



For the protection of AC rotating machinery and power transformers.

Features and Benefits

- Single- and three-phase units available
- Various percentage slopes available
- Electrically operated target seal-in unit
- Restraint current matching taps (IJD53)
- Drawout case

Applications

- AC rotating machines (IJD52)
- Power transformers (IJD53)

Protection and Control

- Fixed slope percentage-differential



Application

The IJD relay is an induction disk unit that should be applied as follows:

For Ac Rotating Machines IJD52A is recommended for ratings as indicated in Table 1.

Differential protection is also recommended for smaller machines, under the following conditions:

- (1) Machines which operate in parallel on the same bus with differentially protected machines.
- (2) Machines, regardless of size, which are important to the operation of the system. The decision governing this application is based on the actual importance of the machine, and the degree of relaying required for the particular application.

For generators rated 2000 kva and above or motors and synchronous condensers rated 3000 hp (or kva) and above, high-speed product-restraint relays, Type CFD are recommended.

NOTE: In order to provide complete percentage protection, it is necessary that both ends of each machine winding be brought out to the terminal board. This construction should be specified when purchasing the machine, since those of lower voltages or lower hp or kva ratings may not ordinarily have this feature.

The IJD52A relays protect against phase-to-phase and phase-to-ground faults within the machine and leads within the differential zone, provided the fault current is above the relay minimum pickup value. They will not protect against open circuits or turn-to-turn faults. If the neutral of the system is not grounded, protection against grounds in the machine winding is provided only upon the occurrence of a second fault in another phase of the system.

Rotating machine current transformers should be selected so that the "difference" current will not exceed 5 per cent of the current that may be encountered during normal or abnormal operation of the machine. This includes all currents up to the maximum fault current which can be delivered by the machine in case of an external fault. This calculation must be based on the actual current-transformer secondary burden including the leads.

In general, it is recommended that current transformers for IJD differential protection be used for no other purpose.

For power transformers, it is recommended that percentage-differential protection be provided for transformers rated 1000 kva and above if circuit breakers are provided for each winding into which power can flow when an internal fault occurs, and for all transformers rated 5000 kva and above even if it requires the purchase of the necessary circuit breakers.

Differential protection is also recommended for transformers rated below 1000 kva that operate in parallel with differentially protected transformers and have circuit breakers for all parallel-connected windings. If a fault occurring in a small parallel connected transformer is not promptly removed, it may prove just as damaging to service as a similar fault in a large bank.

The IJD53C relay is used for protection of two-winding power transformers. This relay has tapped operating and restraining coils, making it possible to balance secondary currents from the two sets of current transformers.

Percentage-differential relays are recommended for transformers rated 1000 up to 1999 kva, below 15,000 volts.

For transformers rated 2000 kva and above, any voltage, high-speed differential relays are recommended (see Type BDD, STD).

Above recommendations also apply to power autotransformers having equivalent physical capacities.

Desensitizing Equipment

In some instances differential relays will operate on magnetizing inrush currents when the power transformer is first energized. This condition can be overcome by the addition of auxiliary desensitizing equipment. To avoid this problem, the Type STD harmonic restraint relay should be considered.

General

- (a) For most installations a hand reset multi-contact auxiliary relay is required.
- (b) Short-circuit duty:

Where short-circuit current available from the bus is sufficient to result in line current transformer secondary current in excess of 50 A, a Thyrite® voltage limiter should be connected across the secondary of each line current transformer secondary.

Fig. 1. Typical machine connections

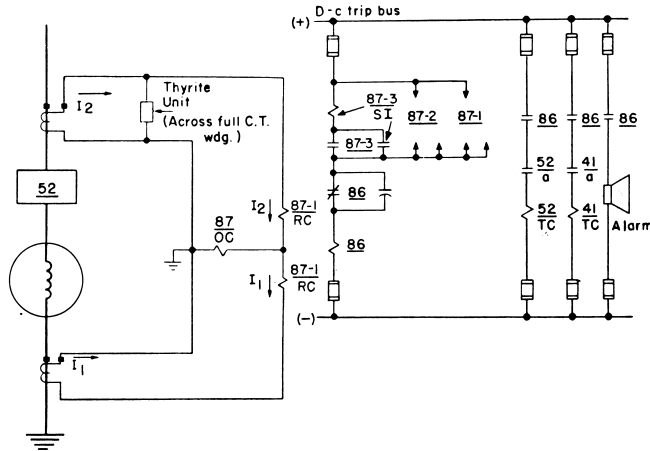


Table 1

Ratings of ac rotating machines for which percentage-differential protection using IJD52A relays is recommended.

Voltage Range	Generators Kva	Synchronous Condensers and Motors Kva or Hp
5000 and up	0 to 1999	501 to 2999
2200 to 4999	501 to 1999	1500 to 2999
0 to 2199	1000 to 1999	Not Applicable

Burdens

Model No.	Coil	Amp	Tap	Freq. (Hz)	Impedance	Z (Ohms)
IJD52A(-)	Restraint	5.0	—	60	0.2 + j0.7	0.7
	Restraint	5.0	—	50	0.2 + j0.6	0.6
	Operating	0.6	—	60	19.6 + j69.8	72.5
	Operating	0.6	—	50	19.5 + j58.2	61.4
IJD53C11A C14A	Restraint	5.0	—	60	0.04 + j0.01	0.04
	Operating	3.2	—	60	0.3 + j0.8	0.8
IJD53C12A C15A	Restraint	5.0	—	50	0.04 + j0.01	0.04
	Operating	3.2	—	50	0.2 + j0.7	0.7
IJD53C19A	Restraint	1.0	—	50	1.0 + j0.2	1.0
	Operating	.64	—	50	6.2 + j16.5	17.6

Internal Connection Diagrams

Fig. 3. Internal connections for IJD52A, front view (6209677)

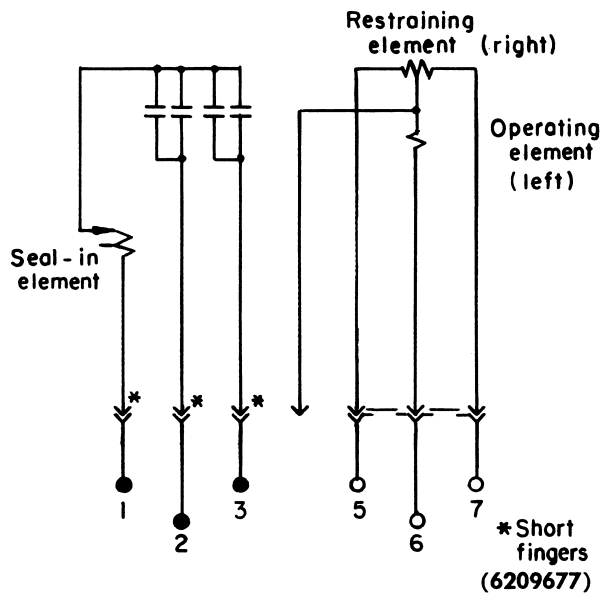
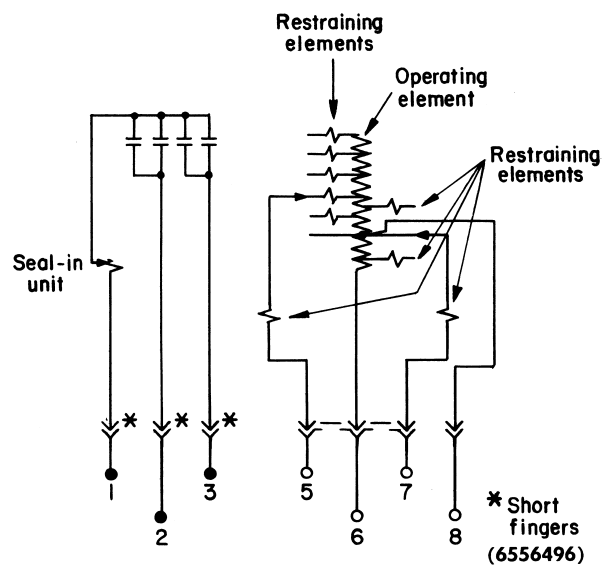


Fig. 4. Internal connections for IJD53C, front view (6556496)



SELECTION GUIDE Single-Phase 0.2/2A Target Seal-in

Frequency (Hz)	Continuous Rating, (Amps)	Tap Range, (Amps)	Minimum Operation Current, (Amps)	Slope Characteristic (Percent)	Contacts	Model No.	Case Size	Approx. Wt Lb(Kg)	
								Net	Ship
IJD52A – FOR PROTECTION OF AC ROTATING MACHINES (3 required)									
60 60	5	0.1	10	2-N.O.	IJD52A11A A12A A14A A17A A19A	S1	12(5.4)	15(6.8)
50		.....	0.5	25				
50		.....	0.1	10				
50		.....	0.5	10				
50		.....	0.5	25				
IJD52B – FOR PROTECTION OF AC ROTATING MACHINES (1 required)									
60 60 60 60 60 60	5	0.1	10	2-N.O. (with one side common)	IJD52B11A B14A B15A B16A B17A B18A	L2	28(12.6)	39(17.6)
60		.....	1.0	10				
60		.....	4.0	50				
60		.....	0.5	25				
60		.....	1.0	50				
60		.....	2.0	50				
50 50		.....	0.1	10				
50	.....	4.0	50					
IJD53C – FOR PROTECTION OF 2-WINDING POWER TRANSFORMERS (3 required)									
60 60	Twice Tap Setting	3.2-8.7	1.28-3.48	25	2-N.O.	IJD53C11A C14A C12A C15A C19A	S1	12(5.4)	15(6.8)
50				50					
50		3.2-8.7	1.28-3.48	25					
50		0.64-1.74	0.26-.70	50					
50				25					
IJD53D – FOR PROTECTION OF 2-WINDING POWER TRANSFORMERS (1 required)									
60 60	Twice Tap Setting	3.2-8.7	1.28-3.48	25	2-N.O. (with one side common)	IJD53D11A D14A	L2	28(12.6)	39(17.6)
50				50					
50				25					
50				50		D12A D15A			
VOLTAGE LIMITER FOR LINE CURRENT TRANSFORMER SECONDARY – SINGLE-PHASE									
50/60	M-6118766G3	...	1(.5)	2(.9)

① Range of instantaneous fault detection unit.