Motor Protection Circuit Breakers 3VU13 and 3VU16

3VU13/3VU16 is suitable for use in fuseless motor feeders upto 11KW/22KW (25A/63A) respectively. 3VU motor protection circuit breakers are used for protection of motor against overload, single phasing and short-circuit faults.

Applications

- **Motor Protection**

  Circuit breakers type 3VU13 & 3VU16 offer overload, short circuit and phase loss protection for 3 phase motors upto 11kW and 22 kW respectively. The breaker has a toggle switch for ease of operation and can be offered with auxiliary contacts, trip indicating contacts, U/V or Shunt release. High breaking capacity of 100kA is available in 3VU13 upto 6A and in 3VU16 upto 25A.

- **Distribution Feeder Protection**

  Standard version of 3VU13 and 3VU16 has adjustable O/L and fixed S/C release. Main application is for disconnection and protection of the distribution feeders, upto 25A and 63A respectively. A large number of overlapping ranges are available for offering closer protection to various loads.

- **Transformer protection**

  A separate 3VU13 range can be offered to protect the primary side of the transformers. The range is available upto 20A. To take care of the inrush current due to transformer switching, the S/C release is set at 19 times the rated current unlike 12 times of the rated current available in standard range.

- **Fuse Monitoring**

  3VU1340-1MS00 is offered for Fuse Monitoring application. This device is connected in parallel to the fuses. In case one of the fuses blows, the rated current will flow through the corresponding phase of this MPCB. MPCB, through its auxiliary contacts, provides a tripping signal to the contactor and thus the motor will be switched off. Hence, the motor will be protected from single phasing. (Refer page 51 for connection diagram)

Fuse Monitoring MPCB - 3VU1340-1MS00

3VU13/16

Standard

3VU motor protection circuit breakers confirm to IS/IEC 60947-1, IS/IEC 60947-2, IS/IEC 60947-4-1, DIN VDE 0660

Range

3VU13: 0.16 - 25A

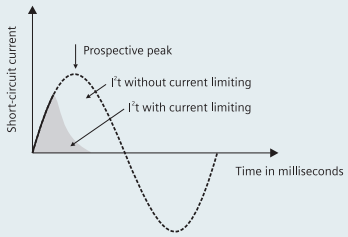
3VU16: 10 - 63A

Benefits and features

High performance

- **Instantaneous Tripping**
  3VU circuit breakers operate on the **Current Limiting Principle**.

  Current Limiting Principle
  In case of short-circuit condition motor protection circuit breaker trips before the short-circuit current reaches the prospective peak. Hence, for circuit breaker to be current limiting it must interrupt the short-circuit current in half cycle or less as shown below.



Current Limiting is achieved in 3VU as follows
In case of a short circuit, the contacts are opened electro-dynamically by the short circuit current. The instantaneous overcurrent release, through the switching mechanism, trips all the three poles of the breaker. A large arc voltage is quickly built up in the arc chamber limiting the short circuit current. Thus ensures faster fault clearing.

- Ambient temperature compensation upto 55°C hence no deration required upto 55°C.

Safety

- **Trip Free Mechanism**
  The breakers have a trip-free mechanism. Even by holding the toggle, tripping operation can not be stopped or blocked once it is started. Thus ensure positive opening in the event of fault.
- **Positive ON/OFF indication through toggle switch**
- **Compact and space saving**

User friendliness and safety

- SIGUT® connection technique ensures ease of wiring (can obviate use of lug)
- Fingers touch proof terminals ensures operator safety
- Separate trip indication on short circuit and overload fault using alarm contact

Flexibility

- Can be used as a main and EMERGENCY STOP switch.
- Identical accessories reduce stock levels

Selection and ordering data

3VU13 Circuit - breakers with 1NO+1NC auxiliary contacts for motor and plant protection

Rated Current In A	Overload release range A	Shortcircuit release setting A	Type[$]	Recommended 415V Motor Rating in Kw/HP (DOL)	Std. pkg. (nos.)
0.16	0.1 - 0.16	1.9	3VU1340-1MB00	–	1
0.24	0.16 - 0.24	2.9	3VU1340-IMC00	–	
0.4	0.24-0.4	4.8	3VU1340-1MD00	–	
0.6	0.4-0.6	7.2	3VU1340-1ME00	–	
1	0.6-1	12	3VU1340-1MF00	0.25/0.33	
1.6	1-1.6	19	3VU1340-1MG00	0.37/0.5	
2.4	1.6-2.4	29	3VU1340-1MH00	0.75/1	
3.2	2-3.2	38	3VU1340-1NH00	1.1/1.5	
4	2.4-4	48	3VU1340-1MJ00	1.5/2	
5	3.2-5	60	3VU1340-1NJ00	2.2/3	
6	4-6	72	3VU1340-1MK00	3/4	
8	5-8	96	3VU1340-1NK00	3.7/5	
10	6-10	120	3VU1340-1ML00	4/5.4	
13	8-13	156	3VU1340-1NL00	5.5/7.5	
16	10-16	190	3VU1340-1MM00	7.5/10	
20	14-20	240	3VU1340-1MN00	9.3/12.5	
25	18-25	300	3VU1340-1MP00	11/15	

3VU13 Circuit - breakers with 1NO+1NC auxiliary contacts for line-side protection of transformers with high inrush current

Rated Current In A	Overload release range A	Shortcircuit release setting A	Type	Std. pkg. (nos.)
0.6	0.4-0.6	12	3VU1340-1TE00	1
1	0.6-1	15	3VU1340-1TF00	
1.6	1-1.6	29	3VU1340-1TG00	
2.4	1.6-2.4	48	3VU1340-1TH00	
4	2.4-4	72	3VU1340-1TJ00	
6	4-6	120	3VU1340-1TK00	
10	6-10	190	3VU1340-1TL00	
16	10-16	300	3VU1340-1TM00	
20	14-20	300	3VU1340-1TN00	

Fuse monitoring motor protection circuit - breakers with 1NO+1NC auxiliary contacts

Rated Current In A	Overload release range A	Shortcircuit release setting A	Type	Std. pkg. (nos.)
0.2	0.2	1.2	3VU1340-1MS00	1

3VU16 Circuit - breakers with 1NO+1NC auxiliary contacts for motor and plant protection

Rated Current In A	Overload release range A	Shortcircuit release setting A	Type[$]	Recommended 415V Motor Rating in Kw/HP (DOL)	Std. pkg. (nos.)
10	6-10	120	3VU1640-1ML00	4/5.4	1
16	10-16	190	3VU1640-1MM00	7.5/10	
25	16-25	300	3VU1640-1MN00	11/15	
32	22-32	380	3VU1640-1MP00	15/20	
40	28-40	480	3VU1640-1MQ00	18.5/25	
52	36-52	600	3VU1640-1MR00	22/30	

3VU16 Circuit - breakers for plant protection

Rated Current In A	Overload release range A	Shortcircuit release setting A	Type[$]	Std. pkg. (nos.)
63	45-63	600	3VU1640-1LS00	1

[$] The 3VU13 and 3VU16 circuit breakers are also available without auxiliary contacts. To order the same, the 8th place of the type number is to be replaced with the digit 0.

Technical Data

According to DIN VDE 0660; IS/IEC 60947-1; IS/IEC 60947-2; IS/IEC 60947-4-1

Type		3VU13		3VU16	
Number of poles		3		3	
Max. rated current I_n					
• motor protection	A	25		52	
• distribution	A	25		63	
Permissible ambient temperature					
• at full rated current	°C	-20 ... +55			
• in storage	°C	-50 ... +80			
Rated operational voltage U_e	V	690			
Rated frequency	Hz	50/60			
Rated insulation voltage U_i	V	750			
Rated impulse withstand voltage U_{imp}	kV	6			
Utilization category					
• to IS/IEC 60947-2 (motor starter protection)		A			
• to IS/IEC 60947-4-1 (motor starters)		AC-3			
Mechanical endurance	Operating cycles				
• up to 25 A	1/h	100,000		100,000	
• 25 A upwards	1/h	–		30,000	
Number of operating cycles/h (on load)	1/h	25		25	
Degree of protection with open terminals/with conductors connected		IP00/IP20			
Temperature compensation	to IS/IEC 60947-4-1	Yes			
Phase failure sensitivity	to IS/IEC 60947-4-1	Yes			
Auxiliary contact for 3VU13 and 3VU16					
Rated operational voltage U_e	AC V	230	400		500
Rated operational current I_e	A	3	1.5		1.2
Utilization category		AC-15			
Rated operational voltage U_e DC L/R 200 ms	DC V	24	60		220
Rated operational current I_e	A	2.3	0.7		0.3
Utilization category		DC-13			
Wattloss Per Breaker					
		Current rating	**Watt**	**Current rating**	**Watt**
		0.6	5	2.4	8
		4	6	6	7
		6	7	25	14
		25	9	63	23
Cross-section for main conductors					
Solid or stranded	mm^2	2 x (1 ... 6)		1 x 1.5 ... 2 x 16 or 1 x 25 + 1 x 10	
Finely stranded with end sleeve	mm^2	2 x (1 ... 4)		1 x 1.5 ... 2 x 10 or 1 x 16 + 1 x 10	
Cross-sections for auxiliary and control connecting leads					
Solid or stranded	mm^2	1 x 0.5 ... 2 x 2.5			
Finely stranded with end sleeve	mm^2	1 x 0.5 ... 2 x 2.5			

Technical data for accessories:

		3VU13	3VU16
Undervoltage Release			
Consumption During Pick-up	VA/W	10/6	
Consumption During Running	VA/W	4.7/2	
Dropout	V	0.7 to 0.35 X Ue	
Pickup	V	85 to 110% of Ue	
Max Operating Time	ms	20	
Shunt Release			
Consumption	VA/W	10/6	
Max Continuous Rating	Sec	5	
Pickup	V	0.7 to 1.1 X Ue	
Current Limiter for 3VU13			
Rated current In		56 Amps	
Rated Voltage Ue		500 V, 50 / 60 Hz.	
Power Connection	mm^2	2 x (1 to 6)	
Mounting			
		on DIN Rail in any position.	

Table 1 3VU13/3VU16 breaking capacity at 415V

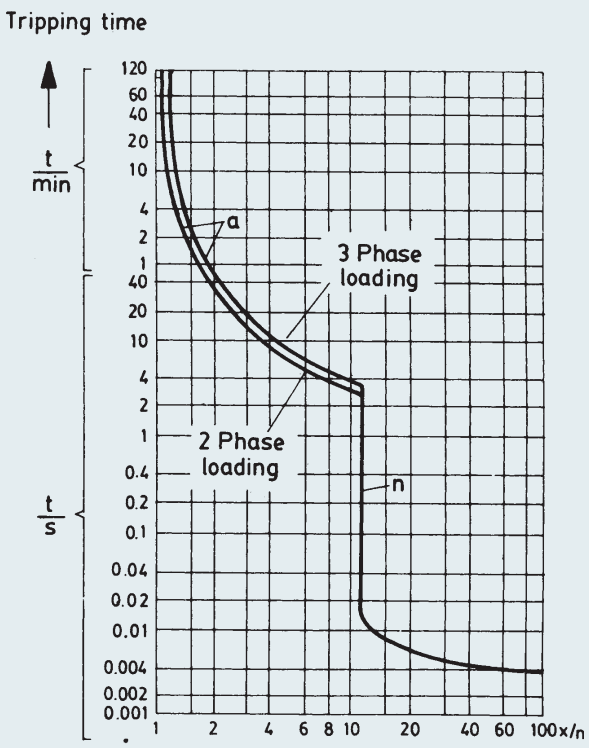
3VU13

Rated current A	0.16-1	1.6	2.4	3.2-4	5-6	8-10	13-16	20-25
Rated Short circuit breaking capacity @ 415V								
Icu kA	100	100	100	100	100	10(50)	6(50)	6(50)
Ics kA	100	100	100	100	100	10(50)	6(50)	6(50)
Maximun back up fuse (gL/gG)								
Diazed A	*	*	*	*	*	80	80	80
NH A	*	*	*	*	*	80	80	80
( ) Values in bracket are with current limiter; * Fuse not required								
For 3VU13 breakers of ratings 8A & above, in place of fuses, the Current Limiter can be used to increase the S/C breaking capacity.								
Rated Breaking Capacity DC; t = 15ms								
1 Contact	2 Contacts in series	3 Contacts in series	**10 kA**					
110-150V	220-300V	330-450V						

3VU16

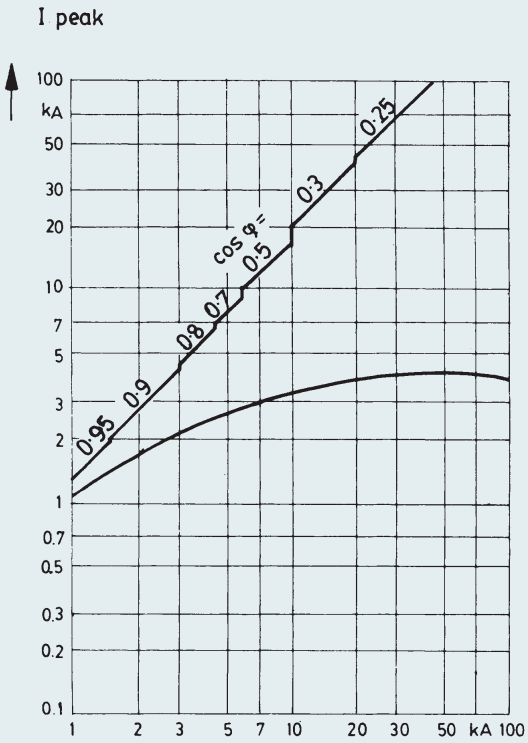
Rated current A	1.6-2.4	4	6	10	16	25	32-63
Rated Short circuit breaking capacity @ 415V							
Icu kA	100	100	100	100	100	100	35
Ics kA	100	100	100	100	100	50	17
Maximun back up fuse (gL/gG); * Fuse not required							
Diazed A	*	*	*	*	*	*	-
NH A	*	*	*	*	*	*	200
Rated Breaking Capacity DC; t = 15ms, upon enquiry							

Characteristic Curves



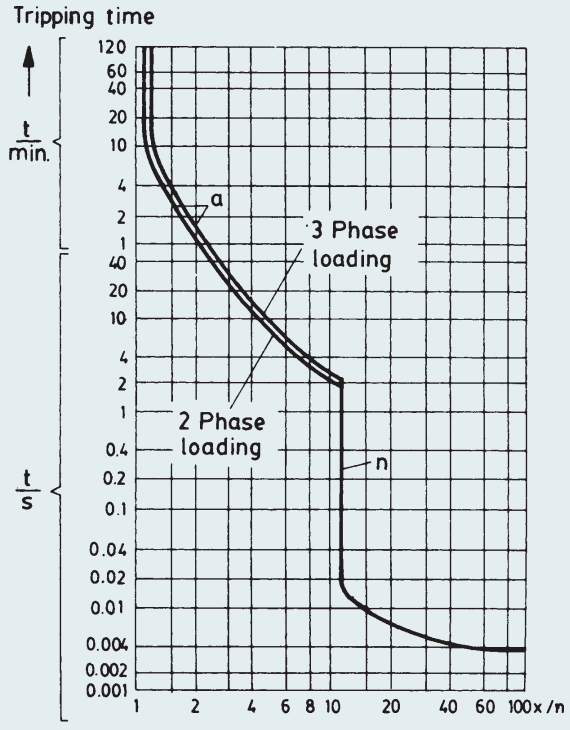
Times set current

Time current characteristics of 3VU13



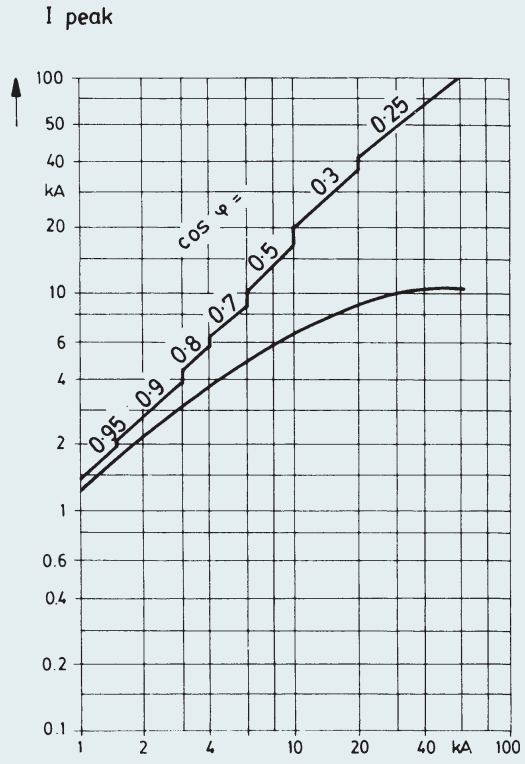
Short circuit current Ik (effective)

Cut off characteristics of 3VU1300-0MK00



Times set current

Time current characteristics of 3VU16



Short circuit current Ik (effective)

Cut off characteristics of 3VU1600-0MN00