

# ROCK CREEK WRRF PRIMARY CLARIFIER NO. 4 TREATMENT EXPANSION CLEAN WATER SERVICES

---

APRIL 2024

## SECTION 17710

### CONTROL SYSTEMS: PANELS, ENCLOSURES, AND PANEL COMPONENTS

#### TABLE OF CONTENTS

RESPONSE TO SUBMITTAL COMMENTS

BILL OF MATERIALS

DRAWINGS

CUT SHEETS

ENCLOSURE

SUBPANEL

GROUND BAR

PILOT DEVICES

TERMINAL BLOCK

MOUNTING RAIL

WIRING DUCT

TERMINAL BOX

INTRINSICALLY SAFE BARRIER



**OPTIMAL CONTROL SYSTEMS, INC.**

2324 Three Lakes Road SE

Albany, OR 97322

Phone: (541) 967-9323

Fax: (541) 967-9485

Project No. 0523-23SSE

# ROCK CREEK WRRF PRIMARY CLARIFIER No. 4 TREATMENT EXPANSION CLEAN WATER SERVICES

---

APRIL 2024

## SECTION 17710

### CONTROL SYSTEMS: PANELS, ENCLOSURES, AND PANEL COMPONENTS

#### RESPONSE TO SUBMITTAL COMMENTS

This submittal contains bill of materials and cut-sheets but no layout and circuit drawings. My past comments were to remove drawings such as loop and P&ID drawings that were not necessary for this submittal. Panel layout and circuit drawings are necessary and need to be in this package.

*Amended. Layout drawings are included in this submittal; wiring drawings are included in the loop and control wiring set per prior submittal comments.*

MCN-PR – Coversheet states “See attached resubmittal and response to comments on Rev 1.”, but the response is missing from the submittal. Please confirm that these comments were addressed.

*Amended. See responses to prior submittal comments below.*

MCN-NR – Fix Title Block Label for the Optimal Control Systems drawings, as they all say the drawing shows a Control Valve. Confirm that the addition of this title block to this diagram for this submittal, 17405-1.1, fulfill CWS CAD drawing standards as commented on in response to submittal 17710-1.0.

*Amended.*

MCN-NR – Delete CR-4 from rungs 4 & 16 of the control circuits for 350VFD1105 and 1106, Primary Sludge Pumps 5 and 6. VFD reset was deleted per a comment in submittal 17710-1.0.

*Amended.*

Eliminate the following from submittal: All un-necessary drawings and cutsheets, such as I002, I107, I202, I302, E004.

*Amended.*

Eliminate the following from submittal: Remove duplicate cutsheets and organize submittal so that bill of materials, panel details, and drawings will be followed by a single set of cut-sheets.

*Amended.*

Eliminate the following from submittal: Remove all blank pages as well as tables for recommended spares.

*Amended.*



**OPTIMAL CONTROL SYSTEMS, INC.**

2324 Three Lakes Road SE

Albany, OR 97322

Phone: (541) 967-9323

Fax: (541) 967-9485

Project No. 0523-23SSE

# ROCK CREEK WRRF PRIMARY CLARIFIER NO. 4 TREATMENT EXPANSION CLEAN WATER SERVICES

---

APRIL 2024

## SECTION 17710 CONTROL SYSTEMS: PANELS, ENCLOSURES, AND PANEL COMPONENTS

### RESPONSE TO SUBMITTAL COMMENTS CONT.

Eliminate the following from submittal: Is a section with clarifications of deviations necessary?

*Amended.*

Loop drawings, VFD, and MCC drawings need to be submitted under loop and control drawing set.

*Amended.*

Drawing Comments: See attached marked up drawing in file labeled "17710-1.1 drawing with comments".

*Amended.*

Drawing Comments: The "ORT1 Checkout Complete" blocks that were copied to each Optimal drawing varies in size from one drawing to another. All these blocks have been modified from the original sent to Hoyt late last year.

*Amended.*

Drawing Comments: Copy the contract drawing so that size of symbols, text, and dimensions are same as contract drawings.

*Amended.*

Drawing Comments: Fix the project name in border. Caustic Improvements?

*Amended.*

Drawing Comments: Change AWWTF to WRRF in project name block in the border.

*Amended.*

Drawing Comments: Dwg numbers on several drawings are incorrect and do not match. Follow naming instructions discussed in Notes 1 and 2 on contract drawings. What is "09" in drawing number 350JB1204-09?

*Amended.*



**OPTIMAL CONTROL SYSTEMS, INC.**

2324 Three Lakes Road SE

Albany, OR 97322

Phone: (541) 967-9323

Fax: (541) 967-9485

Project No. 0523-23SSE

# ROCK CREEK WRRF PRIMARY CLARIFIER No. 4 TREATMENT EXPANSION CLEAN WATER SERVICES

---

APRIL 2024

## SECTION 17710 CONTROL SYSTEMS: PANELS, ENCLOSURES, AND PANEL COMPONENTS

### RESPONSE TO SUBMITTAL COMMENTS CONT.

Drawing Comments: Fix the Sheet title in each drawing and add device description as marked up in one of the submittal comments attachment.

*Amended.*

Drawing Comments: Fix the sheet numbers.

*Amended.*

Drawing Comments: Replace wires labeled with letter to numbers.

*Amended.*

Drawing Comments: Label the terminals that are located in VFD and MCC drawings.

*Amended.*

Drawing Comments: Drawing 300CD1004-LCS needs the SCADA points as shown in contract dwg.

*Amended.*

Need labels on ALL wires 2.04 E

*Amended.*

Missing terminal numbers

*Amended.*



**OPTIMAL CONTROL SYSTEMS, INC.**

2324 Three Lakes Road SE

Albany, OR 97322

Phone: (541) 967-9323

Fax: (541) 967-9485

Project No. 0523-23SSE

# Bill of Materials



**Project:** Rock Creek WRRF Primary Clarifier No. 4 Treatment Expansion  
**Specification Section(s):** Section 17710 – Control Systems: Panels, Enclosures, and Panel Components  
**Date:** April 2024

Item No.	Qty.	Tag(s)	Description	Manufacturer	Part Number	Serial Number
001	1	300CD1004-LCS	S.S. EL Enclosure, H 12" x W 12" x D 6"	Saginaw Control & Engineering	SCE-12EL1206SSLP	
002	1	300CD1004-LCS	Subpanel, Flat	Saginaw Control & Engineering	SCE-12DLP12	
003	1	300CD1004-LCS	Ground Bar, 14 Terminal	Eaton	GBKP1420	
004	1	300CD1004-LCS	Selector Switch, 2-Position, Knob, Black	Eaton	E34VFBK1-1X	
005	1	300CD1004-LCS	Momentary Pushbutton, Flush, Black	Eaton	E34PB1	
006	1	300CD1004-LCS	Contact Block, 2NC, <i>Assembled to E34PB1</i>	Eaton	10250T3	
007	1	300CD1004-LCS	Indicating Light, PressTest, LED, 120VAC, Amber	Eaton	E34FPB297LAP2A	
008	15	300CD1004-LCS	Terminal Block	TE Connectivity	1SNA115116R0700	
009	2	300CD1004-LCS	End Stop	TE Connectivity	1SNK900001R0000	
010	1	300CD1004-LCS	Mounting Rail	TE Connectivity	1SNA173220R0500	
011	1	300CD1004-LCS	Wiring Duct	Panduit	F2X3LG6	
012	1	300CD1004-LCS	Wiring Duct Cover	Panduit	C2LG6	
013						
014						
015						
016						
017						
018						
019						
020						
021						
022						
023						
024						
025						
026						
027						
028						
029						
030						
031						
032						
033						
034						
035						
036						
037						
038						
039						
040						

# Bill of Materials



**Project:** Rock Creek WRRF Primary Clarifier No. 4 Treatment Expansion  
**Specification Section(s):** Section 17710 – Control Systems: Panels, Enclosures, and Panel Components  
**Date:** April 2024

Item No.	Qty.	Tag(s)	Description	Manufacturer	Part Number	Serial Number
001	1	350P1105-LCS	S.S. EL Enclosure, H 12" x W 12" x D 6"	Saginaw Control & Engineering	SCE-12EL1206SSLP	
002	1	350P1105-LCS	Subpanel, Flat	Saginaw Control & Engineering	SCE-12DLP12	
003	1	350P1105-LCS	Ground Bar, 14 Terminal	Eaton	GBKP1420	
004	1	350P1105-LCS	Selector Switch, 3-Position, Knob, Black	Eaton	E34VHBK1-23X	
005	1	350P1105-LCS	Momentary Pushbutton, Flush, Green, NO	Eaton	E34PB3-53X	
006	1	350P1105-LCS	Momentary Pushbutton, Flush, Red, NC	Eaton	E34PB2-51X	
007	7	350P1105-LCS	Terminal Block	TE Connectivity	1SNA115116R0700	
008	2	350P1105-LCS	End Stop	TE Connectivity	1SNK900001R0000	
009	1	350P1105-LCS	Mounting Rail	TE Connectivity	1SNA173220R0500	
010	1	350P1105-LCS	Wiring Duct	Panduit	F2X3LG6	
011	1	350P1105-LCS	Wiring Duct Cover	Panduit	C2LG6	
012						
013						
014						
015						
016						
017						
018						
019						
020						
021						
022						
023						
024						
025						
026						
027						
028						
029						
030						
031						
032						
033						
034						
035						
036						
037						
038						
039						
040						

# Bill of Materials



**Project:** Rock Creek WRRF Primary Clarifier No. 4 Treatment Expansion  
**Specification Section(s):** Section 17710 – Control Systems: Panels, Enclosures, and Panel Components  
**Date:** April 2024

Item No.	Qty.	Tag(s)	Description	Manufacturer	Part Number	Serial Number
001	1	350P1106-LCS	S.S. EL Enclosure, H 12" x W 12" x D 6"	Saginaw Control & Engineering	SCE-12EL1206SSLP	
002	1	350P1106-LCS	Subpanel, Flat	Saginaw Control & Engineering	SCE-12DLP12	
003	1	350P1106-LCS	Ground Bar, 14 Terminal	Eaton	GBKP1420	
004	1	350P1106-LCS	Selector Switch, 3-Position, Knob, Black	Eaton	E34VHBK1-23X	
005	1	350P1106-LCS	Momentary Pushbutton, Flush, Green, NO	Eaton	E34PB3-53X	
006	1	350P1106-LCS	Momentary Pushbutton, Flush, Red, NC	Eaton	E34PB2-51X	
007	7	350P1106-LCS	Terminal Block	TE Connectivity	1SNA115116R0700	
008	2	350P1106-LCS	End Stop	TE Connectivity	1SNK900001R0000	
009	1	350P1106-LCS	Mounting Rail	TE Connectivity	1SNA173220R0500	
010	1	350P1106-LCS	Wiring Duct	Panduit	F2X3LG6	
011	1	350P1106-LCS	Wiring Duct Cover	Panduit	C2LG6	
012						
013						
014						
015						
016						
017						
018						
019						
020						
021						
022						
023						
024						
025						
026						
027						
028						
029						
030						
031						
032						
033						
034						
035						
036						
037						
038						
039						
040						

# Bill of Materials



**Project:** Rock Creek WRRF Primary Clarifier No. 4 Treatment Expansion  
**Specification Section(s):** Section 17710 – Control Systems: Panels, Enclosures, and Panel Components  
**Date:** April 2024

Item No.	Qty.	Tag(s)	Description	Manufacturer	Part Number	Serial Number
001	1	350JB1204	S.S. EL Enclosure, H 12" x W 12" x D 6"	Saginaw Control & Engineering	SCE-12EL1206SSLP	
002	1	350JB1204	Subpanel, Flat	Saginaw Control & Engineering	SCE-12DLP12	
003	1	350JB1204	Ground Bar, 14 Terminal	Eaton	GBKP1420	
004	1	350JB1204	Terminal Box <small>See also Section 17140 submittal for 300LT1204 (qty. 1 total)</small>	WIKA	14052339	
005						
006						
007						
008						
009						
010						
011						
012						
013						
014						
015						
016						
017						
018						
019						
020						
021						
022						
023						
024						
025						
026						
027						
028						
029						
030						
031						
032						
033						
034						
035						
036						
037						
038						
039						
040						

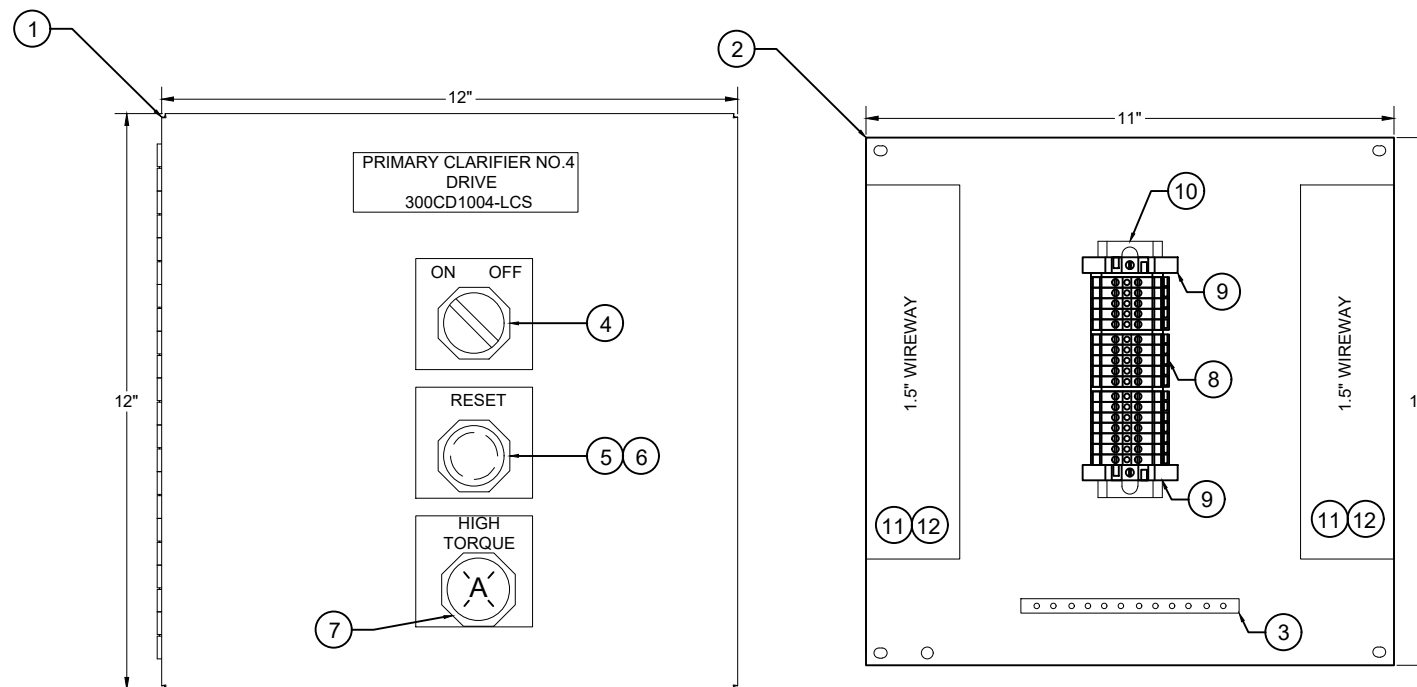


# Bill of Materials



**Project:** Rock Creek WRRF Primary Clarifier No. 4 Treatment Expansion  
**Specification Section(s):** Section 17710 – Control Systems: Panels, Enclosures, and Panel Components  
**Date:** April 2024

Item No.	Qty.	Tag(s)	Description	Manufacturer	Part Number	Serial Number
001	1	350ISBP1204	S.S. EL Enclosure, H 12" x W 12" x D 6"	Saginaw Control & Engineering	SCE-12EL1206SSLP	
002	1	350ISBP1204	Subpanel, Flat	Saginaw Control & Engineering	SCE-12DLP12	
003	1	350ISBP1204	Ground Bar, 14 Terminal	Eaton	GBKP1420	
004	1	350ISBP1204	Loop Powered Passive Barrier	Endress+Hauser	RB223-C1A	
005	4	350ISBP1204	Terminal Block	TE Connectivity	1SNA115116R0700	
006	2	350ISBP1204	End Stop	TE Connectivity	1SNK900001R0000	
007	1	350ISBP1204	Mounting Rail	TE Connectivity	1SNA173220R0500	
008	1	350ISBP1204	Wiring Duct	Panduit	F2X3LG6	
009	1	350ISBP1204	Wiring Duct Cover	Panduit	C2LG6	
010						
011						
012						
013						
014						
015						
016						
017						
018						
019						
020						
021						
022						
023						
024						
025						
026						
027						
028						
029						
030						
031						
032						
033						
034						
035						
036						
037						
038						
039						
040						



ORT1 CHECKOUT

INTEGRATOR: \_\_\_\_\_

ELECTRICAL: \_\_\_\_\_

OWNER: \_\_\_\_\_

DATE: \_\_\_\_\_

DRN: KCED	ORIG DATE: 2023.12.21
DSN: HAD	DWG #: RC300CD1004 LCS
CHK: HAD	CAD FILE #: 0523-23SSE-1004 LCS
APPD:	SCALE: AS NOTED

THIS BAR IS ONE INCH WHEN DRAWING IS FULL SCALE.

REV #	DATE	DRN	APPD	DESCRIPTION
C	2024.04.16	KCED	HAD	BALLOONS & LABELS
B	2024.03.12	KCED	HAD	SCALING
A	2023.12.21	KCED	HAD	ORIGINAL DRAFT



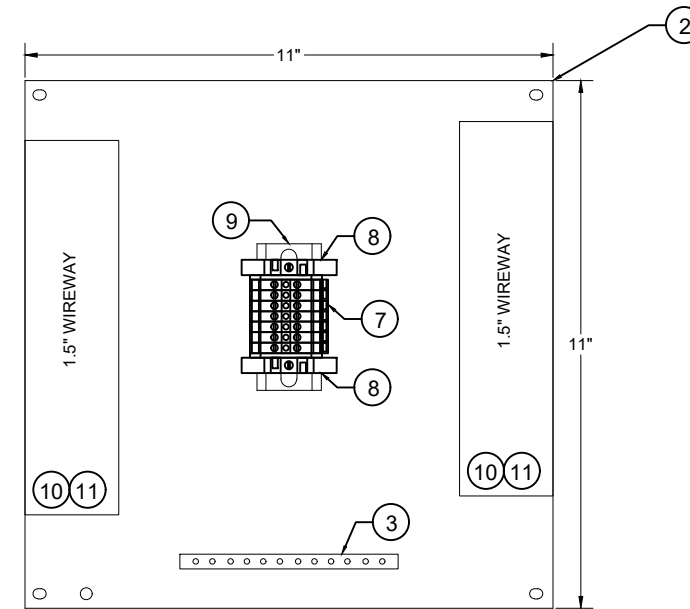
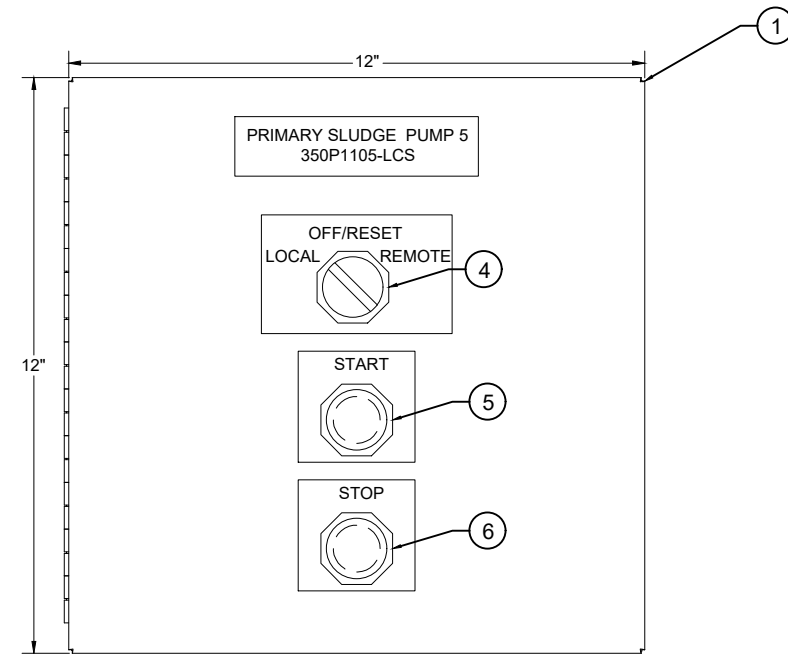
PROJ NAME: ROCK CREEK WRRF  
PRIMARY CLARIFIER NO. 4  
TREATMENT EXPANSION

SHEET TITLE: INSTRUMENTATION  
PC4 LOCAL CONTROL STATION  
PANEL LAYOUT

SHEET: 1 OF: 5  
PLOT DATE: 4/19/24  
PLC #: N/A  
CWS PROJ #: 7012

DWG #: RC300CD1004 LCS

ENGR STAMP:



ORT1 CHECKOUT

INTEGRATOR: \_\_\_\_\_

ELECTRICAL: \_\_\_\_\_

OWNER: \_\_\_\_\_

DATE: \_\_\_\_\_

DRN: KCED	ORIG DATE: 2023.12.21
DSN: HAD	DWG #: RS350P1105 LCS
CHK: HAD	CAD FILE #: 0523-23SSE-P1105 LCS
APPD:	SCALE: AS NOTED

THIS BAR IS ONE INCH WHEN DRAWING IS FULL SCALE.

REV #	DATE	DRN	APPD	DESCRIPTION
C	2024.04.16	KCED	HAD	BALLOONS & LABELS
B	2024.03.12	KCED	HAD	SCALING
A	2023.12.21	KCED	HAD	ORIGINAL DRAFT



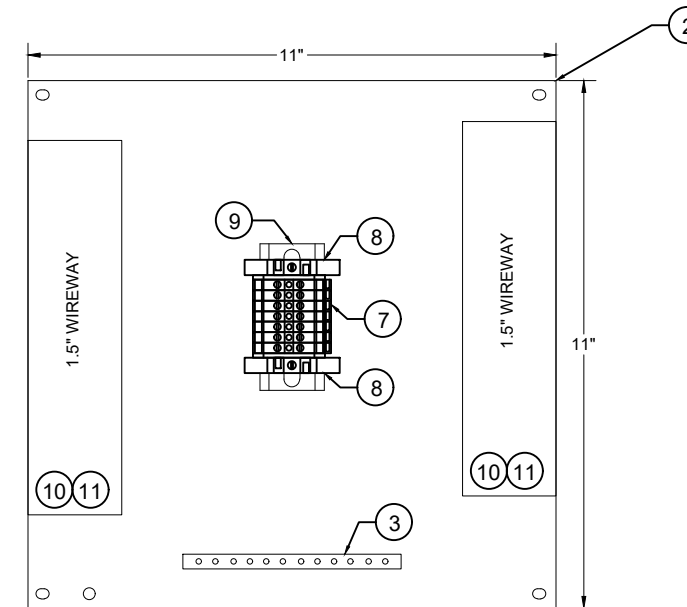
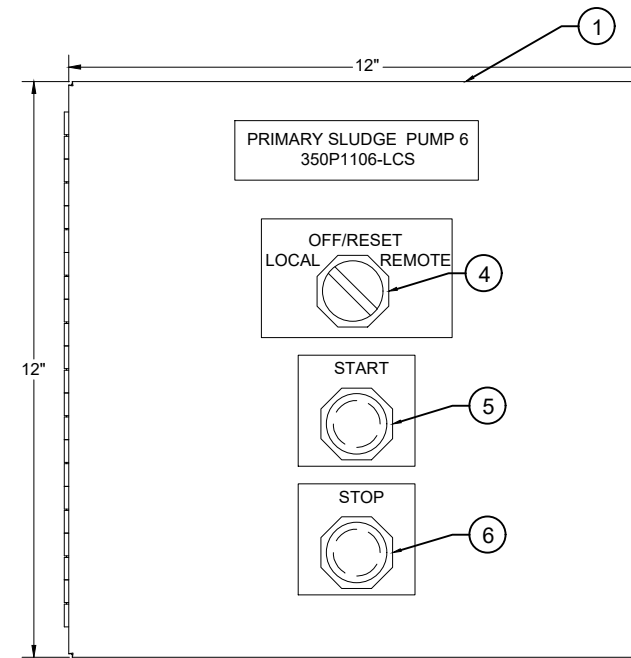
PROJ NAME: ROCK CREEK WRRF PRIMARY CLARIFIER NO. 4 TREATMENT EXPANSION

SHEET TITLE: INSTRUMENTATION PSP5 LOCAL CONTROL STATION PANEL LAYOUT

SHEET: 2 OF: 5  
 PLOT DATE: 4/19/24  
 PLC #: N/A  
 CWS PROJ #: 7012

DWG #: RC350P1105 LCS

ENGR STAMP:



ORT1 CHECKOUT

INTEGRATOR: \_\_\_\_\_

ELECTRICAL: \_\_\_\_\_

OWNER: \_\_\_\_\_

DATE: \_\_\_\_\_

DRN: KCED	ORIG DATE: 2023.12.21
DSN: HAD	DWG #: RS350P1106 LCS
CHK: HAD	CAD FILE #: 0523-23SSE-P1106 LCS
APPD:	SCALE: AS NOTED

THIS BAR IS ONE INCH WHEN DRAWING IS FULL SCALE.

REV #	DATE	DRN	APPD	DESCRIPTION
C	2024.04.16	KCED	HAD	BALLOONS & LABELS
B	2024.03.12	KCED	HAD	SCALING
A	2023.12.21	KCED	HAD	ORIGINAL DRAFT



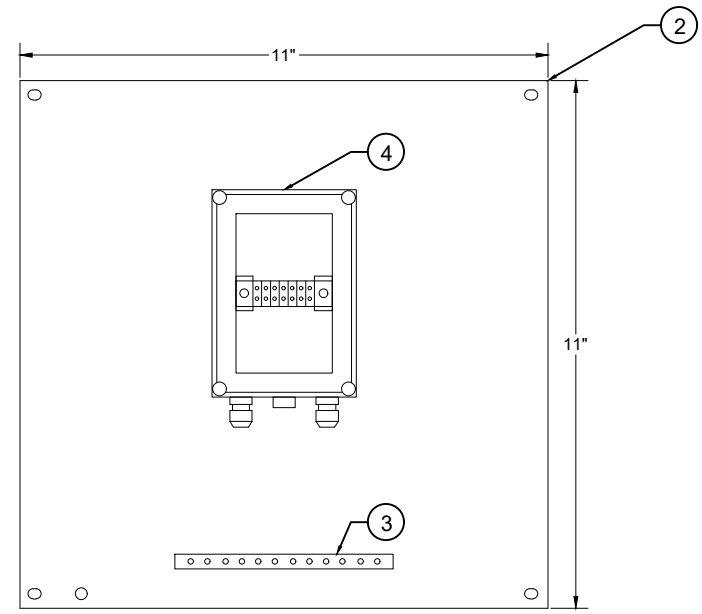
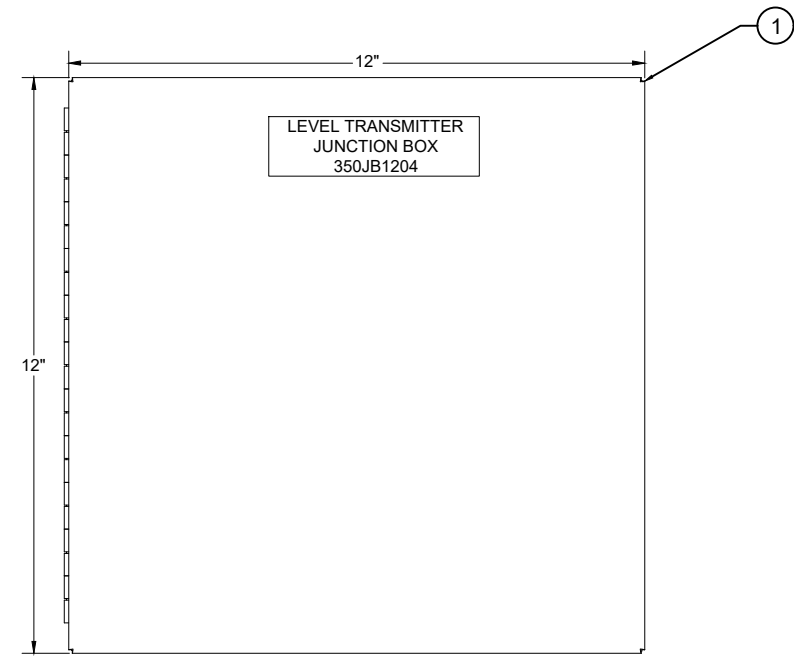
PROJ NAME: ROCK CREEK WRRF PRIMARY CLARIFIER NO. 4 TREATMENT EXPANSION

SHEET TITLE: INSTRUMENTATION PSP6 LOCAL CONTROL STATION PANEL LAYOUT

SHEET: 3 OF: 5  
PLOT DATE: 4/19/24  
PLC #: N/A  
CWS PROJ #: 7012

DWG #: RC350P1106 LCS

ENGR STAMP:



ORT1 CHECKOUT

INTEGRATOR: \_\_\_\_\_

ELECTRICAL: \_\_\_\_\_

OWNER: \_\_\_\_\_

DATE: \_\_\_\_\_

DRN: KCED	ORIG DATE: 2023.12.21
DSN: HAD	DWG #: RC350JB1204
CHK: HAD	CAD FILE #: 0523-23SSE-JB1204
APPD:	SCALE: AS NOTED

THIS BAR IS ONE INCH WHEN DRAWING IS FULL SCALE.

REV #	DATE	DRN	APPD	DESCRIPTION
C	2024.04.16	KCED	HAD	BALLOONS & LABELS
B	2024.03.12	KCED	HAD	SCALING
A	2023.12.21	KCED	HAD	ORIGINAL DRAFT



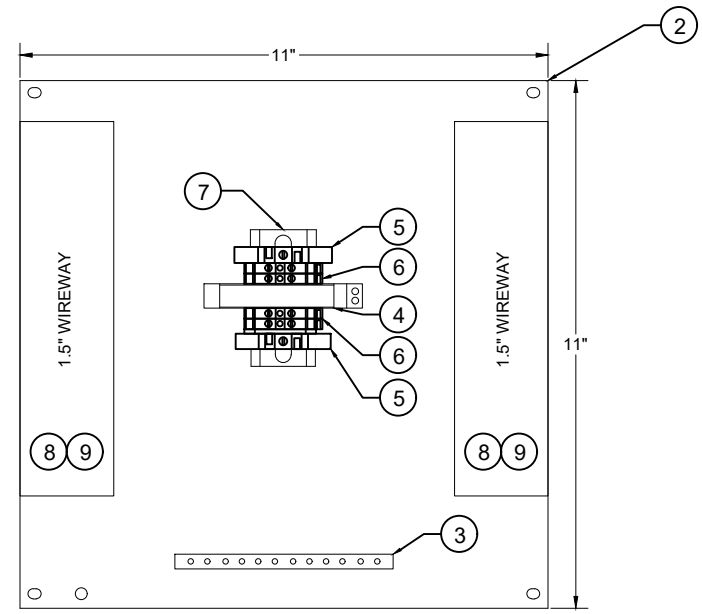
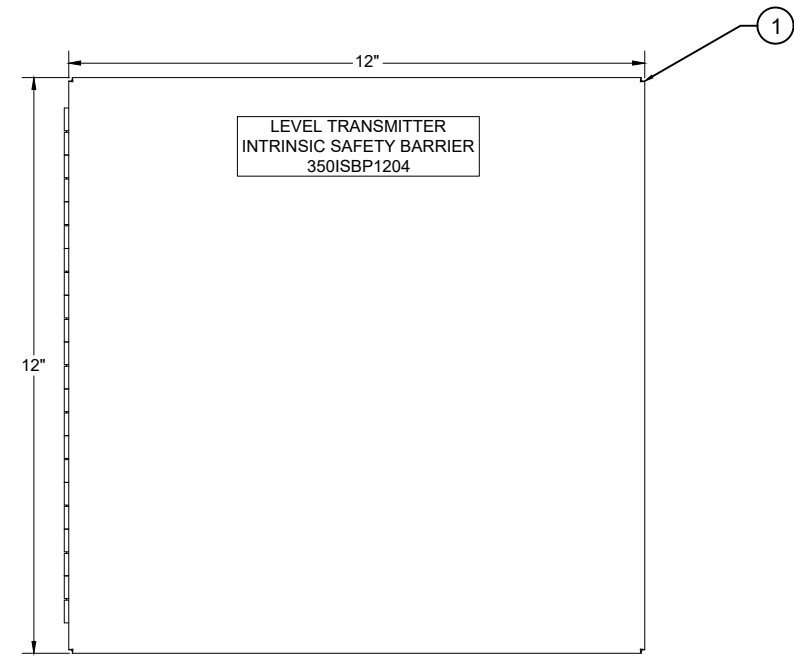
PROJ NAME: ROCK CREEK WRRF PRIMARY CLARIFIER NO. 4 TREATMENT EXPANSION

SHEET TITLE: INSTRUMENTATION LEVEL TRANSMITTER JB PANEL LAYOUT

SHEET: 4 OF: 5  
 PLOT DATE: 4/19/24  
 PLC #: N/A  
 CWS PROJ #: 7012

DWG #: RC350JB1204

ENGR STAMP:



ORT1 CHECKOUT

INTEGRATOR: \_\_\_\_\_

ELECTRICAL: \_\_\_\_\_

OWNER: \_\_\_\_\_

DATE: \_\_\_\_\_

DRN: KCED	ORIG DATE: 2023.12.21
DSN: HAD	DWG #: RC350ISBP1204
CHK: HAD	CAD FILE #: 0523-23SSE-1204
APPD:	SCALE: AS NOTED

THIS BAR IS ONE INCH WHEN DRAWING IS FULL SCALE.

REV #	DATE	DRN	APPD	DESCRIPTION
C	2024.04.16	KCED	HAD	BALLOONS & LABELS
B	2024.03.12	KCED	HAD	SCALING
A	2023.12.21	KCED	HAD	ORIGINAL DRAFT



PROJ NAME: ROCK CREEK WRRF PRIMARY CLARIFIER NO. 4 TREATMENT EXPANSION

SHEET TITLE: INSTRUMENTATION 350LT1204 ISB PANEL LAYOUT

SHEET: 5 OF: 5  
 PLOT DATE: 4/19/24  
 PLC #: N/A  
 CWS PROJ #: 7012

DWG #: RC350ISBP1204

ENGR STAMP:



Your Enclosure Source®

Saginaw Control and Engineering  
95 Midland Road Saginaw, MI 48638-5770  
(800) 234-6871 - Fax: (989) 799-4524  
SCE@SaginawControl.com

## SCE-12EL1206SSLP

### Product Specifications:

**Part Number:** SCE-12EL1206SSLP

**Description:** S.S. EL Enclosure

**Height:** 12.00"

**Width:** 12.00"

**Depth:** 6.00"

**Price Code:** S5

**List Price:** \$625.37

**Catalog Page:** 272

**Est. Ship Weight:** 16.00 lbs



#### Construction

- \* 0.075 In. stainless steel Type 304.
- \* Seams continuously welded and ground smooth.
- \* Flange trough collar around all sides of door opening.
- \* Pour in place oil & water resistant gasket
- \* Collar studs 3/8-16 provided for mounting optional panels.
- \* Stainless steel concealed hinges.
- \* Removable and interchangeable doors.
- \* Black quarter turn latches.
- \* Latches are opened or closed with a screwdriver (optional tamper-resistant inserts are available).
- \* Mounting holes in back of enclosure.
- \* Mounting hardware, sealing washer and hole plug included.
- \* Removable print pocket furnished if height and width of enclosure is greater than 12 inches.
- \* Ground studs on door and body.

#### Application

Designed to house electrical and electronic controls, instruments and components in areas which may be regularly hosed down or are in very wet conditions. Provides protection from dust, dirt, oil, and water. For outdoor application a drip shield and drain vent is recommended.

For details about the design, performance expectations, applications and design suggestions - See Design Considerations  
[www.saginawcontrol.com/instman/considerations.pdf](http://www.saginawcontrol.com/instman/considerations.pdf)

#### Options

Optional mounting feet available. Door hardware available.

#### Finish

#4 brushed finish on all exterior surfaces. Optional sub-panels are powder coated white.

#### Industry Standards - (IS6)

- \* NEMA Type 3R, 4, 4X, 12 and Type 13
- \* UL Listed Type 3R, 4, 4X and 12
- \* CSA Type 4, 4X and 12
- \* IEC 60529
- \* IP 66

#### Notes

Special Instructions apply for IS3, IS4 and IS6 to maintain the environmental rating of Type 3R for these parts. Instructions are located on the enclosure door. Drip shield is required on IS3, drip shield is recommended on IS4 and IS6. Drain holes are required on all.

#### Optional Accessories

- SCE-12DLP12 Subpanel, Flat
- SCE-12DLP12GALV Subpanel, Flat Galvannealed
- SCE-BVK Breather Vent
- SCE-DS12SS Shield, S.S. Drip
- SCE-ELFM12HSS S.S. EL Flush Mount Frame
- SCE-ELFM12WSS S.S. EL Flush Mount Frame
- SCE-ELMFK4 Foot Kit, EL Mounting (4pc.)
- SCE-ELMFK4SS6-OS Foot Kit, S.S. EL Mounting (4pc.)
- SCE-ELSP Kit, Swing-Out Panel (12 -16 High)
- SCE-RD12EL12SS Door, Replacement

#### Similar Part Numbers

- SCE-12EL2406SSLPS.S. EL Enclosure
- SCE-16EL1206SSLPS.S. EL Enclosure
- SCE-16EL1208SSLPS.S. EL Enclosure
- SCE-16EL1606SSLPS.S. EL Enclosure
- SCE-16EL1608SSLPS.S. EL Enclosure
- SCE-16EL2008SSLPS.S. EL Enclosure
- SCE-20EL1606SSLPS.S. EL Enclosure
- SCE-20EL1608SSLPS.S. EL Enclosure
- SCE-20EL1610SSLPS.S. EL Enclosure
- SCE-20EL2006SSLPS.S. EL Enclosure

#### Installation Information

- \* Mounting Foot Kit for Enviroline Enclosures
- \* EL Flush Mount Frame
- \* Drip Shield Kit Assembly
- \* Dead Front Wall Mount Installation Instructions
- \* Swing Panel Assembly for Enviroline Enclosures
- \* Dead Front Wall Mount < 20 In Height Installation Instructions
- \* Swing Panel ELSP3 for Encl. Height > 16
- \* Swing Panel ELSP for Encl. Height <= 16
- \* Sealing Washer Specifications
- \* Service Parts Wall Mount Enclosures



Your Enclosure Source<sup>®</sup>

Saginaw Control and Engineering  
95 Midland Road Saginaw, MI 48638-5770  
(800) 234-6871 - Fax: (989) 799-4524  
SCE@SaginawControl.com

## SCE-12DLP12

### Product Specifications:



**Part Number:** SCE-12DLP12

**Description:** Subpanel, Flat

**Height:** 9.00"

**Width:** 9.00"

**Depth:** 0.10"

**Price Code:** P3

**List Price:** \$15.22

**Catalog Page:** 440

**Est. Ship Weight:** 3.00 lbs

#### Finish

Powder Coated White.

#### Industry Standards - (IS17)

- ⚙ NEMA Not Applicable
- ⚙ UL Not Applicable
- ⚙ CSA N/A

#### Similar Part Numbers

SCE-10P10Subpanel, Flat  
SCE-10P6Subpanel, Flat  
SCE-10P8Subpanel, Flat  
SCE-12P10Subpanel, Flat  
SCE-12P12Subpanel, Flat  
SCE-12P12CSubpanel, Flat  
SCE-12P16CSubpanel, Flat  
SCE-12P20CSubpanel, Flat  
SCE-12P24Subpanel, Bent  
SCE-12P6Subpanel, Flat

#### Installation Information

- ⚙ Sub-Plate Layout & Grounding for 3/8-16



### GBKP14



### Plug-on Neutral Ground Bar Kits

Description (See Legend)	Length Inches (mm)	Ordering Quantity <sup>①</sup>	Catalog Number
●○○○○○●○○○○○	4.05	1	GBKP10 <sup>②</sup>
●○○○○○●○○○○○	5.05	1	GBKP1020 <sup>②</sup>
●○○○○○●○○○○○■	4.05	1	GBKP10P <sup>②③</sup>
●○○○○○●○○○○○	5.39	1	GBKP14 <sup>②</sup>
●○○○○○●○○○○○	6.39	1	GBKP1420 <sup>②</sup>
●○○○○○●○○○○○	5.39	1	GBKP14P <sup>②③</sup>
●○○○○○●○○○○○	7.72	1	GBKP21 <sup>②</sup>
●○○○○○●○○○○○	8.72	1	GBKP2120 <sup>②</sup>
●○○○○○●○○○○○	7.72	1	GBKP21P <sup>②③</sup>
●○○○○○●	2.39	1	GBKP5 <sup>②</sup>
●○○○○○■	3.39	1	GBKP520 <sup>②</sup>
●○○○○○●	2.39	1	GBKP5P <sup>②③</sup>

#### Ground Bar Legend

- = (3) #14–#10 Cu/Al or (1) #14–#4 Cu/Al
- = (1) #6–2/0 Cu/Al
- = Mounting hole

### GBK14



### Legacy Ground Bar Kits

Description (See Legend)	Length Inches (mm)	Ordering Quantity <sup>①</sup>	Catalog Number
●○○○○○●	2.54 (64.5)	1	GBK5 <sup>④</sup>
●○○○○○●■	3.59 (91.2)	1	GBK520 <sup>④</sup>
●○○○○○●○○○○○	4.29 (109.0)	1	GBK10 <sup>④</sup>
●○○○○○●○○○○○■	5.34 (135.6)	1	GBK1020 <sup>④</sup>
●○○○○○●○○○○○	5.69 (144.5)	1	GBK14 <sup>④</sup>
●○○○○○●○○○○○	6.74 (171.2)	1	GBK1420 <sup>④</sup>
●○○○○○●○○○○○■	8.14 (206.8)	1	GBK21 <sup>④</sup>
●○○○○○●○○○○○	9.19 (233.4)	1	GBK2120 <sup>④</sup>

#### Ground Bar Legend

- = (3) #14–#10 Cu/Al or (1) #14–#4 Cu/Al
- = (1) #6–2/0 Cu/Al
- = (1) 1/0–14 or (3) #10–12 Cu/Al
- ◐ = (1) #14–1/0 Cu/Al or (3) #14–#10 Cu/Al
- = Mounting hole

#### Notes

- ① Must be purchased in multiples of ordering quantities indicated.
- ② Distance between mounting holes is 2 inches (50.8 mm).
- ③ Individually packaged.
- ④ Distance between mounting holes is 1-3/4 inches (44.5 mm).

## 30.5 mm Corrosion Resistant Watertight/Oiltight—E34



### Product Description

Eaton's E34 Series 30.5 mm pushbutton line features the same rugged die cast construction of our 10250T line with an additional two-layer 100% solid thermosetting cathodic epoxy coating. This coating provides a flat black smooth, consistent, corrosion resistant surface that has passed a demanding 600 hour salt spray test. (The industry standard for this 4X test requires only 200 hours.)

### Features

- Epoxy-coated metal operators
- Corrosion resistant
- Integral ground screw terminal on operators
- FDA approved for sanitary chemical resistance requirements

### Contents

<i>Description</i>	<i>Page</i>
30.5 mm Corrosion Resistant Watertight/Oiltight—E34	
Product Overview . . . . .	<b>V7-T1-285</b>
Product Identification . . . . .	<b>V7-T1-286</b>
Catalog Number Selection . . . . .	<b>V7-T1-287</b>
Ordering Complete Devices . . . . .	<b>V7-T1-289</b>
Product Selection	
Non-Illuminated Momentary	
Pushbutton Units . . . . .	<b>V7-T1-290</b>
Plastic Lens Indicating Light Units . . . . .	<b>V7-T1-290</b>
Pushbuttons . . . . .	<b>V7-T1-291</b>
Illuminated Pushbuttons and	
Indicating Lights . . . . .	<b>V7-T1-292</b>
Push-Pull Units . . . . .	<b>V7-T1-294</b>
Illuminated Push-Pull Units . . . . .	<b>V7-T1-295</b>
Potentiometers . . . . .	<b>V7-T1-297</b>
Push-Pull Operators . . . . .	<b>V7-T1-298</b>
Selector Switch Units . . . . .	<b>V7-T1-302</b>
Selector Switch Selection . . . . .	<b>V7-T1-303</b>
Selector Switch Operators . . . . .	<b>V7-T1-306</b>
Key Operators . . . . .	<b>V7-T1-306</b>
Illuminated Selector Switch Operators . . . . .	<b>V7-T1-308</b>
Accessories . . . . .	<b>V7-T1-309</b>
Options . . . . .	<b>V7-T1-311</b>
Replacement Parts . . . . .	<b>V7-T1-317</b>
Technical Data and Specifications . . . . .	<b>V7-T1-319</b>
Dimensions . . . . .	<b>V7-T1-322</b>

### Standards and Certifications

- CE EN60947-5-1 and 60947-5-5
- UL 508—File No. E131568
- CSA C22.2 No. 14—File No. LR68551
- FDA 3-A Sanitary Standards



### Ingress Protection

When mounted in similarly rated enclosure—

- Standard indicating lights
  - UL (NEMA) Type 1, 2, 3, 3R, 3S, 4, 4X, 12, 13
  - IEC IP65
- All other operators
  - UL (NEMA) Type 1, 2, 3, 3R, 4, 4X, 12, 13
  - IEC IP65

### Product Overview

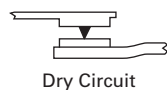
#### Ultraviolet Light

E34 cathodic coating is not recommended for use in applications where exposure to ultraviolet light exists—use NEMA 4X 10250T operators.

#### Reliability Nibs

Eaton’s contact blocks feature enclosed silver contacts with pointed “reliability nibs” for reliable performance from logic level up to 600V. To ensure reliable switching, nibs bite through oxide which can form on silver contacts, eliminating the need for expensive logic level blocks for most applications.

#### Reliability Nibs



Dry Circuit



Medium Duty



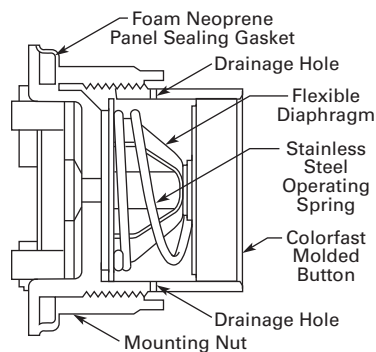
Heavy-Duty

#### Diaphragm Seal with Drainage Holes

##### Liquid Drainage

Eaton’s pushbutton operators offer front of panel drainage via holes in the operator bushing. Hidden from view by the mounting nut, these holes prevent buildup of liquid inside the operator, which can prevent operation in freezing environments. The holes also provide a route for escaping liquid in high pressure washdowns, effectively relieving pressure from the internal diaphragm seal, ensuring reliable sealing in applications even beyond NEMA 4.

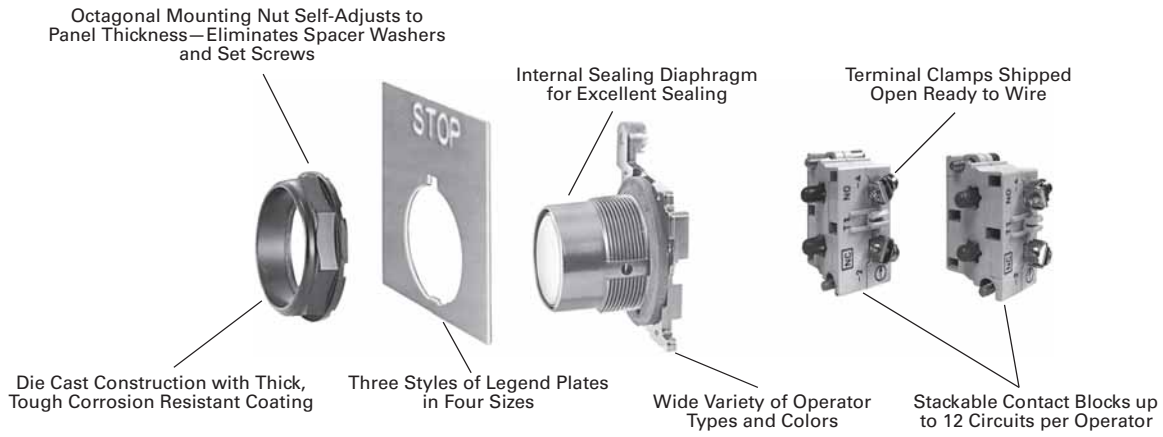
##### Diaphragm Seal



#### 1

#### Product Identification

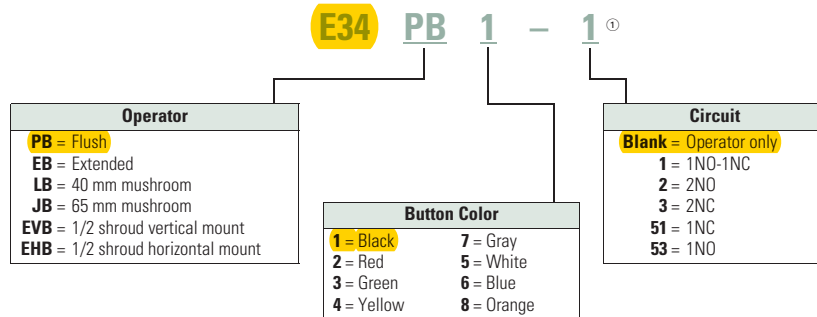
#### 30.5 mm Corrosion Resistant Watertight/Oiltight—E34 Series



### Catalog Number Selection

Catalog Number Selection is for illustrative purposes only and not to be used to create new catalog numbers.

### Non-Illuminated Pushbuttons



**Note**

① Add **X** at end of catalog number to receive parts assembled from factory.

# 1.10

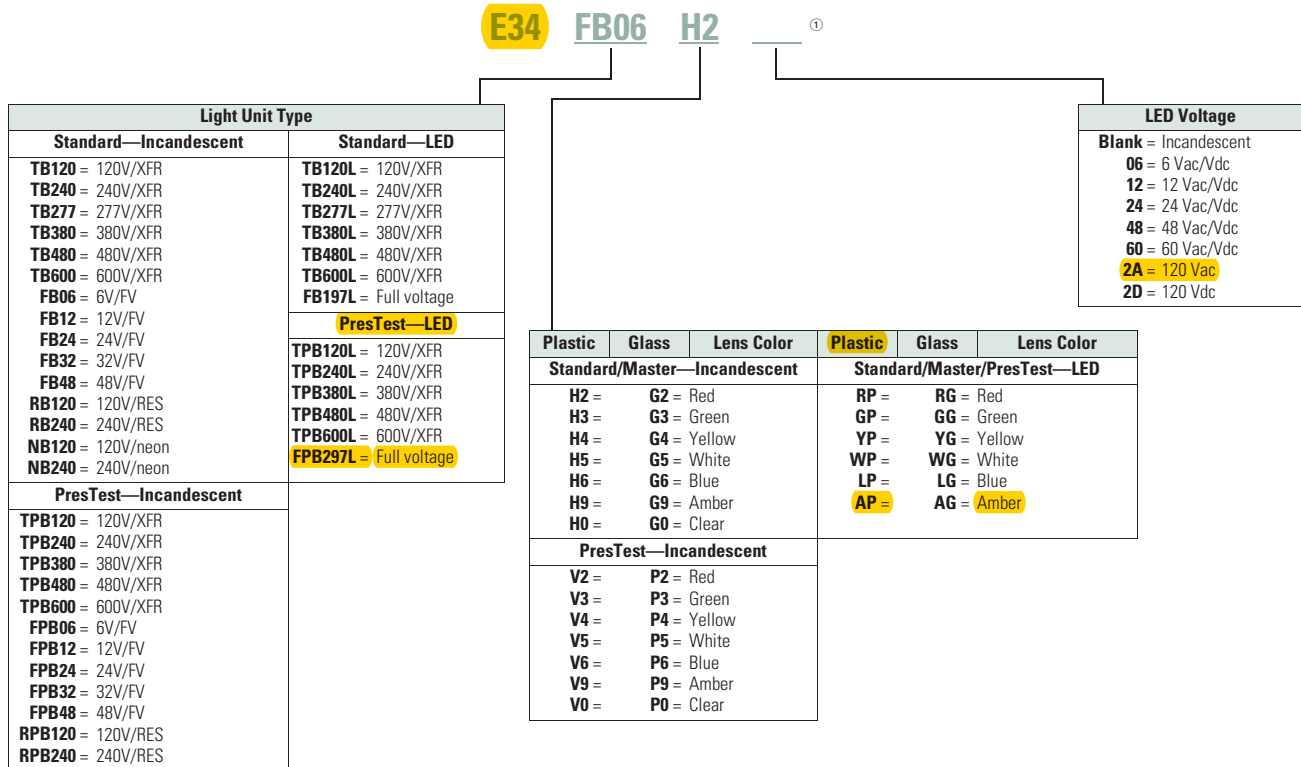
## Pushbuttons and Indicating Lights

30.5 mm Corrosion Resistant Watertight/Oiltight—E34

1

Catalog Number Selection is for illustrative purposes only and not to be used to create new catalog numbers.

### Standard Indicating Lights, PresTest and Master Test



**Note**

① Add X at end of catalog number to receive parts assembled from factory.

Catalog Number Selection is for illustrative purposes only and not to be used to create new catalog numbers.

### Ordering Complete Devices

Complete E34 pushbuttons, indicating lights and/or selector switch operators including contact block(s) and legend plate can be ordered using a single composite catalog number. The

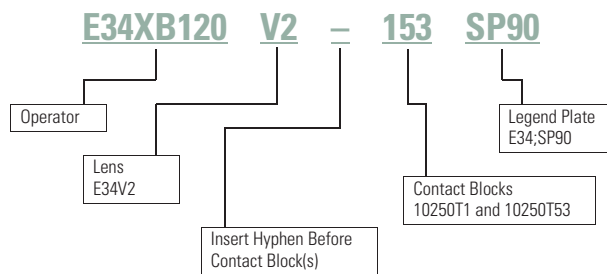
individually packaged components will be shipped unassembled in a single overpack carton marked with the composite catalog number.

### Ordering Example

Illuminated Pushbutton Device—Catalog Number E34XB120V2-153SP90

For a complete Catalog Number breakdown, see **Pages V7-T1-287 to V7-T1-288.**

### For Complete E34 Device Ordering



# 1

## Product Selection

### Non-Illuminated Momentary Pushbutton Units

UL (NEMA) Type 3, 3R, 4, 4X, 12, 13

#### Flush Button



#### Extended Button



#### Mushroom Button



#### Jumbo Mushroom



### Pushbutton Units






Contact Type	Button Color	Flush Button Catalog Number	Extended Button Catalog Number	Mushroom Button Catalog Number	Jumbo Mushroom <sup>①</sup> Catalog Number
1NO	Black	E34PB1-53X	E34EB1-53X	E34LB1-53X	E34JB1-53X
	Red	E34PB2-53X	E34EB2-53X	E34LB2-53X	E34JB2-53X
	Green	E34PB3-53X	E34EB3-53X	E34LB3-53X	E34JB3-53X
	Red—Engraved EMERG. STOP	—	—	—	E34JB2N8-53X
1NC	Black	E34PB1-51X	E34EB1-51X	E34LB1-51X	E34JB1-51X
	Red	E34PB2-51X	E34EB2-51X	E34LB2-51X	E34JB2-51X
	Green	E34PB3-51X	E34EB3-51X	E34LB3-51X	E34JB3-51X
	Red—Engraved EMERG. STOP	—	—	—	E34JB2N8-51X
1NO-1NC	Black	E34PB1-1X	E34EB1-1X	E34LB1-1X	E34JB1-1X
	Red	E34PB2-1X	E34EB2-1X	E34LB2-1X	E34JB2-1X
	Green	E34PB3-1X	E34EB3-1X	E34LB3-1X	E34JB3-1X
	Red—Engraved EMERG. STOP	—	—	—	E34JB2N8-1X



### Pushbuttons

UL (NEMA) Type 3, 3R, 4, 4X, 12, 13

#### Momentary Pushbutton Operators, Non-Illuminated

Button	Color	Catalog Number		
<b>E34PB_</b> 	Flush button	Black	<b>E34PB1</b>	
		Red	<b>E34PB2</b>	
		Green	<b>E34PB3</b>	
		Yellow	<b>E34PB4</b>	
		White	<b>E34PB5</b>	
		Blue	<b>E34PB6</b>	
		Gray	<b>E34PB7</b>	
		Orange	<b>E34PB8</b>	
<b>E34EB_</b> 	Extended button	Black	<b>E34EB1</b>	
		Red	<b>E34EB2</b>	
		Green	<b>E34EB3</b>	
		Yellow	<b>E34EB4</b>	
		White	<b>E34EB5</b>	
		Blue	<b>E34EB6</b>	
		Gray	<b>E34EB7</b>	
		Orange	<b>E34EB8</b>	
<b>E34EHB_</b> 	Half shrouded button		<b>Vertical</b>	<b>Horizontal</b>
		Black	<b>E34EVB1</b>	<b>E34EHB1</b>
		Red	<b>E34EVB2</b>	<b>E34EHB2</b>
		Green	<b>E34EVB3</b>	<b>E34EHB3</b>
		Yellow	<b>E34EVB4</b>	<b>E34EHB4</b>
		White	<b>E34EVB5</b>	<b>E34EHB5</b>
		Blue	<b>E34EVB6</b>	<b>E34EHB6</b>
		Gray	<b>E34EVB7</b>	<b>E34EHB7</b>
		Orange	<b>E34EVB8</b>	<b>E34EHB8</b>
	<b>E34LB_</b> 	Mushroom button	Black	<b>E34LB1</b>
		Red	<b>E34LB2</b>	
		Green	<b>E34LB3</b>	
		Yellow	<b>E34LB4</b>	
		Blue	<b>E34LB6</b>	
<b>E34JB_</b> 	Anodized aluminum jumbo mushroom button <sup>①</sup>	Black	<b>E34JB1</b>	
		Red	<b>E34JB2</b>	
		Red (Engraved EMERG. STOP)	<b>E34JB2N8</b>	
		Green	<b>E34JB3</b>	
		Yellow	<b>E34JB4</b>	

**Notes**

Use NEMA 4X 10250T operators where exposed to ultraviolet light, see **Pages V7-T1-213 to V7-T1-283**.

① Anodized aluminum head—may not be suitable for some corrosive environments.

## Illuminated Pushbuttons and Indicating Lights

## Illuminated Pushbutton

## Operators without Lens



## Indicating Light



## PresTest



Type	Voltage	Lamp Number	Illuminated Pushbutton Catalog Number	Indicating Light Catalog Number	PresTest Catalog Number
<b>LED Lamp (LEDs not included) ①</b>					
Full voltage	—	Bayonet base	<b>E34CB497L</b>	<b>E34FB197L</b>	<b>E34FPB297L</b>
Transformer AC only	24		<b>E34XB024L</b>	—	—
	120		<b>E34XB120L</b>	<b>E34TB120L</b>	<b>E34TPB120L</b>
	240		<b>E34XB240L</b>	<b>E34TB240L</b>	<b>E34TPB240L</b>
	277		<b>E34XB277L</b>	<b>E34TB277L</b>	—
	380		<b>E34XB380L</b>	<b>E34TB380L</b>	<b>E34TPB380L</b>
	480		<b>E34XB480L</b>	<b>E34TB480L</b>	<b>E34TPB480L</b>
	600		<b>E34XB600L</b>	<b>E34TB600L</b>	<b>E34TPB600L</b>
<b>Incandescent Lamp</b>					
Full voltage AC/DC	6	#755	<b>E34CB06</b>	<b>E34FB06</b>	<b>E34FPB06</b>
	12	#756	<b>E34CB12</b>	<b>E34FB12</b>	<b>E34FPB12</b>
	24	#757	<b>E34CB24</b>	<b>E34FB24</b>	<b>E34FPB24</b>
	32	#1828	<b>E34CB32</b>	<b>E34FB32</b>	<b>E34FPB32</b>
	48	#1835	<b>E34CB48</b>	<b>E34FB48</b>	<b>E34FPB48</b>
Resistor AC/DC ②	120	120MB	<b>E34SB120</b>	<b>E34RB120</b>	<b>E34RPB120</b>
	240		<b>E34SB240</b>	<b>E34RB240</b>	<b>E34RPB240</b>
Transformer AC only	24	#755	<b>E34XB024</b>	—	—
	120		<b>E34XB120</b>	<b>E34TB120</b>	<b>E34TPB120</b>
	240		<b>E34XB240</b>	<b>E34TB240</b>	<b>E34TPB240</b>
	277		<b>E34XB277</b>	<b>E34TB277</b>	—
	380		<b>E34XB380</b>	<b>E34TB380</b>	<b>E34TPB380</b>
	480		<b>E34XB480</b>	<b>E34TB480</b>	<b>E34TPB480</b>
	600		<b>E34XB600</b>	<b>E34TB600</b>	<b>E34TPB600</b>
Neon AC/DC	120	NE51H-R-22	—	<b>E34NB120</b>	—
	240	NE51H-4-68	—	<b>E34NB240</b>	—

**Notes**

Use NEMA 4X 10250T operators where exposed to ultraviolet light, see **Pages V7-T1-213 to V7-T1-283**.

① These units do not include lamps. Order LED separately to match lens color, see **Page V7-T1-269** for LED Selection and **Pages V7-T1-287 to V7-T1-288** for Catalog Numbering Selection.

② Resistor units are not available for use with LEDs, choose either transformer or full voltage LED style.

Plastic



Indicating Light Lens

Color	Plastic Catalog Number	Glass ① Catalog Number
Red	E34H2	E34G2
Green	E34H3	E34G3
Yellow	E34H4	E34G4
White	E34H5	E34G5
Blue	E34H6	E34G6
Ambler	E34H9	E34G9
Clear	E34H0	E34G0

Glass



E34V\_



Illuminated Pushbutton Lens

Color	Catalog Number
Red	E34V2
Green	E34V3
Yellow	E34V4
White	E34V5
Blue	E34V6
Ambler	E34V9
Clear	E34V0

Plastic



PresTest Lens

Color	Plastic Catalog Number	Glass ① Catalog Number
Red	E34V2	E34P2
Green	E34V3	E34P3
Yellow	E34V4	E34P4
White	E34V5	E34P5
Blue	E34V6	E34P6
Ambler	E34V9	E34P9
Clear	E34V0	E34P0

Glass



Note

① Glass lens has black anodized aluminum bezel.

**Standard LED Lamp**



**LED Selection**

Voltage	Color	Catalog Number
6 Vac/Vdc suitable for use with transformers	Red	E22LED006RN
	Orange	E22LED006ON
	Yellow	E22LED006YN
	Green	E22LED006GN
	Blue	E22LED006BN
	White	E22LED006WN
12 Vac/Vdc	Red	E22LED012RN
	Orange	E22LED012ON
	Yellow	E22LED012YN
	Green	E22LED012GN
	Blue	E22LED012BN
	White	E22LED012WN
24 Vac/Vdc	Red	E22LED024RN
	Orange	E22LED024ON
	Yellow	E22LED024YN
	Green	E22LED024GN
	Blue	E22LED024BN
	White	E22LED024WN
48 Vac/Vdc	Red	E22LED048RN
	Orange	E22LED048ON
	Yellow	E22LED048YN
	Green	E22LED048GN
	Blue	E22LED048BN
	White	E22LED048WN

Voltage	Color	Catalog Number
60 Vac/Vdc	Red	E22LED060RN
	Orange	E22LED060ON
	Yellow	E22LED060YN
	Green	E22LED060GN
	Blue	E22LED060BN
	White	E22LED060WN
120 Vac	Red	E22LED120RA
	Orange	E22LED120OA
	Yellow	E22LED120YA
	Green	E22LED120GA
	Blue	E22LED120BA
	White	E22LED120WA
120 Vdc	Red	E22LED120RD
	Orange	E22LED120OD
	Yellow	E22LED120YD
	Green	E22LED120GD
	Blue	E22LED120BD
	White	E22LED120WD

# 1

### Selector Switch Units

UL (NEMA) Type 3, 3R, 4, 4X, 12, 13

- Two-, three- and four-position—maintained
- Non-illuminated and illuminated

#### Two-Position Maint. Switch Knob



#### Two-Position Selector Switch

Operator Position <sup>①</sup>		Operator Action <sup>②</sup>	Contact Type	Mounting Location		Cam Code	Non-Illuminated		Illuminated—120V Transformer	
X	O			A	B		Black Knob Catalog Number <sup>③</sup>	Black Lever Catalog Number <sup>③</sup>	Red Knob Catalog Number <sup>③</sup>	Red Lever Catalog Number <sup>③</sup>
X	O	M M	1NC	A	B	1	E34VFBK1-1X	E34VFB1-1X	E34VFB120ER-1X	E34VFB120FR-1X
O	X		1NO							

#### Three-Position Maint. Switch Knob



#### Three-Position Selector Switch

Operator Position <sup>①</sup>			Operator Action <sup>②</sup>	Contact Type	Mounting Location		Cam Code	Non-Illuminated		Illuminated—120V Transformer	
X	O	O			A	B		Black Knob Catalog Number <sup>③</sup>	Black Lever Catalog Number <sup>③</sup>	Red Knob Catalog Number <sup>③</sup>	Red Lever Catalog Number <sup>③</sup>
X	O	O	M M M	1NO	A	B	3	E34VHBK1-2X	E34VHBL1-2X	E34VHB120TER-2X	E34VHB120TFR-2X
O	O	X		1NO							
X	O	O	M M M	1NO	A	B	3	E34VHBK1-23X	E34VHBL1-23X	E34VHB120TER-23X	E34VHB120TFR-23X
O	X	O		2NC (Series)							
O	O	X		1NO							

#### Four-Position Maint. Switch Lever



#### Four-Position Selector Switch

Operator Position <sup>①</sup>				Operator Action <sup>②</sup>	Contact Type	Mounting Location		Cam Code	Non-Illuminated		Illuminated—120V Transformer	
X	O	O	O			A	B		Black Knob Catalog Number <sup>③</sup>	Black Lever Catalog Number <sup>③</sup>	Red Knob Catalog Number <sup>③</sup>	Red Lever Catalog Number <sup>③</sup>
X	O	O	O	M M M M	1NC	A	B	7	E34VTBK1-23X	E34VTBL1-23X	E34VRB120TER-23X	E34VRB120TFR-23X
O	X	O	O		1NO							
O	O	X	O	M M M M	1NO	A	B	7	E34VTBK1-23X	E34VTBL1-23X	E34VRB120TER-23X	E34VRB120TFR-23X
O	O	O	X		1NO							
O	O	O	X		1NC							

#### Color Selection, Non-Illuminated

Color	Code Letter	Color	Code Letter
Black	1	White	5
Red	2	Blue	6
Green	3	Gray	7
Yellow	4	Orange	8

#### Notes

For Light Unit Voltage Suffix and Knobs, Levers tables, see **Page V7-T1-308**.

Use NEMA 4X 10250T operators where exposed to ultraviolet light, see **Pages V7-T1-213 to V7-T1-283**.

① X = closed circuit, O = open circuit.

② M = Maintained.

③ To order different type or color selector switch, substitute the underlined character with appropriate suffix code from the Color Selection table. Example: E34VFBK2-X1.

### Selector Switch Selection



#### Cam and Contact Block Selection

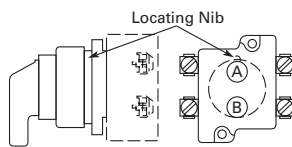
Selector switches in their varied forms (two-position, three-position and four-position) are a big factor contributing to the great flexibility of control that a well rounded line of “pushbuttons” can achieve. Because of their flexibility, they tend to cause difficulty with product selection and application. The following systematic approach should simplify that task.

Cam and contact block selection is better understood if you:

- Work with each incoming and outgoing wire/circuit separately.
- Recognize the terms NO and NC only identify the type of contact by its mode before mounting to the operator. The “X-O” chart (Page V7-T1-305) shows how that contact will act after assembly to the operator with the selected cam shape. X = closed circuit, O = open circuit.

- Up to six NO or NC contacts may be mounted behind each plunger location for a total of twelve contacts. Single circuit contact blocks have only one plunger with the other side of the block “open.” Therefore, single circuit contact blocks transmit motion to blocks behind them only for the position containing the circuit.
- Each cam has two separate lobes, each of which operates one of the two contact block plungers independently of each other. Those are identified as position A (locating nib side) and position B (opposite of locating nib). The position designations give direction in selecting and mounting of the contact blocks.

#### Contact Circuit Locations

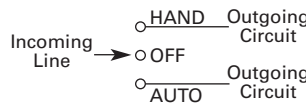


#### Systematic Approach

Application: **HAND-OFF-AUTO** selector switch. In this circuit, one incoming line is distributed to two other outgoing circuits by the switch. The two circuits can be looked at individually.

#### Step 1: Elementary Diagram.

Construct on paper, or in your mind, a simple elementary diagram of the switching scheme as follows:



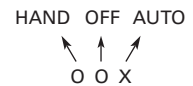
#### Step 2: “X-O” Pattern.

From the elementary diagram, you can construct an “X-O” diagram which describes when the contacts are to be closed (X) or open (O) in the various positions of the switch. The “X-O” for the **HAND** circuit looks like this:



In this circuit, you want a contact closed on the left (HAND) but open in the center and right.

For the **AUTO** circuit, the “X-O” diagram would look like this:



Putting them together, the complete “X-O” diagram is:



Once the “X-O” diagram has been generated, the next step is to select the cam and contact block, or blocks, needed to perform the desired “X-O” functions. The selection tables on the following pages list the various types (shapes) of cams by number to choose from and the type of contact and position to achieve the function outlined in your “X-O” diagram.

1

#### Step 3: Cam Selection.

The cam you select determines the operation of all contact blocks mounted to the operator. It is selected on the basis that it provides the simplest circuitry for the desired "X-O" diagram. The selection tables show all the "X-O" combinations. For the purpose of this example, the applicable portion of those tables is shown on this page.

Now to make the cam selection, make a simple worksheet such as:

	Cam 2	Cam 3
X O O	(A)NO-(B)NC	(A)NO
O O X	(B)NO	(B)NO

It becomes immediately obvious that cam 3 is the better choice for two reasons, (1) the series combination can be avoided making it simpler to wire, (2) only two contacts are required, which is less expensive than the three contacts required by cam 2.

#### Step 4: Contact Block Selection.

Having selected the cam, contact block selection is simply a matter of gathering the A position and B position circuits into pairs which make up the most convenient contact block arrangement. If there is an imbalance in the number of circuits under A or B, then single circuit blocks must be selected for these leftover circuits.

Back to the worksheet, having selected cam 3 do this:

X O X	(A)NO	10250T2
O O X	(B)NO	

#### Step 5: Selector Switch Operator.

Lastly, you have to choose from the many types of operators—knob and lever in various colors or keyed. Also what combinations of maintained and spring return functions are required. Selection of these operators can be found on **Page V7-T1-306**. For the example in step 4, you may want a three-position maintained black knob, cam 3—Catalog Number E34VHBK1.

**The Complete Switch:** E34VHBK1 with one 10250T2 or, for one composite catalog number, E34VHBK1-Y1 found on **Page V7-T1-303**.

#### Diagrams

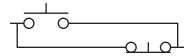
Circuits shown illustrate connections to obtain a selector switch circuit combination and are shown with their appropriate line diagrams. Field wiring of jumper connections required as shown.

X = Closed circuit  
O = Open circuit

#### Wiring of Jumper Connections



Series Connection



Parallel Connection

Four-position selector switches are limited to four contact blocks.

#### Contact Blocks

For selection and number of available contact blocks per operator, see **Page V7-T1-315**.

#### Example Selection Table

No.	"X-O" Pattern	Cam Code #2		Cam Code #3	
		Top A	Bottom B	Top A	Bottom B
1	X 0 0				—
4	0 0 X	—		—	

#### Two-Position Selector Switch Contact Block Selection

No.	Desired Circuit and Operator Position		Contact Blocks Required to Accomplish Circuit Function	
			Top Plunger A	Bottom Plunger B
1	X	0		or
2	0	X		or

#### Note

① Wired in series.

**Three-Position Switch—Cam and Contact Block Selection**

No.	Desired Circuit and Operator Position			Operator with Cam Code #2		Operator with Cam Code #3	
				Mounting Location		Mounting Location	
				Top Plunger A	Bottom Plunger B	Top Plunger A	Bottom Plunger B
1	X	0	0				
2	X	X	0				
3	X	0	X				
4	0	0	X				
5	0	X	X				
6	0	X	0				

**Four-Position Switch—Contact Block Selection**

No.	Desired Circuit and Operator Position				Contact Blocks Required to Accomplish Circuit Function		No.	Desired Circuit and Operator Position				Contact Blocks Required to Accomplish Circuit Function	
					Mounting Location			Mounting Location				Mounting Location	
					Top Plunger A	Bottom Plunger B		Top Plunger A	Bottom Plunger B	Top Plunger A	Bottom Plunger B	Top Plunger A	Bottom Plunger B
1	X	0	0	0			10	X	0	X	0		
2	0	X	0	0									
3	0	0	X	0			11	X	X	X	0		
4	0	0	0	X									
5	X	0	0	X			12	0	X	X	X		
6	0	X	X	0									
7	0	0	X	X			13	X	0	X	X		
8	X	X	0	0									
9	0	X	0	X			14	X	X	0	X		



## 1

**Selector Switch Operators**

UL (NEMA) Type 3, 3R, 4, 4X, 12, 13

**Two-Position Knob Selector Switch****Operators with Knob Assembled**

Positions	Operator Action <sup>①</sup>	Black Knob Selector Switch— Vertical Mounting <sup>②</sup>	
		Cam Code <sup>③</sup>	Catalog Number <sup>④</sup>
Two-position—60° throw		1	<u>E34VFBK1</u>
		1	<u>E34VEBK1</u>
Three-position—60° throw		2	<u>E34VGBK1</u>
		3	<u>E34VHBK1</u>
		2	<u>E34VJBK1</u>
		3	<u>E34VKBK1</u>
		2	<u>E34VLBK1</u>
		3	<u>E34VMBK1</u>
Four-position—40° throw		2	<u>E34VNBK1</u>
		3	<u>E34VPBK1</u>
Four-position—40° throw		7	<u>E34VTBK1</u>
		7	<u>E34VTBK1</u>

**Notes**Use NEMA 4X 10250T operators where exposed to ultraviolet light, see **Pages V7-T1-213 to V7-T1-283**.<sup>①</sup> M = Maintained. S = Spring return in direction of arrow (R).<sup>②</sup> Field convertible to horizontal mounting.<sup>③</sup> For selection of the proper cam and contact block to obtain the proper circuit sequence, see selection instructions and tables on **Pages V7-T1-303 to V7-T1-305**.<sup>④</sup> For other colors of either the knob or lever, replace the underlined characters of the catalog number with the appropriate suffix code from Alternate Knob and Lever table on **Page V7-T1-307**. Example: E34VFBL2.<sup>⑤</sup> Choose key removal position required for application from table on **Page V7-T1-307**. Add key removal code number to listed catalog number. Example: E34KFB2.

E34K\_



E34L\_



E34A\_



**Alternate Knobs and Levers for Operators** <sup>②</sup>

Color	Knob Suffix Code	Catalog Number	Lever Suffix Code	Catalog Number	Lever Designed for Added Ingress Protection <sup>③</sup>	
					Suffix Code	Catalog Number
Black	K1	E34K1	L1	E34L1	A1	E34A1
Red	K2	E34K2	L2	E34L2	A2	E34A2
Green	K3	E34K3	L3	E34L3	A3	E34A3
Yellow	K4	E34K4	L4	E34L4	A4	E34A4
White	K5	E34K5	L5	E34L5	A5	E34A5
Blue	K6	E34K6	L6	E34L6	A6	E34A6
Gray	K7	E34K7	L7	E34L7	A7	E34A7
Orange	K8	E34K8	L8	E34L8	A8	E34A8

**Notes**

- ① Key removal in “spring return from” positions not recommended.
- ② See operators on **Page V7-T1-306**.
- ③ For use on maintained operators only.

### Contact Blocks

#### Standard Contact Blocks

- UL A600/P600 rated
- Color-coded plungers—red/green for NC/NO circuits
- Silver contact tips with “reliability nibs”
- Black (opaque) or amber (translucent) housings
- Pressure plate or spade terminals
- Fingerproof shrouds (for pressure terminals only)

#### Logic Level Contact Blocks

- UL A600/P600 rated
- Black plungers
- Inert palladium knife-blade contacts
- Black (opaque) housings
- Pressure plate or spade terminals
- Fingerproof shrouds not available

#### Special Function Contact Blocks

- UL A600/P600 rated
- Black plungers
- Silver contact tips with “reliability nibs”
- Black (opaque) housings
- Pressure plate terminals only
- Fingerproof shrouds not available

#### Special Purpose Contact Block

- Maximum 300V rated
- Black plungers
- Silver contact tips with “reliability nibs”
- Black (opaque) housings
- Pressure plate terminals only
- Fingerproof shrouds not available

#### Reliability Nibs

Reliability nibs are the hallmark of Eaton’s contact blocks. A pointed silver nib on the contact tip ensures reliable switching from logic level (5V) up to 600V applications. Therefore standard contact blocks can be used for most logic level applications where the contacts are not exposed to any harsh environmental conditions.

#### Palladium Contacts

Palladium, which is more inert than gold, is well suited for voltages and currents approaching zero and is recommended for applications where environmental conditions are a factor.

#### Maximum Contact Block Mounting per Operator Type

Operator	Max. Stack
Pushbuttons	6
Push-pull operators	2
Roto-push operators	4
Two- or three-position selector switches	6
Four-position selector switches	4
Joysticks	4

1

10250T1



#### Contact Blocks

Symbol	Circuit	Description <sup>①</sup>	Standard	Spade Terminal <sup>②</sup>	Logic Level	Spade Terminal <sup>②</sup>
			Pressure Terminal Catalog Number	Catalog Number	Pressure Terminal Catalog Number	Catalog Number
	Blank No Plunger 1NC	Stack up to six blocks (six circuits) unless otherwise noted.	<b>10250T51</b>	<b>10250T59</b>	<b>10250T51E</b>	<b>10250T59E</b>
	Blank No Plunger 1NO	Stack up to six blocks (six circuits) unless otherwise noted.	<b>10250T53</b>	<b>10250T60</b>	<b>10250T53E</b>	<b>10250T60E</b>
	<b>NO-NC</b>	Stack up to six blocks (12 circuits) unless otherwise noted.	<b>10250T1</b>	<b>10250T40</b>	<b>10250T1E</b>	<b>10250T40E</b>
	<b>2NC</b>	Stack up to six blocks (12 circuits) unless otherwise noted.	<b>10250T3</b>	<b>10250T42</b>	<b>10250T3E</b>	<b>10250T42E</b>
	2NO	Stack up to six blocks (12 circuits) unless otherwise noted.	<b>10250T2</b>	<b>10250T41</b>	<b>10250T2E</b>	<b>10250T41E</b>
<b>Special Function Blocks <sup>③</sup></b>						
	Blank No Plunger LONC	Late opening NC. Stack up to six blocks (six circuits) unless otherwise noted.	<b>10250T71 <sup>③</sup></b>	—	<b>10250T71E <sup>③</sup></b>	—
	ECNO-NC	Early closing NO and standard NC. Stack up to six blocks unless otherwise noted.	<b>10250T47 <sup>③④</sup></b>	—	<b>10250T47E <sup>③</sup></b>	—
	ECNO-NO	Early closing NO and standard NO. Stack up to four blocks unless otherwise noted.	<b>10250T57 <sup>③④</sup></b>	—	<b>10250T57E <sup>③</sup></b>	—
	2LONC	Two late opening NC contacts. Stack up to six blocks unless otherwise noted.	<b>10250T45 <sup>③</sup></b>	—	<b>10250T45E <sup>③</sup></b>	—
	LONC-ECNO	Overlapping contacts. Stack up to four blocks unless otherwise noted.	<b>10250T55 <sup>③④</sup></b>	—	<b>10250T55E <sup>③</sup></b>	—
<b>Special Purpose Blocks <sup>⑤</sup></b>						
	2NO-2NC	Four circuits in single block depth. Rated 300V max. Stack up to four blocks unless otherwise noted.	<b>10250T44 <sup>⑤</sup></b>	—		

#### Notes

- ① All 10250T contact blocks shown are suitable for use on standard 10250T and E34 operators. These contact blocks are not suitable for Class I Division 2 type 10250T or E34 devices.
- ② Contact blocks with spade terminals are limited to a maximum of one contact block per operator and minimum spacing between devices is 2.5 in (63.5 mm). Not suitable for use in 10250T or E34 enclosures. Also available in amber housing. Not available with fingerproof shrouds.
- ③ Special function contact blocks are not suitable for use with roto-push operators, three-position push-pull operators, or four-position selector switches.
- ④ ECNO contact blocks are not suitable for use with two-position joysticks or when operators are used with padlock attachments.
- ⑤ Special purpose 10250T44 contact blocks are not suitable on selector switches or roto-push operators. Okay to use with three-position push-pull operators only on low voltage (30V or less) circuits.

# 1.10

## Pushbuttons and Indicating Lights

30.5 mm Corrosion Resistant Watertight/Oiltight—E34

1



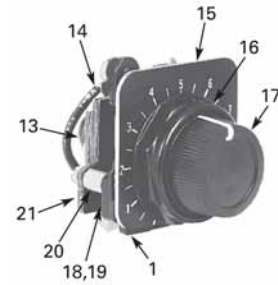
**Flush Head Pushbutton Operator**



**Mushroom Head Pushbutton Operator**



**Jumbo Mushroom Head Operator**



**Potentiometers**



**Illuminated Pushbutton Operator**



**Transformer Type Indicating Light**



**Knob-Operated Selector Switch Operator**



**Full Voltage, Resistor and Transformer Type Illuminated Selector Switch**

### E34 Style Operator Replacement Parts

Item No.	Description	No. Req.	Part Number
1	Gasket	1	16-1548
2	Mounting nut	1	15-1530-4
3	Set screw (#6-32 x 0.250 in long hollow hex)	2	11-2014
4	Mushroom head button (includes [2] item 5)	1	As Req. Below
	Black	—	53-1317
	Red	—	53-1317-2
	Yellow	—	53-1317-3
	Green	—	53-1317-4
	Blue	—	53-1317-22
5	Set screw (#10-32 x 0.250 in long hollow hex)	2	11-544
6	Jumbo mushroom head button (aluminum—includes [2] item 5)	1	As Req. Below
	Red	—	53-1317-9
	Black	—	53-1317-10
	Yellow	—	53-1317-11
	Green	—	53-1317-12
7	Jumbo mushroom head button (aluminum—red EMERG. STOP) does not include item 5	1	53-1349-18
8	Mounting screw (#6-32 x 0.710 in long)	2	10250TA79
	Washer	2	16-2038
9	Terminal screw and lug (captive)	Req.	80-5502
10	Gasket (supplied with basic unit)	1	32-803
11	Round head screw (#4-40 x 0.344 in long) (supplied with basic unit)	2	11-4553

Item No.	Description	No. Req.	Part Number
12	Mounting screw	2	11-1632
13	Simple potentiometer (does not include items 18, 28 or 29)	1	As Req. Below
	1,000 ohms	—	41-782-2
	2,500 ohms	—	41-782-3
	5,000 ohms	—	41-782-10
	10,000 ohms	—	41-782-4
	25,000 ohms	—	41-782-5
	50,000 ohms	—	41-782-6
14	Connector (includes screw and lug)	2	25-1851
15	Indicating plate	1	As Req. Above
	Standard size (without legend)	—	30-4460
	Large size (specify legend)	—	10250TR30
16	Retaining nut	1	15-1547-3
17	Knob	1	53-1314
	Socket set screw (#6-32 x 0.250 in long)	1	11-2014
18	Coupling	1	11-2014 29-3749-2
19	Set screw (#6-32 x 0.188 in long)	1	11-1199
20	Spacer	2	56-1066-18
21	Connector (includes screw and lug)	1	25-1851-2
22	Mounting nut	1	15-1938-2

## Technical Data and Specifications


### Mechanical Ratings

Description	Specification
<b>Frequency of Operation</b>	
All pushbuttons	6000 operations/hr.
Key and lever selector switches	3000 operations/hr.
Auto-latch devices	1200 operations/hr.
<b>Life</b>	
Pushbuttons	10 x 10 <sup>6</sup> operations
Contact blocks	10 x 10 <sup>6</sup> operations
PresTest units	10 x 10 <sup>6</sup> operations
Lever and key selector switches	0.25 x 10 <sup>6</sup> operations
Twist to release pushbuttons	0.3 x 10 <sup>6</sup> operations
<b>Shock Resistance</b>	
Duration	210 ms ≥5g

### General Specifications

Description	Specification
<b>Climate Conditions</b>	
Operating temperature	1° to 150°F (–17° to 66°C)
Storage temperature	–40° to 176°F (–40° to 80°C)
Altitude	6,562 ft (2,000m)
Humidity	Max. 95% RH at 60°C
<b>Terminals</b>	
Marking	NC-NO on the contact block to meet the NEMA requirements. Dual marking system 1–2 for normally closed, 3–4 for normally open to meet BS5472 (Cenelec EN50 005).
Clamps	Terminals are saddle clamp type for 1 x 22 AWG (0.34 mm <sup>2</sup> ) to 2 x 14 AWG (2.5 mm <sup>2</sup> ) conductors
Torque	7 lb-in (0.8 Nm)
Degree of protection against direct electrical contact	IP2X with fingerproof shroud
<b>Light Units</b>	
Transformers	Will withstand short-circuit for 1 hour per IEC 60947-5-1
Bulbs—average life:	
Transformer type	20,000 hrs.
Resistor/direct voltage type	2500 hrs. minimum at rated V
LED	60,000 to 100,000 hrs.

## Electrical Ratings

Description	Specification
Insulation	$U_i = 660 \text{ Vac or Vdc}$
Thermal	$I_{th} = 10\text{A}$
<b>Short Circuit Coordination to IEC/EN 60947-5-1</b>	
Rated conditional short circuit current	1 kA
Fuse type	GE power controls TIA 10, red spot type gG, 10A, 660 Vac, 460 Vdc, BS88-2, IEC 60269-2-1
	
UL rating	A600, P600
AC load life duty cycle 1200 operations/hour	
10A	110V pf 0.4— $1 \times 10^6$ operations
5A	250V pf 0.4— $1 \times 10^6$ operations
2A	600V pf 0.4— $1 \times 10^6$ operations
Switching capacity	
AC 15 rated make/break ( $11 \times I_b$ at $1.1 \times U_b$ )	
6A	120V pf 0.3
4A	240V pf 0.3
2A	660V pf 0.3
DC13 rated make/break ( $1.1 \times I_b$ at $1.1 \times U_b$ )	
1.0A	125V L/R $\geq 0.95$ at 300 ms
0.55A	250V L/R $\geq 0.95$ at 300 ms
0.1A	660V L/R $\geq 0.95$ at 300 ms
10A	110V pure resistive
Maximum ratings for logic level and hostile atmosphere application	
Maximum amperes	0.5A
Maximum volts	120 Vac/Vdc
Low voltage switching	Conical shaped points or “reliability nibs” improve performance in dry circuit, corrosive, fine dust and other contaminated atmospheres. Under normal environmental conditions, the minimum operational voltage is 5V and the minimum operational current is 1 mA, Vac/Vdc.
Contact operation	Slow make and break. All normally closed contacts have positive opening operation, i.e., normally closed contacts are forced open in the event of contact weld or spring breakage.

## Electrical Ratings—Contact Block

Meet or Exceed NEMA Rating Designations A600, A300 and B300 for AC and P600 for DC

Description	50 Vac or 60 H				Vdc		
	120	240	480	600	24/28	125	250
<b>Meet or Exceed NEMA Rating Designations A600, A300 and B300 for AC and P600 for DC</b>							
Make and emerg. interrupting capacity (amp)	60	30	15	12	5.7	1.1	0.55
Normal load break (amp)	6	3	1.5	1.2	5.7	1.1	0.55
Thermal current (amp)	10	10	10	10	5.0	5.0	5.0
Voltamperes:							
Make and emerg. interrupting capacity	7200	7200	7200	7200	138	138	138
Normal load break	720	720	720	720	138	138	138

**Mounting Options**

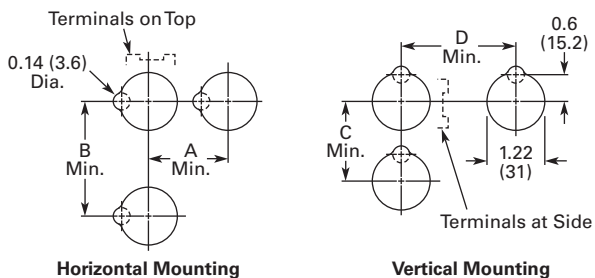
**Panel Thickness**

- Minimum: 0.06 in (1.6 mm)
- Maximum: 0.25 in (8 mm) including legend plate
- Maximum can be increased to 0.375 in (15.9 mm) using optional retaining nut
  - Indicating light: 10250TA30
  - Pushbutton/selector switch: 10250TA31

**Mounting Matrix**

Legend Plate	Dimensions in Inches (mm)			
	A	B	C	D
Small	1.63 (41.3)	2.25 (57.2)	2.25 (57.2)	1.63 (41.3)
Medium	1.75 (44.5)	2.25 (57.2)	2.25 (57.2)	1.75 (44.5)
Large	2.25 (57.2)	2.25 (57.2)	2.25 (57.2)	2.25 (57.2)

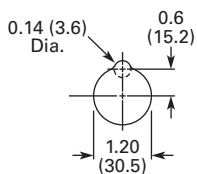
**Mounting Options in Inches (mm)**



Horizontal mounting means terminals are located top and bottom of contact block. Vertical mounting means terminals are left and right of contact block. This allows close spacing of adjacent operators with easy access to terminals.

Locating nib hole or notch is 0.14 in (3.6 mm) #29 drill.

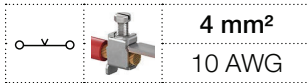
**Drilling Dimensions in Inches (mm)**





# M4/6 screw clamp terminal blocks

## Feed-through - 6 mm 0.236 in spacing



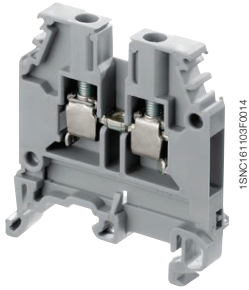
4 mm<sup>2</sup>  
10 AWG

### Description

- Flexibility: snap onto symmetrical and asymmetrical rails,
- Many colors are available in addition to our generic grey, to help you quickly identify any of specific functions.

### Ordering details

Description	Color	Type	Part Number	Pkg qty	Weight (1 pce) g
<b>Feed-through</b>	Grey <input type="checkbox"/>	M4/6	1SNA115116R0700	50	8.20
	Blue <input type="checkbox"/>	M4/6.N	1SNA125116R0100	50	8.20
	Orange <input type="checkbox"/>	M4/6	1SNA105002R2000	50	8.20
	Yellow <input type="checkbox"/>	M4/6	1SNA105116R1600	50	8.20
	Green <input type="checkbox"/>	M4/6	1SNA105001R2700	50	8.20
	Red <input type="checkbox"/>	M4/6	1SNA105032R1500	50	8.20
	Purple <input type="checkbox"/>	M4/6	1SNA206404R0500	50	8.20
	Brown <input type="checkbox"/>	M4/6	1SNA105209R1400	50	8.20
	White <input type="checkbox"/>	M4/6	1SNA105051R2000	50	8.20
	Black <input type="checkbox"/>	M4/6	1SNA105031R1400	50	8.20
	Beige <input type="checkbox"/>	M4/6	1SNA195116R0000	50	8.20



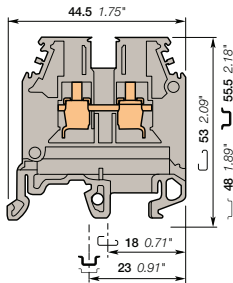
M4/6

### Main technical data

Connecting capacity	IEC	UL	CSA
<b>1 conductor per clamp</b>			
Rigid - Solid / Stranded	0.2-4 mm <sup>2</sup>	22-10 AWG	24-10 AWG
Flexible	0.22-4 mm <sup>2</sup>		
with insulated ferrule			
Gauge	A4		
<b>Rated current / Rated cross section</b>	32 A / 4 mm <sup>2</sup>	30 A / 10 AWG	30 A / 10 AWG
<b>Rated short-time withstand current (1s)</b>	480 A		
<b>Rated voltage</b>	1000 V	600 V	600 V
<b>Impulse withstand voltage</b>	8000 V		
<b>Protection</b>	IP20	NEMA 1	

### Mounting instructions

Rail		G32, TH 35-7.5, TH 35-15
Wire stripping length		9.5 mm 0.37 in
Tool		Flat screwdriver Ø 4 mm Ø 0.157 in
Torque		0.5 - 0.8 N.m 4.4 - 7.1 lb.in



6 mm 0.236 in spacing

The connecting capacity data for one Rigid - Solid / Stranded - Flexible conductor (when applicable) is a mandatory information required by IEC, UL and CSA standards. All other data are provided as supplementary information only. For more details, please consult our CB, UL or CSA certificates and technical datasheet available on <http://www.te.com>

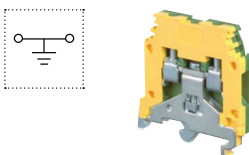
CE	RoHS	UR	CSA	Gost R

### Accessories

Description	Color	Type	Part Number	Pkg qty	Weight (1 pce) g
<b>1 End stops</b>	Grey <input type="checkbox"/>	BAM4	1SNK900001R0000	50	12.00
		BAZ1	1SNK900002R0000	50	4.70
<b>2 End sections</b>		FEM6	1SNA118368R1600	20	2.40
<b>3 Jumper bars</b>					
2 poles		BJM6-2	1SNA176663R0000	10	4.40
3 poles		BJM6-3	1SNA176664R0100	10	6.70
4 poles		BJM6-4	1SNA176665R0200	10	8.90
5 poles		BJM6-5	1SNA176666R0300	10	11.20
10 poles		BJM6-10	1SNA176667R0400	10	22.40
<b>4 Lateral jumper bars</b>	Grey <input type="checkbox"/>				
2 poles		PC6-2	1SNA113546R1400	10	2.00
10 poles		PC6-10	1SNA113548R2600	10	8.00
<b>5 Cross spacing jumpers</b>					
5 mm 0.200 in - 6 mm 0.236 in - 8 mm 0.315 in		EL6	1SNA173627R2100	10	0.10
Universal screw jumper bar kit N°I		BJDP1	1SNA179623R0300	10	7.00
Universal screw jumper bar kit N°III		BJDP3	1SNA179625R0500	10	5.00
<b>6 Insulating tips</b>		EIP	1SNA113550R2400	10	
<b>7 Circuit separators</b>	Grey <input type="checkbox"/>				
0 mm		SCM6	1SNA113003R1000	10	0.30
3 mm		SCF6	1SNA118707R0300	20	
<b>8 Shield connectors</b>		CBM5	1SNA178745R1400	50	
<b>9 Protecting covers</b>	Transparent <input type="checkbox"/>	CPM	1SNA187312R1400	1	
Length 500 mm 19.70 in					
<b>10 Terminal block markers</b>	White <input type="checkbox"/>	RC610	1SNA233000R0100	1	7.50
Blank card					

Complete list of accessories is indicated in the terminal block datasheet.

Some accessories such as jumper bars may modify the terminal block's ratings: complete information in the accessories catalogue pages.



### Ground screw clamp terminal blocks

Description	Color	Type	Part Number	Pkg qty	Weight (1 pce) g
<b>Ground</b>	Green-yellow <input type="checkbox"/>	M4/6.P	1SNA165113R1600	50	21.00
Profile aligned with M4/6...					

Technical data valid for copper conductors only.

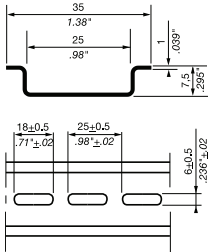
# PR mounting rail

## Common terminal block accessories



1SNK6007ZF0000

PR30



2000 mm 78.74 in spacing

### Description

- Pre-punched symmetrical mounting rail,
- The slotted holes ease the mounting and allow to use existing and/or numerous fixings,
- Particularly well designed for fixing onto back-plates and for terminal assemblies of small dimensions.

### Ordering details

Description	Color	Type	Part Number	Pkg meter	Weight (1 pc) g
Prepunched rail		PR30	1SNA173220R0500	2	328.00

Please note that for all rails: 1 part number equal 1 meter (39 in). Packing of 2 meters (78 in) minimum.  
Check that your order quantity is a multiple of 2.

### Main technical data

Material	Zinc plating and passivation steel				
Rail	TH 35-7.5				
	IEC	UL - CSA			
Equivalent E-Cu cross section	All the main technical data provided are "manufacturer" values.				
RoHS					

### Mounting instructions

- In order to guarantee the performances and security of your installation, please ensure the rail and its fixings can withstand the static and dynamic loads of the components mounted on it;
- To prevent the rail from flexing (1 mm 0.039 in rail thickness only), fixing is recommended every 250 mm 9.84 in;
- To prevent any issues during mounting, screw heads used for rail fixing should not protrude from the rail (7,5 mm 0.295 in rail height only).

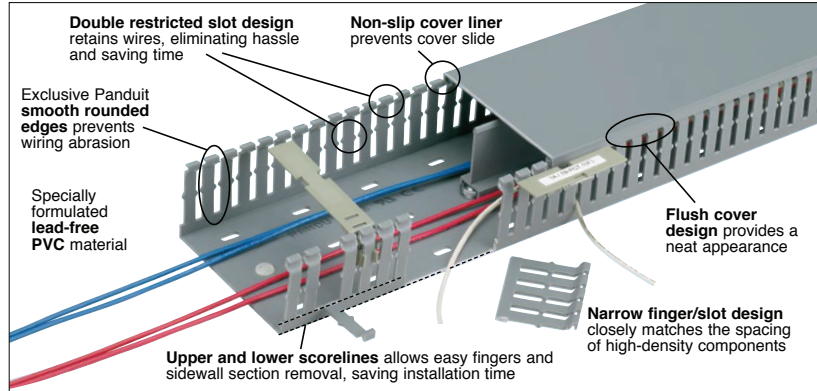
Technical data valid for copper conductors only.

## Features and Benefits – Panduct® Type F Narrow Slot Wiring Duct

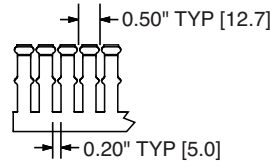
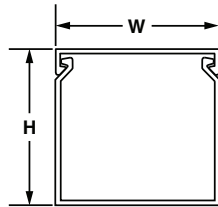
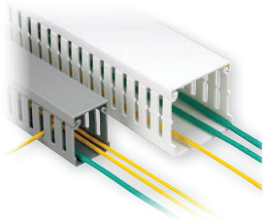


### Panduct® Type F Narrow Slot Wiring Duct

- Narrow slot/finger design provides more slots to fit the spacing of high-density terminal blocks and other hardware
- Material: Lead-free PVC
- UL recognized continuous use temperature: 122°F (50°C)
- UL 94 flammability rating of V-0



- Conforms with NFPA 79-2015 section 13.3.1 requirement for flame retardant material
- Provided with mounting holes
- Base and cover length is 6 feet



Multiple slot restrictors present with 2" and greater duct wall height.

Part Number	Duct Size (W x H)*		Slot Width		Cover Part Number	Std. Pkg. Qty.	Base Ctn. Qty.	Cover Ctn. Qty.
	In.	mm	In.	mm				
<b>F.75X1.5LG6</b>	0.94 x 1.57	23.6 x 39.9			<b>C.75LG6</b>			
<b>F1X1LG6</b>	1.25 x 1.13	32.0 x 28.7			<b>C1LG6</b>			
<b>F1X1.5LG6</b>	1.25 x 1.62	32.0 x 41.1			<b>C1LG6</b>		120	
<b>F1X2LG6</b>	1.25 x 2.12	32.0 x 53.8			<b>C1LG6</b>			
<b>BEST SELLER F1X3LG6</b>	1.25 x 3.13	32.0 x 79.4			<b>C1LG6</b>			
<b>F1X4LG6</b>	1.25 x 4.10	32.0 x 104.1			<b>C1LG6</b>		60	
<b>F1.5X1.5LG6</b>	1.75 x 1.62	44.5 x 41.1			<b>C1.5LG6</b>			
<b>F1.5X2LG6</b>	1.75 x 2.12	44.5 x 53.8			<b>C1.5LG6</b>		120	
<b>BEST SELLER F1.5X3LG6</b>	1.75 x 3.12	44.5 x 79.2			<b>C1.5LG6</b>			
<b>F1.5X4LG6</b>	1.75 x 4.10	44.5 x 104.1			<b>C1.5LG6</b>		60	
<b>F2X2LG6</b>	2.25 x 2.12	57.2 x 53.8			<b>C2LG6</b>		120	
<b>BEST SELLER F2X3LG6</b>	<b>2.25 x 3.14</b>	<b>57.2 x 79.8</b>	<b>0.20</b>	<b>5.0</b>	<b>C2LG6</b>	6		120
<b>BEST SELLER F2X4LG6</b>	2.25 x 4.10	57.2 x 104.1			<b>C2LG6</b>		60	
<b>F2X5LG6</b>	2.25 x 5.10	57.2 x 129.5			<b>C2LG6</b>			
<b>F2.5X3LG6</b>	2.75 x 3.12	69.9 x 79.2			<b>C2.5LG6</b>			
<b>F3X2LG6</b>	3.25 x 2.12	82.6 x 53.8			<b>C3LG6</b>		120	
<b>F3X3LG6</b>	3.25 x 3.13	82.6 x 78.7			<b>C3LG6</b>			
<b>BEST SELLER F3X4LG6</b>	3.25 x 4.10	82.6 x 104.1			<b>C3LG6</b>			
<b>F3X5LG6</b>	3.25 x 5.10	82.6 x 129.5			<b>C3LG6</b>			
<b>F4X3LG6</b>	4.25 x 3.12	108.0 x 79.2			<b>C4LG6</b>			
<b>BEST SELLER F4X4LG6</b>	4.25 x 4.10	108.0 x 104.1			<b>C4LG6</b>		60	
<b>F4X5LG6</b>	4.25 x 5.10	108.0 x 129.5			<b>C4LG6</b>			
<b>F6X4LG6</b>	6.25 x 4.15	158.8 x 105.4			<b>C6LG6</b>			

Part number shown for LG (Light Gray). For other sizes and color availability visit [www.panduit.com](http://www.panduit.com).

Base and cover sold separately.

\*"H" dimension includes duct and cover.

## Accessories

	Description	Order number
	<p><b>Cable strain relief clamp</b></p> <p>The cable strain relief clamp ensures easy and secure mechanical fastening of the submersible pressure sensor's cable. It serves to guide the cable to prevent mechanical damage and to reduce the action of tensile stresses.</p>	14052336
	<p><b>Additional weight</b></p> <p>The additional weight increases the dead weight of the submersible pressure sensor. It simplifies the lowering in monitoring wells, narrow shafts and deep wells. It effectively reduces negative environmental influences of the measuring medium (e.g. turbulent flows) on the measuring result.</p> <p>The additional weight is available in two versions:</p> <ul style="list-style-type: none"> <li>■ Stainless steel 316L, approx. 350 g [12.3 oz], length 120 mm [4.7 in]</li> <li>■ Titanium, approx. 350 g [12.3 oz], length 214.5 mm [8.4 in]</li> </ul> <p>It is recommended that the design of the additional weight is selected in line with the case material of the submersible pressure sensor.</p>	14052322 (316L) 14052330 (titanium)
	<p><b>Terminal box</b></p> <p>The terminal box, with IP67 ingress protection and waterproof ventilation element, provides a moisture-free electrical termination for the submersible pressure sensor. It should be mounted in a dry environment, outside any shafts or vessels, or directly in the switch cabinet.</p>	14052339
	<p><b>Intrinsically safe repeater power supply, model IS Barrier</b></p> <p>Input 0/4 ... 20 mA, supplying and non-supplying Bidirectional HART® signal transmission</p> <p>For details see data sheet AC 80.14</p>	14117118
	<p><b>Display module DIH52 and DIH62</b></p> <p>5-digit display, 20-segment bar graph, without separate power supply, with additional HART® functionality. Automatic adjustment of measuring range and span.</p> <p>“Secondary-master” functionality: Setting the measuring range and unit of the connected transmitter using HART® standard commands possible. Optionally explosion protection per ATEX</p>	on request
	<p><b>HART® modem with USB, RS-232 or Bluetooth® interface</b></p> <p>For scaling the measuring range using a PC via the HART® protocol, a HART® modem with USB, RS-232 or Bluetooth® interface is available. The modem communicates with all registered HART® field instruments and can be used with the most popular HART®-compatible software programs.</p>	7957522 (RS-232 interface) 11025166 (USB interface) 11364254 (Bluetooth® interface)

### Ordering information

Model / Measuring range / Output signal / Accuracy / Cable material / Cable length / Case / Process connection / Sealing / Approval / Certificate / Accessories

© 11/2012 WIKA Alexander Wiegand SE & Co. KG, all rights reserved.  
The specifications given in this document represent the state of engineering at the time of publishing.  
We reserve the right to make modifications to the specifications and materials.



# Configuration summary

Mat. no.	Description Order code	Quantity	Unit
71027061	Passive Barrier RB223 RB223-C1A	1	PC

010	Approval:	C	FM AIS I,II,III/1/ABCDEFG1
020	Channel:	1	1x
030	Transmission direction:	A	LPS hazardous area to non-hazardous area

# Technical Information

## RB223

**One-** or two-channel passive barrier



Loop-powered barrier for the safe separation of 4 to 20 mA standard signal circuits

### Application

Separation of active 0/4 to 20 mA signals from transmitters, valves and actuators

### Your benefits

- Compact side-by-side housing
- Space-saving **1-channel** and 2-channel version
- No power supply required
- International Ex approvals: ATEX, **FM**, CSA
- Can be used up to SIL3
- Bidirectional HART® transmission
- Communication sockets for HART® + integrated HART® resistor for sensor configuration

## Table of contents

<b>Function and system design</b> . . . . .	<b>3</b>	<b>Supplementary documentation</b> . . . . .	<b>9</b>
Measuring principle . . . . .	3	Brief Operating Instructions (KA) . . . . .	9
Measuring system . . . . .	3	Operating Instructions (BA) . . . . .	9
<b>Input</b> . . . . .	<b>3</b>	Safety Instructions (XA) . . . . .	9
Direction of power transmission non-Ex → Ex . . . . .	3	Supplementary device-dependent documentation . . . . .	9
Direction of power transmission Ex → non-Ex . . . . .	3		
<b>Output</b> . . . . .	<b>4</b>		
Direction of power transmission non-Ex → Ex . . . . .	4		
Direction of power transmission Ex → non-Ex . . . . .	4		
Galvanic isolation . . . . .	4		
<b>Power supply</b> . . . . .	<b>4</b>		
Electrical connection, terminal assignment . . . . .	4		
Supply voltage . . . . .	5		
Start-up current (intrinsic consumption) . . . . .	5		
Voltage drop . . . . .	5		
Power loss . . . . .	5		
Terminals . . . . .	5		
<b>Performance characteristics</b> . . . . .	<b>5</b>		
Accuracy . . . . .	5		
Transmission behavior . . . . .	6		
Step response . . . . .	6		
Frequency response . . . . .	6		
<b>Installation</b> . . . . .	<b>6</b>		
Mounting location . . . . .	6		
Orientation . . . . .	6		
Installation instructions . . . . .	6		
<b>Environment</b> . . . . .	<b>6</b>		
<b>Mechanical construction</b> . . . . .	<b>7</b>		
Design, dimensions . . . . .	7		
Weight . . . . .	7		
Materials . . . . .	7		
<b>Human interface</b> . . . . .	<b>7</b>		
Remote operation . . . . .	7		
Local operation . . . . .	7		
<b>Ordering information</b> . . . . .	<b>7</b>		
<b>Accessories</b> . . . . .	<b>8</b>		
Device-specific accessories . . . . .	8		
Service-specific accessories . . . . .	8		
<b>Certificates and approvals</b> . . . . .	<b>8</b>		
CE mark . . . . .	8		
SIL . . . . .	8		

## Function and system design

### Measuring principle

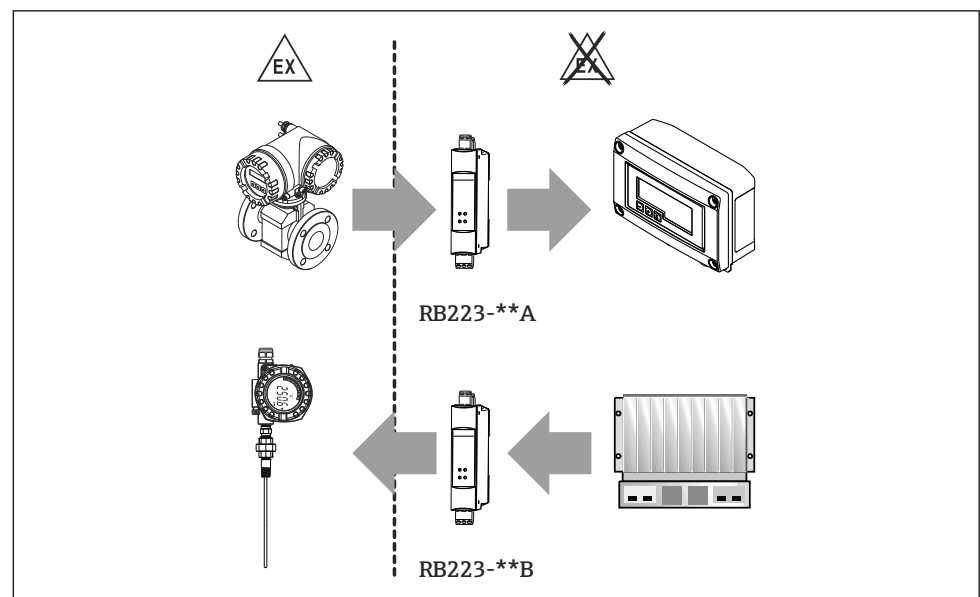
The passive barrier is used for galvanic isolation of active signal circuits (0/4 to 20 mA) in three applications:

- Transmission from non-Ex areas to Ex areas, e.g. for active actuators, controllers or indicators
- Transmission from Ex areas to non-Ex areas for the linking of active, intrinsically safe circuits to the PLC
- Transmission of signals (0/4 to 20 mA) from the Ex area to the non-Ex area when intrinsically safe transmitters in the Ex area are supplied with a non-intrinsically safe loop power supply in the non-Ex area

The device has an analog input and an intrinsically safe analog output, or an output and an intrinsically safe input. The device is also optionally available as a two-channel version. The barrier is used for the intrinsically safe operation of sensors, valves and actuators.

### Measuring system

The standard device has one analog input and one analog output. A two-channel device with two analog inputs and two analog outputs is optionally available.



*RB223-\*\*A Ex to non-Ex: active 4-wire sensor (e.g. Promag 50) -> RB223 -> passive current input (e.g. RIA15)*

*RB223-\*\*B Non-Ex to Ex: passive 2-wire sensor (e.g. TMT162) -> RB223 -> active current input (e.g. PLC)*

A0024952

## Input

### Direction of power transmission non-Ex → Ex

- 0/4 to 22 mA (for specified accuracy)
- 0 to 40 mA operating range
- Max. effective voltage < 26 V for specified accuracy
- $I_{\max} = 100$  mA (short-circuit current of protective diode in event of overvoltage)
- $U_{\max} = 30$  V (limiting voltage of protective diode)
- Reverse polarity protection
- $R_i < 400 \Omega$  (without HART® resistor 232  $\Omega$ )

### Direction of power transmission Ex → non-Ex

- 0/4 to 22 mA (for specified accuracy)
- 0 to 40 mA operating range
- Max. effective voltage < 26 V
- Intrinsically safe [Ex ia] as per ATEX, FM and CSA
- Reverse polarity protection
- $R_i < 120 \Omega$  (without HART® resistor 232  $\Omega$ )



## Output

Direction of power  
transmission non-Ex → Ex

- 0/4 to 22 mA (for specified accuracy)
- 0 to 40 mA Operating range (max. current depends on load)
- Max. load (load resistance) = 0 to 600 Ω
- Intrinsically safe [Ex ia] as per ATEX, FM and CSA

Direction of power  
transmission Ex → non-Ex

- 0/4 to 22 mA (for specified accuracy)
- 0 to 40 mA Operating range (max. current depends on load)
- Max. load (load resistance) = 0 to 600 Ω

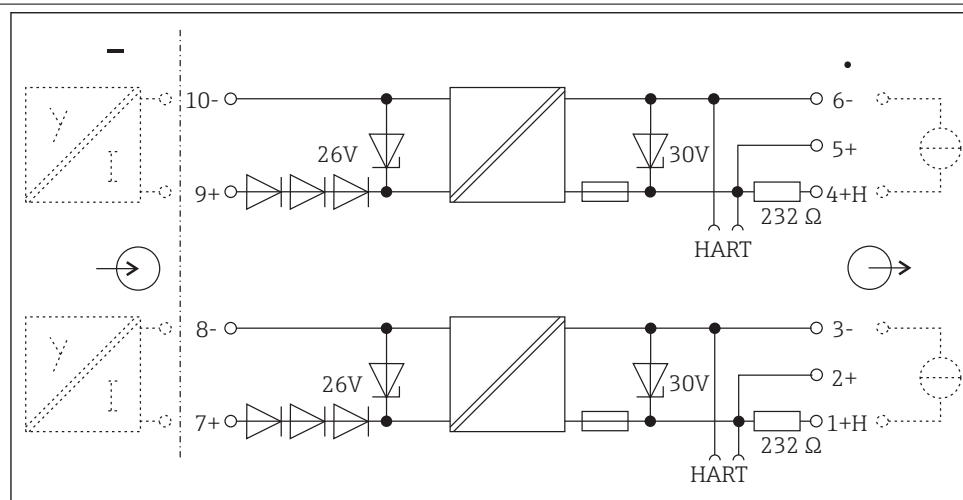
Galvanic isolation

Test voltage

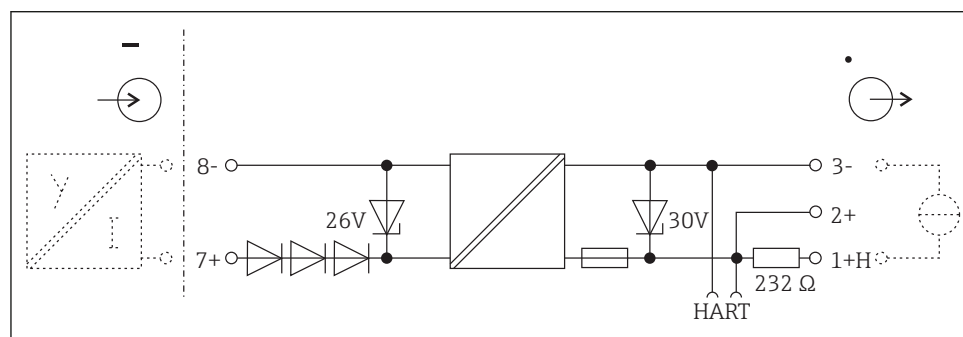
- > 1.5 kV AC between input and output
- > 1.5 kV AC between the channels

## Power supply

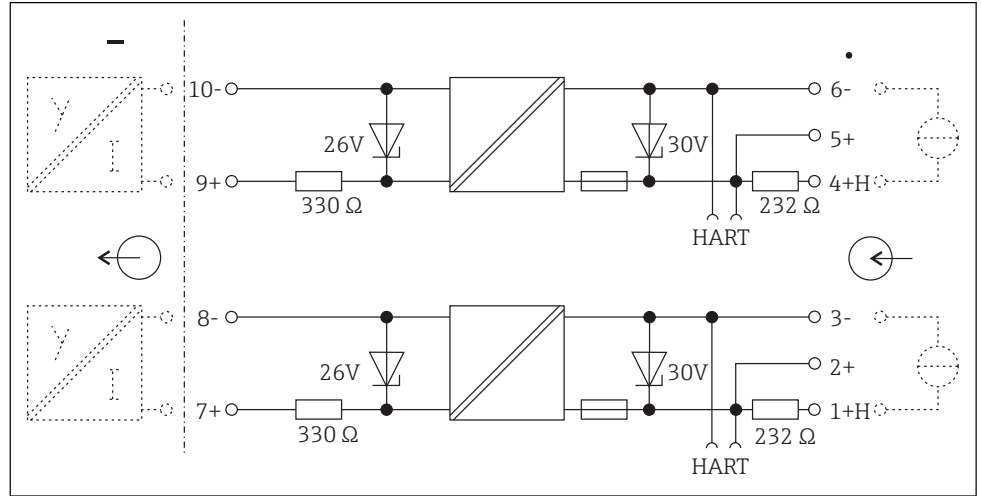
Electrical connection,  
terminal assignment



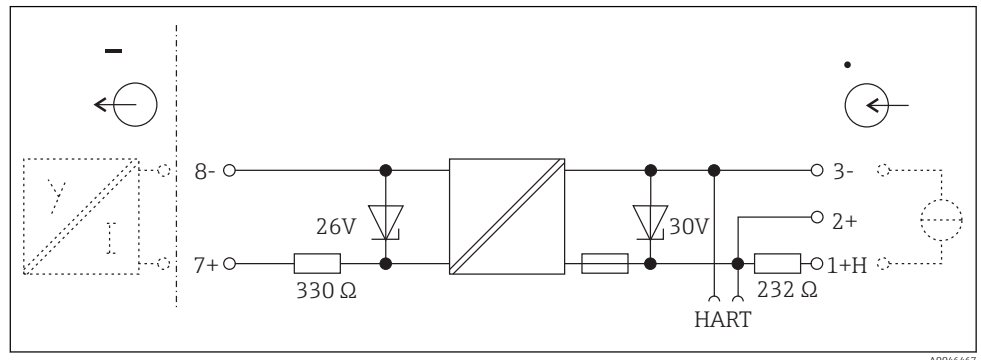
1 Connection RB223-\*\*A, Ex -> non-Ex, 2-channel



2 Connection RB223-\*\*A, Ex -> non-Ex, 1-channel



3 Connection RB223-\*\*B, non-Ex -> Ex, 2-channel



4 Connection RB223-\*\*B, non-Ex -> Ex, 1-channel

<b>Supply voltage</b>	The device is powered from the standard current loop 0/4 to 20 mA
<b>Start-up current (intrinsic consumption)</b>	< 50 mA
<b>Voltage drop</b>	< (1.9 V + 400 Ω x loop current) for non-Ex → Ex < (3.9 V + 120 Ω x loop current) for Ex → non-Ex
<b>Power loss</b>	< 0.2 W for 20 mA (per channel) without HART® resistor < 0.3 W for 20 mA (per channel) with HART® resistor
<b>Terminals</b>	<ul style="list-style-type: none"> <li>■ Coded, pluggable screw terminal, clamping area 1.5 mm<sup>2</sup> solid, or 1.0 mm<sup>2</sup> strand with ferrule</li> <li>■ Communication socket on the front via 2 mm jack plug</li> </ul>

### Performance characteristics

<b>Accuracy</b>	Current transmission	< ± (10 μA + 0.15 % of reading)
	Load error	≤ ± 0.02 % of measured value/100 Ω
	Temperature drift	≤ ± 0.01 %/10 K (0.0056 %/10 °F)
	Residual ripple at output	< 30 mV <sub>eff</sub> for 20 mA loop current and 600 Ω load

<b>Transmission behavior</b>	HART® protocol	Bidirectional transmission possible
<b>Step response</b>	Settling time (10 to 90 % of full scale value)	< 0.5 ms for 500 Ω load for non-Ex → Ex
		< 0.3 ms for 500 Ω load for Ex → non-Ex
<b>Frequency response</b>	Large signal limit frequency	650 Hz for 500 Ω load for non-Ex → Ex
		1 300 Hz for 500 Ω load for Ex → non-Ex

## Installation

<b>Mounting location</b>	Mounting in a cabinet on a mounting rail TS 35 as per IEC 60715
<b>Orientation</b>	No restrictions
<b>Installation instructions</b>	Installation and setup conditions as per IEC 60715

## Environment

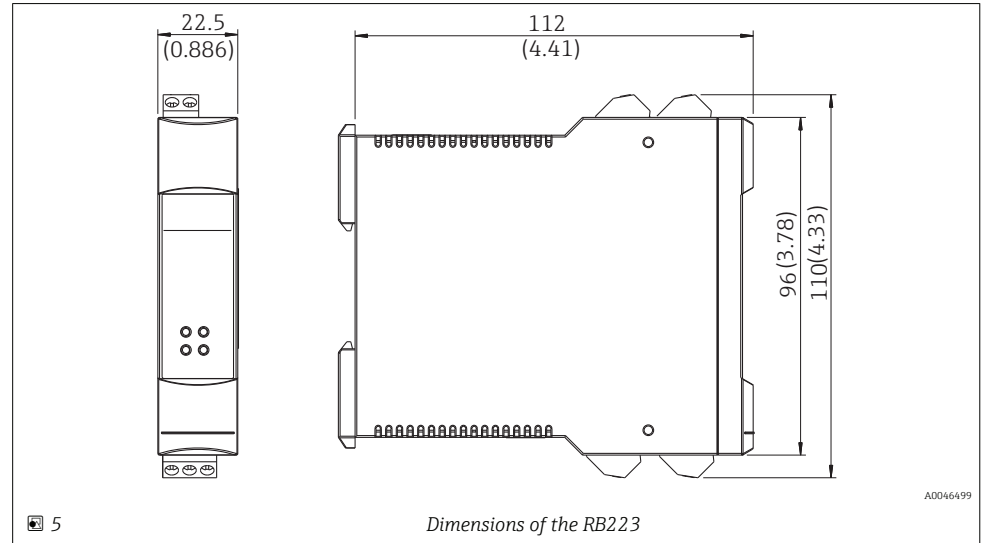
Ambient temperature range	-20 to 60 °C (-4 to 140 °F)
Storage temperature	-20 to 80 °C (-4 to 176 °F)
Degree of protection	IP 20
Climate class	As per IEC 60654-1 Class B2
Relative humidity	< 95 % without condensation
Installation height	As per IEC 61010-1: < 3 000 m (9 843 ft) above MSL
Electromagnetic compatibility (EMC)	Interference immunity as per IEC 61326 (industry) and NAMUR NE21
Electrical safety	Class III equipment, pollution degree 2, overvoltage category II

## Mechanical construction

### Design, dimensions

Dimensions in mm (in)

Housing for DIN rail as per IEC 60715 TH35:



### Weight

Approx. 150 g (5.29 oz)


### Materials

Housing: plastic PC, UL 940

## Human interface

### Remote operation

- HART® communication:
  - Communication signals are transmitted bidirectionally
- Communication resistor:
  - Resistor for HART® communication 232 Ω installed
- Communication sockets:
  - Access for HART® communicator

 Pay attention to voltage drop!

### Local operation

#### Hardware settings / configuration

No manual hardware settings are required at the device for commissioning.

## Ordering information

Detailed ordering information is available for your nearest sales organization [www.addresses.endress.com](http://www.addresses.endress.com) or in the Product Configurator under [www.endress.com](http://www.endress.com) :

1. Click Corporate
2. Select the country
3. Click Products
4. Select the product using the filters and search field
5. Open the product page

The Configuration button to the right of the product image opens the Product Configurator.

### **Product Configurator - the tool for individual product configuration**

- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

## Accessories

Various accessories, which can be ordered with the device or subsequently from Endress+Hauser, are available for the device. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: [www.endress.com](http://www.endress.com).

Device-specific accessories	Type	Order code
	Protective housing IP66 for field mounting	51002468

Service-specific accessories	Accessories	Description
	Configurator	<p>Product Configurator - the tool for individual product configuration</p> <ul style="list-style-type: none"> <li>▪ Up-to-the-minute configuration data</li> <li>▪ Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language</li> <li>▪ Automatic verification of exclusion criteria</li> <li>▪ Automatic creation of the order code and its breakdown in PDF or Excel output format</li> <li>▪ Ability to order directly in the Endress+Hauser Online Shop</li> </ul> <p>The Configurator is available on the Endress+Hauser website at: <a href="http://www.endress.com">www.endress.com</a> -&gt; Click "Corporate" -&gt; Select your country -&gt; Click "Products" -&gt; Select the product using the filters and search field -&gt; Open product page -&gt; The "Configure" button to the right of the product image opens the Product Configurator.</p>
	W@M	<p>Life cycle management for your plant</p> <p>W@M offers assistance with a wide range of software applications over the entire process: from planning and procurement to the installation, commissioning and operation of the measuring devices. All the relevant information is available for every measuring device over the entire life cycle, such as the device status, device-specific documentation, spare parts etc.</p> <p>The application already contains the data of your Endress+Hauser device. Endress+Hauser also takes care of maintaining and updating the data records.</p> <p>W@M is available: Via the Internet: <a href="http://www.endress.com/lifecyclemanagement">www.endress.com/lifecyclemanagement</a></p>

## Certificates and approvals

 For the approvals available, see the Configurator on the specific product page: [www.endress.com](http://www.endress.com) → (search for device name)

<b>CE mark</b>	The product meets the requirements of the harmonized European standards. As such, it complies with the legal specifications of the EC directives. The manufacturer confirms successful testing of the product by affixing to it the CE-mark.
----------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<b>SIL</b>	Can be used up to SIL3
------------	------------------------

---

## Supplementary documentation

The following types of documentation are available in the Download Area of the Endress+Hauser website ([www.endress.com/downloads](http://www.endress.com/downloads)):



For an overview of the scope of the associated Technical Documentation, refer to the following:

- *W@M Device Viewer* ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)): Enter the serial number from nameplate
- *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2D matrix code (QR code) on the nameplate

---

### Brief Operating Instructions (KA)

#### Guide that takes you quickly to the 1st measured value

The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

---

### Operating Instructions (BA)

#### Your reference guide

These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

---

### Safety Instructions (XA)

Depending on the approval, the following Safety Instructions (XA) are supplied with the device. They are an integral part of the Operating Instructions.



The nameplate indicates the Safety Instructions (XA) that are relevant to the device.

---

### Supplementary device-dependent documentation

Additional documents are supplied depending on the device version ordered: Always comply strictly with the instructions in the supplementary documentation. The supplementary documentation is an integral part of the device documentation.



[www.addresses.endress.com](http://www.addresses.endress.com)

---