEMA 4/4X, IP6S compliant when mounted correctly, indoor use only
- Slim design save panel space
- UL, cUL & CE agency approvals
- 2-year warranty from date of purchase

Function	Available
Ethernet	Yes
USB	Yes
SD Card	Yes
Audio Out	Yes
HDMI Video Out	No
Expansion Module	Yes

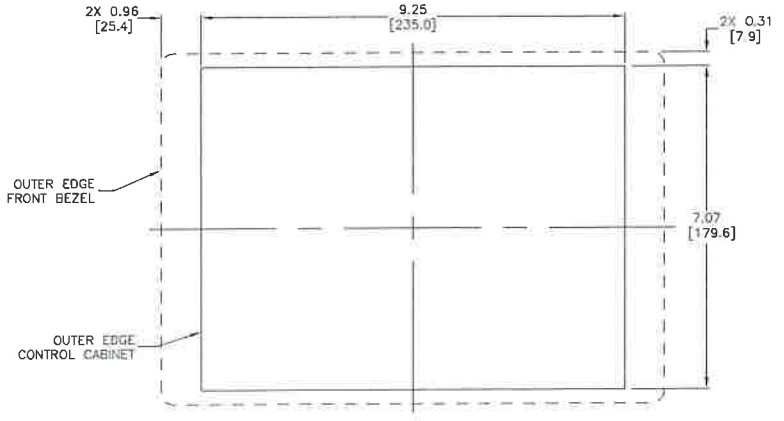
Dimensions

Units: inches [mm]



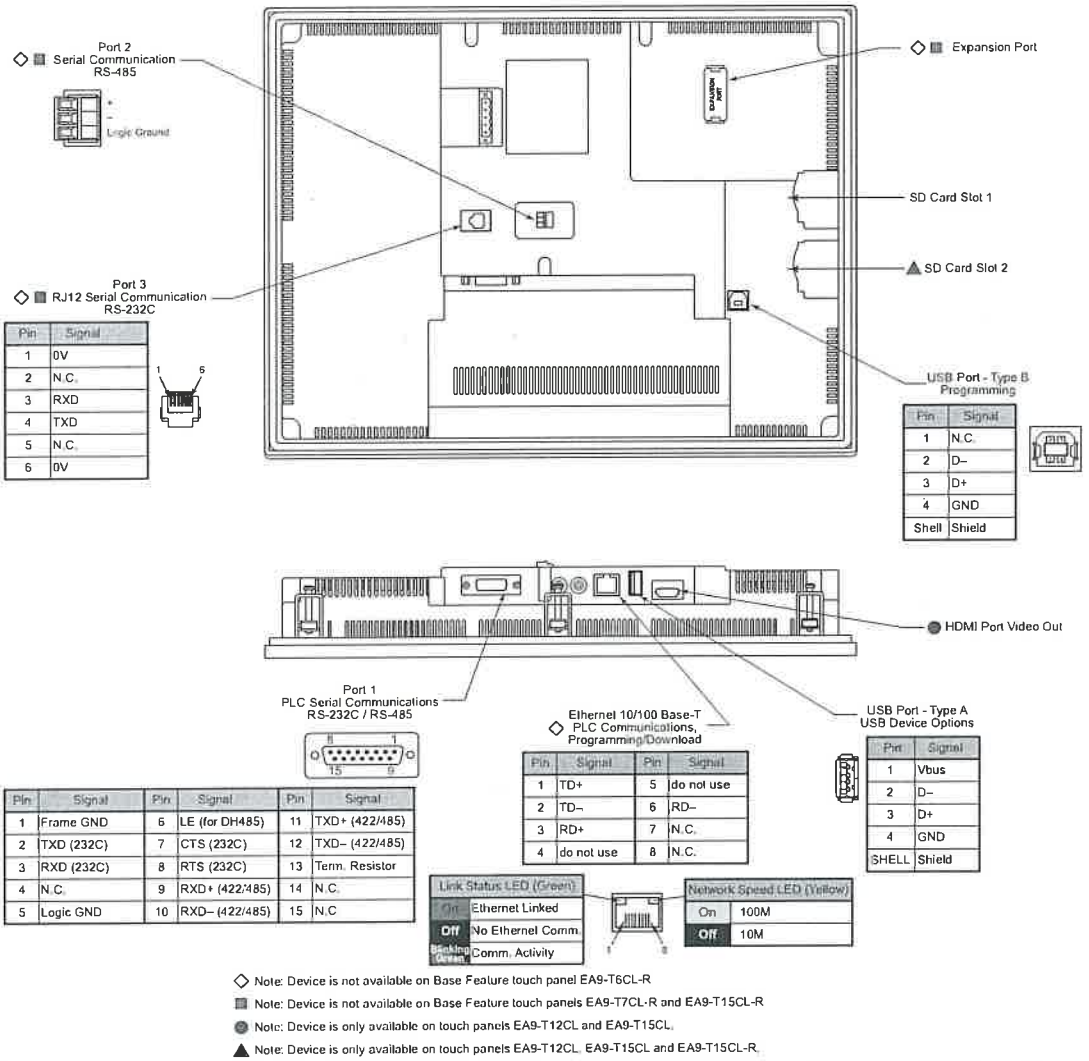
See our website www.AutomationDirect.com for complete engineering drawings.

Mounting Cutout



C-more Communication Ports

OIT



Pin	Signal
1	0V
2	N.C.
3	RXD
4	TXD
5	N.C.
6	0V

Pin	Signal
1	N.C.
2	D–
3	D+
4	GND
Shell	Shield

Pin	Signal	Pin	Signal	Pin	Signal
1	Frame GND	6	LE (for DH485)	11	TXD+ (422/485)
2	TXD (232C)	7	CTS (232C)	12	TXD– (422/485)
3	RXD (232C)	8	RTS (232C)	13	Term. Resistor
4	N.C.	9	RXD+ (422/485)	14	N.C.
5	Logic GND	10	RXD– (422/485)	15	N.C

Pin	Signal	Pin	Signal
1	TD+	5	do not use
2	TD–	6	RD–
3	RD+	7	N.C.
4	do not use	8	N.C.

Pin	Signal
1	Vbus
2	D–
3	D+
4	GND
SHELL	Shield

◇ Note: Device is not available on Base Feature touch panel EA9-T6CL-R

■ Note: Device is not available on Base Feature touch panels EA9-T7CL-R and EA9-T15CL-R

● Note: Device is only available on touch panels EA9-T12CL and EA9-T15CL.

▲ Note: Device is only available on touch panels EA9-T12CL, EA9-T15CL and EA9-T15CL-R.

Ethernet Port

The Ethernet port has several uses:

- Download program to panel
- Communicate to PLCs/PCs
- Send e-mail
- Access FTP server
- Act as a Web server
- Remote Internet access

The Ethernet port has an RJ-45 8-wire modular connector with green and yellow LEDs.

- The yellow LED indicates network speed – off for a 10 Mbps connection and illuminated for a 100 Mbps connection.
- The green LED indicates link status and illuminates when a link is established.

Note: EA6-T6CL-R does not include an Ethernet port, and does not have these capabilities.

Expansion Port

The expansion port supports the EA-ECOM module to provide a second Ethernet Port for all full featured models.

USB Port B

Program ***C-more*** via the USB programming port. It's fast and easy, with no baud rate settings, parity, or stop bits to worry about. We stock standard USB cables for your convenience. USB Port B can be used to upload or download projects to and from a PC.

USB Port A

The Universal Serial Bus (USB) Port A is a standard feature on all models and can be used to connect various USB HID (Human Input Device) devices to the panel, such as the following:

- USB flash drives (USB-FLASH)
- USB keyboards
- USB barcode scanners
- USB card scanners

C-more can log data to the USB flash drive as well as load projects to the panel from the pen drive. You can also back up project files and panel firmware.

Sound Interface (Audio Line Out)

When attached to an amplifier and speaker(s), ***C-more*** can play warning sounds or pre-recorded messages such as "conveyor is jammed". ***C-more*** supports WAV type files. The output is stereo.

Serial Port

Port 1 - Connect to your serial controller network via Port 1. Port 1 is a 15-pin port that supports RS-232 or RS-422/485.

Port 2 - Connect your RS-485 network via Port 2. Port 2 is provided with a 3-wire removable terminal block.

Port 3 - Connect to your RS-232C device via Port 3. Port 3 is an RJ12 connection.

HDMI Video Out

EA9-T12CL and EA9-T15CL include an HDMI Type A port to provide video output to a projector or remote monitor.

OIT

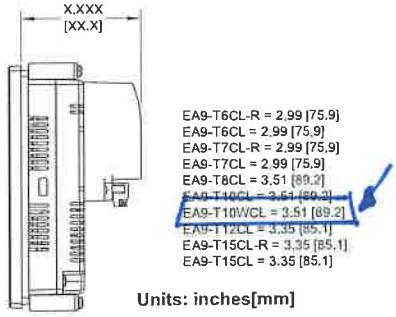
C-more Accessories

AC/DC Power Adapter

The optional ***C-more*** AC/DC Power Adapter can be used to power the ***C-more*** touch panels from a 100-240 VAC, 50/60 Hertz, voltage source. The adapter provides 24VDC @ 1.5 A to the touch panel's DC power connector and can be conveniently secured to the touch panel with two captive screws. The adapter provides a power loss signal to the touch panel that causes the touch panel to stop writing data to SD memory devices providing a controlled shutdown for increased data logging reliability. EA-AC is not compatible with EA9-RHMI.

Part No. EA-AC $98.00

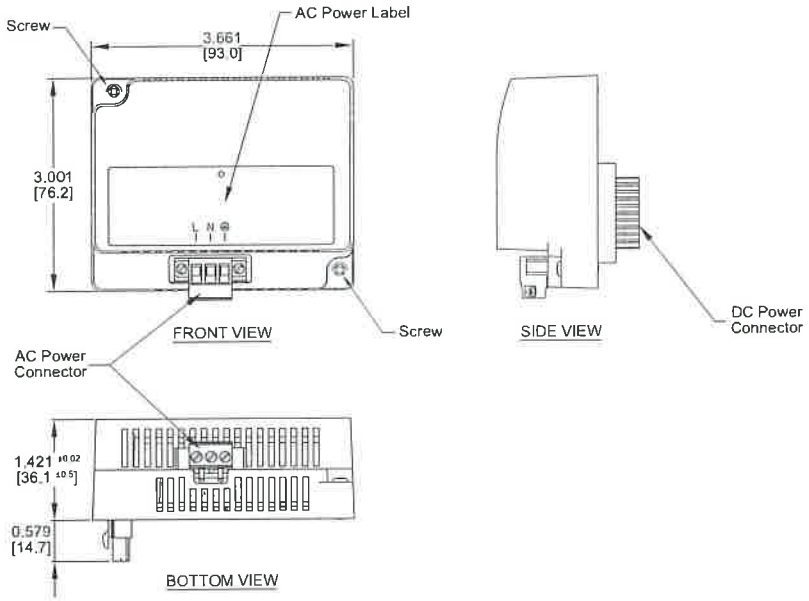
Overall Panel Depth w/ EA-AC Installed



Units: inches[mm]

Dimensions

Units: inches [mm]



AC/DC Power Adapter Specifications			
Part Number	EA-AC	***Short Circuit Protection***	85VAC: 2.6 A, 100VAC: 2.8 A, 264VAC: 3.9 A
Input Voltage & Frequency	100-240 VAC +10% -15%; 50/60 Hertz	***Static Electricity Discharge Resistance***	Compliant with IEC61000-4-2, Contact: 4 kV, Air: 8 kV
Wire	24-14 AWG, 60 / 75°C Copper. Tighten to 72 oz-in (0.5 Nm)	***Agency Approvals***	UL508 - UL Recognized for use with ***C-more*** panels, cUL, CE, EMC EN61132-2
Permissible Momentary Power Failure	Within 40ms	***Environment***	For use in pollution degree 2 environment
Input Power	68VA or less	***Grounding***	Ground resistance: less than 100 ohm
Operating Temperature Range	0°C to 50°C [32 to 122°F] Maximum surrounding temperature rating, 50°C	***Dimensions - inches [mm]***	3.00" (H) x 3.66" (W) x 1.42" (D) [76.2 mm x 93.0 mm x 36.1 mm] (Excluding DC Power Connector.)
Storage Temperature Range	-20 to 60°C [-4 to 140°F]	***Weight***	6.13 oz. [175 g]
Operating & Storage Humidity	10-85% RH (non-condensing)	***Cooling Method***	Natural convection
Noise Immunity	1000VAC p-p (Pulse width 1 µs, rise time: 1 ns), with proper ground connection on AC terminal block.	***Removable AC Power Connector (included)***	EA-AC-CON or DECA Switchlab MC101-508-03G Secured with (2) captive M2.5 screws, torque to 70 oz-in [0.5 Nm]
Hi-Pot	1000VAC, 1 minute, with proper ground connection on AC terminal block.	***Output Voltage and Ripple***	21.6 - 26.4 VDC, Ripple < 100 mV p-p
Insulation Resistance	500VDC, 10 M ohm or above, with proper ground connection on AC terminal block.	***Output Current***	Maximum 1.5 A
Vibration	Compliant with IEC61131-2	***Inrush Current***	For 100VAC: 15A, 3ms or less For 240VAC: 20A, 3ms or less
Shock	Pulse shape: Sine half wave, Peak acceleration: 147 m/s² (15 G), X, Y, Z: 3 directions, 2 times each	***Mounting to Touch Panel***	Secure with (2) spring loaded captive M3-20 screws, torque to 50 oz-in [0.35 Nm]
Thermal Protection	140°C [284°F], with autorecovery	***Recommended External Fuse***	3.0A (ADC p/n: MDL3)

OIT

C-more Accessories

SD Card

EA-SD-CARD

$130.00

SD memory card for non-volatile storage, 2GB industrial grade, 70° C maximum operating temperature makes it suitable for data logging in industrial applications. Recommended for ***C-more*** EA9 series. The EA-SD-CARD utilizes SLC technology so it is the fastest option for writing and storing data. If logged data is saved to external memory, AutomationDirect recommends using an EA-SD-CARD. EA-SD-CARD may be used with all products with an SD card slot.

SLC Flash memory utilized by EA-SD-CARD has the advantage of being the most accurate flash memory type when reading and writing data. SLC Flash has the longest lifespan of flash types and can operate in a broader temperature range than other types.

EA-SD-CARD with SLC Flash memory is recommended for industrial workloads that require heavy read / write cycles.

EA-SD-CARD Specifications	
Operating Temperature	0 to 70°C (32 to 158°F)
Humidity	20 to 85% (non-condensing)
Capacity	2GB
Speed Modes	High-Speed Normal-Speed
Interface	SD Memory Card Specification Ver. 3.0
Speed Class	Class 6

USB Flash Drive

USB-FLASH

$25.50

USB flash drive for non-volatile storage, 32GB. Recommended for the ***C-more*** EA9 series touch panels.

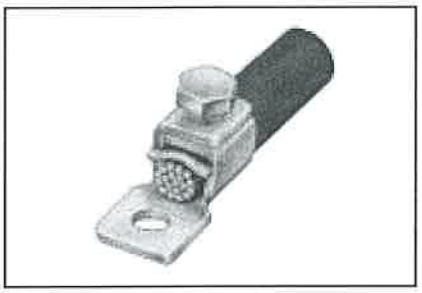
MOTOR STARTERS

TYPE KPA

SCRULUG™

For Copper Cable

High copper alloy tin-plated terminal for joining a wide range of cable to equipment pads or terminal blocks. Especially good in light industrial applications. The tongue and body are a one-piece design. The pressure bar equalizes pressure over the conductor and prevents the screw from cutting into the cable.



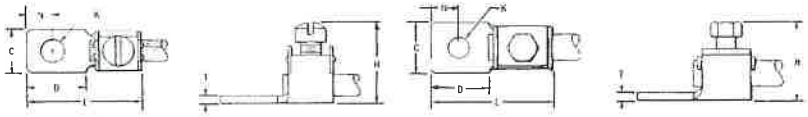


Fig. 1 Fig. 2

CATALOG NUMBER	WIRE RANGE	FIG. NO.	C	D	H	K	STUD HOLE SIZE	L	N	T	RECOMMENDED TIGHTENING TORQUE in-lb
KPA8C	8 STR. - 14 SOL.	1	.38	.47	.72	.21	.10	.95	.22	.06	12
KPA4C	14 SOL. - 4 STR.	1	.50	.59	.94	.27	1/4	1.20	.30	.06	45
KPA25	4 STR. - 1/0 STR.	2	.75	.81	1.25	.33	5/16	1.70	.41	.10	180
KPA28	1/0 STR. - 4/0 STR.	2	.97	1.12	1.66	.40	3/8	2.29	.53	.13	250
KPA34	4/0 STR. - 500 kcmil	2	1.38	1.38	2.44	.54	1/2	3.14	.75	.20	375

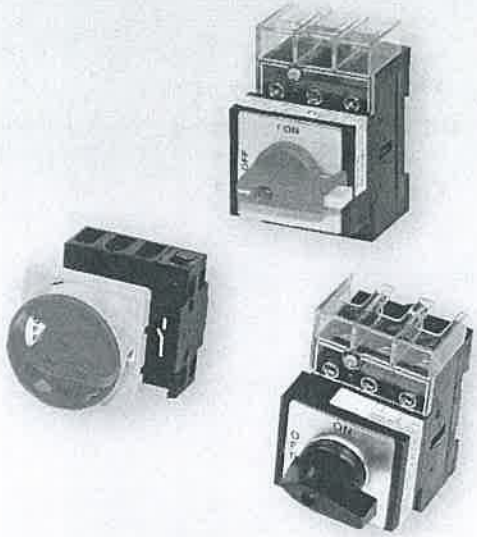
NOTE: For unplated version add "UNPL" suffix.

PDS

series DS

c3controls offers the most rugged, dependable Disconnect Switches that money can buy. From Panel/Base Mount to Door Mount with switch ratings from 16A - 125A, we've got what you need. And, of course, they're all certified to UL and CSA standards and CE marked for global versatility.

NON-FUSED DISCONNECT SWITCHES



PROVEN

c UL us CE

Conformity to Standards:
UL 508
CSA C22.2 No. 14
IEC 60947-1, 60947-3

Certifications:
UL File #: E187641 (Guide NLRV2, NLRV7, NLRV8, NLRV)

CE Marked (per EU Low Voltage Directive 2006/95/EC and RoHS Directive 2011/65/EU)

Visit www.c3controls.com to download product certifications.

NOTE: The scope (range, description, price, specifications, dimensions, etc.) of the product featured in this section is subject to change without notice. Refer to www.c3controls.com for product updates.

PDS

IT'S EASY TO BUILD YOUR OWN DISCONNECT SWITCH

Simply pick the code number from each of the sections below and combine them to build your part number.

Series DS2 Disconnect Switches (Non-Fused)

D	DS2-	3	40	- DHM	RY	
I	II	III	IV	V	VI	VII

Example: To build one of our most popular Disconnect Switches, the part number would be I + DS2 + III + IV + V + VI + VII or DDS2-325-DHGRY

I. INSTALLATION

CODE	DESCRIPTION	PRICE
D	Door Mount	$34.00
P	Panel/Base Mount	$38.00

II. OPERATOR TYPE

CODE	DESCRIPTION
DS2	Non-Fused Disconnect Switch

III. NUMBER OF POWER POLES

CODE	DESCRIPTION	PRICE
3	3 Poles	*
4	4 Poles	*
5	5 Poles	*

*NOTE: Price included with Current Rating. See Chart IV below.

IV. CURRENT RATING

		FOR USE WITH		
CODE	DESCRIPTION	3 POLES	4 POLES	5 POLES
16	16 Amp	$ 0.00	$ 14.00	$ 28.00
25	25 Amp	$ 4.00	$ 18.00	$ 32.00
30	32 Amp	$ 11.00	$ 27.00	$ 43.00
40	40 Amp	$ 23.00	$ 50.00	$ 78.00
60	63 Amp	$ 33.00	$ 63.00	$ 94.00
80	80 Amp	$ 67.00	$135.00	$185.00
100	100 Amp	$ 95.00	$146.00	$198.00
125	125 Amp	$117.00	$171.00	$225.00

DISCOUNT SCHEDULE G

V. OPERATING HANDLE TYPE

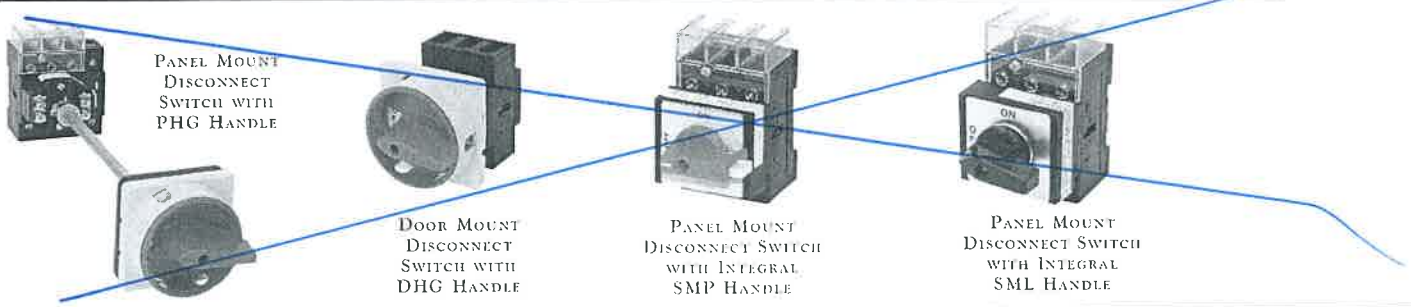
CODE	DESCRIPTION	FOR CURRENT RATING CODES	PRICE
	DOOR MOUNT HANDLES FOR DOOR MOUNT SWITCHES		
MDHG	Padlockable Lever (IP55)	16	$ 13.00
MSDHG	Padlockable Lever - Single Hole (22.5mm) Mounting (IP55)	16	$ 13.00
DHM	Round (Type 1, 2, 3, 3R, 4/4X, 12, 13, and IP65)	25 ~ 60	$ 43.00
DHG	Round (Type 1, 2, 3, 3R, 4/4X, 12, 13, and IP65)	25 ~ 125	$ 15.00
	DOOR MOUNT HANDLES FOR PANEL/BASE MOUNT SWITCHES		
MPHG	Padlockable Lever (IP65)	16	$ 13.00
PHM	Round (Type 1, 2, 3, 3R, 4/4X, 12, 13, and IP65)	25 ~ 125	$ 43.00
PHG	Round (Type 1, 2, 3, 3R, 4/4X, 12, 13, and IP65)	25 ~ 125	$ 15.00
SPH	Short Pistol (IP65)	25 ~ 125	$ 56.00
LPH	Long Pistol (IP65)	80 ~ 125	$ 70.00
	INTEGRAL HANDLES FOR PANEL/BASE MOUNT SWITCHES		
SML	Lever (IP30)	25 ~ 60	$ 11.50
SMP	Padlockable Lever (IP30)	25 ~ 60	$ 13.00

VI. OPERATING HANDLE COLOR

CODE	OPERATOR COLOR	BEZEL COLOR	FOR OPERATOR TYPE CODE
RY	Red	Yellow	DHM, ~~DHG, PHM, PHG, MDHG, MSDHG, MPHG, SMP~~
GB	Grey	Black	DHM, PHM
BB	Black	Black	DHM, PHM
BG	Black	Grey	DHM, DHG, PHM, PHG, MDHG, MSDHG, MPHG
BA	Black	Aluminum	SML
BN	Black	—	SPH, LPH

VII. OPERATING SHAFT LENGTH

CODE	DESCRIPTION	FOR CURRENT RATING CODES	PRICE
(Blank)	Door Mount and Panel/Base Mount Switch with Integral Operating Handle	—	—
06	150mm (5-57/64") Operating Shaft for Panel/Base Mount Switch	16	$ 6.30
11	283mm (11") Operating Shaft for Panel/Base Mount Switch	25 ~ 125	$ 8.10



Panel Mount Disconnect Switch with PHG Handle

Door Mount Disconnect Switch with DHG Handle

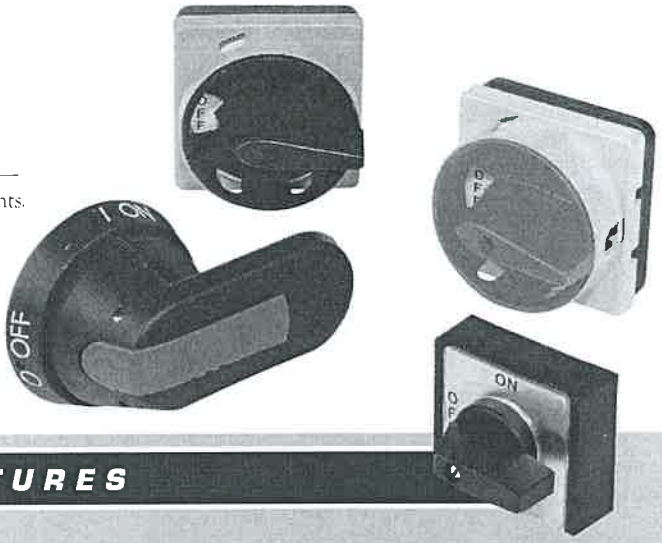
Panel Mount Disconnect Switch with Integral SMP Handle

Panel Mount Disconnect Switch with Integral SML Handle

WE DIDN'T INVENT CONTROL, WE'RE PERFECTING IT.

Series DS2 Non-Fused Operating Handles

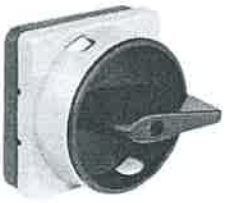
c3controls Series DS2 non-fused disconnect switch operating handles are available in a wide variety of styles, colors, and ingress protection ratings — perfect for any application from light duty to severe industrial environments. External operating handles are easy to install in standard 4-hole panel drilling layouts. A single hole (22.5mm) operating handle is also available for 16A switches. Operating handles can be installed in enclosures with door thicknesses up to 6mm (5/64") depending on handle type, see dimension drawings on pages 17-21.



UNIQUE PRODUCT FEATURES

Easy to install, stylish operating handles provide reliable actuation in disconnecting applications and can be locked off for extra safety.

1. Handles can be padlocked OFF with up to three padlocks to meet global installation codes and standards requirements.
2. Operating handles with ON/OFF and I/O markings.
3. Door interlock — can only be opened in the OFF position.
4. Positive, reliable actuation of the switch is ensured through the rigid operating shaft that can be cut to length for enclosure depths up to 204mm (8") for 16A switches and up to 355mm (13-63/64") for 25A ~ 63A switches and 456.5mm (17-63/64") for 80A ~ 125A switches.
5. Pistol operating handles include a concealed "defeater mechanism" that must be operated with a tool. Allows entry into the enclosure with the switch in the ON position.

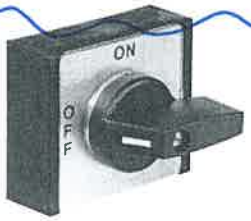


DHG/PHG
Door/Panel Mount
Round Operating Handle
(Type 1, 2, 3, 3R, 4/4X, 12, 13, and IP65)

DHM/~~PHM~~ Door/Panel Mount
Operating Handle
(Type 1, 2, 3, 3R, 4/4X, 12, 13, and IP65)

SMP Panel Mount Integral
Padlockable Lever
Operating Handle
(IP30)

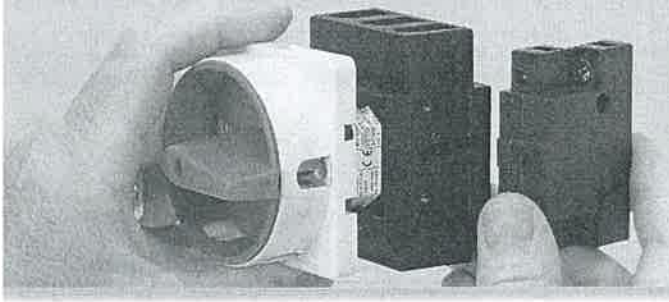
SPH/LPH Panel Mount
Pistol Operating Handle
(IP65)



SML Panel Mount Integral
Lever Operating Handle
(IP30)

MDHG/MSDHG/MPHG
Door/Panel Mount Lever
Operating Handle
(MDHG & MSDHG: IP55) (MPHG: IP65)

SPECIAL FEATURES



Engineered to add Auxiliary Contacts, Power Poles, and Neutral Poles Easily!

Up to two modules (Auxiliary Contacts, Power Poles, and Neutral Poles) can be added to a three pole switch. One module can be installed on the left side and right side of the switch.

NEUTRAL POLE MODULES

Normally open early make (NOEM) configuration. IP20 terminals guard against accidental contact with live parts.

DOOR MOUNT		
CODE	CURRENT RATING CODE	PRICE
DNA216	16	$17.00
DNA225	25	$17.00
DNA230	30	$19.50
DNA240	40	$21.00
DNA260	60	$23.00
DNA280	80	$27.00
DNA2100	100	$28.00
DNA2125	125	$29.00

PANEL MOUNT		
CODE	CURRENT RATING CODE	PRICE
PDNA216	16	$17.00
PDNA225	25	$17.00
PDNA230	30	$19.50
PDNA240	40	$21.00
PDNA260	60	$23.00
PDNA280	80	$27.00
PDNA2100	100	$28.00
PDNA2125	125	$29.00

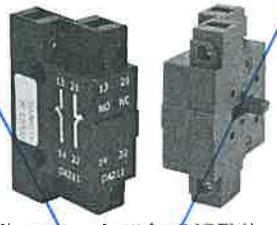
POWER POLE MODULES

Normally open (NO) configuration. IP20 terminals guard against accidental contact with live parts. Electrical ratings are equivalent to the associated switch rating (refer to specifications on page 15).

DOOR MOUNT		
CODE	CURRENT RATING CODE	PRICE
DPA216	16	$17.00
DPA225	25	$17.00
DPA230	30	$19.50
DPA240	40	$21.00
DPA260	60	$23.00
DPA280	80	$27.00
DPA2100	100	$28.00
DPA2125	125	$29.00

PANEL MOUNT		
CODE	CURRENT RATING CODE	PRICE
PDPA216	16	$17.00
PDPA225	25	$17.00
PDPA230	30	$19.50
PDPA240	40	$21.00
PDPA260	60	$23.00
PDPA280	80	$27.00
PDPA2100	100	$28.00
PDPA2125	125	$29.00

AUXILIARY CONTACT MODULES



1 normally open early make (NOEM) and 1 normally closed (NC) contact configuration. IP20 terminals guard against accidental contact with live parts. Auxiliary contacts can be installed on switches rated 16A to 125A, reducing inventory requirements.

Ratings: AC-15: 6A at ≤240V AC
4A at 240V AC to 480V AC
Continuous Thermal Current: 15A

DOOR MOUNT		
CODE	CURRENT RATING CODE	PRICE
D16A211	16	$27.00
DA211	25 ~ 60	$27.00
D125A211	80 ~ 125	$27.00

PANEL MOUNT		
CODE	CURRENT RATING CODE	PRICE
PA16DA211	16	$27.00
PADA211	25 ~ 60	$27.00
PA125DA211	80 ~ 125	$27.00

TERMINAL SHIELDS

Terminal shields can be installed on the line or load side of the disconnect switch to provide extra protection and guard against accidental contact with live parts.

CODE	CURRENT RATING CODE	PRICE
DS2TS20	16	$ 5.00
DS2TS60	25 ~ 60	$ 5.00
DS2TS125	80 ~ 125	$10.00

DISCOUNT SCHEDULE G

SPECIFICATIONS:

SERIES DS2 NON-FUSED DISCONNECT SWITCH SPECIFICATIONS

		SWITCH CURRENT RATING CODE							
		16	25	30	40	60	80	100	125
ELECTRICAL UL/CSA APPLICATIONS									
	UNITS								
Rated Operating Voltage, Ue	VAC	600							
Rated Operating Current, Ie	A	16	25	32	40	63	80	100	125
RATED 3-PHASE POWER, Pe									
@ 240V AC	HP	3	7.5	7.5	10	15	20	20	30
@ 480V AC	HP	7.5	15	20	20	25	30	30	40
@ 600V AC	HP	10	20	25	30	30	40	40	50
RATED SINGLE PHASE POWER, Pe									
@ 120V AC	HP	0.5	1.5	2	3	3	3	3	3
@ 240V AC	HP	1.5	2	3	5	7.5	7.5	7.5	7.5
SHORT CIRCUIT RATINGS @ 600V AC									
With Class J Fuses	kA	10	10	10	10	10	10	10	10
Maximum Fuse Size	A	20	45	45	70	70	125	125	125
ELECTRICAL IEC APPLICATIONS									
Rated Insulation Voltage, Ui	VAC	750							
Rated Impulse Voltage, Uimp	kV	6							
Rated Operating Voltage, Ue	VAC	690							
RATED OPERATING CURRENT, Ie									
AC-22A	A	16	25	32	40	63	80	100	125
AC-1	A	20	32	40	63	80	80	100	125
RATED 3-PHASE POWER, AC-23A, Pe									
@ 220 ~ 240V AC	kW	7.5	11	15	22	30	37	44	60
@ 380 ~ 440V AC	kW	15	22	22	45	45	90	90	90
@ 500 ~ 690V AC	kW	15	22	22	45	45	90	90	90
RATED 3-PHASE POWER, AC-3, Pe									
@ 220 ~ 240V AC	kW	4	8	11	15	22	30	37	44
@ 380 ~ 440V AC	kW	5.5	15	15	30	30	55	55	55
@ 500 ~ 690V AC	kW	11	15	15	30	30	55	55	55
SHORT CIRCUIT RATINGS									
With Type gG Fuses	kA	5	30	30	30	30	30	30	30
Maximum Fuse Size	A	20	32	32	63	63	125	125	125
MECHANICAL									
Operating Torque (Door Mount)	Nm	0.45	0.8	0.8	0.8	0.8	①	①	①
	Lb-in.	4.0	7	7	7	7	①	①	①
Operating Torque (Panel Mount)	Nm	0.45	1.0	1.0	1.0	1.0	1.6	1.6	1.6
	Lb-in.	4.0	9	9	9	9	14	14	14
ENVIRONMENTAL									
Ambient Operating Temperature	°C/°F	-25 to 55 / -13 to 131							
Altitude	m/ft.	2,000/6,528							
Ingress Protection									
Switch Body	IP	20							
Operating Handles	—	For detailed specifications by operating handle, see page 16.							
CONSTRUCTION									
CONDUCTOR SIZE									
UL/CSA	AWG	16 ~ 12	18 ~ 10	18 ~ 10	12 ~ 6	12 ~ 6	10 ~ 1	10 ~ 1	10 ~ 1
Solid/Multi-strand	mm²	1 ~ 4	2.5 ~ 10	2.5 ~ 10	6 ~ 25	6 ~ 25	2.5 ~ 50	2.5 ~ 50	2.5 ~ 50
Fine strand with sleeve	mm²	0.5 ~ 6	0.75 ~ 6	0.75 ~ 6	2.5 ~ 10	2.5 ~ 10	4 ~ 50	4 ~ 50	4 ~ 50
Terminal Torque	Nm	0.8	1.7	1.7	2	2	2.5	2.5	2.5
	Lb-in.	7.1	15	15	17.7	17.7	22	22	22
Recommended Wire Strip Length	mm	10	10	12	12	12	15	15	15
	in.	3/8	3/8	1/2	1/2	1/2	5/8	5/8	5/8
ROHS COMPLIANCE		For RoHS compliance documentation by product, refer to www.c3controls.com							

① Consult factory

Specifications:

SERIES DS2 NON-FUSED DISCONNECT SWITCHES – OPERATING HANDLES		
ENVIRONMENTAL		
	UNITS	
DHG / PHG HANDLE		
Handle Type		Round
Installation		Door/Panel Mount
Padlock Provision		3
Ingress Protection Rating	—	Type 1, 2, 3, 3R, 4/4X, 12, 13 and IP65
DHM / PHM HANDLE		
Handle Type		Round
Installation		Door/Panel Mount
Padlock Provision		3
Ingress Protection Rating	—	Type 1, 2, 3, 3R, 4/4X, 12, 13 and IP65
SMP HANDLE		
Handle Type		Padlockable Lever
Installation		Integral Panel Mount
Padlock Provision		1
Ingress Protection Rating	IP	30
SPH / LPH HANDLE*		
Handle Type		Pistol
Installation		Panel Mount
Padlock Provision		3
Ingress Protection Rating	IP	65
SML HANDLE		
Handle Type		Lever
Installation		Integral Panel Mount
Padlock Provision		6
Ingress Protection Rating	IP	30
MDHG / MSDHG / MPHG HANDLE		
Handle Type		Padlockable Lever
Installation		Door/Panel Mount
Padlock Provision		1
Ingress Protection Rating	IP	MDHG & MSDHG: 55 MPHG: 65

*NOTE: Includes concealed defeater mechanism.

DHG/PHG

DHM/PHM

SMP

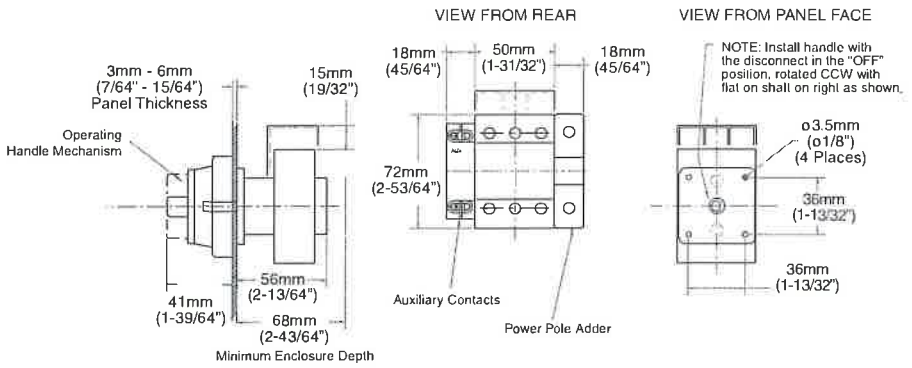
SPH/LPH

SML

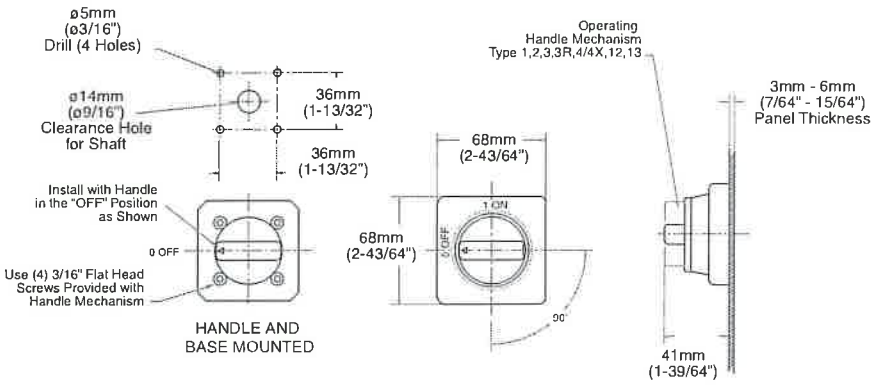
MDHG/MSDHG/ MPHG

Door Mounted Disconnect Switch with DHM Operating Handle

25A - 63A Switches

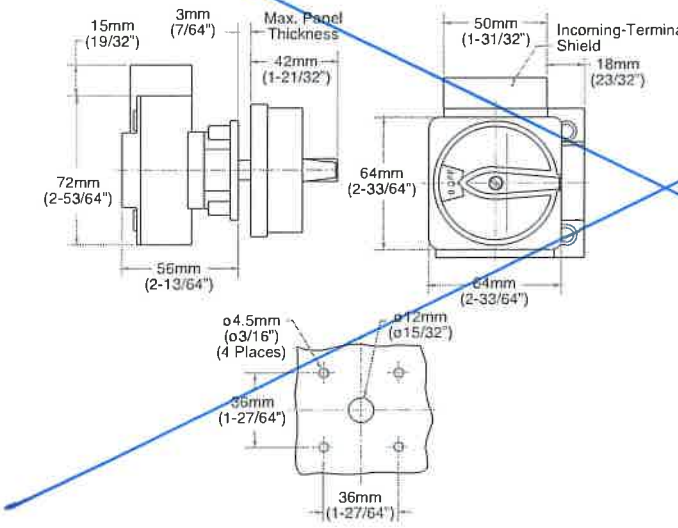


DHM Operating Handle Mounting Holl Pattern

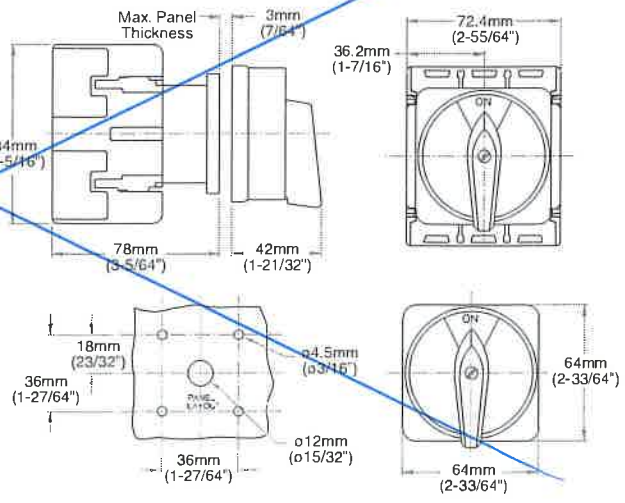


Door Mounted Disconnect Switch with DHG Operating Handle

25A - 63A Switches



80A - 125A Switches



nVent | HOFFMAN

TWO-DOOR WITH FLOOR STANDS AND 3-POINT LATCH, TYPE 4

FEATURES

- Three-point latch for security and ease of use
- Return flange around the door opening excludes liquids and contaminants
- Removable centerpost permits easy panel installation

SPECIFICATIONS

- 12 gauge steel
- 3-point latch system with POWERGLIDE padlocking handles
- Seams continuously welded and ground smooth; no holes or knockouts
- Body stiffeners
- Panel supports
- Heavy gauge continuous hinge with stainless steel hinge pin
- Data pocket is high-impact thermoplastic
- 12-in. floor stands are welded to enclosure
- Heavy-duty lifting eyes
- Oil-resistant door gasket
- Collar stud for mounting optional panels
- Grounding stud on body
- Bonding provision on door
- Provision for mounting flourescent light

INDUSTRY STANDARDS

UL 508A Listed; Type 4, 12; File No. E61997
cUL Listed per CSA C22.2 No. 94; Type 4, 12; File No. E61997

NEMA/EEMAC, Type 3, 4, 12, 13
IEC 60529, IP66

APPLICATION

These enclosures are ideal for indoor or outdoor applications where it is necessary to protect controls and instrumentation from wet, non-corrosive environments. The design features Hoffman's exclusive POWERGLIDE Handle with 3-point latching for secure closure and floor stands that provide additional height and access for cleaning under the enclosure.

FINISH

ANSI 61 gray polyester paint inside and out over pretreated surfaces. Optional panels have white or conductive finish.

ACCESSORIES

Panels
PANELITE Enclosure Lights
SPECTRACOOL Indoor/Outdoor
Enclosure Stabilizers
Steel, Stainless Steel and Non-Metallic Window Kits
Electric Heaters
HOL-SEALERS Hole Seals
INTERSAFE Data Interface Ports, Type 4/4X/12

MODIFICATION AND CUSTOMIZATION

Hoffman excels at modifying and customizing products to your specifications. Contact your local Hoffman sales office or distributor for complete information.

BULLETIN: A4L3

Standard Product

Catalog Number	AxBxC in./mm	Panel	Conductive Panel	Body Stiffener S in./mm	Panel Size D x E in./mm
A62H4810LP3PT	62.06 x 48.06 x 10.06 1576 x 1221 x 256	A60P48	A60P48G	15.00 381	56.00 x 44.00 1422 x 1118
A62H4818LP3PT	62.06 x 48.06 x 18.06 1576 x 1221 x 459	A60P48	A60P48G	15.00 381	56.00 x 44.00 1422 x 1118
A62H6012LP3PT	62.06 x 60.06 x 12.06 1576 x 1526 x 306	A60P60	A60P60G	21.00 533	56.00 x 56.00 1422 x 1422
A62H6018LP3PT	62.06 x 60.06 x 18.06 1576 x 1526 x 459	A60P60	A60P60G	21.00 533	56.00 x 56.00 1422 x 1422
A74H6012LP3PT	74.06 x 60.06 x 12.06 1881 x 1526 x 306	A72P60	A72P60G	21.00 533	68.00 x 56.00 1727 x 1422
A74H6018LP3PT	74.06 x 60.06 x 18.06 1881 x 1526 x 459	A72P60	A72P60G	21.00 533	68.00 x 56.00 1727 x 1422
A74H7212LP3PT	74.06 x 72.06 x 12.06 1881 x 1830 x 306	A72P72	A72P72G	24.00 610	68.00 x 68.00 1727 x 1727
A74H7218LP3PT	74.06 x 72.06 x 18.06 1881 x 1830 x 459	A72P72	A72P72G	24.00 610	68.00 x 68.00 1727 x 1727
A74H7224LP3PT	74.06 x 72.06 x 24.06 1881 x 1830 x 611	A72P72	A72P72G	24.00 610	68.00 x 68.00 1727 x 1727

Order panel separately.

"FCP"

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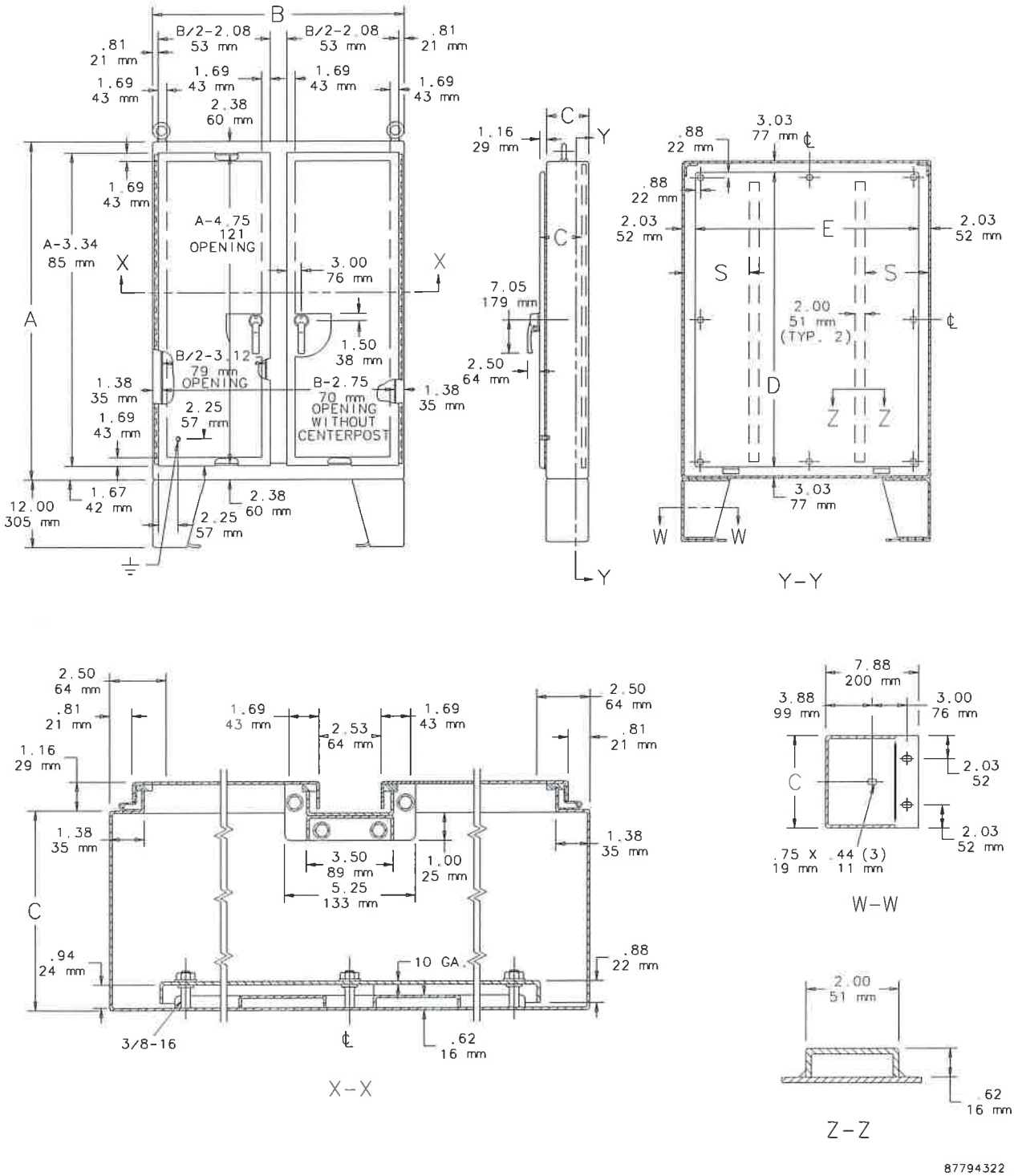

87794322

"FCP"

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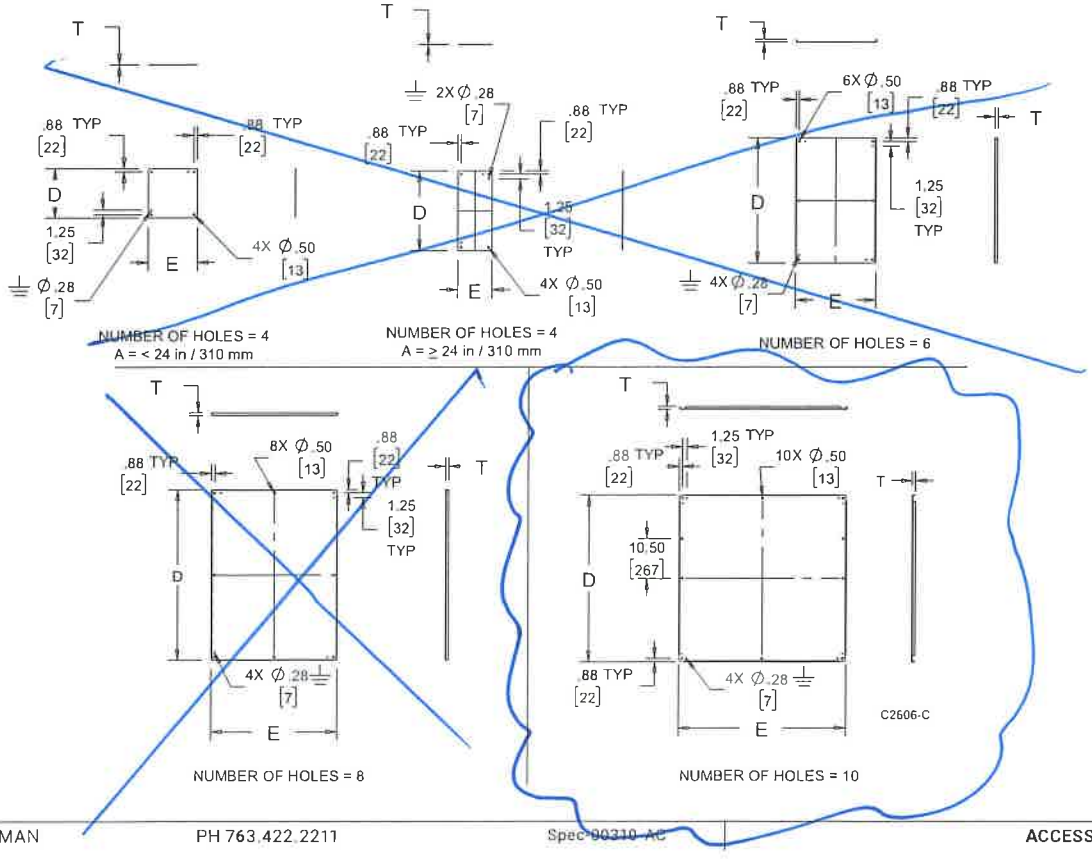
PANELS FOR TYPE 3R, 4, 4X, 12 AND 13 ENCLOSURES

Steel panels are 11 or 12 gauge, finished with white polyester powder paint or a conductive, corrosion-resistant coating. Larger panels have flanges on two or four sides. Some larger steel panels are 11 gauge and include extra holes for panel lifting. Aluminum panels are 5052-H32 aluminum alloy. Larger panels have flanges on four sides. Aluminum panels are protected on one side with a plastic film. Stainless steel panels are Type 316 stainless steel. Panel mounting hardware is furnished with all enclosures which accept these panels.

BULLETIN: PNLFS, PNLJ, PNLWM

Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	Panel Gauge or Thickness	Edge Flanges	T (in.)	T (mm)	Number of Holes
A12P24	Painted steel	9.00 x 21.00	229 x 533	12 ga.	0	–	–	4
A12P24G	Conductive steel	9.00 x 21.00	229 x 533	12 ga.	0	–	–	4
A16P12	Painted steel	13.00 x 9.00	330 x 229	12 ga.	0	–	–	4
A16P12G	Conductive steel	13.00 x 9.00	330 x 229	12 ga.	0	–	–	4
A16P12SS6	Stainless Steel	13.00 x 9.00	330 x 229	12 ga.	0	–	–	4
A16P12AL	Aluminum	13.00 x 9.00	330 x 229	0.10 in./3 mm	0	–	–	4
A16P16	Painted steel	13.00 x 13.00	330 x 330	12 ga.	0	–	–	4
A16P16G	Conductive steel	13.00 x 13.00	330 x 330	12 ga.	0	–	–	4
A16P16SS6	Stainless Steel	13.00 x 13.00	330 x 330	12 ga.	0	–	–	4
A16P16AL	Aluminum	13.00 x 13.00	330 x 330	0.10 in./3 mm	0	–	–	4
A18P18	Painted steel	15.00 x 15.00	381 x 381	12 ga.	0	–	–	4
A18P18G	Conductive steel	15.00 x 15.00	381 x 381	12 ga.	0	–	–	4
A20P12	Painted steel	17.00 x 9.00	432 x 229	12 ga.	0	–	–	4
A20P12G	Conductive steel	17.00 x 9.00	432 x 229	12 ga.	0	–	–	4
A20P16	Painted steel	17.00 x 13.00	432 x 330	12 ga.	0	–	–	4
A20P16G	Conductive steel	17.00 x 13.00	432 x 330	12 ga.	0	–	–	4
A20P16SS6	Stainless Steel	17.00 x 13.00	432 x 330	12 ga.	0	–	–	4
A20P16AL	Aluminum	17.00 x 13.00	432 x 330	0.10 in./3 mm	0	–	–	4
A20P20	Painted steel	17.00 x 17.00	432 x 432	12 ga.	0	–	–	4
A20P20G	Conductive steel	17.00 x 17.00	432 x 432	12 ga.	0	–	–	4
A20P20SS6	Stainless steel	17.00 x 17.00	432 x 432	12 ga.	0	–	–	4
A20P20AL	Aluminum	17.00 x 17.00	432 x 432	0.10 in./3 mm	0	–	–	4
A24P16	Painted steel	21.00 x 13.00	533 x 330	12 ga.	0	–	–	4
A24P16G	Conductive steel	21.00 x 13.00	533 x 330	12 ga.	0	–	–	4
A24P16SS6	Stainless Steel	21.00 x 13.00	533 x 330	12 ga.	0	–	–	4
A24P20	Painted steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20G	Conductive steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20SS6	Stainless Steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20AL	Aluminum	21.00 x 17.00	533 x 432	0.10 in./3 mm	4	0.75	19	4
A24P24	Painted steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24G	Conductive steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24SS6	Stainless Steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24AL	Aluminum	21.00 x 21.00	533 x 533	0.10 in./3 mm	2	0.75	19	4
A30P16	Painted steel	27.00 x 13.00	686 x 330	12 ga.	2	0.75	19	4
A30P16G	Conductive steel	33.00 x 27.00	838 x 686	12 ga.	2	0.75	19	4
A30P20	Painted steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P20G	Conductive steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P20SS6	Stainless Steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P24	Painted steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24G	Conductive steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24SS6	Stainless Steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24AL	Aluminum	27.00 x 21.00	686 x 533	0.10 in./3 mm	2	0.75	19	4
A30P30	Painted steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A30P30G	Conductive steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A30P30SS6	Stainless Steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A36P16	Painted steel	33.00 X 13.00	838 X 330	12 ga.	2	0.75	19	4
A36P16G	Conductive steel	33.00 x 13.00	838 x 330	12 ga.	2	0.75	19	4
A36P24	Painted steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24G	Conductive steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24SS6	Stainless Steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24AL	Aluminum	33.00 x 21.00	838 x 533	0.10 in./3 mm	2	0.75	19	6
A36P30	Painted steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30G	Conductive steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30SS6	Stainless Steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30AL	Aluminum	33.00 x 27.00	838 x 686	0.10 in./3 mm	4	0.75	19	6
A36P36	Painted steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A36P36G	Conductive steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A36P36SS6	Stainless Steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A40P24	Painted steel	37.00 x 21.00	940 x 533	12 ga.	4	0.75	19	6
A40P24G	Conductive steel	37.00 x 21.00	940 x 533	12 ga.	4	0.75	19	6
A40P30	Painted steel	37.00 x 29.00	940 x 737	12 ga.	4	0.75	19	4
A40P30G	Conductive steel	37.00 x 29.00	940 x 737	12 ga.	4	0.75	19	4
A42P24	Painted steel	39.00 x 21.00	991 x 533	12 ga.	2	0.75	19	6
A42P24G	Conductive steel	39.00 x 21.00	991 x 533	12 ga.	2	0.75	19	6
A42P30	Painted steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6

Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	Panel Gauge or Thickness	Edge Flanges	T (in.)	T (mm)	Number of Holes
A42P30G	Conductive steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6
A42P30SS6	Stainless Steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6
A42P36	Painted steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P36G	Conductive steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P36SS6	Stainless Steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P42	Painted steel	39.00 x 39.00	991 x 991	12 ga.	4	0.75	19	8
A42P42G	Conductive steel	39.00 x 39.00	991 x 991	12 ga.	4	0.75	19	8
A48P24	Painted steel	45.00 x 21.00	1143 x 533	12 ga.	2	0.75	19	6
A48P24G	Conductive steel	45.00 x 21.00	1143 x 533	12 ga.	2	0.75	19	6
A48P30	Painted steel	45.00 x 27.00	1143 x 686	12 ga.	4	0.75	19	6
A48P30G	Conductive steel	45.00 x 27.00	1143 x 686	12 ga.	4	0.75	19	6
A48P36	Painted steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36G	Conductive steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36SS6	Stainless Steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36AL	Aluminum	45.00 x 33.00	1143 x 838	0.10 in./3 mm	4	0.75	19	8
A48P42	Painted steel	45.00 x 39.00	1143 x 991	12 ga.	4	0.75	19	8
A48P42G	Conductive steel	45.00 x 39.00	1143 x 991	12 ga.	4	0.75	19	8
A48P48	Painted steel	44.00 x 44.00	1118 x 1118	11 ga.	4	0.84	21	10
A48P48G	Conductive steel	44.00 x 44.00	1118 x 1118	11 ga.	4	0.84	21	10
A54P42	Painted steel	50.00 x 38.00	1270 x 965	11 ga.	4	0.84	21	10
A54P42G	Conductive steel	50.00 x 38.00	1270 x 965	11 ga.	4	0.84	21	10
A60P24	Painted steel	57.00 x 21.00	1448 x 533	12 ga.	4	0.75	19	6
A60P24G	Conductive steel	57.00 x 21.00	1448 x 533	12 ga.	4	0.75	19	6
A60P30	Painted steel	57.00 x 27.00	1448 x 686	12 ga.	4	0.75	19	6
A60P30G	Conductive steel	57.00 x 27.00	1448 x 686	12 ga.	4	0.75	19	6
A60P36	Painted steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36G	Conductive steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36SS6	Stainless Steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36AL	Aluminum	57.00 x 33.00	1448 x 838	0.10 in./3 mm	4	0.75	19	8
A60BFP42	Painted steel	56.00 x 38.00	1422 x 965	11 ga.	4	0.84	21	10
A60BFP42G	Conductive steel	56.00 x 38.00	1422 x 965	11 ga.	4	0.84	21	10
A60P48	Painted steel	56.00 x 44.00	1422 x 1118	11 ga.	4	0.84	21	10
A60P48G	Conductive steel	56.00 x 44.00	1422 x 1118	11 ga.	4	0.84	21	10
A60P60	Painted steel	56.00 x 56.00	1422 x 1422	11 ga.	4	0.84	21	10
A60P60G	Conductive steel	56.00 x 56.00	1422 x 1422	11 ga.	4	0.84	21	10
A72P36	Painted steel	69.00 x 33.00	1753 x 838	12 ga.	4	0.75	19	8
A72P36G	Conductive steel	69.00 x 33.00	1753 x 838	12 ga.	4	0.75	19	8
A72P60	Painted steel	68.00 x 56.00	1727 x 1422	11 ga.	4	0.84	21	10
A72P60B	Painted steel	68.00 x 56.00	1727 x 1422	11 ga.	4	0.84	21	10
A72P60G	Conductive steel	68.00 x 56.00	1727 x 1422	11 ga.	4	0.84	21	10
A72P60BG	Conductive steel	68.00 x 56.00	1727 x 1422	11 ga.	4	0.84	21	10
A72P72	Painted steel	68.00 x 68.00	1727 x 1727	11 ga.	4	0.84	21	10
A72P72B	Painted steel	68.00 x 68.00	1727 x 1727	11 ga.	4	0.84	21	10
A72P72G	Conductive steel	68.00 x 68.00	1727 x 1727	11 ga.	4	0.84	21	10
A72P72BG	Conductive steel	68.00 x 68.00	1727 x 1727	11 ga.	4	0.84	21	10



J. Boxes

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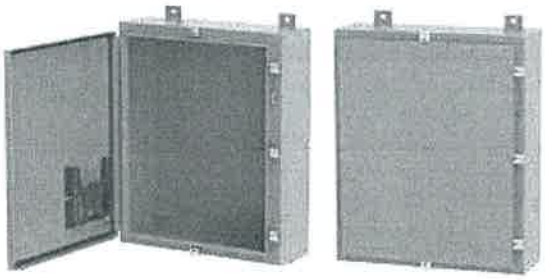
CONTINUOUS HINGE WITH CLAMPS, TYPE 4



INDUSTRY STANDARDS

UL 508A Listed; Type 4, 12, 13; File No. E61997
cUL Listed per CSA C22.2 No. 94; Type 4, 12, 13; File No. E61997

NEMA/EEMAC Type 3, 4, 12, and 13
CSA, File No. 42186: Type 4 and 12
IEC 60529, IP66

APPLICATION

These single-door enclosures feature a hinged door with clamps on three sides to create a secure seal in indoor or outdoor environments. The gray polyester powder finish inside and out provides enhanced corrosion protection in outdoor applications.

SPECIFICATIONS

- 16 or 14 gauge steel
- Seams continuously welded and ground smooth
- External welded-on mounting brackets for easy installation
- Formed external flanges around all sides of enclosure opening
- Stainless steel screw-down clamps on three sides of door
- Removable heavy gauge stainless steel continuous hinge pin
- Removable door with continuous hinge for strength and ruggedness
- Hasp and staple for padlocking
- Data pocket is high-impact thermoplastic
- Collar studs for mounting optional panels
- Bonding provision on door
- Seamless foam-in-place gasket

FINISH

ANSI 61 gray polyester powder paint inside and out

ACCESSORIES

Panels for Type 3R, 4, 4X, 12 and 13 Enclosures
Industrial Corrosion Inhibitors
Fast-Operating Clamp Assembly
PANELITE Enclosure Lights
Steel and Stainless Steel Window Kits
HOL-SEALERS Hole Seals
TFP Side-Mount Fans
HF Side-Mount Filter Fans

MODIFICATION AND CUSTOMIZATION

Hoffman excels at modifying and customizing products to your specifications. Contact your local Hoffman sales office or distributor for complete information.

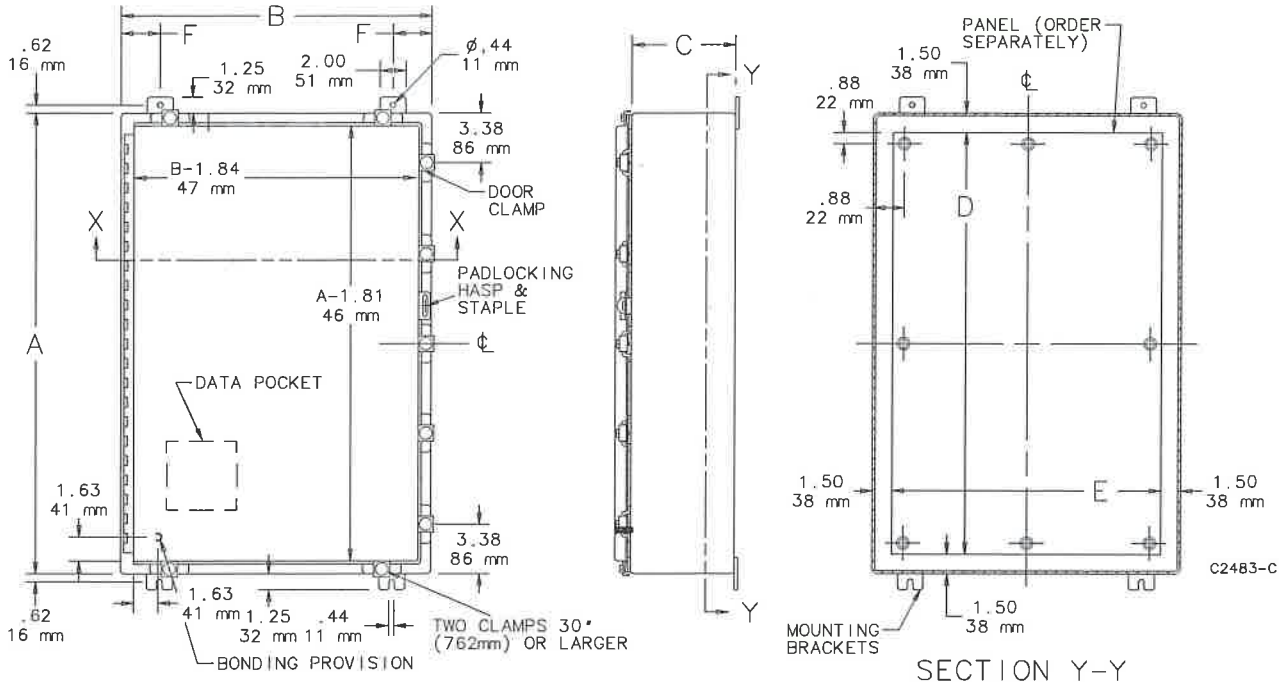
BULLETIN: A4

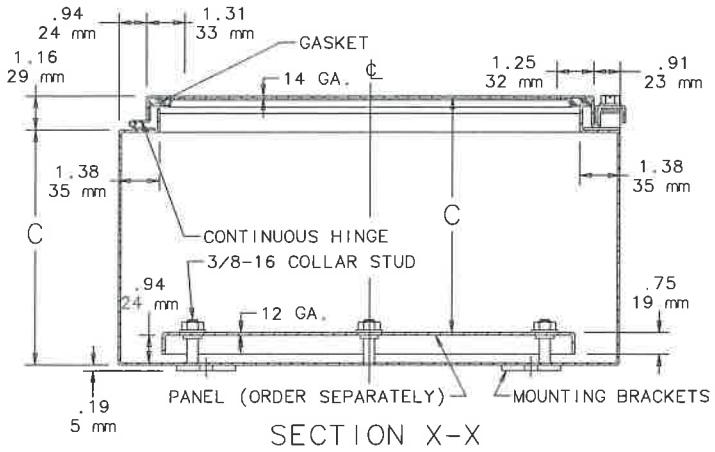
Standard Product

Catalog Number	AxBxC in.	AxBxC mm	Body Gauge	Panel	Conductive Panel	Panel Size D x E (in.)	Panel Size D x E (mm)	F (in.)	F (mm)	Number of Clamps	Data Pocket
A16H12ALP	16.00 x 12.00 x 6.00	406 x 305 x 152	16	A16P12	A16P12G	13.00 x 9.00	330 x 229	1.25	32	4	Small
A16H16ALP	16.00 x 16.00 x 6.00	406 x 406 x 152	16	A16P16	A16P16G	13.00 x 13.00	330 x 330	3.00	76	4	Small
A16H20ALP	16.00 x 20.00 x 6.00	406 x 508 x 152	16	A20P16	A20P16G	17.00 x 13.00	432 x 330	3.00	76	4	Small
A20H16ALP	20.00 x 16.00 x 6.00	508 x 406 x 152	16	A20P16	A20P16G	17.00 x 13.00	432 x 330	3.00	76	4	Small
A20H20ALP	20.00 x 20.00 x 6.00	508 x 508 x 152	16	A20P20	A20P20G	17.00 x 17.00	432 x 432	3.00	76	4	Small
A24H12ALP	24.00 x 12.00 x 6.00	610 x 305 x 152	16	A12P24	A12P24G	9.00 x 21.00	229 x 533	1.25	32	5	Small
A24H16ALP	24.00 x 16.00 x 6.00	610 x 406 x 152	16	A24P16	A24P16G	21.00 x 13.00	533 x 330	3.00	76	5	Small
A24H20ALP	24.00 x 20.00 x 6.00	610 x 508 x 152	16	A24P20	A24P20G	21.00 x 17.00	533 x 432	3.00	76	5	Small
A24H24ALP	24.00 x 24.00 x 6.00	610 x 610 x 152	16	A24P24	A24P24G	21.00 x 21.00	533 x 533	3.00	76	5	Small
A30H20ALP	30.00 x 20.00 x 6.00	762 x 508 x 152	14	A30P20	A30P20G	27.00 x 17.00	686 x 432	3.00	76	5	Small
A30H24ALP	30.00 x 24.00 x 6.00	762 x 610 x 152	14	A30P24	A30P24G	27.00 x 21.00	686 x 533	3.00	76	5	Large
A36H24ALP	36.00 x 24.00 x 6.00	914 x 610 x 152	14	A36P24	A36P24G	33.00 x 21.00	838 x 533	3.00	76	5	Large
A16H12BLP	16.00 x 12.00 x 8.00	406 x 305 x 203	16	A16P12	A16P12G	13.00 x 9.00	330 x 229	1.25	32	4	Small
A20H16BLP	20.00 x 16.00 x 8.00	508 x 406 x 203	16	A20P16	A20P16G	17.00 x 13.00	432 x 330	3.00	76	4	Small
A20H20BLP	20.00 x 20.00 x 8.00	508 x 508 x 203	16	A20P20	A20P20G	17.00 x 17.00	432 x 432	3.00	76	4	Small
A20H24BLP	20.00 x 24.00 x 8.00	508 x 610 x 203	16	A24P20	A24P20G	21.00 x 17.00	533 x 432	3.00	76	4	Small
A24H20BLP	24.00 x 20.00 x 8.00	610 x 508 x 203	16	A24P20	A24P20G	21.00 x 17.00	533 x 432	3.00	76	5	Small
A24H24BLP	24.00 x 24.00 x 8.00	610 x 610 x 203	16	A24P24	A24P24G	21.00 x 21.00	533 x 533	3.00	76	5	Small
A24H30BLP	24.00 x 30.00 x 8.00	610 x 762 x 203	14	A30P24	A30P24G	27.00 x 21.00	686 x 533	3.00	76	7	Small
A30H20BLP	30.00 x 20.00 x 8.00	762 x 508 x 203	14	A30P20	A30P20G	27.00 x 17.00	686 x 432	3.00	76	5	Small
A30H24BLP	30.00 x 24.00 x 8.00	762 x 610 x 203	14	A30P24	A30P24G	27.00 x 21.00	686 x 533	3.00	76	5	Large
A30H30BLP	30.00 x 30.00 x 8.00	762 x 762 x 203	14	A30P30	A30P30G	27.00 x 27.00	686 x 686	3.00	76	7	Large
A36H24BLP	36.00 x 24.00 x 8.00	914 x 610 x 203	14	A36P24	A36P24G	33.00 x 21.00	838 x 533	3.00	76	5	Large
A36H30BLP	36.00 x 30.00 x 8.00	914 x 762 x 203	14	A36P30	A36P30G	33.00 x 27.00	838 x 686	3.00	76	7	Large
A42H30BLP	42.00 x 30.00 x 8.00	1067 x 762 x 203	14	A42P30	A42P30G	39.00 x 27.00	991 x 686	3.00	76	8	Small
A42H36BLP	42.00 x 36.00 x 8.00	1067 x 914 x 203	14	A42P36	A42P36G	39.00 x 33.00	991 x 838	3.00	76	8	Large
A48H36BLP	48.00 x 36.00 x 8.00	1219 x 914 x 203	14	A48P36	A48P36G	45.00 x 33.00	1143 x 838	3.00	76	8	Large
A60H36BLP	60.00 x 36.00 x 8.00	1524 x 914 x 203	14	A60P36	A60P36G	57.00 x 33.00	1448 x 838	3.00	76	9	Large
A20H16CLP	20.00 x 16.00 x 10.00	508 x 406 x 254	14	A20P16	A20P16G	17.00 x 13.00	432 x 330	3.00	76	4	Small
A24H20CLP	24.00 x 20.00 x 10.00	610 x 508 x 254	14	A24P20	A24P20G	21.00 x 17.00	533 x 432	3.00	76	5	Small
A30H24CLP	30.00 x 24.00 x 10.00	762 x 610 x 254	14	A30P24	A30P24G	27.00 x 21.00	686 x 533	3.00	76	5	Large
A36H30CLP	36.00 x 30.00 x 10.00	914 x 762 x 254	14	A36P30	A36P30G	33.00 x 27.00	838 x 686	3.00	76	7	Large
A48H30CLP	48.00 x 30.00 x 10.00	1219 x 762 x 254	14	A48P30	A48P30G	45.00 x 27.00	1143 x 686	3.00	76	8	Small
A48H36CLP	48.00 x 36.00 x 10.00	1219 x 914 x 254	14	A48P36	A48P36G	45.00 x 33.00	1143 x 838	3.00	76	8	Large
A60H36CLP	60.00 x 36.00 x 10.00	1524 x 914 x 254	14	A60P36	A60P36G	57.00 x 33.00	1448 x 838	3.00	76	9	Large
A30H24DLP	30.00 x 24.00 x 12.00	762 x 610 x 305	14	A30P24	A30P24G	27.00 x 21.00	686 x 533	3.00	76	5	Large
A36H30DLP	36.00 x 30.00 x 12.00	914 x 762 x 305	14	A36P30	A36P30G	33.00 x 27.00	838 x 686	3.00	76	7	Large
A48H36DLP	48.00 x 36.00 x 12.00	1219 x 914 x 305	14	A48P36	A48P36G	45.00 x 33.00	1143 x 838	3.00	76	8	Large

Catalog Number	AxBxC in.	AxBxC mm	Body Gauge	Panel	Conductive Panel	Panel Size D x E (in.)	Panel Size D x E (mm)	F (in.)	F (mm)	Number of Clamps	Data Pocket
A36H30FLP	36.00 x 30.00 x 16.00	914 x 762 x 406	14	A36P30	A36P30G	33.00 x 27.00	838 x 686	3.00	76	7	Large
A48H36FLP	48.00 x 36.00 x 16.00	1219 x 914 x 406	14	48P36	A48P36G	45.00 x 33.00	1143 x 838	3.00	76	8	Large
A60H36FLP	60.00 x 36.00 x 16.00	1524 x 914 x 406	14	A60P36	A60P36G	57.00 x 33.00	1448 x 838	3.00	76	9	Large

Purchase panels separately. Optional stainless steel, conductive, composite and aluminum panels are available for most sizes.





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PANELS FOR TYPE 3R, 4, 4X, 12 AND 13 ENCLOSURES

Steel panels are 11 or 12 gauge, finished with white polyester powder paint or a conductive, corrosion-resistant coating. Larger panels have flanges on two or four sides. Some larger steel panels are 11 gauge and include extra holes for panel lifting. Aluminum panels are 5052-H32 aluminum alloy. Larger panels have flanges on four sides. Aluminum panels are protected on one side with a plastic film. Stainless steel panels are Type 316 stainless steel. Panel mounting hardware is furnished with all enclosures which accept these panels.

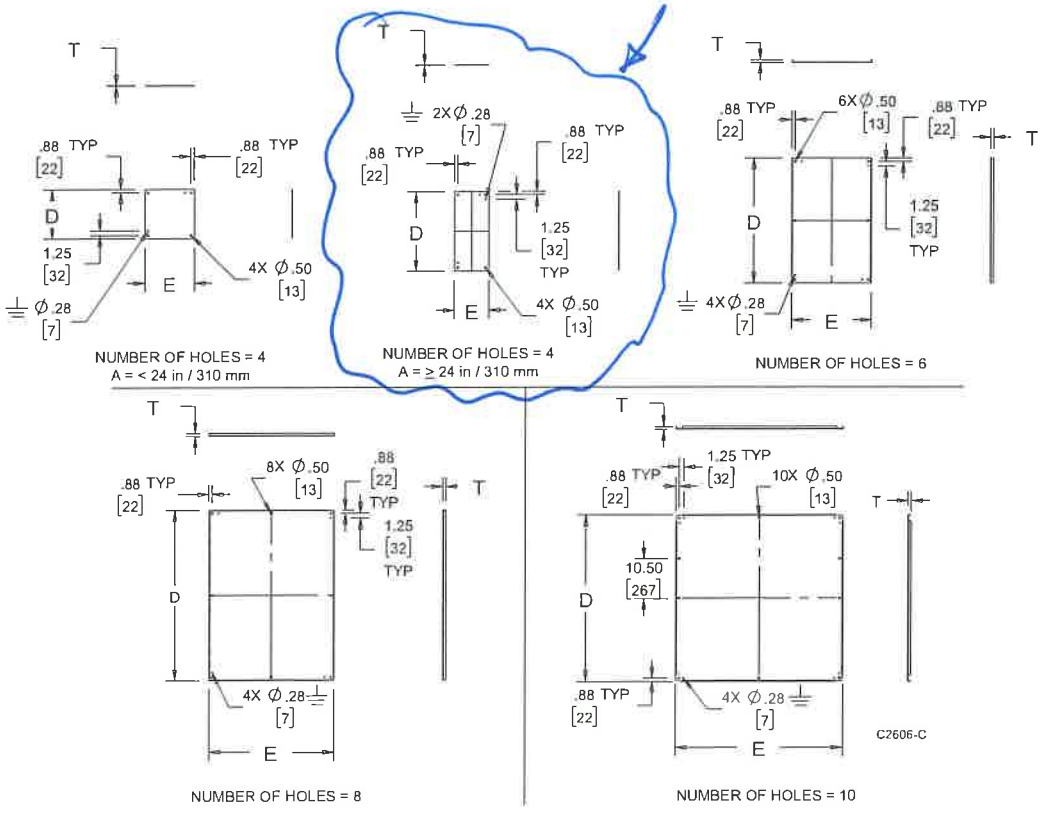
BULLETIN: PNLFS, PNLJ, PNLWM

Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	Panel Gauge or Thickness	Edge Flanges	T (in.)	T (mm)	Number of Holes
A12P24	Painted steel	9.00 x 21.00	229 x 533	12 ga.	0	–	–	4
A12P24G	Conductive steel	9.00 x 21.00	229 x 533	12 ga.	0	–	–	4
A16P12	Painted steel	13.00 x 9.00	330 x 229	12 ga.	0	–	–	4
A16P12G	Conductive steel	13.00 x 9.00	330 x 229	12 ga.	0	–	–	4
A16P12SS6	Stainless Steel	13.00 x 9.00	330 x 229	12 ga.	0	–	–	4
A16P12AL	Aluminum	13.00 x 9.00	330 x 229	0.10 in./3 mm	0	–	–	4
A16P16	Painted steel	13.00 x 13.00	330 x 330	12 ga.	0	–	–	4
A16P16G	Conductive steel	13.00 x 13.00	330 x 330	12 ga.	0	–	–	4
A16P16SS6	Stainless Steel	13.00 x 13.00	330 x 330	12 ga.	0	–	–	4
A16P16AL	Aluminum	13.00 x 13.00	330 x 330	0.10 in./3 mm	0	–	–	4
A18P18	Painted steel	15.00 x 15.00	381 x 381	12 ga.	0	–	–	4
A18P18G	Conductive steel	15.00 x 15.00	381 x 381	12 ga.	0	–	–	4
A20P12	Painted steel	17.00 x 9.00	432 x 229	12 ga.	0	–	–	4
A20P12G	Conductive steel	17.00 x 9.00	432 x 229	12 ga.	0	–	–	4
A20P16	Painted steel	17.00 x 13.00	432 x 330	12 ga.	0	–	–	4
A20P16G	Conductive steel	17.00 x 13.00	432 x 330	12 ga.	0	–	–	4
A20P16SS6	Stainless Steel	17.00 x 13.00	432 x 330	12 ga.	0	–	–	4
A20P16AL	Aluminum	17.00 x 13.00	432 x 330	0.10 in./3 mm	0	–	–	4
A20P20	Painted steel	17.00 x 17.00	432 x 432	12 ga.	0	–	–	4
A20P20G	Conductive steel	17.00 x 17.00	432 x 432	12 ga.	0	–	–	4
A20P20SS6	Stainless steel	17.00 x 17.00	432 x 432	12 ga.	0	–	–	4
A20P20AL	Aluminum	17.00 x 17.00	432 x 432	0.10 in./3 mm	0	–	–	4
A24P16	Painted steel	21.00 x 13.00	533 x 330	12 ga.	0	–	–	4
A24P16G	Conductive steel	21.00 x 13.00	533 x 330	12 ga.	0	–	–	4
A24P16SS6	Stainless Steel	21.00 x 13.00	533 x 330	12 ga.	0	–	–	4
A24P20	Painted steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20G	Conductive steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20SS6	Stainless Steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20AL	Aluminum	21.00 x 17.00	533 x 432	0.10 in./3 mm	4	0.75	19	4
A24P24	Painted steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24G	Conductive steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24SS6	Stainless Steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24AL	Aluminum	21.00 x 21.00	533 x 533	0.10 in./3 mm	2	0.75	19	4
A30P16	Painted steel	27.00 x 13.00	686 x 330	12 ga.	2	0.75	19	4
A30P16G	Conductive steel	33.00 x 27.00	838 x 686	12 ga.	2	0.75	19	4
A30P20	Painted steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P20G	Conductive steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P20SS6	Stainless Steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P24	Painted steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24G	Conductive steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24SS6	Stainless Steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24AL	Aluminum	27.00 x 21.00	686 x 533	0.10 in./3 mm	2	0.75	19	4
A30P30	Painted steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A30P30G	Conductive steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A30P30SS6	Stainless Steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A36P16	Painted steel	33.00 X 13.00	838 X 330	12 ga.	2	0.75	19	4
A36P16G	Conductive steel	33.00 x 13.00	838 x 330	12 ga.	2	0.75	19	4
A36P24	Painted steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24G	Conductive steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24SS6	Stainless Steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24AL	Aluminum	33.00 x 21.00	838 x 533	0.10 in./3 mm	2	0.75	19	6
A36P30	Painted steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30G	Conductive steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30SS6	Stainless Steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30AL	Aluminum	33.00 x 27.00	838 x 686	0.10 in./3 mm	4	0.75	19	6
A36P36	Painted steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A36P36G	Conductive steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A36P36SS6	Stainless Steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A40P24	Painted steel	37.00 x 21.00	940 x 533	12 ga.	4	0.75	19	6
A40P24G	Conductive steel	37.00 x 21.00	940 x 533	12 ga.	4	0.75	19	6
A40P30	Painted steel	37.00 x 29.00	940 x 737	12 ga.	4	0.75	19	4
A40P30G	Conductive steel	37.00 x 29.00	940 x 737	12 ga.	4	0.75	19	4
A42P24	Painted steel	39.00 x 21.00	991 x 533	12 ga.	2	0.75	19	6
A42P24G	Conductive steel	39.00 x 21.00	991 x 533	12 ga.	2	0.75	19	6
A42P30	Painted steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6

JUNCTION BOXES

nVent | HOFFMAN

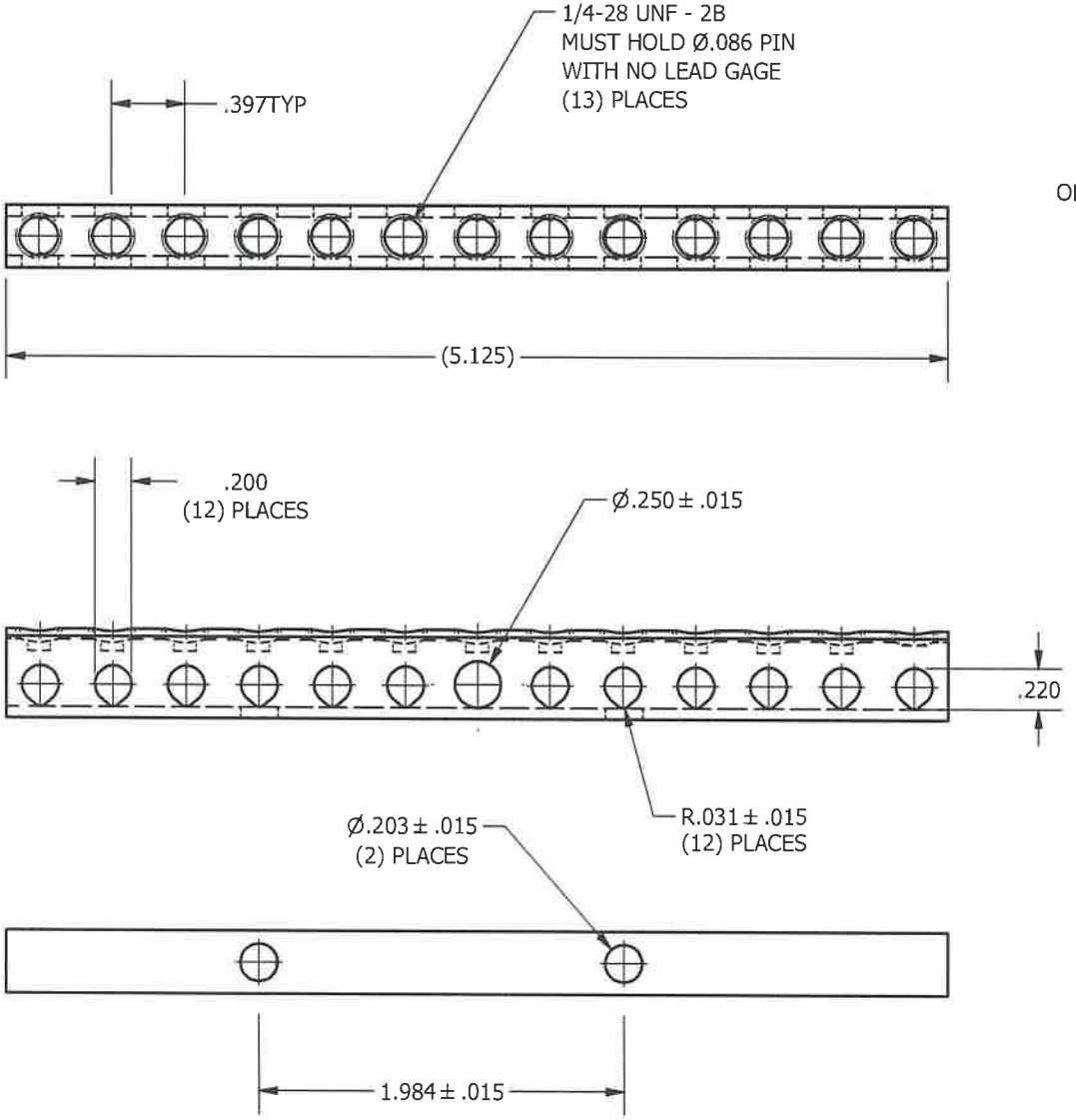
Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	Panel Gauge or Thickness	Edge Flanges	T (in.)	T (mm)	Number of Holes
A42P30G	Conductive steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6
A42P30SS6	Stainless Steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6
A42P36	Painted steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P36G	Conductive steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P36SS6	Stainless Steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P42	Painted steel	39.00 x 39.00	991 x 991	12 ga.	4	0.75	19	8
A42P42G	Conductive steel	39.00 x 39.00	991 x 991	12 ga.	4	0.75	19	8
A48P24	Painted steel	45.00 x 21.00	1143 x 533	12 ga.	2	0.75	19	6
A48P24G	Conductive steel	45.00 x 21.00	1143 x 533	12 ga.	2	0.75	19	6
A48P30	Painted steel	45.00 x 27.00	1143 x 686	12 ga.	4	0.75	19	6
A48P30G	Conductive steel	45.00 x 27.00	1143 x 686	12 ga.	4	0.75	19	6
A48P36	Painted steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36G	Conductive steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36SS6	Stainless Steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36AL	Aluminum	45.00 x 33.00	1143 x 838	0.10 in./3 mm	4	0.75	19	8
A48P42	Painted steel	45.00 x 39.00	1143 x 991	12 ga.	4	0.75	19	8
A48P42G	Conductive steel	45.00 x 39.00	1143 x 991	12 ga.	4	0.75	19	8
A48P48	Painted steel	44.00 x 44.00	1118 x 1118	11 ga.	4	0.84	21	10
A48P48G	Conductive steel	44.00 x 44.00	1118 x 1118	11 ga.	4	0.84	21	10
A54P42	Painted steel	50.00 x 38.00	1270 x 965	11 ga.	4	0.84	21	10
A54P42G	Conductive steel	50.00 x 38.00	1270 x 965	11 ga.	4	0.84	21	10
A60P24	Painted steel	57.00 x 21.00	1448 x 533	12 ga.	4	0.75	19	6
A60P24G	Conductive steel	57.00 x 21.00	1448 x 533	12 ga.	4	0.75	19	6
A60P30	Painted steel	57.00 x 27.00	1448 x 686	12 ga.	4	0.75	19	6
A60P30G	Conductive steel	57.00 x 27.00	1448 x 686	12 ga.	4	0.75	19	6
A60P36	Painted steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36G	Conductive steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36SS6	Stainless Steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36AL	Aluminum	57.00 x 33.00	1448 x 838	0.10 in./3 mm	4	0.75	19	8
A60BFP42	Painted steel	56.00 x 38.00	1422 x 965	11 ga.	4	0.84	21	10
A60BFP42G	Conductive steel	56.00 x 38.00	1422 x 965	11 ga.	4	0.84	21	10
A60P48	Painted steel	56.00 x 44.00	1422 x 1118	11 ga.	4	0.84	21	10
A60P48G	Conductive steel	56.00 x 44.00	1422 x 1118	11 ga.	4	0.84	21	10
A60P60	Painted steel	56.00 x 56.00	1422 x 1422	11 ga.	4	0.84	21	10
A60P60G	Conductive steel	56.00 x 56.00	1422 x 1422	11 ga.	4	0.84	21	10
A72P36	Painted steel	69.00 x 33.00	1753 x 838	12 ga.	4	0.75	19	8
A72P36G	Conductive steel	69.00 x 33.00	1753 x 838	12 ga.	4	0.75	19	8
A72P60	Painted steel	68.00 x 56.00	1727 x 1422	11 ga.	4	0.84	21	10
A72P60B	Painted steel	68.00 x 56.00	1727 x 1422	11 ga.	4	0.84	21	10
A72P60G	Conductive steel	68.00 x 56.00	1727 x 1422	11 ga.	4	0.84	21	10
A72P60BG	Conductive steel	68.00 x 56.00	1727 x 1422	11 ga.	4	0.84	21	10
A72P72	Painted steel	68.00 x 68.00	1727 x 1727	11 ga.	4	0.84	21	10
A72P72B	Painted steel	68.00 x 68.00	1727 x 1727	11 ga.	4	0.84	21	10
A72P72G	Conductive steel	68.00 x 68.00	1727 x 1727	11 ga.	4	0.84	21	10
A72P72BG	Conductive steel	68.00 x 68.00	1727 x 1727	11 ga.	4	0.84	21	10

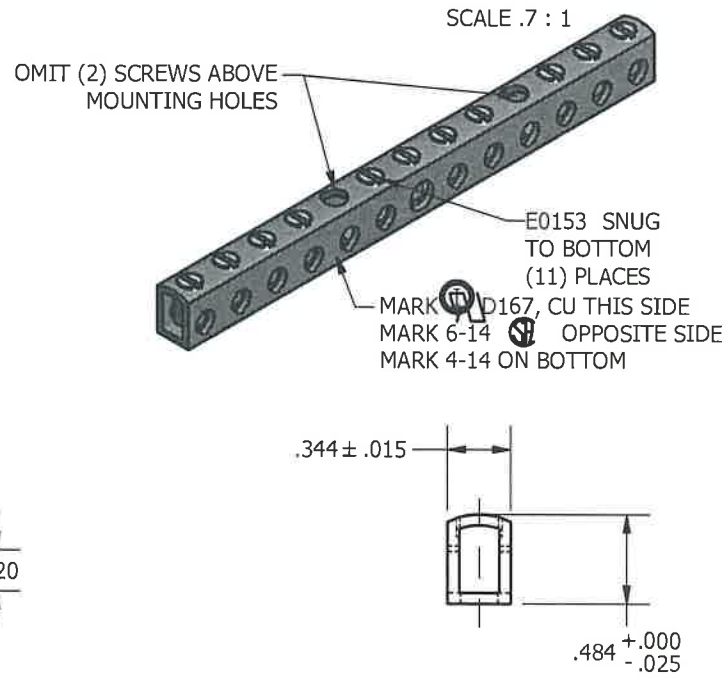


SCREW: E0153	MATERIAL:COPPER, L021925	TOLERANCES-UNLESS OTHERWISE SPECIFIED 2 PL. DEC. ±.010 TRUE C.L. ±.015 3 PL. DEC. ±.005 ANGLES ±1	DWG. NO. N0013	ILSCO CORP.
CAT. NO.:D167-10	PLATING: BRIGHT DIP			
MASS:.108 LBS.	MARKING:	DRAWN BY: CLH / SCALE: 1:1	SHEET 1 OF 1	
SURFACE AREA: 12.899 IN²		DATE: 8/14/2007 / SIZE: A		
STUFFER SHT: FORM 1	CELL:CBP			

REV.	DESCRIPTION
R	

Cat #: D167-10

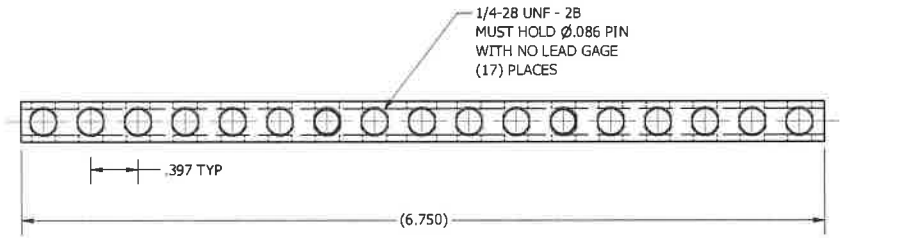


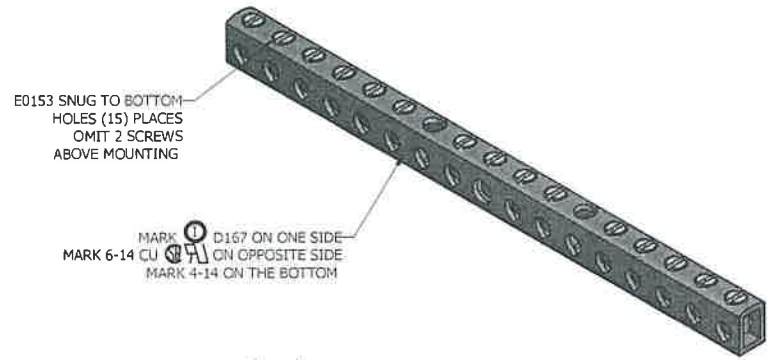


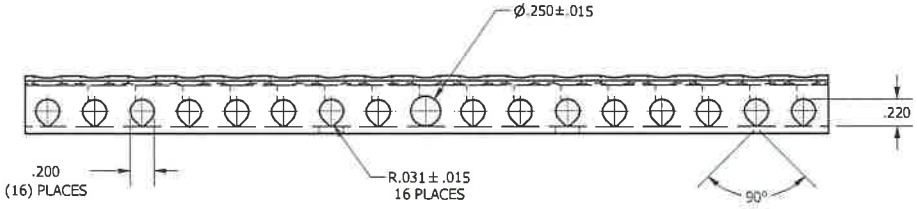
SCREW: E01S3	MATERIAL: COPPER, L021925	CELL: CBP	TOLERANCES-UNLESS OTHERWISE SPECIFIED 2 PL. DEC. ±.010 TRUE C.L. ±.015 3 PL. DEC. ±.005 ANGLES ±1	DWG. NO. N0017	ILSCO CORP.
CAT. NO.: D167-14	PLATING: BRIGHT DIP	STUFFER SHT.: FORM 1		SHEET 1 OF 1	
MASS: .143 LBS.	MARKING: SEE DRAWING		DRAWN BY: CLH	SCALE: 1:1	
SURFACE AREA: 16.979 IN²			DATE: 8/24/2007	SIZE: B	

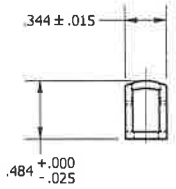
REV.	DESCRIPTION
S	

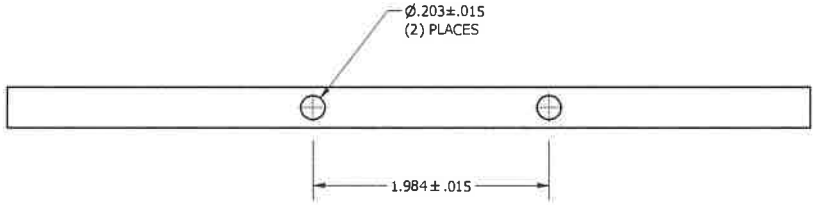
Cat #: D167-14







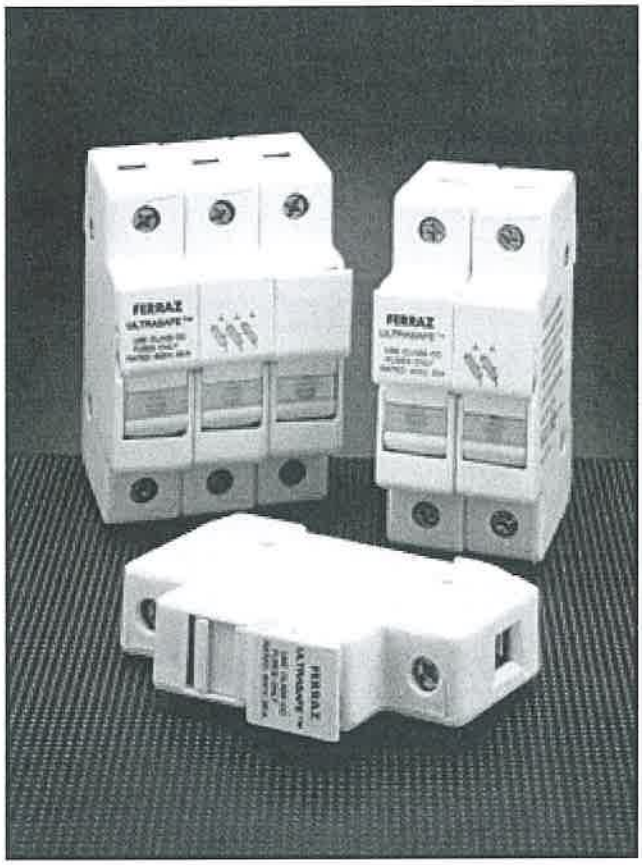




"FS"

Ferraz Shawmut

USCC & USM 24, 48 & 600 VOLT / ULTRASAFE™ FUSEHOLDERS



ULTRASAFE MODULAR FUSE HOLDERS

Ferraz Shawmut ULTRASAFE™ modular 24, 48 and 600 volt Fuse Holders introduce a new level of safety for Class CC (USCC) and Midget 1-1/2" x 13/32" (USM) as well as DC rated fuses up to 30 amperes. ULTRASAFE holders qualify as "finger safe" under IEC and DIN standards to an IP2 grade of protection, including fuse changing (with the flick of a finger). ULTRASAFE holders are available in 1, 2, 3 or 4 poles, with or without blown-fuse indicators in each pole. AC indicators are orange and DC are red. The multi-pole units can also be made up by ordering pin-tie handles for field assembly. ULTRASAFE holders save up to 15% mounting space and any combination can be snapped onto 35mm DIN rail for extra savings in panel building time. ULTRASAFE holders with Class CC fuses chosen for Type "2" protection give one of the safest protection packages in the industry. Ultrasafe body material is tough and durable polyamide, with exceptional insulating properties.

HIGHLIGHTS:

- Finger Safe
- Optional Indicator Lights
- DIN Rail Mount
- Compact Footprint
- Quick, Easy Fuse Change

APPLICATIONS:

- All circuits up to 600 volts for motors, control circuits, transformers, etc.
- Non-load disconnect
- 12, 24 and 48 volt DC circuits

Ratings

- 600VAC, 30A
  Min. voltage to operate indicator light:
  90VAC
  [Less than 0.7 mA leakage current at 600V]
- 24VDC, 30A
- 48VDC, 30A
- Withstand rating:
  Class CC 200kA I.R.
  Midget Fuse 100kA I.R.

Approvals

- All Ultrasafe Fuse Holders meet the requirements of UL512
- UL Listed
  Class CC
  Guide IZLT, File E52283
- UL Recognized
  Component
  Midget
  Guide IZLT2, File E52283
- CSA Certified
  Class CC & Midget
  C22.2, Class 6225
  File 32169

RECOMMENDED FUSE USAGE

USCC ..... .use with ATDR*, ~~ATMR, ATQR~~

USM ..... .use with ~~ATQ, ATM*, A6Y-2B, A25Z-2,~~ TRM, ~~OTM, A13X-2, GFN, GGU, A60Q-2~~

*** Recommended for DC Applications**

"FS"

Ferraz Shawmut

USCC & USM 24, 48 & 600 VOLT / ULTRASAFE™ FUSEHOLDERS

For use with Class CC Fuses

CATALOG NO.	DESCRIPTION
USCC1	1 pole
USCC1I	1 pole with indicator
USCC2	2 pole
USCC2I	2 pole with indicators
USCC3	3 pole
USCC3I	3 pole with indicators
USCC3IN	3 pole with indicators and a 4th neutral pole
USCC3N	3 pole with a 4th neutral pole
USCC4	4 pole
USCC4I	4 pole with indicators

FSLI

For use with Midget (1-1/2" x 13/32") Fuses

USM1	1 pole
USM1I	1 pole with indicator
USM2	2 pole
USM2I	2 pole with indicators
USM3	3 pole
USM3I	3 pole with indicators
USM3IN	3 pole with indicators and a 4th neutral pole
USM3N	3 pole with a 4th neutral pole
USM4	4 pole
USM4I	4 pole with indicators

FSILI → FSBLI

Neutral Link Pole

USN	1 Pole with Integral Neutral Link

Accessories

USPTH2	Pin-tie handle for 2 poles
USPTH3	Pin-tie handle for 3 poles
USPTH4	Pin-tie handle for 4 poles

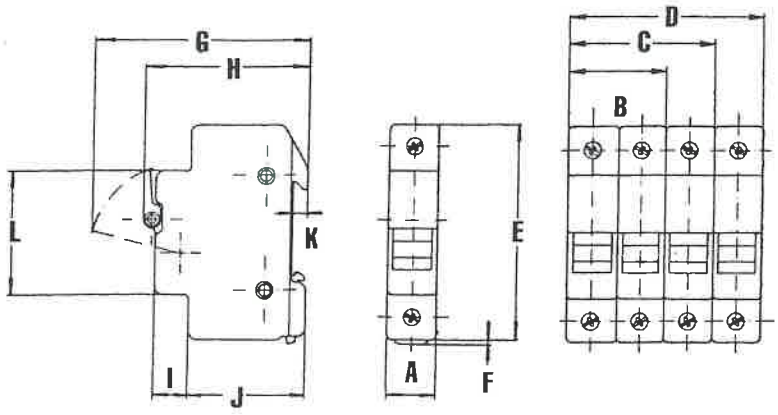
For use with DC rated Class CC & Midget Fuses

PART NUMBER	INDICATOR TYPE	OPERATING VOLTAGE	LEAKAGE CURRENT
USM1I-DC24	LED	12 to 24 VDC	10mA max.(@24vdc)
USM1I-DC24P	LED	20 to 24 VDC	1mA max.(@24vdc)
USM1I-DC48	LED	35 to 48 VDC	10mA max.(@48vdc)
USCC1I-DC24	LED	12 to 24 VDC	10mA max.(@24vdc)
USCC1I-DC48	LED	35 to 48 VDC	10mA max.(@48vdc)

H

Dimensions

DIMENSION	mm	In
A	17.5	0.69
B	35.0	1.38
C	52.5	2.07
D	70.0	2.76
E	78.0	3.07
F	2.5	0.10
G	78.0	3.07
H	59.0	2.32
I	12.5	0.49
J	42.5	1.67
K	5.0	0.20
L	45.0	1.77



Terminal screws: Phillips/slot head
Suggested screw torque: 14.75 in-lbs.
Connector type: Pressure plate
Wire range: #6 to #14 (solid/stranded Cu)
Load-break disconnect: No

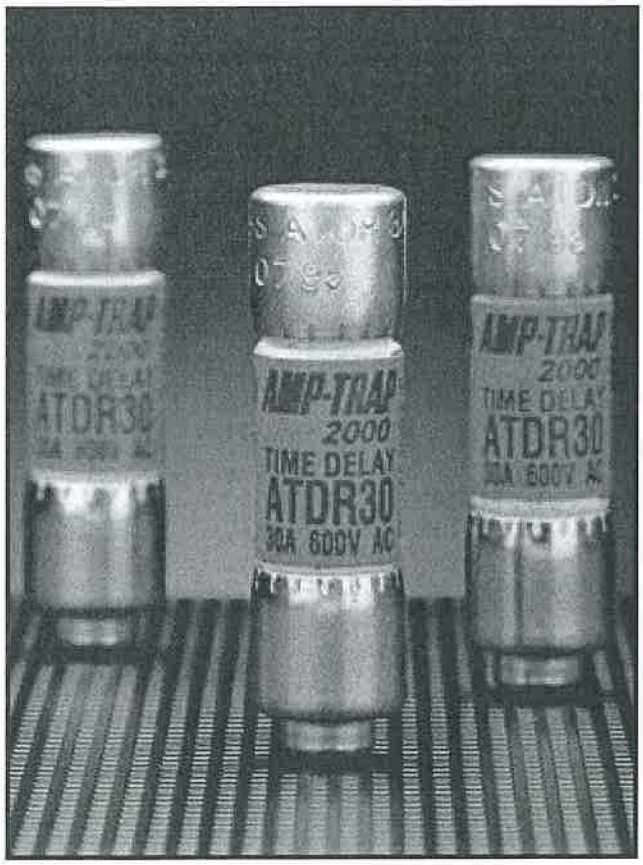
FSL1

AMP-TRAP 2000®

ATDR

Ferraz Shawmut

TIME DELAY / CLASS CC



THE BEST PROTECTION FOR TODAY'S SMALL MOTORS.

Amp-trap 2000® ATDR small-dimension fuses can provide IEC Type 2 "no damage" protection to your facility's increasingly sensitive branch circuit components and small motors – minimizing the risk of fault-related damage. ATDR Class CC fuses deliver the best time delay characteristics in their class with excellent cycling ability for small motor loads.

A

Features/Benefits

- **Time delay** for motor starting inrush currents *without* nuisance opening
- **Highly current limiting** for low peak let-thru current
- **Improved cycling ability** for frequent motor starts/stops without nuisance fuse opening
- **Rejection-style design** prevents replacement errors (when used with recommended fuse blocks)
- **High-visibility orange label** ensures instant recognition, simplifies replacement
- **Metal-embossed date and catalog number** for traceability and lasting identification
- **Fiberglass body** provides dimensional stability in harsh industrial settings
- **High-grade silica filler** ensures fast arc quenching and optimum current limitation

HIGHLIGHTS:

- Time Delay
- Best Choice for Small Motor Protection
- Highly Current-Limiting
- AC & DC Rated

APPLICATIONS:

- Small Motors
- Contactors
- Lighting, Heating & General Loads
- Branch Circuit Protector

Ratings

- **AC:** 1/4 to 30A 600VAC, 200kA I.R.
- **DC:** 1/4 to 30A 300VDC, 100kA I.R.

Approvals

- UL Listed to Standard 248-4
- CSA Certified to Standard C22.2 No. 248.4
- DC Listed to UL Standard 198L

FSL1

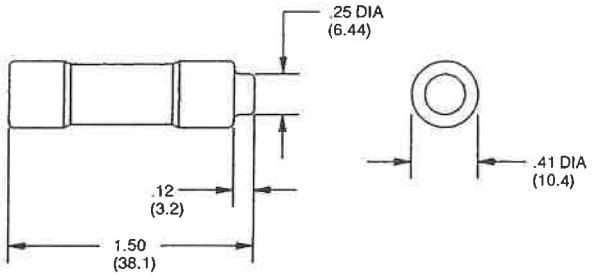
TIME DELAY / CLASS CC FUSES

ATDR

Standard Fuse Ampere Ratings, Catalog Numbers

AMPERE RATING	CATALOG NUMBER	AMPERE RATING	CATALOG NUMBER	AMPERE RATING	CATALOG NUMBER	AMPERE RATING	CATALOG NUMBER	AMPERE RATING	CATALOG NUMBER
1/4	ATDR1/4	1-1/2	ATDR1-1/2	3	ATDR3	6	ATDR6	12	ATDR12
1/2	ATDR1/2	1-6/10	ATDR1-6/10	3-2/10	ATDR3-2/10	6-1/4	ATDR6-1/4	15	ATDR15
8/10	ATDR8/10	1-8/10	ATDR1-8/10	3-1/2	ATDR3-1/2	7	ATDR7	17-1/2	ATDR17-1/2
1	ATDR1	2	ATDR2	4	ATDR4	7-1/2	ATDR7-1/2	20	ATDR20
1-1/8	ATDR1-1/8	2-1/4	ATDR2-1/4	4-1/2	ATDR4-1/2	8	ATDR8	25	ATDR25
1-1/4	ATDR1-1/4	2-1/2	ATDR2-1/2	5	ATDR5	9	ATDR9	30	ATDR30
1-4/10	ATDR1-4/10	2-8/10	ATDR2-8/10	5-6/10	ATDR5-6/10	10	ATDR10		

Dimensions



Small Motor Fuse Protection, 600 Volts AC or Less

MOTOR FULL LOAD AMPERES	ATDR RATING*	
	MINIMUM DUTY	NORMAL DUTY
.71 - .89	1-1/4	1-6/10
.90 - 1.19	1-6/10	2
1.20 - 1.34	2	2-1/2
1.35 - 1.79	2-1/2	3
1.80 - 2.25	3	4
2.26 - 2.69	4	5
2.70 - 2.90	4	6
2.91 - 3.20	5	6
3.21 - 3.75	5	7
3.76 - 4.50	6	8
4.51 - 5.34	8	10
5.35 - 5.69	10	12
5.70 - 6.70	12	12
6.71 - 7.79	12	15
7.80 - 8.88	15	17-1/2
8.89 - 11.1	17-1/2	20
11.2 - 13.3	20	25
13.4 - 15.2	25	30

* The 1996 National Electrical Code allows time-delay Class CC fuses to be sized at up to 400% (maximum) of motor FLA, if needed.

Recommended Fuse Blocks for Class CC Fuses

Number of Poles	CATALOG NUMBER			
	ULTRASAFE™ Indicating Fuse Holder	Screw Connector w/ Double Quick Connects	Pressure Plate Connector w/ Double Quick Connects	Copper Box Connector
AODER		30310R	30320R	30350R
1	USCC1I	30311R	30321R	30351R
2	USCC2I	30312R	30322R	30352R
3	USCC3I	30313R	30323R	30353R

FSILI THRU BLI

TRI-ONIC®

TRM

Ferraz Shawmut

1-1/2" X 13/32" MIDGET FUSES

Tri-onic TRM time-delay midget fuses are rated 250 volts AC and are offered in 36 ampere ratings from 1/10A to 30A. They have 12 seconds time delay at 200% rating to provide supplemental protection of small motors, small transformers and other high inrush loads, plus many other 250 volt applications. (Not for Branch Circuit Protection).

Features/Benefits

- **Numerous ratings** for a wide variety of applications
- **250VAC rating** in all sizes up to 30A
- **Time delay** for circuits with high inrush currrent
- Can be used with **ULTRASAFE™** fuse holders

C

HIGHLIGHTS:

- Time Delay
- 250 VAC Rated

APPLICATIONS:

- Small Motors
- Small Transformers
- Lighting Circuits
- Control Circuits

Ratings

- **AC:** 1/10 to 30A 250VAC, 10kA I.R.

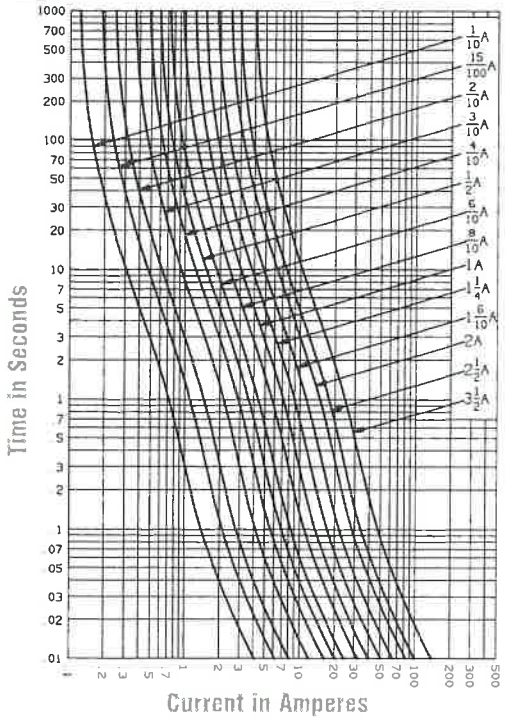
Approvals

- UL Listed to Standard 248-14
- CSA Certified to Standard C22.2 No. 248.14

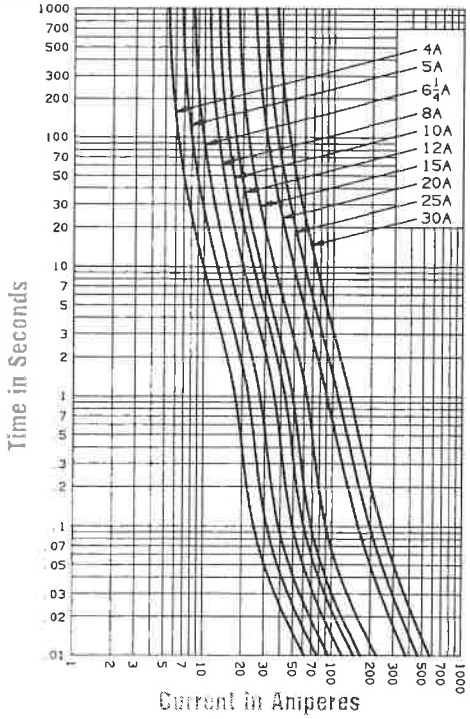
Standard Fuse Ampere Ratings, Catalog Numbers

AMPERE RATING	CATALOG NUMBER	AMPERE RATING	CATALOG NUMBER	AMPERE RATING	CATALOG NUMBER	AMPERE RATING	CATALOG NUMBER	AMPERE RATING	CATALOG NUMBER	AMPERE RATING	CATALOG NUMBER
1/10	TRM1/10	6/10	TRM6/10	1-6/10	TRM1-6/10	3	TRM3	5-6/10	TRM5-6/10	10	TRM10
15/100	TRM15/100	8/10	TRM8/10	1-8/10	TRM1-8/10	3-2/10	TRM3-2/10	6	TRM6	12	TRM12
2/10	TRM2/10	1	TRM1	2	TRM2	3-1/2	TRM3-1/2	6-1/4	TRM6-1/4	15	TRM15
3/10	TRM3/10	1-1/8	TRM1-1/8	2-1/4	TRM2-1/4	4	TRM4	7	TRM7	20	TRM20
4/10	TRM4/10	1-1/4	TRM1-1/4	2-1/2	TRM2-1/2	4-1/2	TRM4-1/2	8	TRM8	25	TRM25
1/2	TRM1/2	1-4/10	TRM1-4/10	2-8/10	TRM2-8/10	5	TRM5	9	TRM9	30	TRM30

Melting Time – Current Data 1/10 - 3-1/2 Amperes, 250 Volts AC



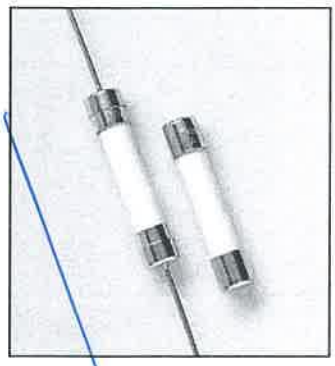
Melting Time – Current Data 4 - 30 Amperes, 250 Volts AC



FS40

Ferraz Shawmut

ELECTRONIC / GLASS FUSES



GSA / GSA-V

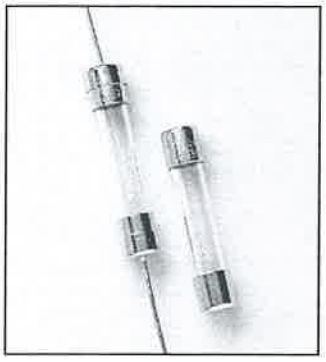
Ceramic Body
Time Delay
1/4" x 1-1/4"
1-1/2" Axial Leads Optional

1/4A through 10A, 250VAC - UL Listed, 12A through 20A UL Recognized
1/4A through 20A, 250VAC - CSA Certified
25A and 30A, 125VAC - CSA Certified, UL Recognized

Standard Fuse Ampere Ratings

CATALOG NUMBER	AXIAL LEAD CAT. NO	AMPERE RATING	VOLTS	I.R.
GSA1/100	GSA-V1/100	1/100A	250V	1
GSA1/32	GSA-V1/32	1/32A	250V	1
GSA1/16	GSA-V1/16	1/16A	250V	1
GSA1/10	GSA-V1/10	1/10A	250V	1
GSA1/8	GSA-V1/8	1/8A	250V	1
GSA15/100	GSA-V15/100	15/100A	250V	1
GSA175/1000	GSA-V175/1000	175/1000A	250V	1
GSA3/16	GSA-V3/16	3/16A	250V	1
GSA2/10	GSA-V2/10	2/10A	250V	1
GSA1/4	GSA-V1/4	1/4A	250V	2
GSA3/10	GSA-V3/10	3/10A	250V	2
GSA3/8	GSA-V3/8	3/8A	250V	2
GSA4/10	GSA-V4/10	4/10A	250V	2
GSA1/2	GSA-V1/2	1/2A	250V	2
GSA6/10	GSA-V6/10	6/10A	250V	2
GSA7/10	GSA-V7/10	7/10A	250V	2
GSA3/4	GSA-V3/4	3/4A	250V	2
GSA8/10	GSA-V8/10	8/10A	250V	2
GSA1	GSA-V1	1A	250V	2
GSA1-2/10	GSA-V1-2/10	1-2/10A	250V	2
GSA1-1/4	GSA-V1-1/4	1-1/4A	250V	2
GSA1-1/2	GSA-V1-1/2	1-1/2A	250V	2
GSA1-6/10	GSA-V1-6/10	1-6/10A	250V	2
GSA2	GSA-V2	2A	250V	2
GSA2-1/4	GSA-V2-1/4	2-1/4A	250V	2
GSA2-1/2	GSA-V2-1/2	2-1/2A	250V	2
GSA2-8/10	GSA-V2-8/10	2-8/10A	250V	2
GSA3	GSA-V3	3A	250V	2
GSA3-2/10	GSA-V3-2/10	3-2/10A	250V	2
GSA3-1/2	GSA-V3-1/2	3-1/2A	250V	2
GSA4	GSA-V4	4A	250V	3
GSA5	GSA-V5	5A	250V	3
GSA6	GSA-V6	6A	250V	4
GSA6-1/4	GSA-V6-1/4	6-1/4A	250V	3
GSA7	GSA-V7	7A	250V	3
GSA8	GSA-V8	8A	250V	3
GSA10	GSA-V10	10A	250V	3
GSA12	GSA-V12	12A	250V	3
GSA15	GSA-V15	15A	250V	3
GSA20	GSA-V20	20A	250V	3
GSA25	GSA-V25	25A	125V	5
GSA30	GSA-V30	30A	125V	5

1. 250VAC @ 35A I.R./125VAC @ 10kA I.R.
2. 250VAC @ 100A I.R./125VAC @ 10kA I.R.
3. 250VAC @ 400A I.R./125VAC @ 10kA I.R.
4. 250VAC @ 200A I.R./125VAC @ 10kA I.R.
5. 125VAC @ 400A I.R.



GDL / GDL-V

Glass Body
Time Delay
1/4" x 1-1/4"

1/100A through 8A, 250VAC - UL Listed and CSA Certified
10A through 15A, 125VAC - UL Listed and CSA Certified
20A through 30A, 32VAC - UL Recognized

Standard Fuse Ampere Ratings

CATALOG NUMBER	AXIAL LEAD CAT. NO	AMPERE RATING	VOLTS	I.R.
GDL1/100	GDL-V1/100	1/100A	250V	1
GDL1/32	GDL-V1/32	1/32A	250V	1
GDL4/100	GDL-V4/100	4/100A	250V	1
GDL1/16	GDL-V1/16	1/16A	250V	1
GDL1/10	GDL-V1/10	1/10A	250V	1
GDL1/8	GDL-V1/8	1/8A	250V	1
GDL15/100	GDL-V15/100	15/100A	250V	1
GDL175/1000	GDL-V175/1000	175/1000A	250V	1
GDL3/16	GDL-V3/16	3/16A	250V	1
GDL2/10	GDL-V2/10	2/10A	250V	1
GDL1/4	GDL-V1/4	1/4A	250V	1
GDL3/10	GDL-V3/10	3/10A	250V	1
GDL3/8	GDL-V3/8	3/8A	250V	1
GDL4/10	GDL-V4/10	4/10A	250V	1
GDL1/2	GDL-V1/2	1/2A	250V	1
GDL6/10	GDL-V6/10	6/10A	250V	1
GDL7/10	GDL-V7/10	7/10A	250V	1
GDL3/4	GDL-V3/4	3/4A	250V	1
GDL8/10	GDL-V8/10	8/10A	250V	1
GDL1	GDL-V1	1A	250V	1
GDL1-2/10	GDL-V1-2/10	1-2/10A	250V	2
GDL1-1/4	GDL-V1-1/4	1-1/4A	250V	2
GDL1-1/2	GDL-V1-1/2	1-1/2A	250V	2
GDL1-6/10	GDL-V1-6/10	1-6/10A	250V	2
GDL1-8/10	GDL-V1-8/10	1-8/10A	250V	2
GDL2	GDL-V2	2A	250V	2
GDL2-1/4	GDL-V2-1/4	2-1/4A	250V	2
GDL2-1/2	GDL-V2-1/2	2-1/2A	250V	2
GDL2-8/10	GDL-V2-8/10	2-8/10A	250V	2
GDL3	GDL-V3	3A	250V	2
GDL3-2/10	GDL-V3-2/10	3-2/10A	250V	2
GDL4	GDL-V4	4A	250V	3
GDL5	GDL-V5	5A	250V	3
GDL6	GDL-V6	6A	250V	3
GDL6-1/4	GDL-V6-1/4	6-1/4A	250V	3
GLD7	GDL-V7	7A	250V	3
GLD8	GDL-V8	8A	250V	3
GLD10	GDL-V10	10A	125V	4
GDL12	GDL-V12	12A	125V	4
GDL15	GDL-V15	15A	125V	4
GDL20	GDL-V20	20A	32V	5
GDL25	GDL-V25	25A	32V	5
GDL30	GDL-V30	30A	32V	5

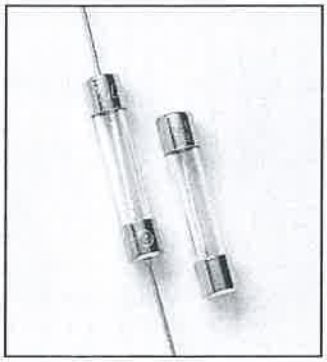
1. 250VAC @ 35A I.R./125VAC @ 10kA I.R.
2. 250VAC @ 100A I.R./125VAC @ 10kA I.R.
3. 250VAC @ 200A I.R./125VAC @ 10kA I.R.
4. 125VAC @ 10kA I.R.
5. 32VAC @ 300A I.R.

C

ANALOG FUSES

Ferraz Shawmut

ELECTRONIC / GLASS FUSES



GGC / GGC-V

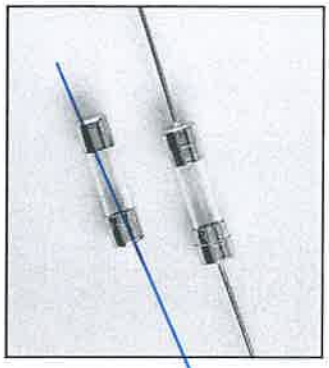
Glass Body
Fast Acting
1/4" x 1-1/4"
1-1/2" Axial Leads Optional

1/100A through 10A, 250VAC - UL Listed and CSA Certified
12A and 15A, 125VAC - UL Listed and CSA Certified
20A through 30A, 32VAC - UL Listed and CSA Certified

Standard Fuse Ampere Ratings

CATALOG NUMBER	AXIAL LEAD CAT. NO	AMPERE RATING	VOLTS	I.R.
GGC1/100	GGC-V1/100	1/100A	250V	1
GGC1/32	GGC-V1/32	1/32A	250V	1
GGC1/16	GGC-V1/16	1/16A	250V	1
GGC1/10	GGC-V1/10	1/10A	250V	1
GGC1/8	GGC-V1/8	1/8A	250V	1
GGC15/100	GGC-V15/100	15/100A	250V	1
GGC175/1000	GGC-V175/1000	175/1000A	250V	1
GGC3/16	GGC-V3/16	3/16A	250V	1
GGC2/10	GGC-V2/10	2/10A	250V	1
GGC1/4	GGC-V1/4	1/4A	250V	1
GGC3/10	GGC-V3/10	3/10A	250V	1
GGC3/8	GGC-V3/8	3/8A	250V	1
GGC4/10	GGC-V4/10	4/10A	250V	2
GGC1/2	GGC-V1/2	1/2A	250V	1
GGC6/10	GGC-V6/10	6/10A	250V	1
GGC3/4	GGC-V3/4	3/4A	250V	1
GGC8/10	GGC-V8/10	8/10A	250V	2
GGC1	GGC-V1	1A	250V	1
GGC1-1/4	GGC-V1-1/4	1-1/4A	250V	3
GGC1-1/2	GGC-V1-1/2	1-1/2A	250V	3
GGC1-3/4	GGC-V1-3/4	1-3/4A	250V	3
GGC1-6/10	GGC-V1-6/10	1-6/10A	250V	3
GGC2	GGC-V2	2A	250V	3
GGC2-1/4	GGC-V2-1/4	2-1/4A	250V	3
GGC2-1/2	GGC-V2-1/2	2-1/2A	250V	3
GGC3	GGC-V3	3A	250V	3
GGC3-2/10	GGC-V3-2/10	3-2/10A	250V	4
GGC4	GGC-V4	4A	250V	2
GGC5	GGC-V5	5A	250V	2
GGC6	GGC-V6	6A	250V	2
GGC6-3/10	GGC-V6-3/10	6-3/10A	250V	2
GGC7	GGC-V7	7A	250V	2
GGC7-1/2		7-1/2A	250V	2
GGC8	GGC-V8	8A	250V	2
GGC10	GGC-V10	10A	250V	2
GGC12	GGC-V12	12A	125V	5
GGC15	GGC-V15	15A	125V	5
GGC20	GGC-V20	20A	32V	6
GGC25	GGC-V25	25A	32V	6
GGC30	GGC-V30	30A	32V	6

1. 250VAC @ 35A I.R./125VAC @ 10kA I.R.
2. 250VAC @ 200A I.R./125VAC @ 10kA I.R.
3. 250VAC @ 100A I.R./125VAC @ 10kA I.R.
4. 250VAC @ 10kA I.R.
5. 125VAC @ 10kA I.R.
6. 32VAC @ 300A I.R.



GGM / GGM-V

Glass Body
Fast Acting
5mm x 20mm
1-1/2" Axial Leads Optional

1/10A through 3A, 250VAC - UL Listed and CSA Certified
4A through 8A, 125VAC - UL Listed and CSA Certified
10A and 15A, 250VAC - UL Recognized

Standard Fuse Ampere Ratings

CATALOG NUMBER	AXIAL LEAD CAT. NO	AMPERE RATING	VOLTS	I.R.
GGM1/16	GGM-V1/16	1/16A	250V	2
GGM1/10	GGM-V1/10	1/10A	250V	1
GGM1/8	GGM-V1/8	1/8A	250V	1
GGM2/10	GGM-V2/10	2/10A	250V	1
GGM1/4	GGM-V1/4	1/4A	250V	1
GGM3/10	GGM-V3/10	3/10A	250V	1
GGM4/10	GGM-V4/10	4/10A	250V	1
GGM1/2	GGM-V1/2	1/2A	250V	1
GGM6/10	GGM-V6/10	6/10A	250V	1
GGM7/10	GGM-V7/10	7/10A	250V	1
GGM3/4	GGM-V3/4	3/4A	250V	3
GGM8/10	GGM-V8/10	8/10A	250V	1
GGM1	GGM-V1	1A	250V	1
GGM1-2/10		1-2/10A	250V	2
GGM1-1/4	GGM-V1-1/4	1-1/4A	250V	2
GGM1-1/2	GGM-V1-1/2	1-1/2A	250V	3
GGM1-6/10	GGM-V1-6/10	1-6/10A	250V	2
GGM2	GGM-V2	2A	250V	2
GGM2-1/2	GGM-V2-1/2	2-1/2A	250V	2
GGM3	GGM-V3	3A	250V	2
GGM4	GGM-V4	4A	125V	4
GGM5	GGM-V5	5A	125V	4
GGM6	GGM-V6	6A	125V	4
GGM7	GGM-V7	7A	125V	4
GGM8	GGM-V8	8A	125V	4
GGM10	GGM-V10	10A	250V	5
GGM15	GGM-V15	15A	250V	5

1. 250VAC @ 35A I.R./125VAC @ 10kA I.R.
2. 250VAC @ 100A I.R./125VAC @ 10kA I.R.
3. 250VAC @ 200A I.R./125VAC @ 10kA I.R.
4. 125VAC @ 10kA I.R.
5. 250VAC @ 100A I.R.

MOTOR STARTERS

TRI-ONIC®

TR & TRS

Ferraz Shawmut

TIME DELAY / CLASS RK5

THE INDUSTRY'S MOST POPULAR FUSE FOR MOTOR CIRCUIT PROTECTION.

Tri-onic® SmartSpot® fuses now provide a visual open fuse indicator. With advanced material technology added to the existing product the TR and TRS current limiting time delay fuses are engineered for overcurrent protection of motors and transformers, service entrance equipment, feeder and branch circuits. Tri-onic proven time delay characteristic safely handles harmless starting currents and inrush currents associated with today's motors and transformers.

Features/Benefits

- **Solid State SmartSpot Indicator**
- **Time delay** for motor start-ups and transformer inrush currents *without* nuisance opening
- **Current limiting** for low peak let-thru current
- **Rejection-style design** prevents replacement errors (when used with recommended fuse blocks)
- **Easy-to-read label** for quick recognition and replacement
- **Metal-embossed date and catalog number** for traceability and lasting identification
- **Fiberglass body** provides dimensional stability in harsh industrial settings
- **Brass end-caps** (blade-style) for cooler operation and superior performance
- **High-grade** silica filler ensures fast arc quenching and high current limitation

HIGHLIGHTS:

- Time Delay
- Current Limiting
- AC & DC Rated

APPLICATIONS:

- Motor Circuits
- Mains
- Feeders
- Branch Circuits
- Transformers
- Service Entrance Equipment
- General-purpose Protection

Ratings

- **TR**
  AC: 1/10 to 600A 250VAC, 200kA I.R.
  DC: 1/10 to 2 8/10A & 35 to 400A, 250VDC, 20kA I.R.; 3 to 30A & 450 to 600A, 160VDC, 20kA I.R.
- **TRS**
  AC: 1/10 to 600A 600VAC, 200kA I.R.
  DC: 1/10 to 12A, 600VDC, 20kA I.R.; 70 to 600A, 600VDC, 100kA I.R.; 15 to 60A, 300VDC, 20kA I.R.

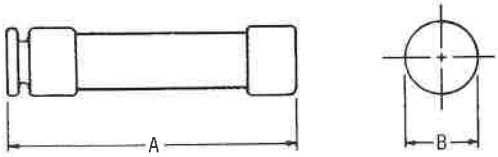
Approvals

- UL Listed to Standard 248-12
- CSA Certified to Standard C22.2 No. 248.12
- DC Listed to UL Standard 198L

TIME DELAY / CLASS RK5 FUSES

Standard Fuse Ampere Ratings, Catalog Numbers

Ampere Rating	Catalog Number 250V	Catalog Number 600V	Ampere Rating	Catalog Number 250V	Catalog Number 600V	Ampere Rating	Catalog Number 250V	Catalog Number 600V
1/10	TR1/10R	TRS1/10R	3-1/2	TR3-1/2R	TRS3-1/2R	50	TR50R	TRS50R
15/100	TR15/100R	TRS15/100R	4	TR4R	TRS4R	60	TR60R	TRS60R
2/10	TR2/10R	TRS2/10R	4-1/2	TR4-1/2R	TRS4-1/2R	70	TR70R	TRS70R
3/10	TR3/10R	TRS3/10R	5	TR5R	TRS5R	75	TR75R	TRS75R
4/10	TR4/10R	TRS4/10R	5-6/10	TR5-6/10R	TRS5-6/10R	80	TR80R	TRS80R
1/2	TR1/2R	TRS1/2R	6	TR6R	TRS6R	90	TR90R	TRS90R
6/10	TR6/10R	TRS6/10R	6-1/4	TR6-1/4R	TRS6-1/4R	100	TR100R	TRS100R
8/10	TR8/10R	TRS8/10R	7	TR7R	TRS7R	110	TR110R	TRS110R
1	TR1R	TRS1R	8	TR8R	TRS8R	125	TR125R	TRS125R
1-1/8	TR1-1/8R	TRS1-1/8R	9	TR9R	TRS9R	150	TR150R	TRS150R
1-1/4	TR1-1/4R	TRS1-1/4R	10	TR10R	TRS10R	175	TR175R	TRS175R
1-4/10	TR1-4/10R	TRS1-4/10R	12	TR12R	TRS12R	200	TR200R	TRS200R
1-6/10	TR1-6/10R	TRS1-6/10R	15	TR15R	TRS15R	225	TR225R	TRS225R
1-8/10	TR1-8/10R	TRS1-8/10R	17-1/2	TR17-1/2R	TRS17-1/2R	250	TR250R	TRS250R
2	TR2R	TRS2R	20	TR20R	TRS20R	300	TR300R	TRS300R
2-1/4	TR2-1/4R	TRS2-1/4R	25	TR25R	TRS25R	350	TR350R	TRS350R
2-1/2	TR2-1/2R	TRS2-1/2R	30	TR30R	TRS30R	400	TR400R	TRS400R
2-8/10	TR2-8/10R	TRS2-8/10R	35	TR35R	TRS35R	450	TR450R	TRS450R
3	TR3R	TRS3R	40	TR40R	TRS40R	500	TR500R	TRS500R
3-2/10	TR3-2/10R	TRS3-2/10R	45	TR45R	TRS45R	600	TR600R	TRS600R



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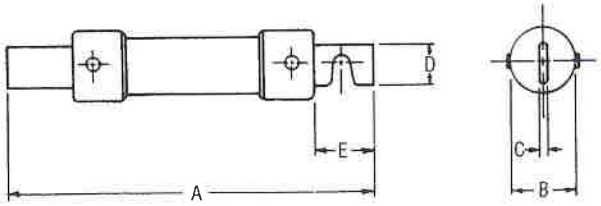


61-600A

Dimensions

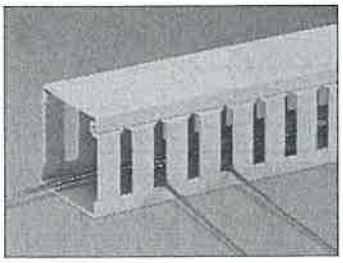
AMPERE RATING	A In.	A mm	B In.	B mm	C In.	C mm	D In.	D mm	E In.	E mm
250V-TR FUSES										
0-30	2	51	9/16	14	-	-	-	-	-	-
31-60	3	76	13/16	21	-	-	-	-	-	-
61-100	5-7/8	149	1-1/16	27	1/8	3	3/4	19	1	25
101-200	7-1/8	181	1-9/16	40	3/16	5	1-1/8	28	1-3/8	35
201-400	8-5/8	219	2-1/16	53	1/4	6	1-5/8	41	1-7/8	48
401-600	10-3/8	264	2-9/16	66	1/4	6	2	51	2-1/4	57
600V-TRS FUSES										
0-30	5	127	13/16	21	-	-	-	-	-	-
31-60	5-1/2	139	1-1/16	27	-	-	-	-	-	-
61-100	7-7/8	200	1-5/16	34	1/8	3	3/4	19	1	25
101-200	9-5/8	244	1-13/16	46	3/16	5	1-1/8	28	1-3/8	35
201-400	11-5/8	295	2-9/16	66	1/4	6	1-5/8	41	1-7/8	48
401-600	13-3/8	340	3-1/8	80	1/4	6	2	51	2-1/4	57

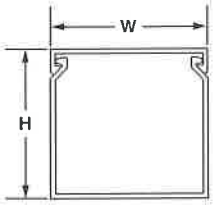
Recommended Fuse Blocks With Box Connectors For Tri-onic® Class RK5 Fuses

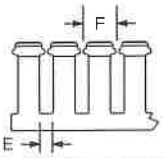
Fuse Ampere Rating	Catalog Number 250V 1 Pole	Catalog Number 250V 3 pole	Catalog Number 600V 1 pole	Catalog Number 600V 3 pole
0-30	20306R	20308R	60306R	60308R
31-60	20606R	20608R	60606R	60608R
61-100	21036R	21038R	61036R	61038R
101-200	22001R	22003R	62001R	62003R
201-400	24001R	24003R	64001R	64003R
401-600	2631R	2633R	6631R	6633R

Panduct® Type G Wide Slot Wiring Duct

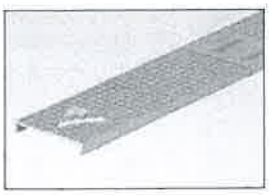
- Wide slot/finger design provides greater sidewall rigidity and can be used with a wide range of wire bundle sizes
- Material: Lead-free PVC
- UL recognized continuous use temperature: 122°F (50°C)
- UL 94 flammability rating of V-0
- Conforms with NFPA 79-2007 section 13.3.1 requirement for flame retardant material
- Provided with mounting holes
- Base and cover length is 6 feet







	E	F
For .5" duct height:	0.37" [9.4]	0.80" [20.3]
0.75" to 2" duct height:	0.31" [7.9]	0.80" [20.3]
3" to 4" duct height:	0.31" [7.9]	1.00" [25.4]
5" duct height:	0.38" [9.4]	1.33" [33.8]



To order cover with protective film add "-F" to part number. 6" cover not available with film.

Base Part Number	Duct Size (W x H)* In.	Duct Size (W x H)* mm	Slot Width In.	Slot Width mm	Cover Part Number	Std. Pkg. Qty.	Base Ctn. Qty.	Cover Ctn. Qty.
G.5X.5LG6	0.69 x 0.60	17.5 x 15.2	0.38	9.7	C.5LG6	6	120	120
G.5X1LG6	0.69 x 1.06	17.5 x 26.9	0.31	7.9	C.5LG6	6	120	120
G.5X2LG6	0.69 x 2.03	17.5 x 51.6	0.31	7.9	C.5LG6	6	120	120
G.75X.75LG6	0.93 x 0.82	23.6 x 20.8	0.31	7.9	C.75LG6	6	120	120
G.75X1LG6	0.93 x 1.06	23.6 x 26.9	0.31	7.9	C.75LG6	6	120	120
G.75X1.5LG6	0.93 x 1.57	23.6 x 39.9	0.31	7.9	C.75LG6	6	120	120
G.75X2LG6	0.93 x 2.03	23.6 x 51.7	0.31	7.9	C.75LG6	6	120	120
G1X1LG6	1.26 x 1.12	32.0 x 28.4	0.31	7.9	C1LG6	6	120	120
G1X1.5LG6	1.26 x 1.62	32.0 x 41.1	0.31	7.9	C1LG6	6	120	120
G1X2LG6	1.26 x 2.12	32.0 x 53.8	0.31	7.9	C1LG6	6	120	120
G1X3LG6	1.26 x 3.12	32.0 x 79.2	0.31	7.9	C1LG6	6	120	120
G1X4LG6	1.26 x 4.10	32.0 x 104.1	0.31	7.9	C1LG6	6	60	120
G1.5X1LG6	1.75 x 1.12	44.5 x 28.4	0.31	7.9	C1.5LG6	6	120	120
G1.5X1.5LG6	1.75 x 1.62	44.5 x 41.1	0.31	7.9	C1.5LG6	6	120	120
G1.5X2LG6	1.75 x 2.12	44.5 x 53.8	0.31	7.9	C1.5LG6	6	120	120
G1.5X3LG6	1.75 x 3.12	44.5 x 79.2	0.31	7.9	C1.5LG6	6	120	120
G1.5X4LG6	1.75 x 4.10	44.5 x 104.1	0.31	7.9	C1.5LG6	6	60	120
G2X1LG6	2.25 x 1.12	57.2 x 28.4	0.31	7.9	C2LG6	6	120	120
G2X1.5LG6	2.25 x 1.62	57.2 x 41.1	0.31	7.9	C2LG6	6	120	120
G2X2LG6	2.25 x 2.12	57.2 x 53.8	0.31	7.9	C2LG6	6	120	120
G2X3LG6	2.25 x 3.12	57.2 x 79.2	0.31	7.9	C2LG6	6	60	120
G2X4LG6	2.25 x 4.10	57.2 x 104.1	0.31	7.9	C2LG6	6	60	120
G2X5LG6	2.25 x 5.10	57.2 x 129.5	0.38	9.7	C2LG6	6	60	120
G2.5X3LG6	2.75 x 3.12	69.9 x 79.2	0.31	7.9	C2.5LG6	6	120	120
G3X1LG6	3.25 x 1.12	82.6 x 28.4	0.31	7.9	C3LG6	6	120	120
G3X2LG6	3.25 x 2.12	82.6 x 53.8	0.31	7.9	C3LG6	6	120	120
G3X3LG6	3.25 x 3.12	82.6 x 79.2	0.31	7.9	C3LG6	6	60	120
G3X4LG6	3.25 x 4.10	82.6 x 104.1	0.31	7.9	C3LG6	6	60	120
G3X5LG6	3.25 x 5.10	82.6 x 129.5	0.38	9.7	C3LG6	6	60	120
G4X1.5LG6	4.25 x 1.62	108.0 x 41.1	0.31	7.9	C4LG6	6	120	120
G4X2LG6	4.25 x 2.12	108.0 x 53.8	0.31	7.9	C4LG6	6	60	120
G4X3LG6	4.25 x 3.12	108.0 x 79.2	0.31	7.9	C4LG6	6	60	120
G4X4LG6	4.25 x 4.10	108.0 x 104.1	0.31	7.9	C4LG6	6	60	120
G4X5LG6	4.25 x 5.10	108.0 x 129.5	0.38	9.7	C4LG6	6	60	120
G6X4LG6	6.25 x 4.15	158.8 x 105.4	0.31	7.9	C6LG6	6	60	120

Part number shown for LG (Light Gray). For other color availability see color selection guide, page C1.48.
Base and cover sold separately.
*"H" dimension includes duct and cover.

UNO-PS/1AC/24DC/ 30W - Power supply unit

DCPS

2902991

https://www.phoenixcontact.com/us/products/2902991

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Primary-switched UNO POWER power supply for DIN rail mounting, input: 1-phase, output: 24 V DC/30 W

Product Description

UNO POWER power supplies with basic functionality
Thanks to their high power density, compact UNO POWER power supplies are the ideal solution for loads up to 240 W, particularly in compact control boxes. The power supply units are available in various performance classes and overall widths. Their high degree of efficiency and low idling losses ensure a high level of energy efficiency.

Your advantages

- Flexible mounting by simply snapping onto the DIN rail
- More space in the control cabinet with up to 20 % higher power density
- Maximum energy efficiency, thanks to over 90 % efficiency and extremely low idling losses under 0.3 W
- Outdoor installation, thanks to the wide temperature range from -25°C to +70°C

Commercial Data

Item number	2902991
Packing unit	1 pc
Minimum order quantity	1 pc
Sales Key	CM14
Product Key	CMPU13
Catalog Page	Page 266 (C-4-2019)
GTIN	4046356729192
Weight per Piece (including packing)	187.43 g
Weight per Piece (excluding packing)	147 g
Customs tariff number	85044083
Country of origin	VN

DCPS

UNO-PS/1AC/24DC/ 30W - Power supply unit

2902991

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Technical Data

Input data

AC operation	
Nominal input voltage range	100 V AC ... 240 V AC
Input voltage range	85 V AC ... 264 V AC
Input voltage range AC	85 V AC ... 264 V AC
Voltage type of supply voltage	AC
Inrush current	< 30 A (typ.)
Inrush current integral (I^2t)	< 0.4 A^2s (typ.)
AC frequency range	50 Hz ... 60 Hz
Frequency range (f_N)	50 Hz ... 60 Hz ±10 %
Mains buffering time	> 25 ms (120 V AC)
	> 115 ms (230 V AC)
Current consumption	typ. 0.8 A (100 V AC)
	typ. 0.4 A (240 V AC)
Nominal power consumption	72.1 VA
Protective circuit	Transient surge protection; Varistor
Power factor (cos phi)	0.47
Typical response time	< 1 s
Input fuse	2 A (slow-blow, internal)
Recommended breaker for input protection	6 A ... 16 A (Characteristics B, C, D, K)

Output data

Efficiency	typ. 87 % (120 V AC)
	typ. 88 % (230 V AC)
Output characteristic	HICCUP
Nominal output voltage	24 V DC ±1 %
Nominal output current (I_N)	1.25 A (-25 °C ... 55 °C)
Derating	55 °C ... 70 °C (2.5%/K)
Feedback voltage resistance	< 35 V DC
Protection against overvoltage at the output (OVP)	≤ 35 V DC
Control deviation	< 1 % (change in load, static 10 % ... 90 %)
	< 2 % (Dynamic load change 10 % ... 90 %, 10 Hz)
	< 0.1 % (change in input voltage ±10 %)
Residual ripple	< 60 mV_{PP} (with nominal values)
Short-circuit-proof	yes
Output power	30 W
Maximum no-load power dissipation	< 0.3 W
Power loss nominal load max.	< 5 W
Rise time	< 0.5 s (U_{OUT} (10 % ... 90 %))
Response time	< 2 ms
Connection in parallel	yes, for redundancy and increased capacity

Connection in series	yes

Connection data

Input

Connection method	Screw connection
Conductor cross section, rigid min.	0.2 mm²
Conductor cross section, rigid max.	2.5 mm²
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	2.5 mm²
Single conductor/flexible terminal point with ferrule with plastic sleeve, min.	0.2 mm²
Single conductor/flexible terminal point with ferrule with plastic sleeve, max.	2.5 mm²
Single conductor/flexible terminal point with ferrule without plastic sleeve, min.	0.2 mm²
Single conductor/flexible terminal point with ferrule without plastic sleeve, max.	2.5 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	14
Stripping length	8 mm
Screw thread	M3
Tightening torque, min	0.5 Nm
Tightening torque max	0.6 Nm

Output

Connection method	Screw connection
Conductor cross section, rigid min.	0.2 mm²
Conductor cross section, rigid max.	2.5 mm²
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	2.5 mm²
Single conductor/flexible terminal point with ferrule with plastic sleeve, min.	0.2 mm²
Single conductor/flexible terminal point with ferrule with plastic sleeve, max.	2.5 mm²
Single conductor/flexible terminal point with ferrule without plastic sleeve, min.	0.2 mm²
Single conductor/flexible terminal point with ferrule without plastic sleeve, max.	2.5 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	14
Stripping length	8 mm
Screw thread	M3
Tightening torque, min	0.5 Nm
Tightening torque max	0.6 Nm

Signaling

Types of signaling	LED

Electrical properties

Number of phases	1.00
Insulation voltage input/output	4 kV AC (type test)
	3 kV AC (routine test)

Product properties

Product type	Power supply
Product family	UNO POWER
MTBF (IEC 61709, SN 29500)	> 1158000 h (40 °C)

Insulation characteristics

Protection class	II (in closed control cabinet)
Degree of pollution	2

Dimensions

Width	22.5 mm
Height	90 mm
Depth	84 mm

Installation dimensions

Installation distance right/left	0 mm / 0 mm
Installation distance top/bottom	30 mm / 30 mm

Mounting

Mounting type	DIN rail mounting
Assembly instructions	alignable: 0 mm horizontally, 30 mm vertically
Mounting position	horizontal DIN rail NS 35, EN 60715
With protective coating	No

Material specifications

Flammability rating according to UL 94 (housing / terminal blocks)	V0
Housing material	Plastic
Foot latch material	POM (Polyoxymethylene)
Housing material	Polycarbonate

Environmental and real-life conditions

Ambient conditions

Degree of protection	IP20
Ambient temperature (operation)	-25 °C ... 70 °C (> 55 °C Derating: 2.5 %/K)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Ambient temperature (start-up type tested)	-40 °C
Climatic class	3K22 (in accordance with EN 60721-3-3)

Max. permissible relative humidity (operation)	≤ 95 % (at 25 °C, non-condensing)
Shock	18 ms, 30g, in each space direction (according to IEC 60068-2-27)
Vibration (operation)	< 15 Hz, amplitude ±2.5 mm (according to IEC 60068-2-6)
	15 Hz ... 150 Hz, 2.3g, 90 min.

Standards and regulations

Standard – Electronic equipment for use in electrical power installations and their assembly into electrical power installations	EN 50178/VDE 0160 (PELV)
Standard – Limitation of mains harmonic currents	EN 61000-3-2
Standard - Electrical safety	IEC 62368-1 (SELV)
Standard – Safety extra-low voltage	IEC 62368-1 (SELV) und EN 60204-1 (PELV)
Standard - Safe isolation	DIN VDE 0100-410
Standard - Safety of transformers	EN 61558-2-16
Approval - requirement of the semiconductor industry with regard to mains voltage dips	EN 61000-4-11

Approvals

CSA	CAN/CSA-C22.2 No. 60950-1-07
	CSA-C22.2 No. 107.1-01
	CAN/CSA-C22.2 No. 213 Class I, Division 2, Groups A, B, C, D T4 (Hazardous Location)
UL approvals	UL/C-UL listed UL 508
	NEC Class 2 as per UL 1310
	UL/C-UL Listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D T4 (Hazardous Location)
	UL/C-UL Recognized UL 60950-1

Conformity/Approvals

SIL in accordance with IEC 61508	0
Performance level according to ISO 13849	without

EMC data

Low Voltage Directive	Conformance with Low Voltage Directive 2014/35/EC
EMC requirements for noise emission	EN 61000-6-3
	EN 61000-6-4
EMC requirements for noise immunity	EN 61000-6-1
	EN 61000-6-2
Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU

Electrostatic discharge

Standards/regulations	EN 61000-4-2

Electrostatic discharge

Contact discharge	6 kV (Test Level 3)
Discharge in air	8 kV (Test Level 3)
Comments	Criterion B

Electromagnetic HF field	
Standards/regulations	EN 61000-4-3
Electromagnetic HF field	
Frequency range	80 MHz ... 1 GHz
Test field strength	10 V/m (Test Level 3)
Frequency range	1 GHz ... 6 GHz
Test field strength	10 V/m (Test Level 3)
Comments	Criterion A
Fast transients (burst)	
Standards/regulations	EN 61000-4-4
Fast transients (burst)	
Input	4 kV (Test Level 4 - asymmetrical)
Output	2 kV (Test Level 3 - asymmetrical)
Comments	Criterion B
Surge voltage load (surge)	
Standards/regulations	EN 61000-4-5
Input	2 kV (Test Level 3 - symmetrical) 4 kV (Test Level 4 - asymmetrical)
Output	1 kV (Test Level 2 - symmetrical) 2 kV (Test Level 3 - asymmetrical)
Comments	Criterion B
Conducted interference	
Standards/regulations	EN 61000-4-6
Conducted interference	
Input/Output	asymmetrical
Frequency range	0.15 MHz ... 80 MHz
Comments	Criterion A
Voltage	10 V (Test Level 3)
Voltage dips	
Standards/regulations	EN 61000-4-11
Voltage	230 V AC
Frequency	50 Hz
Voltage dip	70 %
Number of periods	25 periods
Additional text	Class 3
Comments	Criterion A
Voltage dip	40 %
Number of periods	10 periods
Additional text	Class 3
Comments	Criterion A

Voltage dip	0 %
Number of periods	1 period
Additional text	Class 3
Comments	Criterion A

Emitted interference

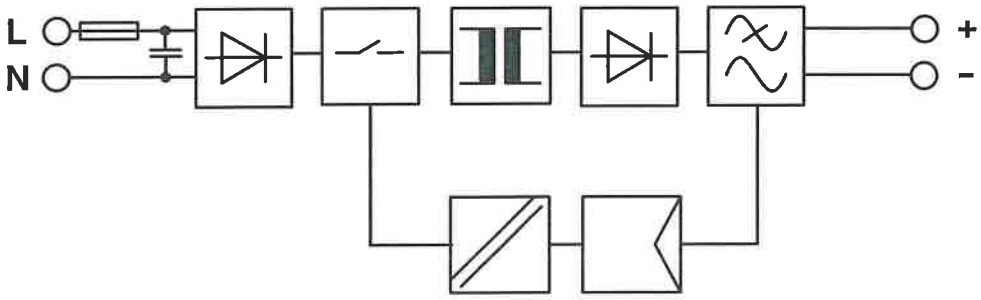
Standards/regulations	EN 61000-6-3
Radio interference voltage in acc. with EN 55011	EN 55011 (EN 55022) class B used in industry and residential area / EMC 1
Emitted radio interference in acc. with EN 55011	EN 55011 (EN 55022) class B used in industry and residential area / EMC 1

Criteria

Criterion A	Normal operating behavior within the specified limits.
Criterion B	Temporary impairment to operational behavior that is corrected by the device itself.

Drawings

Block diagram



DCPS

UNO-PS/1AC/24DC/ 30W - Power supply unit

2902991

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Approvals

To download certificates, visit the product detail page: https://www.phoenixcontact.com/us/products/2902991

cUL Recognized
Approval ID: FILE E 214596

UL Recognized
Approval ID: FILE E 214596

IECEE CB Scheme
Approval ID: DK-30305-A3-M1-UL

EAC
Approval ID: EAC-Zulassung

EAC
Approval ID: EAC-Zulassung

EAC
Approval ID: RU S-DE.BL08.W.00764

cULus Listed
Approval ID: FILE E 123528

UL Recognized
Approval ID: FILE E 214596

IECEE CB Scheme
Approval ID: DK-30305-A3-M1-UL

cUL Recognized
Approval ID: FILE E 214596

cULus Listed
Approval ID: FILE E 123528

SA

VAL-US-120/40/1+1-FM - Type 1 surge protection device

2910349

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Surge protective device, two channel with remote indicator contact for 120 V AC, 2-wire plus ground.

Commercial Data

Item number	2910349
Packing unit	1 pc
Sales Key	CL17
Product Key	CL132U
Catalog Page	Page 93 (C-4-2019)
GTIN	4055626444901
Weight per Piece (including packing)	225.2 g
Weight per Piece (excluding packing)	225.2 g
Customs tariff number	85363030
Country of origin	DE

SA

VAL-US-120/40/1+1-FM - Type 1 surge protection device

2910349

https://www.phoenixcontact.com/us/products/2910349

Technical Data

Product properties

IEC test classification	II
	T2
EN type	T2
IEC power supply system	TN-S
	TT
Type	DIN rail module, two-section, divisible
Product type	Surge protection for NEMA power supply units
Product family	VALVETRAB US
Number of positions	2
Surge protection fault message	Optical, remote indicator contact

Insulation characteristics

Overvoltage category	III
Pollution degree	2

Electrical properties

Nominal frequency f_N	50 Hz (60 Hz)

Indicator/remote signaling

Connection name	Remote fault indicator contact
Switching function	Changeover contact
Operating voltage	5 V AC ... 250 V AC
	30 V DC
Operating current	5 mA AC ... 1.5 A AC
	1 A DC

Connection data

Connection method	Screw connection
Screw thread	M5
Tightening torque	4.5 Nm (1.5 mm² ... 16 mm²)
	4.5 Nm (25 mm² ... 35 mm²)
Stripping length	16 mm
Conductor cross section flexible	1.5 mm² ... 25 mm²
Conductor cross section rigid	1.5 mm² ... 35 mm²
Conductor cross section AWG	15 ... 2

Remote fault indicator contact

Connection method	Screw connection
Screw thread	M2
Tightening torque	0.25 Nm
Stripping length	7 mm
Conductor cross section flexible	0.14 mm² ... 1.5 mm²

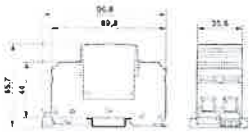
VAL-US-120/40/1+1-FM - Type 1 surge protection device

2910349

https://www.phoenixcontact.com/us/products/2910349

Conductor cross section rigid	0.14 mm² ... 1.5 mm²
Conductor cross section AWG	28 ... 16

Dimensions

Dimensional drawing	
Width	35.6 mm
Height	96.8 mm
Depth	65.7 mm (incl. DIN rail 7.5 mm)
Horizontal pitch	2 Div.

Material specifications

Flammability rating according to UL 94	V-0
CTI value of material	600
Insulating material	PA 6.6/PBT
Material group	I
Housing material	PA 6.6
	PBT

Protective circuit

Mode of protection	L-N
	L-PE
	N-PE
Direction of action	1L-N & N-GND
Nominal voltage U_N	120 V AC (TN-S)
	120 V AC (TT)
Nominal frequency f_N	50 Hz (60 Hz)
Rated load current I_L	80 A
Residual current I_{PE}	≤ 5 µA
Nominal discharge current I_n (8/20) µs	20 kA
Follow current interrupt rating I_{fi} (N-PE)	100 A (305 V AC)
Short-circuit current rating I_{SCCR}	25 kA
Voltage protection level U_p (L-N)	≤ 0.9 kV
Voltage protection level U_p (L-PE)	≤ 1.6 kV
Voltage protection level U_p (N-PE)	≤ 1.5 kV
Residual voltage U_{res} (L-N)	≤ 0.9 kV (at I_n)
	≤ 0.75 kV (at 10 kA)
	≤ 0.6 kV (at 5 kA)
	≤ 0.55 kV (at 3 kA)
Residual voltage U_{res} (L-PE)	≤ 1.6 kV (at I_n)
	≤ 1.2 kV (at 10 kA)

VAL-US-120/40/1+1-FM - Type 1 surge protection device

2910349

https://www.phoenixcontact.com/us/products/2910349

	≤ 1 kV (at 5 kA)
	≤ 0.9 kV (at 3 kA)
Residual voltage U_{res} (N-PE)	≤ 0.4 kV (at I_n)
	≤ 0.25 kV (at 10 kA)
	≤ 0.15 kV (at 5 kA)
	≤ 0.1 kV (at 3 kA)
TOV behavior at U_T (L-N)	208 V AC (5 s / withstand mode)
	240 V AC (120 min / safe failure mode)
TOV behavior at U_T (N-PE)	1200 V AC (200 ms / withstand mode)
Response time t_A (L-N)	≤ 25 ns
Response time t_A (L-PE)	≤ 100 ns
Response time t_A (N-PE)	≤ 100 ns
Max. backup fuse with V-type through wiring	80 A (gG)
Max. backup fuse with branch wiring	125 A (gG)

Environmental and real-life conditions

Ambient conditions

Degree of protection	IP20 (only when all terminal points are used)
Ambient temperature (operation)	-40 °C ... 80 °C
Ambient temperature (storage/transport)	-40 °C ... 80 °C
Altitude	≤ 2000 m (amsl)
Permissible humidity (operation)	5 % ... 95 %
Shock (operation)	25g (Half-sine / 11 ms / 3x ±X, ±Y, ±Z)
Vibration (operation)	5g (10 ... 500 Hz / 2.5 h / X, Y, Z)

Approvals

UL specifications

Maximum continuous operating voltage MCOV (L-N)	175 V AC
Maximum continuous operating voltage MCOV (L-G)	175 V AC
Maximum continuous operating voltage MCOV (N-G)	305 V AC
Short-circuit current rating (SCCR)	200 kA
Voltage protection rating VPR (L-N)	700 V
Voltage protection rating VPR (L-G)	1800 V
Voltage protection rating VPR (N-G)	1200 V
UL type	type 1
Nominal discharge current I_n	20 kA
Maximum Surge Current per Phase	40 kA
Mode of protection	L-N
	L-G
	N-G
Nominal voltage	120 V AC
Power distribution system	Single phase
Nominal frequency	50/60 Hz

SPD Type	1

UL indicator/remote signaling

AC operating voltage	125 V AC
AC operating current	1 A AC

UL connection data

Tightening torque	30 lb_f-in.
Conductor cross section AWG	14 ... 2

Standards and regulations

Air clearances and creepage distances

Standards/regulations	EN 60664-1 / EN 61643-11
Standards/specifications	IEC 61643-11
Standards/specifications	EN 61643-11

Mounting

Mounting type	DIN rail: 35 mm

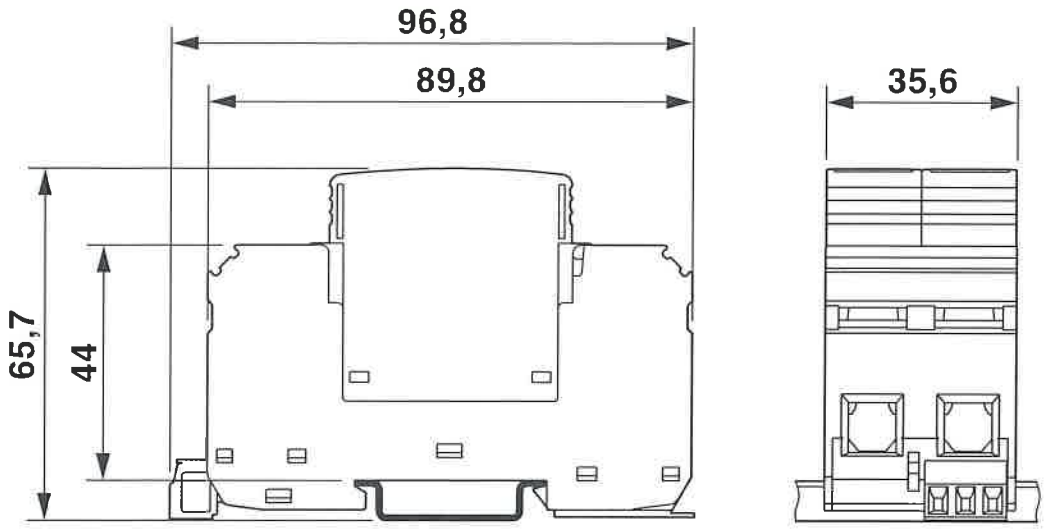
VAL-US-120/40/1+1-FM - Type 1 surge protection device

2910349

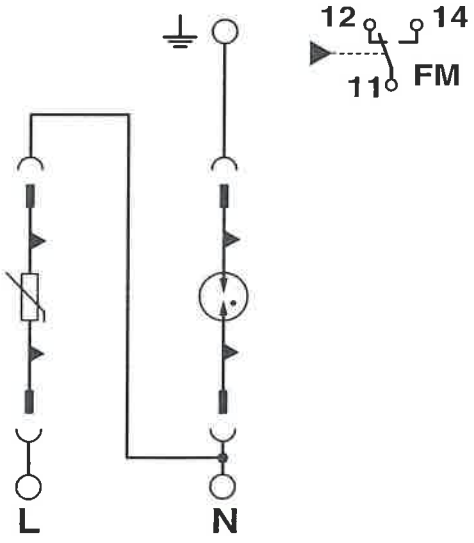
https://www.phoenixcontact.com/us/products/2910349

Drawings

Dimensional drawing



Circuit diagram



SA

VAL-US-120/40/1+1-FM - Type 1 surge protection device

2910349

https://www.phoenixcontact.com/us/products/2910349

Approvals

To download certificates, visit the product detail page: https://www.phoenixcontact.com/us/products/2910349

UL Listed
Approval ID: FILE E 330181

cUL Listed
Approval ID: FILE E 330181

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UT 6 - Feed-through terminal block

3044131

https://www.phoenixcontact.com/us/products/3044131

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Feed-through terminal block, nom. voltage: 1000 V, nominal current: 41 A, number of connections: 2, connection method: Screw connection, Rated cross section: 6 mm^2, cross section: 0.2 mm^2 - 10 mm^2, mounting type: NS 35/7,5, NS 35/15, color: gray

Your advantages

- The large wiring space enables the connection of solid and stranded conductors without ferrules, even above the nominal cross section
- As well as saving space, the compact design enables user-friendly wiring in a small amount of space
- Optimum screwdriver guidance through closed screw shafts
- The cable entry funnel enables the use of conductors with ferrules and plastic collars within the nominal cross section
- Tested for railway applications

Commercial Data

Item number	3044131
Packing unit	1 pc
Minimum order quantity	50 pc
Sales Key	BE01
Product Key	BE1111
Catalog Page	Page 173 (C-1-2019)
GTIN	4017918960438
Weight per Piece (including packing)	14.451 g
Weight per Piece (excluding packing)	13.9 g
Customs tariff number	85369010
Country of origin	DE

Technical Data

Product properties

Product type	Feed-through terminal block
Product family	UT
Area of application	Railway industry
	Machine building
	Plant engineering
	Process industry
Number of connections	2
Number of rows	1
Potentials	1

Insulation characteristics

Overvoltage category	III
Degree of pollution	3

Electrical properties

Rated surge voltage	8 kV
Maximum power dissipation for nominal condition	1.31 W

Connection data

Number of connections per level	2
Nominal cross section	6 mm²
Rated cross section AWG	8

Level 1 above 1 below 1

Screw thread	M4
Tightening torque	1.5 ... 1.8 Nm
Stripping length	10 mm
Internal cylindrical gage	A5
Connection in acc. with standard	IEC 60947-7-1
Conductor cross section rigid	0.2 mm² ... 10 mm²
Cross section AWG	24 ... 8 (converted acc. to IEC)
Conductor cross section flexible	0.2 mm² ... 10 mm²
Conductor cross section, flexible [AWG]	24 ... 8 (converted acc. to IEC)
Conductor cross-section flexible (ferrule without plastic sleeve)	0.25 mm² ... 6 mm²
Flexible conductor cross section (ferrule with plastic sleeve)	0.25 mm² ... 6 mm²
2 conductors with same cross section, solid	0.2 mm² ... 2.5 mm²
2 conductors with same cross section, flexible	0.2 mm² ... 2.5 mm²
2 conductors with same cross section, flexible, with ferrule without plastic sleeve	0.25 mm² ... 1.5 mm²
2 conductors with the same cross section, flexible, with TWIN ferrule with plastic sleeve	0.5 mm² ... 4 mm²
Nominal current	41 A

Maximum load current	57 A (with 10 mm² conductor cross section)
Nominal voltage	1000 V
Note	Note: Product releases, connection cross sections and notes on connecting aluminum cables can be found in the download area.
Nominal cross section	6 mm²

Ex data

Rated data (ATEX/IECEx)

Identification	II 2 GD Ex eb IIC Gb
Operating temperature range	-60 °C ... 110 °C
Ex-certified accessories	3047028 D-UT 2,5/10
	3047167 ATP-UT
	1205066 SZS 1,0X4,0 VDE
	3022276 CLIPFIX 35-5
	3022218 CLIPFIX 35
List of bridges	Plug-in bridge / FBS 2-8 / 3030284
	Plug-in bridge / FBS 3-8 / 3030297
	Plug-in bridge / FBS 4-8 / 3030307
	Plug-in bridge / FBS 5-8 / 3030310
	Plug-in bridge / FBS 10-8 / 3030323
Bridge data	39 A / 6 mm²
Ex temperature increase	40 K (44.9 A / 6 mm²)
Rated voltage	690 V
for bridging with bridge	690 V
- At bridging between non-adjacent terminal blocks	275 V
- At bridging between non-adjacent terminal blocks via PE terminal block	176 V
- At cut-to-length bridging with cover	220 V
- At cut-to-length bridging with partition plate	275 V
Rated insulation voltage	630 V
output	(Permanent)

Ex level General

Rated current	40 A
Maximum load current	50 A
Contact resistance	0.2 mΩ

Ex connection data General

Torque range	1.5 Nm ... 1.8 Nm
Nominal cross section	6 mm²
Rated cross section AWG	10
Connection capacity rigid	0.2 mm² ... 10 mm²
Connection capacity AWG	24 ... 8
Connection capacity flexible	0.2 mm² ... 6 mm²
Connection capacity AWG	24 ... 10

2 conductors with same cross section, solid	0.2 mm² ... 2.5 mm²
2 conductors with the same cross-section AWG rigid	24 ... 14
2 conductors with same cross section, stranded	0.2 mm² ... 2.5 mm²
2 conductors with the same cross-section AWG flexible	24 ... 14

Dimensions

Width	8.2 mm
End cover width	2.2 mm
Height	47.7 mm
Height NS 35/15	55 mm
Height NS 35/7,5	47.5 mm
Depth	46.9 mm
Length	47.7 mm

Material specifications

Color	gray
Flammability rating according to UL 94	V0
Insulating material group	I
Insulating material	PA
Static insulating material application in cold	-60 °C
Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	125 °C
Relative insulation material temperature index (Elec., UL 746 B)	130 °C
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3
Calorimetric heat release NFPA 130 (ASTM E 1354)	27,5 MJ/kg
Surface flammability NFPA 130 (ASTM E 162)	passed
Specific optical density of smoke NFPA 130 (ASTM E 662)	passed
Smoke gas toxicity NFPA 130 (SMP 800C)	passed

Electrical tests

Surge voltage test

Test voltage setpoint	9.8 kV
Result	Test passed

Temperature-rise test

Requirement temperature-rise test	Increase in temperature ≤ 45 K
Result	Test passed
Short-time withstand current 6 mm²	0.72 kA
Short-time withstand current 10 mm²	1.2 kA
Result	Test passed

Power-frequency withstand voltage

Test voltage setpoint	2.2 kV
Result	Test passed

Mechanical properties

Mechanical data

Open side panel	Yes

Mechanical tests

Mechanical strength

Result	Test passed

Attachment on the carrier

DIN rail/fixing support	NS 35
Test force setpoint	5 N
Result	Test passed

Test for conductor damage and slackening

Rotation speed	10 rpm
Revolutions	135
Conductor cross section/weight	0.2 mm² / 0.2 kg
	6 mm² / 1.4 kg
	10 mm² / 2 kg
Result	Test passed

Environmental and real-life conditions

Needle-flame test

Time of exposure	30 s
Result	Test passed

Oscillation/broadband noise

Specification	DIN EN 50155 (VDE 0115-200):2008-03
Spectrum	Service life test category 1, class B, body mounted
Frequency	f_1 = 5 Hz to f_2 = 150 Hz
ASD level	1.857 $(m/s^2)^2/Hz$
Acceleration	0.8g
Test duration per axis	5 h
Test directions	X-, Y- and Z-axis
Result	Test passed

Shocks

Specification	DIN EN 50155 (VDE 0115-200):2008-03
Pulse shape	Half-sine
Acceleration	5g
Shock duration	30 ms
Number of shocks per direction	3

Test directions	X-, Y- and Z-axis (pos. and neg.)
Result	Test passed

Ambient conditions

Ambient temperature (operation)	-60 °C ... 105 °C (max. short-term operating temperature RTI Elec.)
Ambient temperature (storage/transport)	-25 °C ... 60 °C (for a short time, not exceeding 24 h, -60 °C to +70 °C)
Ambient temperature (assembly)	-5 °C ... 70 °C
Ambient temperature (actuation)	-5 °C ... 70 °C
Permissible humidity (storage/transport)	30 % ... 70 %

Standards and regulations

Connection in acc. with standard	IEC 60947-7-1

Mounting

Mounting type	NS 35/7,5 NS 35/15

cUL Recognized
Approval ID: E192998

	Nominal Voltage U_N	Nominal Current I_N	Cross Section AWG	Cross Section mm^2
Use group B				
	600 V	50 A	24 - 8	-
Use group C				
	600 V	50 A	24 - 8	-

EAC Ex
Approval ID: RU C-DE.HA91.B.00066

IECEx
Approval ID: IECEx KEM 06.0027U

UL Recognized
Approval ID: E192998

	Nominal Voltage U_N	Nominal Current I_N	Cross Section AWG	Cross Section mm^2
Use group B				
	600 V	50 A	24 - 8	-
Use group C				
	600 V	50 A	24 - 8	-

CCC
Approval ID: 2020322313000622

UKCA-EX
Approval ID: DEKRA 21UKEX0304U

Accessories

Note: Applying some accessories below might limit this product.

FBS 2-8 - Plug-in bridge

3030284

https://www.phoenixcontact.com/us/products/3030284

Plug-in bridge, pitch: 8.2 mm, number of positions: 2, color: red

Max. current carrying capacity: 41 A

FBS 3-8 - Plug-in bridge

3030297

https://www.phoenixcontact.com/us/products/3030297

Plug-in bridge, pitch: 8.2 mm, number of positions: 3, color: red

Max. current carrying capacity: 41 A

UT 6 - Feed-through terminal block

3044131

https://www.phoenixcontact.com/us/products/3044131

FBS 4-8 - Plug-in bridge

3030307

https://www.phoenixcontact.com/us/products/3030307

Plug-in bridge, pitch: 8.2 mm, number of positions: 4, color: red

Max. current carrying capacity: 41 A

FBS 5-8 - Plug-in bridge

3030310

https://www.phoenixcontact.com/us/products/3030310

Plug-in bridge, pitch: 8.2 mm, number of positions: 5, color: red

Max. current carrying capacity: 41 A

UT 6 - Feed-through terminal block

3044131

https://www.phoenixcontact.com/us/products/3044131

FBS 6-8 - Plug-in bridge

3032470

https://www.phoenixcontact.com/us/products/3032470

Plug-in bridge, pitch: 8.2 mm, number of positions: 6, color: red

Max. current carrying capacity: 41 A

FBS 10-8 - Plug-in bridge

3030323

https://www.phoenixcontact.com/us/products/3030323

Plug-in bridge, pitch: 8.2 mm, number of positions: 10, color: red

Max. current carrying capacity: 41 A

UT 6 - Feed-through terminal block

3044131

https://www.phoenixcontact.com/us/products/3044131

D-UT 2,5/10 - End cover

3047028

https://www.phoenixcontact.com/us/products/3047028

End cover, length: 47 mm, width: 2.2 mm, height: 39.8 mm, color: gray

ATP-UT - Partition plate

3047167

https://www.phoenixcontact.com/us/products/3047167

Partition plate, length: 53.4 mm, width: 2.2 mm, height: 45.7 mm, color: gray

UT 6 - Feed-through terminal block

3044131

https://www.phoenixcontact.com/us/products/3044131

UC-TM 8 - Marker for terminal blocks

0818072

https://www.phoenixcontact.com/us/products/0818072

Marker for terminal blocks, Sheet, white, unlabeled, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, PLOTMARK, CMS-P1-PLOTTER, mounting type: snapped, for terminal block width: 8.2 mm, lettering field size: 7.6 x 10.5 mm, Number of individual labels: 56

UC-TM 8 CUS - Marker for terminal blocks

0824597

https://www.phoenixcontact.com/us/products/0824597

Marker for terminal blocks, can be ordered: by sheet, white, labeled according to customer specifications, mounting type: snap into tall marker groove, for terminal block width: 8.2 mm, lettering field size: 7.6 x 10.5 mm, Number of individual labels: 56

UT 6-MT - Knife-disconnect terminal block

3064069

https://www.phoenixcontact.com/us/products/3064069

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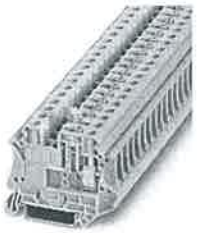

Knife-disconnect terminal block, nom. voltage: 500 V, Thermal continuous current I_{th}: 20 A, connection method: Screw connection, Rated cross section: 2.5 mm^2, cross section: 0.2 mm^2 - 10 mm^2, mounting: NS 35/7,5, NS 35/15, color: gray

Your advantages

- Double bridge shaft enables individual potential distribution and supply
- Compact design and high current carrying capacity of 20 A

Commercial Data

Item number	3064069
Packing unit	1 pc
Minimum order quantity	50 pc
Sales Key	BE01
Product Key	BE1131
Catalog Page	Page 175 (C-1-2019)
GTIN	4046356285711
Weight per Piece (including packing)	18.5 g
Weight per Piece (excluding packing)	18.138 g
Customs tariff number	85369010
Country of origin	PL

Technical Data

Product properties

Product type	Disconnect terminal block
Number of connections	2
Number of rows	1
Potentials	1

Insulation characteristics

Overvoltage category	III
Degree of pollution	3

Electrical properties

Rated surge voltage	6 kV
Maximum power dissipation for nominal condition	1.31 W

Connection data

Number of connections per level	2
Nominal cross section	6 mm²

Level 1 above 1 below 1

Screw thread	M4
Tightening torque	1.5 ... 1.8 Nm
Stripping length	10 mm
Internal cylindrical gage	A5
Connection in acc. with standard	IEC 60947-7-1
Conductor cross section rigid	0.2 mm² ... 10 mm²
Cross section AWG	24 ... 8 (converted acc. to IEC)
Conductor cross section flexible	0.2 mm² ... 10 mm²
Conductor cross section, flexible [AWG]	24 ... 8 (converted acc. to IEC)
Conductor cross-section flexible (ferrule without plastic sleeve)	0.25 mm² ... 6 mm²
Flexible conductor cross section (ferrule with plastic sleeve)	0.25 mm² ... 6 mm²
2 conductors with same cross section, solid	0.2 mm² ... 2.5 mm²
2 conductors with same cross section, flexible	0.2 mm² ... 2.5 mm²
2 conductors with same cross section, flexible, with ferrule without plastic sleeve	0.25 mm² ... 1.5 mm²
2 conductors with the same cross section, flexible, with TWIN ferrule with plastic sleeve	0.5 mm² ... 4 mm²
Thermal continuous current I_{th}	20 A
Maximum load current	20 A (with 10 mm² conductor cross section)
Nominal voltage	500 V
Nominal cross section	2.5 mm²

Dimensions

Width	8.2 mm

Height	57.8 mm
Height NS 35/15	56.6 mm
Height NS 35/7,5	49.1 mm
Length	57.8 mm

Material specifications

Color	gray
Flammability rating according to UL 94	V0
Insulating material group	I
Insulating material	PA
Static insulating material application in cold	-60 °C
Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	125 °C
Relative insulation material temperature index (Elec., UL 746 B)	130 °C
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3
Calorimetric heat release NFPA 130 (ASTM E 1354)	27,5 MJ/kg
Surface flammability NFPA 130 (ASTM E 162)	passed
Specific optical density of smoke NFPA 130 (ASTM E 662)	passed
Smoke gas toxicity NFPA 130 (SMP 800C)	passed

Electrical tests

Surge voltage test

Test voltage setpoint	7.3 kV
Result	Test passed

Temperature-rise test

Requirement temperature-rise test	Increase in temperature ≤ 45 K
Result	Test passed
Short-time withstand current 2.5 mm²	0.3 kA
Result	Test passed

Power-frequency withstand voltage

Test voltage setpoint	1.89 kV
Result	Test passed

Mechanical properties

Mechanical data

Open side panel	No

Mechanical tests

Mechanical strength

Result	Test passed

Attachment on the carrier

DIN rail/fixing support	NS 35
Test force setpoint	5 N
Result	Test passed

Test for conductor damage and slackening

Rotation speed	10 rpm
Revolutions	135
Conductor cross section/weight	0.2 mm² / 0.2 kg
	6 mm² / 1.4 kg
	10 mm² / 2 kg
Result	Test passed

Environmental and real-life conditions

Needle-flame test

Time of exposure	30 s
Result	Test passed

Ambient conditions

Ambient temperature (operation)	-60 °C ... 105 °C (max. short-term operating temperature RTI Elec.)
Ambient temperature (storage/transport)	-25 °C ... 60 °C (for a short time, not exceeding 24 h, -60 °C to +70 °C)
Ambient temperature (assembly)	-5 °C ... 70 °C
Ambient temperature (actuation)	-5 °C ... 70 °C
Permissible humidity (storage/transport)	30 % ... 70 %

Standards and regulations

Connection in acc. with standard	IEC 60947-7-1

Mounting

Mounting type	NS 35/7,5
	NS 35/15

Drawings

Circuit diagram

Approvals

To download certificates, visit the product detail page: https://www.phoenixcontact.com/us/products/3064069

cULus Recognized
Approval ID: E60425

	Nominal Voltage U_N	Nominal Current I_N	Cross Section AWG	Cross Section mm^2
Use group B				
	600 V	16 A	24 - 8	-
Multi-conductor connection	600 V	16 A	24 - 12	-
Use group C				
	600 V	16 A	24 - 8	-
Multi-conductor connection	600 V	16 A	24 - 12	-

CSA
Approval ID: 13631

	Nominal Voltage U_N	Nominal Current I_N	Cross Section AWG	Cross Section mm^2
Use group B				
	600 V	16 A	24 - 8	-
Use group C				
	600 V	16 A	24 - 8	-

EAC
Approval ID: RU C-DE.BL08.B.00534

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F-S4Ø

UT 6-HESILED 24 (6,3X32) - Fuse modular terminal block

3046414

https://www.phoenixcontact.com/us/products/3046414

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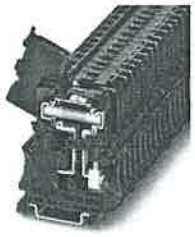

Fuse modular terminal block, fuse type: Glass / ceramics / ..., fuse type: G / 6,3 x 32, nom. voltage: 24 V, nominal current: 10 A, connection method: Screw connection, Rated cross section: 6 mm^2, cross section: 0.2 mm^2- 10 mm^2, mounting type: NS 35/7,5, NS 35/15, color: black

Your advantages

- An extremely compact design
- Test connection on both sides in safety lever
- Tested for railway applications

Commercial Data

Item number	3046414
Packing unit	1 pc
Minimum order quantity	50 pc
Sales Key	BE01
Product Key	BE1134
Catalog Page	Page 173 (C-1-2019)
GTIN	4046356055819
Weight per Piece (including packing)	25.09 g
Weight per Piece (excluding packing)	25.09 g
Customs tariff number	85369095
Country of origin	PL

FS40

UT 6-HESILED 24 (6,3X32) - Fuse modular terminal block

3046414

https://www.phoenixcontact.com/us/products/3046414

Technical Data

Notes

General	The current is determined by the fuse used, the voltage by the selected LED. If the fuse is faulty, the downstream circuit will not be disconnected.

Product properties

Product type	Fuse terminal block
Area of application	Railway industry Machine building Plant engineering
Number of connections	2
Number of rows	1
Potentials	1

Insulation characteristics

Overvoltage category	III
Degree of pollution	3

Electrical properties

Fuse type	Glass / ceramics / ...
Rated surge voltage	6 kV
Maximum power dissipation for nominal condition	1.31 W
Fuse	G / 6,3 x 32
LED voltage range	12 V AC/DC ... 30 V AC/DC
Maximum current with single arrangement	10 A
LED current range	0.31 mA ... 0.95 mA
Maximum power dissipation	max. 1.6 W (with single arrangement of the fuse terminal block in the event of overload) max. 1.6 W (With interconnected arrangement of several fuse terminal blocks in the event of overload) max. 4 W (with single arrangement of the fuse terminal block in the event of a short-circuit) max. 2.5 W (With interconnected arrangement of several fuse terminal blocks in the event of a short-circuit)

Input data

LED voltage range	12 V AC/DC ... 30 V AC/DC

Connection data

Number of connections per level	2
Nominal cross section	6 mm²

Level 1 above 1 below 1

Screw thread	M4

FS40

UT 6-HESILED 24 (6,3X32) - Fuse modular terminal block

3046414

https://www.phoenixcontact.com/us/products/3046414

Tightening torque	1.5 ... 1.8 Nm
Stripping length	10 mm
Internal cylindrical gage	A5
Connection in acc. with standard	IEC 60947-7-3
Conductor cross section rigid	0.2 mm² ... 10 mm²
Cross section AWG	24 ... 8 (converted acc. to IEC)
Conductor cross section flexible	0.2 mm² ... 10 mm²
Conductor cross section, flexible [AWG]	24 ... 8 (converted acc. to IEC)
Conductor cross-section flexible (ferrule without plastic sleeve)	0.25 mm² ... 6 mm²
Flexible conductor cross section (ferrule with plastic sleeve)	0.25 mm² ... 6 mm²
2 conductors with same cross section, solid	0.2 mm² ... 2.5 mm²
2 conductors with same cross section, flexible	0.2 mm² ... 2.5 mm²
2 conductors with same cross section, flexible, with ferrule without plastic sleeve	0.25 mm² ... 1.5 mm²
2 conductors with the same cross section, flexible, with TWIN ferrule with plastic sleeve	0.5 mm² ... 4 mm²
Nominal current	10 A
Maximum load current	10 A (the current is determined by the fuse used)
Nominal voltage	24 V
Nominal cross section	6 mm²

Dimensions

Width	8.2 mm
Height	57.8 mm
Height NS 35/15	80.5 mm
Height NS 35/7,5	73 mm
Length	57.8 mm

Material specifications

Color	black
Flammability rating according to UL 94	V0
Insulating material group	I
Insulating material	PA
Static insulating material application in cold	-60 °C
Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	125 °C
Relative insulation material temperature index (Elec., UL 746 B)	130 °C
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3
Calorimetric heat release NFPA 130 (ASTM E 1354)	27,5 MJ/kg
Surface flammability NFPA 130 (ASTM E 162)	passed
Specific optical density of smoke NFPA 130 (ASTM E 662)	passed
Smoke gas toxicity NFPA 130 (SMP 800C)	passed

FS40

UT 6-HESILED 24 (6,3X32) - Fuse modular terminal block

3046414

https://www.phoenixcontact.com/us/products/3046414

Mechanical properties

Mechanical data

Open side panel	No

Environmental and real-life conditions

Ambient conditions

Ambient temperature (operation)	-60 °C ... 105 °C (max. short-term operating temperature RTI Elec.)
Ambient temperature (storage/transport)	-25 °C ... 60 °C (for a short time, not exceeding 24 h, -60 °C to +70 °C)
Ambient temperature (assembly)	-5 °C ... 70 °C
Ambient temperature (actuation)	-5 °C ... 70 °C
Permissible humidity (storage/transport)	30 % ... 70 %

Standards and regulations

Connection in acc. with standard	IEC 60947-7-3

Mounting

Mounting type	NS 35/7,5 NS 35/15

FS40

UT 6-HESILED 24 (6,3X32) - Fuse modular terminal block

3046414

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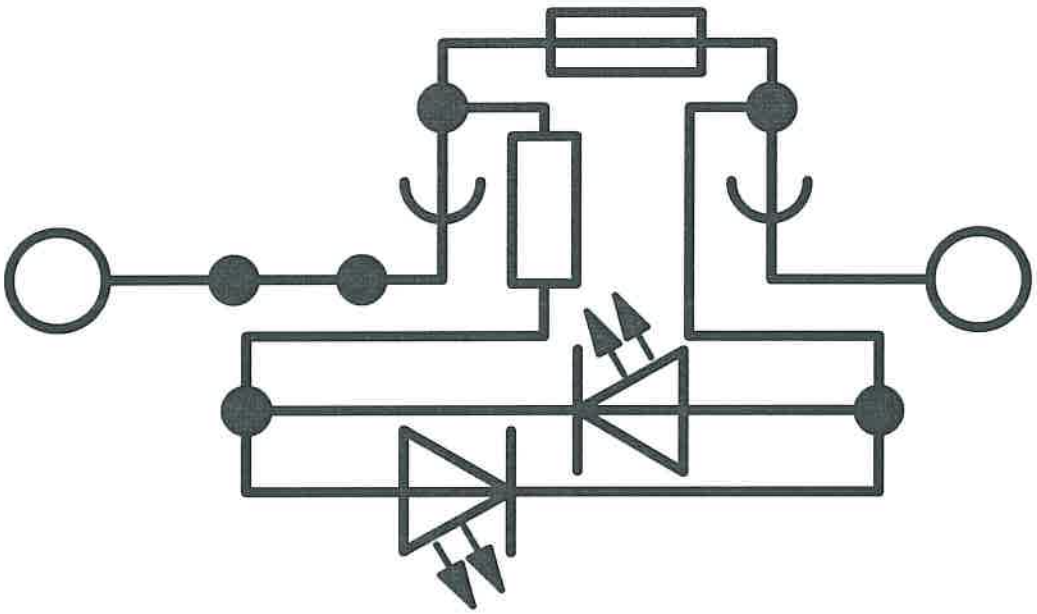
Circuit diagram



FS4 ø

UT 6-HESILED 24 (6,3X32) - Fuse modular terminal block

3046414

https://www.phoenixcontact.com/us/products/3046414

Approvals

To download certificates, visit the product detail page: https://www.phoenixcontact.com/us/products/3046414

CSA
Approval ID: 13631

	Nominal Voltage U_N	Nominal Current I_N	Cross Section AWG	Cross Section mm^2
Use group B				
	600 V	10 A	24 - 8	-
Use group C				
	600 V	10 A	24 - 8	-

IECEE CB Scheme
Approval ID: NL-23159_A1

	Nominal Voltage U_N	Nominal Current I_N	Cross Section AWG	Cross Section mm^2
	24 V	10 A	-	0.2 - 6

EAC
Approval ID: RU C-DE.A*30.B.01742

cULus Recognized
Approval ID: E60425

	Nominal Voltage U_N	Nominal Current I_N	Cross Section AWG	Cross Section mm^2
Use group B				
	600 V	10 A	24 - 8	-
Disconnect terminal block function	600 V	16 A	24 - 8	-
Use group C				
	600 V	10 A	24 - 8	-
Disconnect terminal block function	600 V	16 A	24 - 8	-

KEMA-KEUR
Approval ID: 71-104946

	Nominal Voltage U_N	Nominal Current I_N	Cross Section AWG	Cross Section mm^2
	24 V	10 A	-	0.2 - 6

RS
Approval ID: 22.44.01.00083.250

ESS

DT-LAN-CAT.6+ - Surge protection device

2881007

https://www.phoenixcontact.com/us/products/2881007

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Surge protection in accordance with Class E_A ($CAT6_A$), for Gigabit Ethernet (up to 10 Gbps), token ring, FDDI/CDDI, ISDN, and DS1. Suitable for Power over Ethernet (PoE++ / 4PPoE) "Mode A" and "Mode B". RJ45 attachment plug with separate grounding cable and ground connection snap-on foot for NS 35 DIN rails.

Your advantages

- Can be used in applications up to 10 Gbps with adapted protective circuit
- High power transmission with PoE++ / 4PPoE support
- Easy network integration via RJ45 jacks
- Can be installed in a control cabinet by removing the ground connection adapter

Commercial Data

Item number	2881007
Packing unit	1 pc
Minimum order quantity	1 pc
Sales Key	CL24
Product Key	CL3112
Catalog Page	Page 142 (C-4-2017)
GTIN	4046356151900
Weight per Piece (including packing)	314.857 g
Weight per Piece (excluding packing)	314.1 g
Customs tariff number	85363010
Country of origin	DE

DT-LAN-CAT.6+ - Surge protection device

2881007

https://www.phoenixcontact.com/us/products/2881007

Technical Data

Product properties

IEC test classification	B2
	C1
	C2
	C3
	D1
Type	Attachment plug for DIN rail mounting
Product type	Surge protection for information technology
Product family	DATATRAB
Number of positions	8
Wire pairs per module	4

Insulation characteristics

Overvoltage category	II
Pollution degree	2

Connection data

Connection method	RJ45

Dimensions

Dimensional drawing

Width	25 mm
Height	102 mm
Depth	63.5 mm

Material specifications

Color	Silver
Housing material	Zinc die-cast

Mechanical properties

Mechanical data

Open side panel	No

Protective circuit

Direction of action	Line-Line & Line-Ground/Shield
Maximum continuous voltage U_C (line-line)	≤ 3.3 V DC (±60 V DC / PoE)

Rated current	≤ 1.5 A (25 °C)
Operating effective current I_C at U_C	≤ 1 µA
Residual current I_{PE}	≤ 400 µA
Nominal discharge current I_n (8/20) µs (line-line)	100 A
Nominal discharge current I_n (8/20) µs (line-ground)	2 kA (per signal pair)
Pulse discharge current I_{imp} (10/350) µs (line-earth)	1 kA
Total discharge current I_{totlal} (8/20) µs	10 kA
Nominal pulse current Ian (10/700) µs (line-line)	≤ 40 A
Nominal pulse current Ian (10/700) µs (line-earth)	≤ 160 A
Output voltage limitation at 1 kV/µs (line-line) spike	≤ 85 V (PoE)
Output voltage limitation at 1 kV/µs (line-earth) spike	≤ 700 V
Output voltage limitation at 1 kV/µs (line-line) static	≤ 9 V
Output voltage limitation at 1 kV/µs (line-earth) static	≤ 700 V
Residual voltage at I_n (conductor-conductor)	≤ 15 V
	≤ 100 V (PoE)
Voltage protection level U_p (line-line)	≤ 9 V (B2 - 1 kV / 25 A)
	≤ 100 V (B2 - 1 kV / 25 A - PoE)
	≤ 12 V (C3 - 20 A)
Voltage protection level U_p (line-earth)	≤ 900 V (B2 - 4 kV / 100 A)
	≤ 700 V (C2 - 4 kV / 2 kA)
	≤ 1 kV (C3 - 80 A)
Response time t_A (line-line)	≤ 1 ns
Response time t_A (line-earth)	≤ 100 ns
Input attenuation aE, sym.	≤ 1 dB (up to100 MHz/direct measuring)
	≤ 1 dB (up to 250 MHz/direct measuring)
	≤ 3 dB (up to 500 MHz/direct measuring)
Near-end crosstalk attenuation	≥ 35 dB (250 MHz/100 Ω/link)
	≥ 45 dB (100 MHz / 100 Ω / Link)
	≥ 27 dB (500 MHz / 100 Ω / Link)
	≥ 39 dB (250 MHz/100 Ω/direct measuring)
Capacity (Core-Core)	typ. 12 pF (f= 1 MHz / VR= 0 V)
Capacity (Core-Earth)	typ. 2 pF (f= 1 MHz / VR= 0 V)
Surge protection fault message	none
Impulse durability (line-line)	B2 - 1 kV / 25 A
	C3 - 20 A
Impulse durability (line-earth)	B2 - 4 kV / 100 A
	C2 - 4 kV / 2 kA
	C3 - 80 A
	D1 - 1 kA

Environmental and real-life conditions

Ambient conditions

Degree of protection	IP20

Ambient temperature (operation)	-40 °C ... 70 °C
Ambient temperature (storage/transport)	-40 °C ... 70 °C
Altitude	≤ 4000 m (amsl)
Permissible humidity (operation)	5 % ... 85 %

Standards and regulations

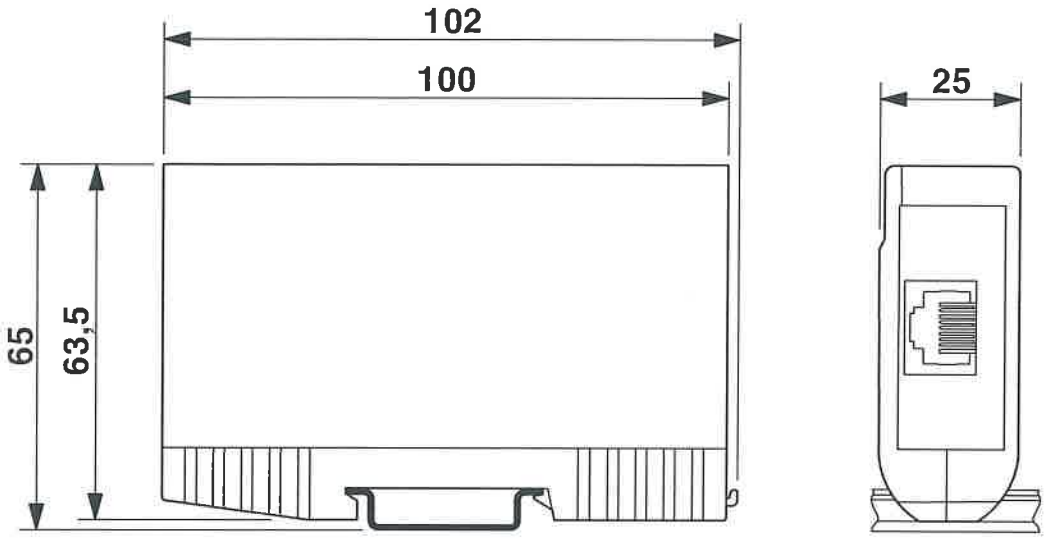
Standards/specifications	IEC 61643-21
Standards/specifications	EN 50173-1
Standards/specifications	ISO/IEC 11801-Am.1

Mounting

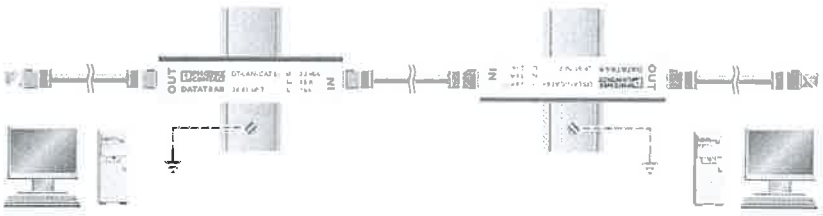
Mounting type	Connection-specific attachment plug and DIN rail, 35 mm

Drawings

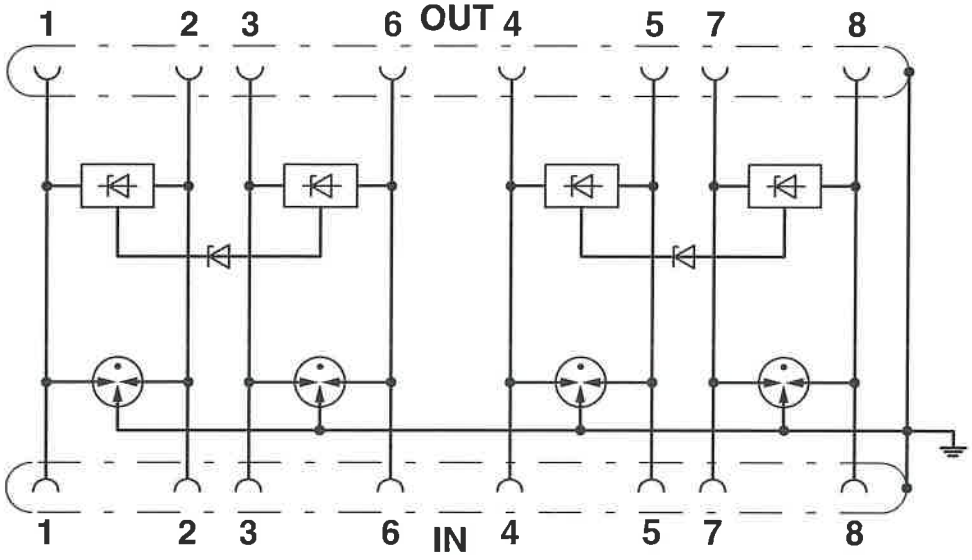
Dimensional drawing



Application drawing



Circuit diagram



Approvals

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EAC
Approval ID: EAC-Zulassung

EAC
Approval ID: RU C-DE.*09.B.00169

UL Listed
Approval ID: FILE E 138168

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ES

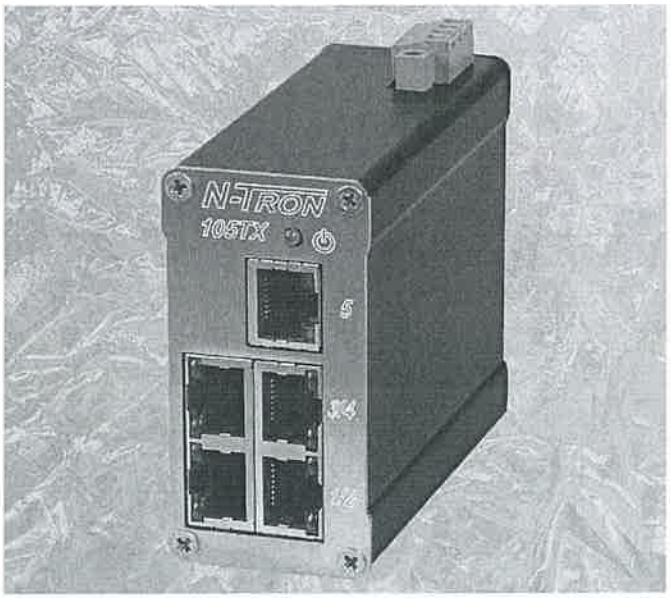
105TX Industrial Ethernet Switch

N-Tron Networking Series

red lion®

Unmanaged Industrial Ethernet Switch

The *N-TRON® 105TX* is a low cost unmanaged five port Industrial Ethernet Switch. It is housed in a hardened, metal, DIN-Rail enclosure, and is designed for use in mission critical data acquisition, control, and Ethernet I/O applications.



PRODUCT FEATURES

- Compact, Space Saving Package
- Full IEEE 802.3 Compliance
- American Burcau of Shipping (ABS) Type Approval
- EN50155 for Railway applications
- Five 10/100BaseTX RJ-45 Ports
- Unmanaged Operation
- Extended Environmental Specifications
  - -40°C to 80°C Operating Temperature
  - >2M Hours MTBF
- Supports Full/Half Duplex Operation
- Up to 1.0Gbs Maximum Throughput
- MDIX Auto Sensing Cable
- Auto Sensing Speed and Flow Control
- Full Wire Speed Communications
- Store-and-forward Technology
- Redundant Power Inputs (10-30 VDC)
- LED Link/Activity Status Indication
- Hardened Metal DIN-Rail Enclosure

PRODUCT OVERVIEW

The *105TX* Industrial Network Switch is designed to solve the most demanding industrial communication requirements while providing high throughput and minimum downtime.

The *105TX* provides five RJ-45 auto sensing 10/100BaseTX ports. All ports are full/half duplex capable, using "state of the art" Ethernet switching technology. The *105TX* auto-negotiates the speed and flow control capabilities of the five TX port connections, and configures itself automatically.

Since the *105TX* is auto sensing, there will be no need to make extensive wiring changes if upgrades are made to host computers, plant systems, or Ethernet I/O modules. The switching fabric simply scales up or down automatically to match specific network environments.

The *105TX* supports up to 2,000 MAC addresses, enabling these products to support extremely sophisticated and complex network architectures.

The is an ideal candidate for upgrading existing hubs and repeaters to increase bandwidth and determinism by virtually eliminating network collisions. The *N-TRON 105TX* combines affordability and the plug & play simplicity of the unmanaged hub.

The *105TX* can simplify plant wiring by eliminating the need to bring data acquisition and control network connections back to a climate controlled environment. The *105TX* has extended operating environmental specifications to meet the harsh needs of the industrial environment. For cost savings and convenience it can be DIN-Rail mounted alongside Ethernet I/O or other Industrial Equipment.

To increase reliability the *105TX* provides dual redundant power inputs. LED's are provided to display the link status and activity of each port.

industrial networking

ES

105TX Specifications

105TX SPECIFICATIONS

Case Dimensions

Height:	2.9"	(7.3cm)
Width:	1.5"	(3.8 cm)
Depth:	3.6"	(9 cm)
Weight:	0.6 lbs.	(0.28 kg)
DIN-Rail:	35mm	

Electrical

Input Voltage:	10-30 VDC
Steady Input Current:	215mA@24V
Inrush:	7.8Amp/0.7ms@24V

Environmental

Operating Temperature:	-40°C to 80°C
Storage Temperature:	-40°C to 85°C
Operating Humidity:	10% to 95% (Non Condensing)
Operating Altitude:	0 to 10,000 ft.

Shock and Vibration (bulkhead mounted)

Shock:	200g @ 10ms
Vibration/Seismic:	50g, 5-200Hz, Triaxial

Reliablity

MTBF:	>2 Million Hours

Network Media

10BaseT:	>Cat3 Cable
100BaseTX:	>Cat5 Cable

Connectors

10/100BaseTX:	Five (5) RJ-45 TX Copper Ports

Recommended Wiring Clearance

Front:	2" (5.08 cm)
Top:	1" (2.54 cm)

Ordering Information

105TX	Five 10/100BaseTX Ports
~~NTPS-24-1.3~~	~~DIN-Rail Power Supply 24V@1.3 Amp~~
~~100-MDR-1~~	~~Metal Din Rail Option*~~

* MDR option must be specified with switch order - not field upgradable

BENEFITS

Industrial Network Switch

- Compact Size / Small Footprint
- Extended Environmental Specifications
- Hardened Metal DIN-Rail Enclosure
- High Performance
- High MTBF >2M Hours
- ESD Protection Diodes on RJ-45 Ports
- Surge Protection Diodes on Power Inputs

Ease of Use

- Plug & Play Operation
- Auto Sensing 10/100BaseTX
- Auto Negotiation Full/Half Duplex
- MDIX Auto Cable Sensing
- Unmanaged Operation

Increased Performance

- Full Wire Speed Capable
- Full Duplex Capable
- Eliminates Network Collisions
- Increases Network Determinism

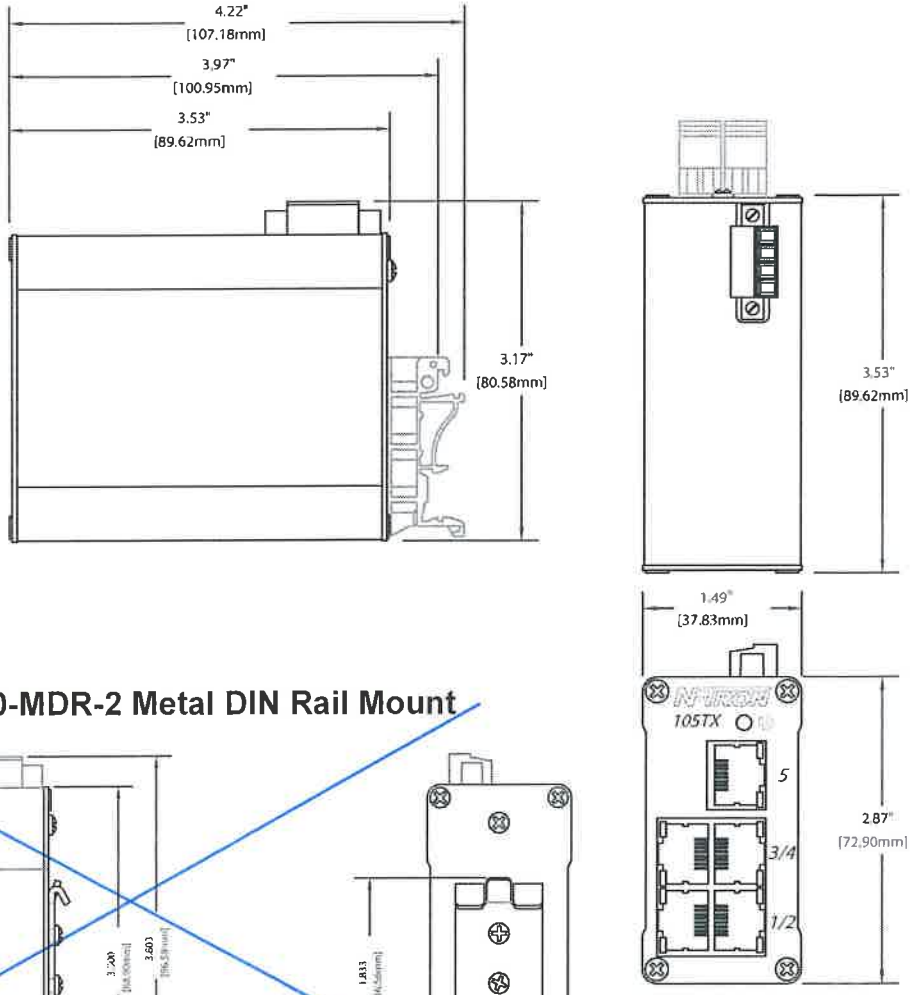
Regulatory Approvals

FCC Title 47 Part 15 Class A; ICES-003- Class A
CE: EN61000-6-2,4; EN61000-4-2,3,4,5,6; EN5501
UL Listed (US and Canada) per ANSI/ISA-12.12.01-20
Class I, Div 2, Groups A,B,C,D,T4A
GOST-R Certified
ABS Type Approval for Shipboard Applications
DNV-GL Type Approval Certification
EN50155 for Railway Applications
RoHS Compliant

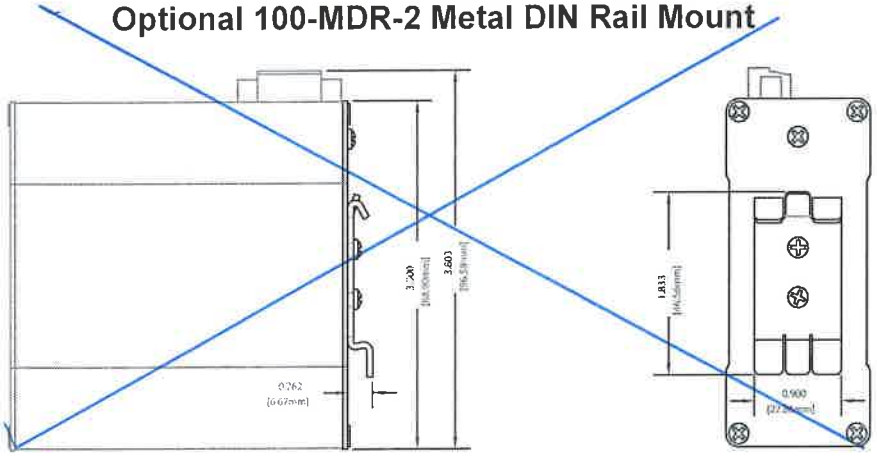
Designed to comply with:
IEEE 1613 for Electric Utility Substations
NEMA TS1/TS2 for Traffic Control Equipment

105TX Specifications

105TX with Standard DIN rail Mount



Optional 100-MDR-2 Metal DIN Rail Mount



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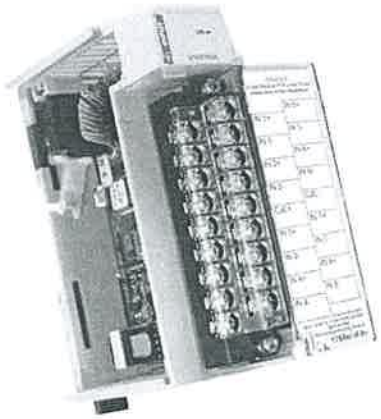
As the global experts in communication, monitoring and control for industrial automation and networking, Red Lion has been delivering innovative solutions for over forty years. Our automation, Ethernet and cellular M2M technology enables companies worldwide to gain real-time data visibility that drives productivity. Product brands include Red Lion, N-Tron and Sixnet. With headquarters in York, Pennsylvania, the company has offices across the Americas, Asia-Pacific and Europe. Red Lion is part of Spectris plc, the productivity-enhancing instrumentation and controls company. For more information, please visit www.redlion.net.

PLC AI's

SPECTRUM CONTROLS

1769sc-IF8u
8-Channel Universal Analog Input Module

for Allen-Bradley CompactLogix™ and MicroLogix™ 1500 PLCs



- Eight channels of voltage, current and thermocouple or 4 channels of RTD/resistance input provide a flexible solution for applications requiring mixed analog input.
- Any combination of input types may be used at one time.
- Features 500 Vdc channel-to-backplane isolation; 500 Vdc channel-to-chassis ground isolation; 10 Vdc channel-to-channel isolation.
- Easily configured by ladder register settings and on-board jumpers.
- Channel selectable filtering for maximum speed with minimum noise.
- Fully auto-calibrating for best possible accuracy.
- Cold junction compensation included for thermocouples.
- Low power consumption.

Reduce System Costs

The 1769sc-IF8u can reduce system costs replacing dedicated analog I/O modules with one module. The 1769sc-IF8u module can replace analog input, thermocouple and RTD modules without compromising performance. Mix and match input types to reduce your analog I/O module count. Installation is simplified and costs are reduced by using a common I/O within your system.

State-of-the-Art Features

The broad variety of input types and configuration options provide unsurpassed flexibility and simplify integration. Features such as input type, open circuit detection, high and low range alarms are individually programmable for each channel. Accuracy is comparable to dedicated analog input modules. The module incorporates proprietary Allen-Bradley ASIC technology insuring operation and performance mirror existing Allen-Bradley products. Configuration is accomplished using existing programming software.

The Spectrum Controls 1769sc-IF8u is compatible with Allen-Bradley MicroLogix 1500 and CompactLogix controllers. It offers the functionality of dedicated analog input modules without compromising performance or price.

ROCKWELL AUTOMATION ENCOMPASS GLOBAL PARTNER

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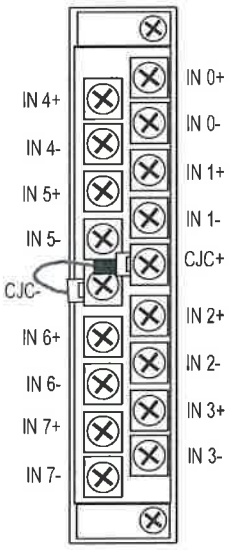
Web Site: www.spectrumcontrols.com • E-mail: spectrum@spectrumcontrols.com

PLC AI's

1769sc-IF8u
8-Channel Universal Analog Input Module

for Allen-Bradley CompactLogix™ and MicroLogix 1500 PLCs

1769sc-IF8u Wiring



Inputs per Module	8 (eight) V,C,TC; 4 (four) RTD, Resistance
Module Location	CompactLogix 1769 , MicroLogix 1500
Input Types Thermocouple RTD Resistance Current Voltage	 J, K, T, B, E, R, S, N, C PT385/3916, Ni618/672, NiFe518, Cu 426 0-150, 0-1000, 0-3000 ohm 0-20 mA, 4-20 mA ±50mV, ±100mV, 0-5V, 1-5V, 0-10V, ±10V
Advanced Features	6 filter frequencies (individually selectable by channel); fully auto-calibration; on-board error checking; open circuit detection for most input types
Update Times* With eight channels enabled * = TC update times may be longer	2.44 sec @ 10 Hz 0.53 sec @ 50 Hz 0.45 sec @ 60 Hz 0.15 sec @ 250 Hz 0.09 sec @ 500 Hz 0.07 sec @ 1000 Hz
Communication Formats	16-bit two's complement Engineering units, Engineering units x10 Scaled for PID, Proportional Count
Electrical Isolation (continuous)	±10 Vdc channel-to-channel 500 Vdc field-wiring-to-backplane 500 Vdc field-wiring-to-chassis-ground
Input Impedance	>10 Mohm Thermocouple, Voltage, RTD <250 ohm, Current
Input Overvoltage Protection	+30 Vdc continuous
Input Overcurrent Protection	28mA continuous
Common Mode Rejection	115 dB @ 50/60 Hz
Normal Mode Rejection	85 dB @ 50/60 Hz
Backplane Current Required	45 mA @ 24 V max 150 mA @ 5 V max
Thermal Dissipation	3.00 Watts, maximum
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity	 0° to 60°C (32° to 140°F) -45° to 85°C (-49° to 185°F) 5 to 95% (non-condensing)
Certifications	UL/cUL (Class I, Div 2, Groups ABCD) and CE
Recommended Cable	For TC inputs: Shielded, twisted-pair TC extension wire For RTD, mV, V or mA inputs: Belden 8761 or equivalent

SPECTRUM CONTROLS

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ROCKWELL AUTOMATION ENCOMPASS GLOBAL PARTNER

Printed in USA. Publication 0100107-01 Rev B 6/09

LT1, LT2

Enclosure LED Lights Magnet or Screw Mounted

Magnet mount

Applications

- Suitable for all types of panels and enclosures, especially where space is at a premium
- Suitable for daisy-chaining
- Allows for up to 10 lights to be connected to each other

Features

- Energy saving LED technology
- Available with magnet or screw mounts allowing them to be easily positioned in any enclosure
- Magnet mount has powerful non-slip rubberized magnets and work on ferrous steel only
- Wide voltage range

Listings

- UL File No. E234324
- CE, VDE, EAC

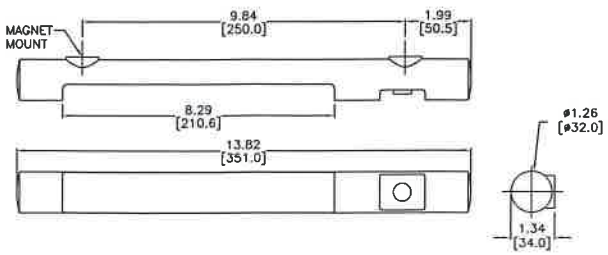
Screw mount

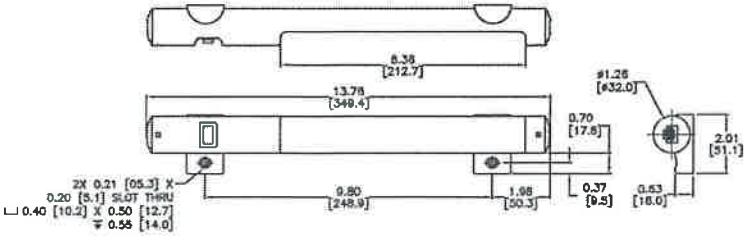
Enclosure LED Lights Specifications	
Power Consumption	Max. 5W (~75 W incandescent bulb)
Luminosity	400 Lm at 120° (1,200 Lm at 360° or equivalent 95 W light bulb)
Lamp Type	LED, 120° angle of radiation light color – daylight, color temperature – 6,000 to 7,000 K
Service Life	60,000 hrs. at 68°F [20°C]
Connection	2-pole plug with snap lock (order separately)
Housing	plastic, transparent
Mounting	Magnet or M5 screws (not included), 9.8" (250 mm) centers
Operating / Storage Temperature	-22 to 140°F [-30 to 60°C] / -40 to 185°F [-40 to 85°C]
Operating / Storage Humidity	max. 90% RH (non-condensing)
Protection Class	II (double insulated)
Protection Type	IP20
Approvals	CE, UL Recognized File No.: E234324, VDE, EAC, RoHS 2 compliant

Enclosure LED Lights					
Magnet Mount	*Price*	*Screw Mount*	*Price*	*Operating Voltage*	*Switch Type*
~~025400-00~~	$107.00	025400-01	$93.00	100-240 VAC, 50/60 Hz (min. 90 VAC, max. 265 V)	On/Off Switch[2]
~~025401-00~~	$162.00	025401-01	$149.00	24-48 VDC (min. 20 VDC, max. 60 VDC)	
~~025410-00~~	$181.00	025410-01	$168.00	100-240 VAC, 50/60 Hz (min. 90 VAC, max. 265 V)	PIR Motion Sensor[1,3]
~~025411-00~~	$248.00	025411-01	$235.00	24-48 VDC (min. 20 VDC, max. 60 VDC)	

Notes: [1]Passive Infrared (PIR) motion sensor is factory preset to turn the light OFF five minutes after all action ceases.
[2]Weight: 0.30 lb [135 g]
[3]Weight: 0.31 lb [140 g]

Dimensions





LT1, LT2

Enclosure Accessories – LED Light Accessories

Power cable with input connector and wire leads

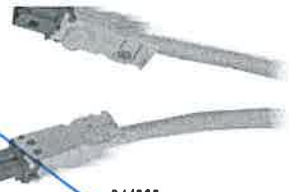
244357

244361

Part Number	Price	Description	Length	Voltage	Color
244357	$28.00	Connection cable 2 x 15 AWG with input connector	6.5 ft (2.0 m)	AC	Connectors: white; Cable: white
244361	$28.00	Connection cable 2 x 15 AWG with input connector		DC	Connectors: blue; Cable: white

Extension cable with 2 connectors for daisy chain (input and output) connection

244359



244363

Part Number	Price	Description	Length	Voltage	Color
244359	$33.50	Extension cable 2 x 15 AWG with 2 connectors	3.2 ft (1.0 m)	AC	Connectors: white; Cable: white
244363	$33.50	Extension cable 2 x 15 AWG with 2 connectors		DC	Connectors: blue; Cable: white

Power Input and Output Connectors

(Field Wireable)

264057 and 264058

264059 and 264060

Part Number	Price	Description	Voltage	Color
264057	$9.00	Input connector	AC	White
264058	$8.50	Output connector		
264059	$9.00	Input connector	DC	Blue
264060	$8.50	Output connector		

1000 Eaton Boulevard
Cleveland, OH 44122
United States

Cat5e 350 MHz Snagless Molded (UTP) Ethernet Cable (RJ45 M/M), PoE - Blue, 1 ft. (0.31 m)

MODEL NUMBER: **N001-001-BL**

Highlights

- Premium cabling for Category 5 and 5e applications—rated for 350 MHz/1 Gbps communications
- IEEE 802.3ab
- PVC 4-pair stranded UTP
- All cables feature boots with integral strain-relief and RJ45 (Male) connectors

System Requirements

- For 1000Base-T (1Gbps Ethernet), 10/100Base-T (Ethernet), 100 Mbps TPDDI, 155 Mbps ATM, ISDN, voice and Token Ring Type3 applications.

Package Includes

- 1-ft. (0.31 m) Blue Snagless Cat5e Patch Cable

Description

Tripp Lite's 1-ft. (0.31 m) Blue snagless category 5e (Cat5e) patch cable has 2 snagless RJ45 molded male connectors featuring integral strain relief. The cable is manufactured from PVC 4-pair stranded UTP and is rated for 350MHz/1Gbps communication. All cables are offered in a variety of lengths and colors for all category 5 (Cat5) and 5e cabling needs. Standard, non-snagless category 5e patch cables are also available (N002-Series).

Features

- Cabling for category 5 (Cat5) and 5e (Cat5e) applications
- Length: 1-ft. (0.31 m) color: Blue connectors: RJ45 male
- Feature molded connectors with integral strain relief
- Snagless design protects the locking tabs on the RJ45 connectors from being damaged or snapped off during installation
- PVC 4-pair stranded UTP
- Rated for 350MHz/ 1Gbps communication
- Meets most current industry standards including IEEE 802.3ab, IEEE 802.5, ANSI/EIA/TIA 568, ISO/IEC 11801 and ETL (category 5e draft 11)
- Available in other colors and lengths
- Also available without the snagless feature (N002-Series)
- Also available - Cat6 cables (N201-Series)

Specifications

OVERVIEW	
UPC Code	037332172426
Technology	Cat5/5e

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POWER	
Power Over Cable (PoC) Support	No
PHYSICAL	
Cable Jacket Color	Blue
Cable Jacket Material	PVC
Cable Jacket Rating	CM
Cable Shielding	UTP
Cable Outer Diameter (OD)	5.0 mm
Number of Conductors	4 Pair
Conductor Material	Stranded Copper
Conductor Gauge	26 AWG
Cable Length (ft.)	1
Cable Length (m)	0.30
Cable Length (in.)	12
Cable Length (cm)	30.5
Shipping Dimensions (hwd / in.)	9.00 x 7.00 x 0.50
Shipping Dimensions (hwd / cm)	22.86 x 17.78 x 1.27
Shipping Weight (lbs.)	0.06
Shipping Weight (kg)	0.03
ENVIRONMENTAL	
Operating Temperature Range	14 to 104 F (-10 to 40 C)
Storage Temperature Range	5 to 122 F (-15 to 50 C)
Operating Humidity Range	0% to 90% RH, Non-Condensing
Storage Humidity Range	0% to 90% RH, Non-Condensing
COMMUNICATIONS	
Bandwidth per TIA Standard	100 MHz
Maximum Bandwidth as Tested	350 MHz
Network Compatibility	1 Gbps (Gigabit)
IEEE Standards Supported	802.3ab; 802.3at
CONNECTIONS	
Side A - Connector 1	RJ45 (MALE)
Side B - Connector 1	RJ45 (MALE)

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Crossover Wiring	No
Contact Plating	Gold
PoE Type	Type 2 PoE+ (30W, IEEE 802.3at)
Connector Type	Molded; Snagless
Wiring Configuration	EIA/TIA 568B
Angled Connector	No
FEATURES & SPECIFICATIONS	
IP68 Rated	No
Snagless Connector	No
Antibacterial	No
IP20 Rated	No
STANDARDS & COMPLIANCE	
Product Certifications	UL Listed; cUL Listed
Product Compliance	CE (Europe); RoHS; IEEE 802.3ab 1000Base-T; IEEE 802.3at PoE+; REACH; UKCA
WARRANTY & SUPPORT	
Product Warranty Period (Worldwide)	Lifetime limited warranty

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Cat5e 350 MHz Snagless Molded (UTP) Ethernet Cable (RJ45 M/M), PoE - Blue, 7 ft. (2.13 m)

MODEL NUMBER: **N001-007-BL**

Highlights

- Premium cabling for Category 5 and 5e applications—rated for 350 MHz/1 Gbps communications
- IEEE 802.3ab
- PVC 4-pair stranded UTP
- All cables feature boots with integral strain-relief and RJ45 (Male) connectors

System Requirements

- For 1000Base-T (1Gbps Ethernet), 10/100Base-T (Ethernet), 100 Mbps TPDDI, 155 Mbps ATM, ISDN, voice and Token Ring Type3 applications.

Package Includes

- 7-ft. (2.13 m) Blue Snagless Cat5e Patch Cable

Description

Tripp Lite's 7-ft. (2.13 m) blue snagless category 5e (Cat5e) patch cable has 2 snagless RJ45 molded male connectors featuring integral strain relief. The cable is manufactured from PVC 4-pair stranded UTP and is rated for 350MHz/1Gbps communication. All cables are offered in a variety of lengths and colors for all category 5 (Cat5) and 5e cabling needs. Standard category 5e patch cables are also available.

Features

- Cabling for category 5 (Cat5) and 5e (Cat5e) applications
- Length: 7-ft. (2.13 m) color: blue connectors: RJ45 male
- Feature molded connectors with integral strain relief
- Snagless design protects the locking tabs on the RJ45 connectors from being damaged or snapped off during installation
- PVC 4-pair stranded UTP
- Rated for 350MHz/ 1Gbps communication
- Meets most current industry standards including IEEE 802.3ab, IEEE 802.5, ANSI/EIA/TIA 568, ISO/IEC 11801 and ETL (category 5e draft 11)
- Available in other colors and lengths
- Also available without the snagless feature (N002 series)
- Also available - Cat6 cables (N201 series)

Specifications

OVERVIEW	
UPC Code	037332042484
Technology	Cat5/5e

1000 Eaton Boulevard
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POWER	
Power Over Cable (PoC) Support	No
PHYSICAL	
Cable Jacket Color	Blue
Cable Jacket Material	PVC
Cable Jacket Rating	CM
Cable Shielding	UTP
Cable Outer Diameter (OD)	5.0 mm
Number of Conductors	4 Pair
Conductor Material	Stranded Copper
Conductor Gauge	26 AWG
Cable Length (ft.)	7
Cable Length (m)	2.13
Cable Length (in.)	84
Cable Length (cm)	213.4
Shipping Dimensions (hwd / in.)	9.00 x 7.00 x 0.50
Shipping Dimensions (hwd / cm)	22.86 x 17.78 x 1.27
Shipping Weight (lbs.)	0.15
Shipping Weight (kg)	0.07
Unit Dimensions (hwd / in.)	0.000 x 0.000 x 0.000
ENVIRONMENTAL	
Operating Temperature Range	14° to 104°F (-10° to 40°C)
Storage Temperature Range	5° to 122°F (-15° to 50°C)
Operating Humidity Range	0% to 90% RH, Non-Condensing
Storage Humidity Range	0% to 90% RH, Non-Condensing
COMMUNICATIONS	
Bandwidth per TIA Standard	100 MHz
Maximum Bandwidth as Tested	350 MHz
Network Compatibility	1 Gbps (Gigabit)
IEEE Standards Supported	802.3ab; 802.3at
CONNECTIONS	
Side A - Connector 1	RJ45 (MALE)

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Side B - Connector 1	RJ45 (MALE)
Crossover Wiring	No
Contact Plating	Gold
PoE Type	Type 2 PoE+ (30W, IEEE 802.3at)
Connector Type	Molded; Snagless
Wiring Configuration	EIA/TIA 568B
Angled Connector	No
FEATURES & SPECIFICATIONS	
Antibacterial	No
IP68 Rated	No
Snagless Connector	No
IP20 Rated	No
STANDARDS & COMPLIANCE	
Product Certifications	UL Listed; cUL Listed
Product Compliance	CE (Europe); RoHS; IEEE 802.3ab 1000Base-T; IEEE 802.3at PoE+; REACH; UKCA
WARRANTY & SUPPORT	
Product Warranty Period (Worldwide)	Lifetime limited warranty

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Cat5e 350 MHz Snagless Molded (UTP) Ethernet Cable (RJ45 M/M), PoE - Blue, 10 ft. (3.05 m)

MODEL NUMBER: **N001-010-BL**

Highlights

- Premium cabling for Category 5 and 5e applications—rated for 350 MHz/1 Gbps communications
- IEEE 802.3ab
- PVC 4-pair stranded UTP
- All cables feature boots with integral strain-relief and RJ45 (Male) connectors

System Requirements

- For 1000Base-T (1Gbps Ethernet), 10/100Base-T (Ethernet), 100 Mbps TPDDI, 155 Mbps ATM, ISDN, voice and Token Ring Type3 applications.

Package Includes

- 10-ft. (3.05 m) Blue Snagless Cat5e Patch Cable

Description

Tripp Lite's 10-ft. (3.05 m) blue snagless category 5e (Cat5e) patch cable has 2 snagless RJ45 molded male connectors featuring integral strain relief. The cable is manufactured from PVC 4-pair stranded UTP and is rated for 350MHz/1Gbps communication. All cables are offered in a variety of lengths and colors for all category 5 (Cat5) and 5e cabling needs. Standard category 5e patch cables are also available.

Features

- Cabling for category 5 (Cat5) and 5e (Cat5e) applications
- Length: 10-ft. (3.05 m) color: blue connectors: RJ45 male
- Feature molded connectors with integral strain relief
- Snagless design protects the locking tabs on the RJ45 connectors from being damaged or snapped off during installation
- PVC 4-pair stranded UTP
- Rated for 350MHz/ 1Gbps communication
- Meets most current industry standards including IEEE 802.3ab, IEEE 802.5, ANSI/EIA/TIA 568, ISO/IEC 11801 and ETL (category 5e draft 11)
- Available in other colors and lengths
- Also available without the snagless feature (N002 series)
- Also available - Cat6 cables (N201 series)

Specifications

OVERVIEW	
UPC Code	037332042545
Technology	Cat5/5e

1000 Eaton Boulevard
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United States

POWER	
Power Over Cable (PoC) Support	No
PHYSICAL	
Cable Jacket Color	Blue
Cable Jacket Material	PVC
Cable Jacket Rating	CM
Cable Shielding	UTP
Cable Outer Diameter (OD)	5.0 mm
Number of Conductors	4 Pair
Conductor Material	Stranded Copper
Conductor Gauge	26 AWG
Cable Length (ft.)	10
Cable Length (m)	3.05
Cable Length (in.)	120
Cable Length (cm)	304.8
Shipping Dimensions (hwd / in.)	9.00 x 7.00 x 0.50
Shipping Dimensions (hwd / cm)	22.86 x 17.78 x 1.27
Shipping Weight (lbs.)	0.20
Shipping Weight (kg)	0.09
ENVIRONMENTAL	
Operating Temperature Range	14 to 104 F (-10 to 40 C)
Storage Temperature Range	5 to 122 F (-15 to 50 C)
Operating Humidity Range	0% to 90% RH, Non-Condensing
Storage Humidity Range	0% to 90% RH, Non-Condensing
COMMUNICATIONS	
Bandwidth per TIA Standard	100 MHz
Maximum Bandwidth as Tested	350 MHz
Network Compatibility	1 Gbps (Gigabit)
IEEE Standards Supported	802.3ab; 802.3at
CONNECTIONS	
Side A - Connector 1	RJ45 (MALE)
Side B - Connector 1	RJ45 (MALE)

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Crossover Wiring	No
Contact Plating	Gold
PoE Type	Type 2 PoE+ (30W, IEEE 802.3at)
Connector Type	Molded; Snagless
Wiring Configuration	EIA/TIA 568B
Angled Connector	No
FEATURES & SPECIFICATIONS	
IP68 Rated	No
Snagless Connector	No
Antibacterial	No
IP20 Rated	No
STANDARDS & COMPLIANCE	
Product Certifications	UL Listed; cUL Listed
Product Compliance	CE (Europe); RoHS; IEEE 802.3ab 1000Base-T; IEEE 802.3at PoE+; REACH; UKCA
WARRANTY & SUPPORT	
Product Warranty Period (Worldwide)	Lifetime limited warranty