Unitized "Quick Install" Multi-Way Switches

Switch Type RL-C2W/3W

69 kV - 138 kV ▪ 1200A and 2000A

US Patent Number: 9355797 B1

CLEAVELAND/PRICE INC.

14000 Rt. 993, Trafford, PA 15085 **p** 724-864-4177 **f** 724-864-9040
e sales@cleavelandprice.com **w** cleavelandprice.com

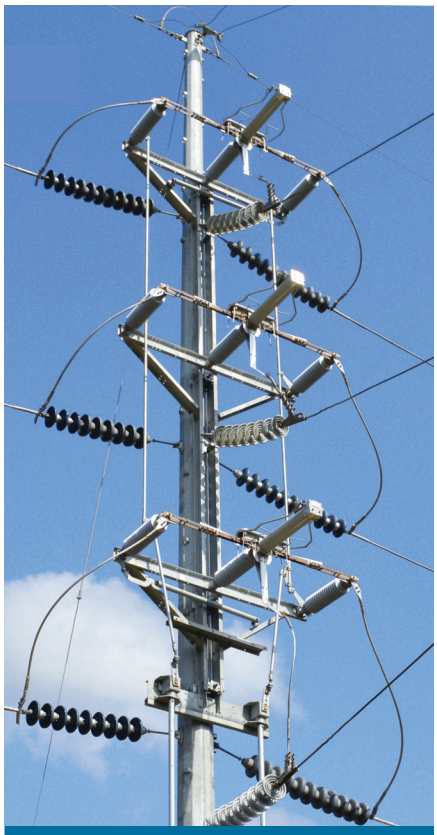
“Quick Install” Transmission Switches

Cleaveland/Price “Quick Install” Transmission Switches

Cleaveland/Price “Quick Install” switches are unitized, phase-over-phase transmission switches that ship from the factory fully assembled and adjusted. After many years of championing unitized 1-way switches for transmission applications, Cleaveland/Price has advanced the concept by developing the RL-C2W/3W, a true unitized multi-way switch. The RL-C2W/3W switch is based upon the proven Cleaveland/Price high kV RL-C switch design.

“Quick Install” switches are designed to address issues that customers have with other transmission switch designs. Some customers have difficulty getting switches into adjustment when mounted on tall transmission poles. This is the result of the torsional “windup” of the vertical operating pipe between phases, which causes the three pole units to operate out of sync. Cleaveland/Price has designed the “Quick Install” switches with “push-pull” interphase linkage so that the three pole units always move in unison, regardless of the length of the vertical operating pipe. The switch ships from the factory fully adjusted with the linkage set in toggle in the closed and open positions. The switch stays in adjustment after installation, just as it was tested and operated at the factory.

Available in 2-way and 3-way configurations, the RL-C2W/3W is supplied with ReliaVac® vacuum interrupters, making it suitable for load switching, loop switching, and line/cable charging switching in sectionalizing, tap, and multi-way transfer applications.



69 kV, 1200A RL-C2W two-way switch

“Quick Install” Transmission Switches

- Easy to install
- Switch adjustment is not necessary during or after installation
- Consistent full contact engagement on all three phases regardless of pole height and operating speed
- Low force operation
- Reduces the amount of crane time necessary at site
- Cost effective

Ratings						
Nominal Voltage	Maximum Voltage	BIL kV	Current	Momentary kA	Peak Withstand	Short-Time Withstand
69 kV	72 kV	350 kV	1200A	61 kA	99 kA	38 kA
			2000A	100 kA	114 kA	44 kA
115 kV	121 kV	550 kV	1200A	61 kA	99 kA	38 kA
			2000A	100 kA	114 kA	44 kA
138 kV	145 kV	650 kV	1200A	61 kA	99 kA	38 kA
			2000A	100 kA	114 kA	44 kA

69 kV, 1200A RL-C3W three-way switch

Assembly Construction

115 kV RL-C3W

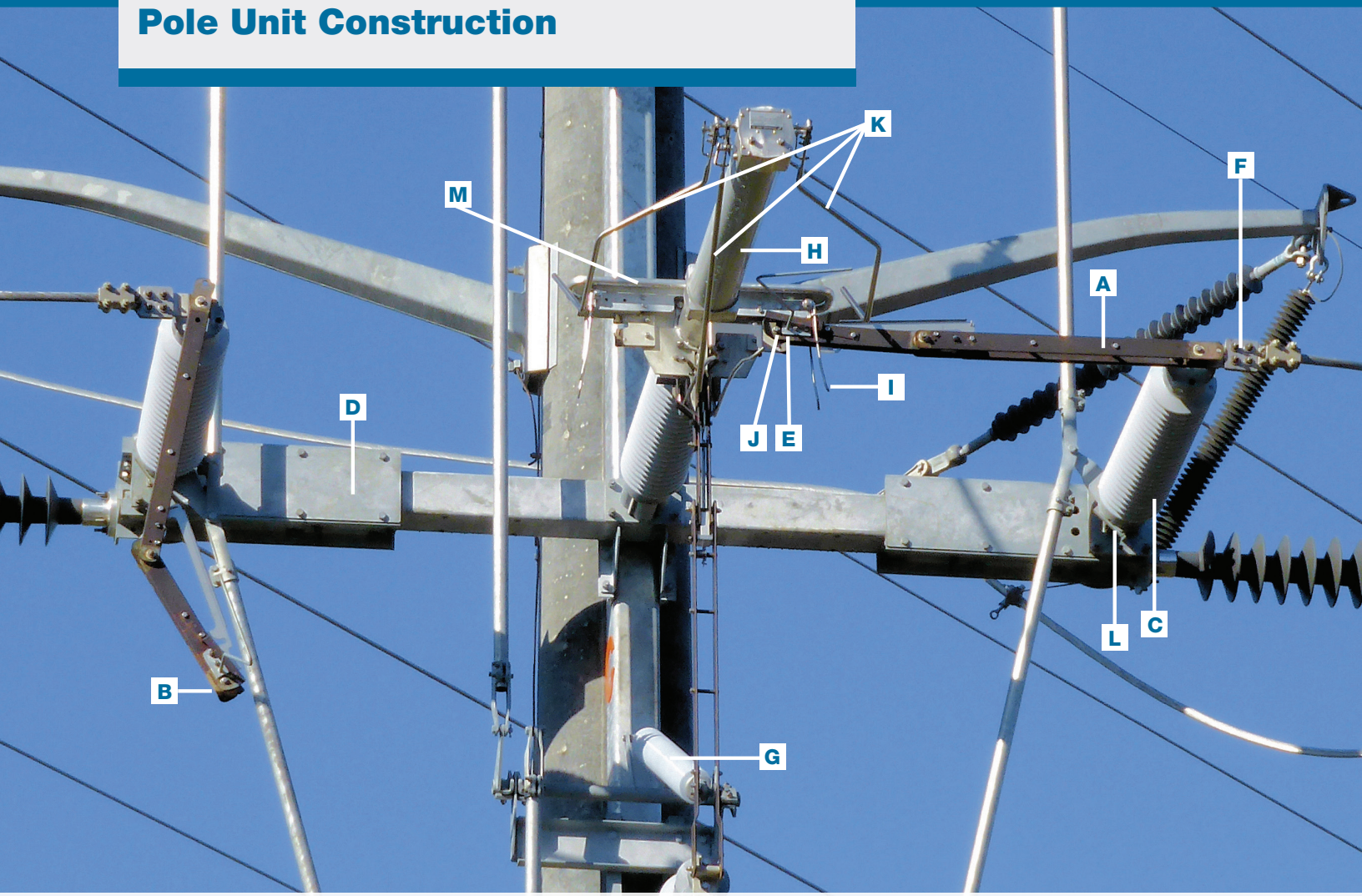
69 kV RL-C2W

RL-C2W/3W Features

- Two side-break blade assemblies on the 2-way RL-C2W switch; two side-break and one vertical-break blade assembly on the 3-way RL-C3W switch
- ReliaVac® vacuum interrupters ship assembled to the switch at 69 kV and detached for shipping at 115 kV and 138 kV
- Galvanized steel frame with extendable bases at 115 kV and 138 kV ratings
- Galvanized steel reciprocating interphase operating pipe, counterbalanced with stainless steel counterbalance springs
- Customer specified lengths of galvanized steel vertical operating pipe
- 90° miter boxes to convert the torsional motion of the vertical operating pipe to a reciprocating motion for the interphase pipe. The miter box drive lever travels into toggle in both the open and closed positions, minimizing operating force.
- Universal joints, when needed

Conductors dead-end to the pole or to the switch mounting frame near the bolts used to attach the frame to the pole. The assembly can accommodate a maximum line tension of 10,000 lbs. and a maximum pull-off angle of 30°.

Pole Unit Construction



- **A** All-copper current-carrying parts
- **B** Toggle blade with built-in blade guide
- **C** Standard-strength porcelain insulators
- **D** Hot-dip galvanized steel base (extendable at 115 kV and 138 kV)
- **E** Silver-to-silver high-pressure line contacts
- **F** NEMA-standard terminal pads
- **G** Porcelain push rod on the vertical break switch (3-way switches only)
- **H** ReliaVac® interrupter
- **I** Arc horns
- **J** Stainless steel contact springs
- **K** Interrupter actuating arms
- **L** Ball-bearing rotating insulator-bearing assembly
- **M** Ice shield

Extendable Base

At 115 kV and 138 kV, the RL-C2W and RL-C3W feature an extendable base. The extendable base enables the switch to be shipped on a standard-width truck and stored in a compact form. The base is easily extended at site for installation. Extending the base entails removing four bolts, sliding the base to its extended position and rebolting it in place. There is no need to unpin the interphase and drive pipes while extending the base.

ReliaVac® Interrupter

Reliavac® Interrupter

Cleaveland/Price RL-C2W/3W switches are provided with ReliaVac® vacuum interrupter attachments. Typical switching applications include:

- Load switching
- Loop switching
- Line/cable charging switching

The ReliaVac®'s switching capabilities were tested using circuit conditions specified by IEEE Standard 1247-2005 and IEC 62271-103-104. Testing consisted of load-interrupting to 2000A, line/cable capacitance-interrupting to 370A, shunt-capacitor switching, and loop splitting. A 1000-operation mechanical-endurance test was also performed.

ReliaVac® *interrupter on an RL-C3W switch*

The Cleaveland/Price Difference

While Cleaveland/Price follows the industry practice of stacking vacuum bottles in a support tube, the similarity between the ReliaVac® and other switch-interrupter attachment designs stops there. Cleaveland/Price has taken innovative approaches to addressing issues relating to vacuum interrupters that customers have shared with us. New design features include:

- The insulating medium in the housing is air that will hold the voltage across the bottles. With the ReliaVac®, there is no gas or oil to leak, and no desiccant to saturate within the interrupter housing. A special vent prevents condensation within the housing.
- There are no external mechanisms or bumpers to ice up. Return springs and dampers are enclosed in the housing.
- The vacuum bottle assembly within the interrupter support housing is kept in compression by bias springs to prevent the braze joints of the ceramic bottles from seeing tensile loads that result from the high-speed mechanism actuating the contacts. The compression system also prevents the vacuum bottles from leaking due to shock loads that could occur during shipping.

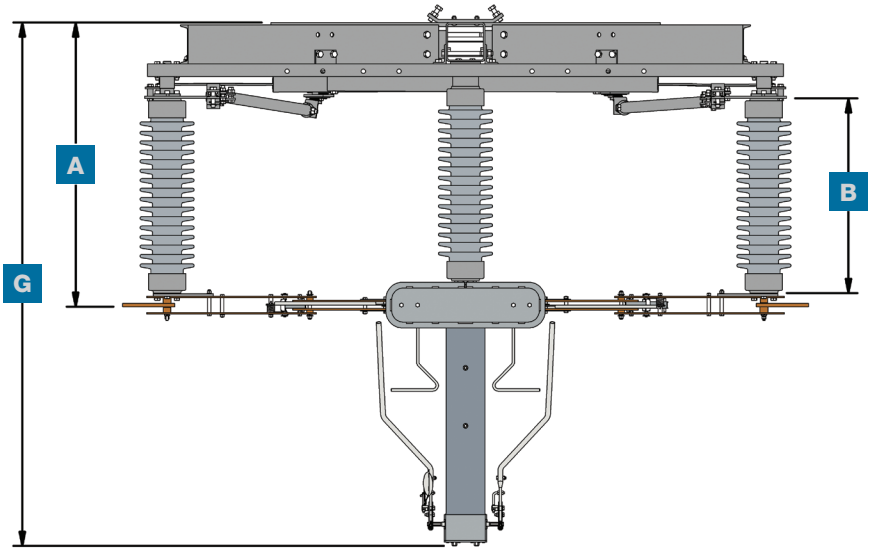
For more information on the ReliaVac® vacuum interrupter, reference Bulletin DB-192A15.

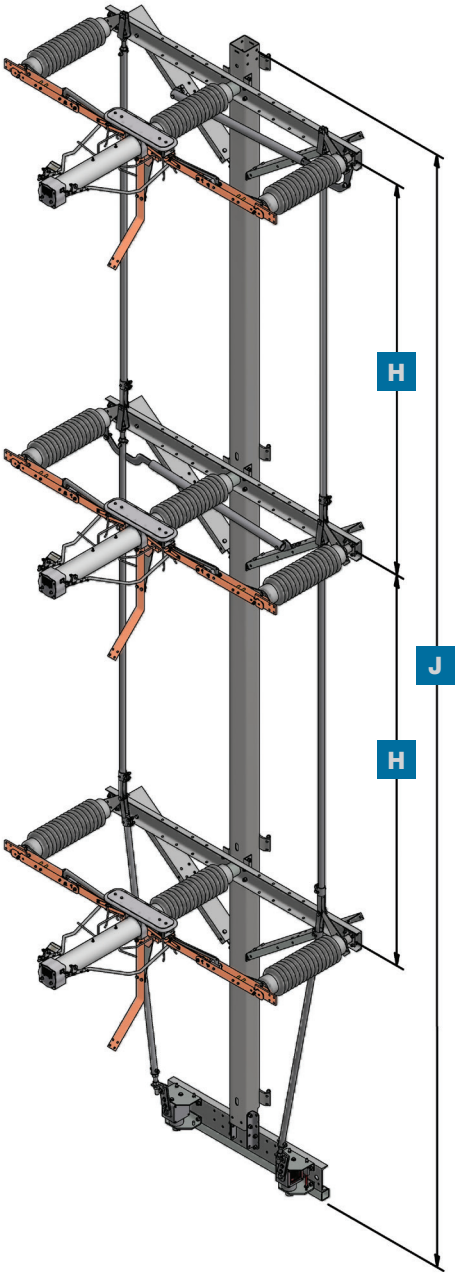
Number of Bottles Required and Ratings - Grounded Neutral System*

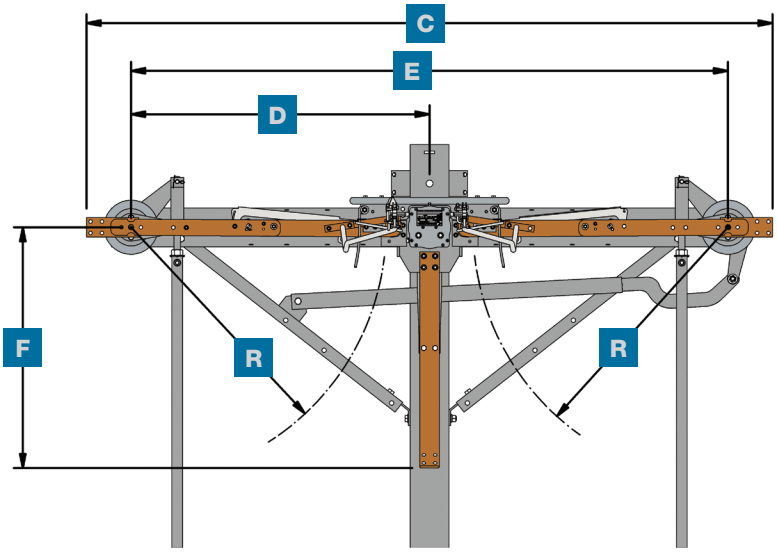
		Loop				Full Load	
Nom. kV	Max. kV	No. of Bottles	Loop Switching < 30% PF 2000A		Line Switching 370A	Load Switching ≥ 70% PF 2000A	No. of Bottles
69	72.5	1	60.2 kV @ 95 µs	TRV Peak		31.8 kV at 100 µs	2
			11.8 kV	Peak Recovery Voltage	118.4 kV		
115	123	1	60.2 kV at 95 µs	TRV Peak		60.2 kV at 100 µs	4
			20.1 kV	Peak Recovery Voltage	200.9 kV		
138	145	1	60.2 kV at 95 µs	TRV Peak		60.2 kV at 100 µs	4
			23.7 kV	Peak Recovery Voltage	236.8 kV		

***The circuit on which the switch is installed must be solidly grounded.**

RL-C2W Dimensions and Technical Data



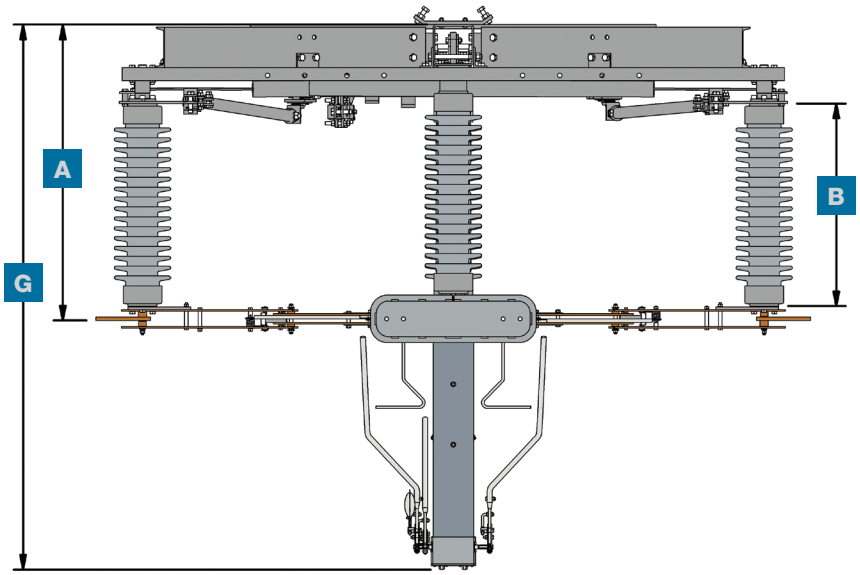


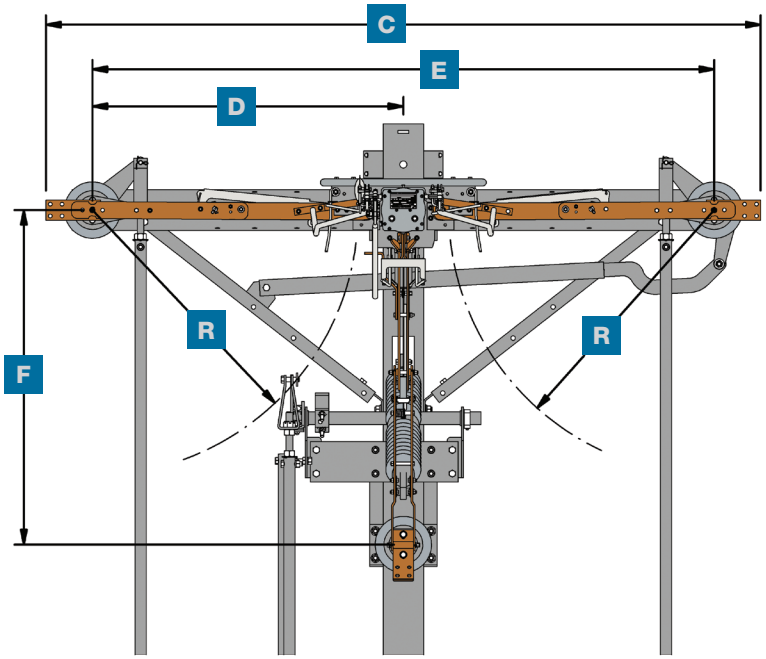


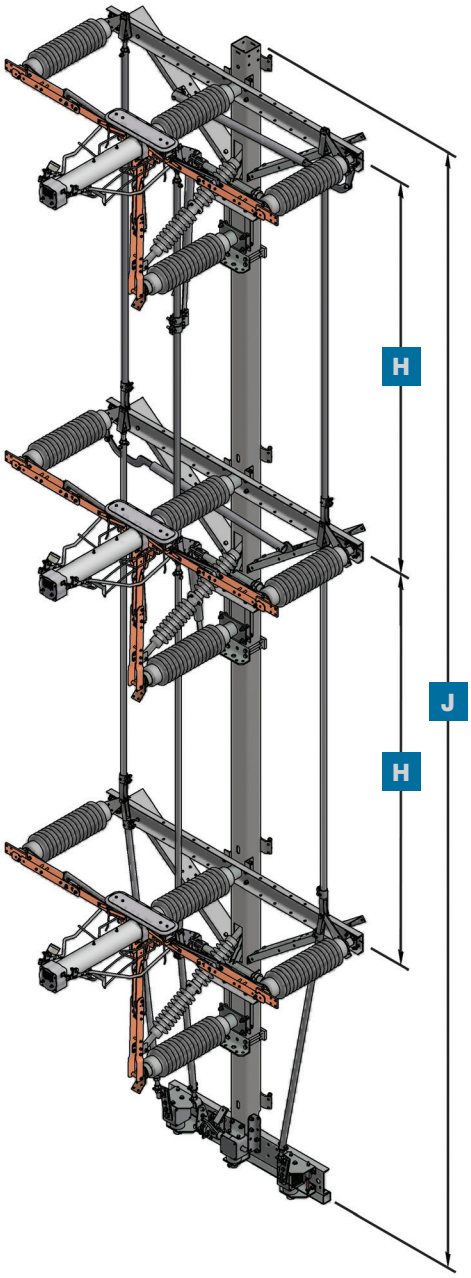
Voltage	Insulator	Dimensions (inches) A	B	C	D	E	F	G	H*	J	R	Installation Data Current	Switch Lift Weight (lbs.)
69 kV	TR216	43.7	30	105.8	46	92	37.1	80.7	132	376.6	39.3	1200A	3275
												2000A	3375
115 kV	TR286	68.3	45	135.8	61	122	37.1	123.3	192	527.5	50.8	1200A	5790
												2000A	5890
138 kV	TR288	79.6	54	154.8	70.5	141	37.1	143.4	216	597.5	61.3	1200A	7100
												2000A	7200

*Consult the factory if greater or less phase-spacing is needed.

RL-C3W Dimensions and Technical Data







Voltage	Insulator	Dimensions (inches)										Installation Data	
		A	B	C	D	E	F	G	H*	J	R	Current	Switch Lift Weight (lbs.)
69 kV	TR216	43.7	30	105.8	46	92	49.5	80.7	132	376.6	39.3	1200A	4050
												2000A	4150
115 kV	TR286	68.3	45	135.8	61	122	72.25	123.3	192	527.5	50.8	1200A	7640
												2000A	7740
138 kV	TR288	79.6	54	154.8	70.5	141	80	143.4	216	597.5	61.3	1200A	8400
												2000A	8500

*Consult the factory if greater or less phase-spacing is needed.

Operators/Options

Manual Operation

A “Quick Install” switch can be manually operated with a swing handle or a wormgear-type operator. A wormgear operator is recommended at 115 kV and 138 kV for ease of operation.

SCADA-ready Installations

For remotely operating the switch through a customer’s SCADA system, the switch can be provided with transmission-class motor operators.

A SCADA-ready installation would consist of a “Quick Install” switch, Cleaveland/Price BT-T motor operators, customer’s choice of RTU, provision for customer’s choice of communication means, and any other specified equipment such as sensors or fault indicators.

The BT-T operator is a 17,000 in-lb. torque operator that will open or close a switch in 3.4 seconds with 180° rotation of the vertical operating pipe. It comes with a padlockable safety cover that protects operating personnel from rotating parts and also prevents tampering with the mechanism. A padlockable torque–relief decoupler also is provided. The motor operator is supplied with contacts that will indicate the true switch position whether the vertical pipe is coupled or decoupled. For manual operation, a telescoping swing handle and handcrank are supplied with the motor operator.

At locations where low-voltage AC is not available for charging the BT-T’s battery, a complete solar charging package can be offered. Consult the factory for more information.

BT-T operator

This brochure describes a standard product and does not show variations in design that may be available. Contact the factory for additional details.

Cleaveland/Price reserves the right to make changes or improvements to the product shown in this brochure without notice or obligation.

Padlockable GH-C wormgear operators on a 3-way manual switch

SCADA installation with BT-T motor operator and communication by satellite

SCADA installation with BT-T motor operator and communication by radio

CLEAVELAND/PRICE INC.

14000 Rt. 993, Trafford, PA 15085 **p** 724-864-4177 **f** 724-864-9040
e sales@cleavelandprice.com **w** cleavelandprice.com