

Westinghouse**Static Trip Comparisons**

This information is of a confidential nature and is for internal use only.

The following are comparison charts for the static trip devices of Westinghouse, General Electric, ITE and Allis Chalmers.

Long Delay Pick up Ranges

Westinghouse		General Electric		ITE		Allis Chalmers	
Sensors	Amperes Continuous Trip Range	Sensor Tap Setting	Amperes 6 Step Trip Range	Sensor Tap Setting	Amperes 5 Step Trip Range	Sensors	Amperes Continuous Trip Range
DS-206		AK-25		K-600S		LA-600	
100	50-125	45	36-58	50	40-60	80	40-80
150	75-187	70	56-91	70	56-84	150	75-150
200	100-250	90	72-117	100	80-120	250	125-250
300	150-375	125	100-162	150	120-180	400	200-400
400	200-525	175	140-228	225	180-270	600	300-600
500	250-600	225	180-292	250	200-300	800	400-600
600	300-600	200	160-260	400	320-480		
		300	240-390	600	480-600		
		400	320-520				
		500	400-600				
		600	480-600				
DS-416		AK-50		K-1600S		LA-1600	
100	50-125	200	160-260	250	200-300	250	125-250
150	75-187	300	240-390	400	320-480	400	200-400
200	100-250	400	320-520	600	480-600	600	300-600
300	150-375	500	400-650	600	480-720	800	400-800
400	200-525	600	480-780	1000	800-1200	1000	500-1000
500	250-625	600	480-780	1600	1280-1600	1600	800-1600
600	300-750	800	640-1040			2000	1000-1500
800	400-1000	1200	960-1560				
1200	600-1500	1600	1280-1600				
1600	800-1600						
DS-632		AK-75		K-3000S		LA-3000	
2400	1200-3000	1500	1200-1950	2000	1600-2400	2400	1200-2400
3200	1600-3200	2000	1600-2600	3000	2400-3000	4000	2000-3000
		2500	2000-3000				
		3000	2400-3000				

Short Time Pick up Ranges

Westinghouse		General Electric		ITE		Allis Chalmers	
Sensors	Short Time Pick-up	Sensor Tap Setting	Short Time Pick-up 6 Step	Sensor Tap Setting	Short Time Pick-up 6 Step	Long Delay Pick-up	Short Time Pick-up
DS-206		AK-25		K-600S		LA-600	
100	400-1000	45	90-225	50	100-500	40-80	200-800 to 400-1600
150	600-1500	70	140-350	70	140-700	75-150	375-1500 to 750-3000
200	800-2000	90	180-450	100	200-1000	125-250	625-2500 to 1250-5000
300	1200-3000	125	250-625	150	300-1500	200-400	1000-4000 to 2000-8000
400	1600-4000	175	350-875	225	450-2250	300-600	1500-6000 to 3000-12000
500	2000-5000	225	450-1125	250	500-2500	400-600	2000-8000 to 3000-12000
600	2400-6000	200	400-1000	400	800-4000		
		300	600-1500	600	1200-6000		
		400	800-2000				
		500	1000-2500				
		600	1200-3000				
DS-416		AK-50		K-1600S		LA-1600	
100	400-1000	200	400-1000	250	500-2500	125-250	625-2500 to 1250-5000
150	600-1500	300	600-1500	400	800-4000	200-400	1000-4000 to 2000-8000
200	800-2000	400	800-2000	600	1200-6000	300-600	1500-6000 to 3000-12000
300	1200-3000	500	1000-2500	600	1200-6000	400-800	2000-8000 to 4000-16000
400	1600-4000	600	1200-3000	1000	2000-10000	500-1000	2500-10000 to 5000-20000
500	2000-5000	600	1200-3000	1600	3200-16000	800-1600	4000-16000 to 8000-32000
600	2400-6000	800	1600-4000			1000-1500	5000-20000 to 7500-30000
800	3200-8000	1200	2400-6000				
1200	4800-12000	1600	3200-6400				
1600	6400-16000						
DS-632		AK-75		K-3000S		LA-3000	
2400	9600-24000	1500	3000-7500	2000	4000-20000	1200-2400	6000-24000 to 12000-48000
3200	12800-32000	2000	4000-10000	3000	6000-30000	2000-3000	10000-40000 to 15000-60000
		2500	5000-12500				
		3000	6000-15000				

Westinghouse



	Westinghouse	General Electric	ITE
Type of Adjustment	Continuous	Step	Step
Shape of Curve	Line	Line	Line
Sensors or Tap Settings	^S DS-206: 100, 150, 200, 300 400, 500, or 600 DS-416: 100, 150, 200, 300, 400, 500, 600, 800, 1200, or 1600 DS-532: 2400 or 3200	^T AK-25: 45, 70, 90, 125, 175, 225 or 200, 300, 400, 500, 600 AK-50: 200, 300, 400, 500, 600 or 600, 800, 1200, 1600 AK-75: 1500, 2000, 2500, 3000 AK-100: 2000, 2500, 3000, 4000	^T K-600S: 50, 70, 100, 150, 225 or 250, 400, 600 K-1600S: 250, 400, 600 or 600, 1000, 1600 K-2000S: 800, 1200, 1600 K-3000S: 2000, 3000 K-4000S: 3000, 4000
Long Delay Pick-Up Adjustment	50 to 125% continuous pick-up of any sensor rating but not exceeding the frame size of the breaker being considered. Calibrated at 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, and 1.25.	80 to 130% of tap setting with fixed point settings of 80, 90, 100, 110, 120, and 130% of tap setting not to exceed the frame size of the breaker being considered.	80 to 120% of tap setting with fixed point settings of 80, 90, 100, 110, and 120% of tap setting not to exceed frame size of the breaker being considered.
Long Delay Adjustment Time	Reference point at 6 times the sensor rating. Adjustable from 4 to 36 seconds, with calibration marks at 4 second intervals.	Reference points at 0.8, 0.9, 1.0, 1.1, 1.2, and 1.3 of tap setting. Fixed point settings are at 5, 15, and 30 seconds.	Reference points at 0.8, 0.9, 1.0, 1.1, and 1.2 of tap setting. Fixed point settings at 2.5, and 15 seconds or at 4, 10, and 30 seconds.
Instantaneous Pick-up	4 to 12 times the sensor rating with continuous pick-up. Calibration points are at 4, 5, 6, 7, 8, 10 and 12 times the sensor rating. Instantaneous pick-up can be set to approx. 2x using the test kit.	4 to 12 times the tap setting with fixed point settings at 4, 5, 6, 8, 10, and 12 times the tap setting.	4 to 12 times the tap setting with fixed point settings at 4, 5, 6, 8, 10 and 12 times the tap setting.
Short Delay Pick-up	4 to 10 times the sensor rating with continuous pick-up. Calibration marks are at 4, 5, 6, 7, 8, 9, and 10 times the sensor rating. The pick-up can be set to approximately 2 times the sensor rating by using the test kit.	2 to 10 times the tap setting with fixed point settings at 2, 2.5, 3, 3.5, 4, and 5 times the tap setting or at 4, 5, 6, 7, 8, and 10 times the tap setting.	2 to 10 times the tap setting at fixed point settings of 2, 3, 4, 6, 8, and 10 times the tap setting.
Short Delay Time Adjustment	0.18 sec. (11.4 Hz) to 0.50 sec. (30 Hz) with calibration marks at 0.18, 0.33, and 0.50 sec. continuous adjustment.	Fixed point settings at 0.08 sec. (4.8 Hz), 0.20 sec. (12 Hz) and 0.40 sec. (24 Hz).	Fixed point settings at 0.08 sec. (4.8 Hz), 0.20 sec. (12 Hz), and 0.35 sec. (21 Hz).
Ground Fault Pick-up	20% of sensor rating.	AK-25: 100, 200, 300, 400 or 300, 600, 900, 1200 AK-50: 300, 600, 900, 1200 or 750, 1500, 2250, 3000 AK-75: 750, 1500, 2250, 3000 AK-100: 750, 1500, 2250, 3000	K-600S: 100, 200, 300, 400, 600 or 300, 600, 900, 1200, 1800 K-1600S: 100, 200, 300, 400, 600 or 300, 600, 900, 1200, 1800 K-2000S: 300, 600, 900, 1200, 1800 K-3000S: 500, 1000, 1500, 2000, 3000 K-4000S: 500, 1000, 1500, 2000, 3000
Ground Fault Time Delay Adjustment	0.21 to 0.50 second continuous adjustment with calibration marks at 0.21, 0.35 and 0.50 second.	Fixed point settings at 0.06, 0.12, 0.18, 0.25 and 0.30 second.	Fixed point settings at 0.03, 0.20, and 0.35 seconds.
Additional Equipment Required For Ground Fault Tripping	Ground fault protection circuit is included in the trip unit. One additional sensor required if neutral bus is present.	Ground fault protection circuitry is included in trip unit and 3 additional current sensors (4 sensors if a neutral is present) are required.	Ground fault protection circuit is included in trip unit and one additional sensor is required if neutral is present.
No. of Sensor for Trip Unit	3 current sensors to provide both operational power and fault sensing.	3 sensors for operational power and 3 sensors for fault sensing.	3 sensors for operational power and 3 sensors for fault sensing.
Power Source for Trip Unit	Power obtained from current sensors as an integral part of trip unit.	Power obtained from separate power current transformers. The power unit is physically separated from the trip unit.	The power is obtained from a separate set of sensors but the circuitry is contained in the trip unit.
Location of Sensors	Mounted on breaker studs immediately ahead of finger clusters.	Under main contacts in front of breaker.	Under main contacts in front of breaker.
Steps in Changing Sensors	Remove finger clusters, unscrew two connections, slide off sensor, replace with new sensor.	Remove sensor, change tap settings for fault sensors and power sensor, install new sensors.	Remove sensor, change tap settings for fault sensors and power sensors, install new sensors.
Connection of Test Kit	Jack on test kit plugs into receptacle on the front of the breaker.	Must be connected at different locations on the trip unit by plugs.	Unknown
Test Calibration in Test Pos.	Yes	Yes	Yes
Actuator	Flux-shifting	Shunt Trip	Shunt Trip

Static Trip Comparisons

Allis Chalmers	Westinghouse Advantages
Continuous	Continuous adjustment for both time and pick-up permits closer coordination on selective trip applications. On standard Dual Trip, A.C. has fixed long time curve.
Inverse	Line curve is more in line with I ² T heating curves of equipment thus better approaching actual heating conditions.
^s LA-600: 80, 150, 250, 400, 600, 800* LA-1600: 250, 400, 600, 800 1600, 2000* LA-3000: 2400, 4000* LA-4000: 4000 *Continuous current rating not to exceed frame size.	See Below S=Sensor Rating TS=Tap Settings
50 to 100% continuous pick-up of sensor rating but not exceeding frame size of the breaker being considered.	Combination of a large number of sensors with the wide 50% to 125% long time pick-up provides a large number of trip selections permitting future load growth without changing sensors.
Inst. reference points continuously adjustable from 5 to 15 times the sensor rating. Time delay band is selected and set at factory and is not field adjustable on standard long and inst.	Continuous adjustment of long time pick-up and time permits a large selection at settings to permit closer coordination with up-stream and down-stream devices.
5 to 15 times the sensor rating with continuous pick-up adjustment calibration points at 5, 8, 12 and 15 times the sensor rating.	Continuous adjustment of instantaneous pick-up also permits a large selection of settings to permit closer coordination.
5 to 20 times the sensor rating continuous pick-up with calibration marks at 5, 10 and 20 times the sensor rating.	Continuous adjustment permits closer coordination.
0.8 sec. (4.8 Hz) to 0.48 sec. (28.8 Hz) continuous adjustment.	Continuous adjustment permits closer coordination.
20, 40, 60, and 80% of the sensor rating continuous pick-up.	
Time delay band is selected and set at the factory and is not field adjustable.	Continuous adjustment permits closer coordination.
Ground fault protection circuit is included in trip unit and one additional sensor is required if neutral is present. Normal sensor on phase #2 is replaced by a special ground fault sensor.	Fewer sensors less chance of trouble.
3 sensors to provide both operational power and fault sensing.	Fewer sensors less chance of trouble.
Direct from current sensors through trip unit.	Integral power source eliminates separate power circuits which inherently are a potential source of trouble, just as any multiple circuits are. The more circuits the greater chance for trouble.
Mounted on breaker studs immediately ahead of finger clusters.	Sensors are very accessible and easy to change.
Basically the same as Westinghouse.	It is more complicated and expensive to change G.E. and ITE sensors.
Must be connected at different locations on the trip unit by alligator clips.	Plug-in test kit permits fast convenient on site testing for pick-up and time.
No	It is more convenient to test calibration in the test position.
Flux-shifting	Separate power source not required for flux-shifting type trip attachment

Static Trip Comparisons

Ground Fault

Westinghouse

Pick-up Time

General Electric

Pick-up Time

ITE

Pick-up Time

Allis Chalmers

Pick-up
Constant Adj. Time

DS-206
Sensor
100 20
150 30
200 40
300 60
400 80
500 100
600 120

Continuous
Adjustment
Calibrated
At:
.21 sec.-12.6 Hertz
.35 sec.-21 Hertz
.50 sec.-30 Hertz
Top of
Curve Band

AK-25
100
200
300
400
300
600
900
1200

Step Adjustment

.06 sec.-3.6 Hertz
.12 sec.-7.2 Hertz
.18 sec.-10.8 Hertz
.24 sec.-14.4 Hertz
.30 sec.-18 Hertz
Lower Third
Of Curve Band

K-600S
100
200
300
400
600

Step Adjustment

.35 sec.-21 Hertz
.20 sec.-12 Hertz
.08 sec.-4.8 Hertz
Bottom of
Curve Band

LA-600
40-160
60-240
80-320

Continuous
Adjustment
Calibrated At:
.4 sec.-24 Hertz
.2 sec.-12 Hertz
.1 sec.-6 Hertz
Midpoint of
Curve Band

DS-416
Sensor

100 20
150 30
200 40
300 60
400 80
500 100
600 120
800 160
1200 240
1600 320

AK-50

300
600
900
1200

K-1600S

100
200
300
400
600
300
600
900
1200
1800

Sensor
No. 1Sensor
No. 2

LA-1600

40-160
60-240
80-320
100-400
160-640
200-800

DS-632
Sensor

2400 480
3200 640

AK-75

750
1500
2250
3000

K-3000S

500
1000
1500
2000
3000

LA-3000

240-960
400-1600

Instantaneous Pick up Ranges

Westinghouse

Sensors Inst.
Pick-up

General Electric

Sensor Inst.
Tap Setting Pick-up

ITE

Sensor Inst.
Tap Setting Pick-up

Allis Chalmers

Sensors Inst.
Pick-up

DS-206
100
150
200
300
400
500
600

Continuous
400-1200
600-1800
800-2400
1200-3600
1600-4800
2000-6000
2400-7200

AK-25
45
70
90
125
175
225
200
300
400
500
600

6-Step
180-540
280-840
360-1080
500-1500
700-2100
900-2700
800-2400
1200-3600
1600-4800
2000-6000
2400-7200

K-600S
50
70
100
150
225
250
400
600

6-Step
200-600
280-840
400-1200
600-1800
900-2700
1000-3000
1600-4800
2400-7200

LA-600
80
150
250
400
600
800

200-600 to 400-1200
375-1125 to 750-2250
625-1875 to 1250-3750
1000-3000 to 2000-6000
1500-4500 to 3000-9000
2000-6000 to 4000-12000

DS-416

100
150
200
300
400
500
600
800
1200
1600

400-1200
600-1800
800-2400
1200-3600
1600-4800
2000-6000
2400-7200
3200-9600
4800-14400
6400-19200

AK-50

200
300
400
500
600
600
800
1200
1600

800-2400
1200-3600
1600-4800
2000-6000
2400-7200
2400-7200
3200-9600
4800-14400
6400-19200

K-1600S

250
400
600
600
1000
1600

1000-3000
1600-4800
2400-7200
2400-7200
4000-12000
6400-19200

LA-1600

250
400
600
800
1000
1600
2000

625-1875 to 1250-3750
1000-3000 to 2000-6000
1500-4500 to 3000-9000
2000-6000 to 4000-12000
2500-7500 to 5000-15000
4000-12000 to 8000-24000
5000-15000 to 10000-30000

DS-632

2400
3200

9600-28800
12800-38400

AK-75

1500
2000
2500
3000

6000-18000
8000-24000
10000-30000
12000-36000

K-3000S

2000
3000

8000-24000
12000-36000

LA-3000

2400
4000

6000-18000 to 12000-36000
10000-30000 to 20000-60000