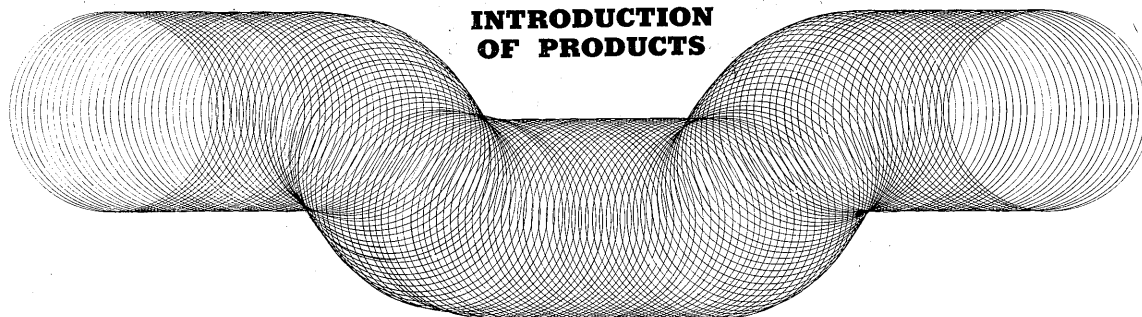


INTRODUCTION OF PRODUCTS



CSA-APPROVED ELECTRICAL MACHINES AND APPARATUS

I. PREFACE

Our electric motors and magnetic contactors have been approved by Canadian Standards Association (CSA) to which we applied for tests on electrical machines and apparatus of our manufacture and we present their outline.

The CSA not only determines standards of industrial products as applied in Canada but also tests electrical equipment to see if they are manufactured in accordance with the standards thus determined. The main objective of the association lies in protecting the general public from dangers resulting from defects of such machines and apparatus during the course of their manufacturing processes. The CSA standards are said to be the severest in the whole world. By passing this severest test the electrical equipment of our company had its superiority and excellence proven.

Moreover, laws of provinces of Canada stipulate that no electrical products, whether they be manufactured in Canada or imported, can be sold which have not been approved by CSA. Since this stipulation applies not to electrical parts per se alone but equally to equipment such as machine tools, medical apparatus and business machines which incorporate parts of electrical nature, exports of these sorts of merchandise to Canada will be greatly facilitated if CSA-approved electricals are used.

In America, meanwhile, there is a similar organ called the Underwriter's Laboratory (UL) but in many states of the United States both CSA and UL are considered equal. Thus the areas in which the CSA is applied are extremely wide and the CSA qualification contributes greatly to export promotion vis-a-vis the United States as well as Canada.

II. DRIP-PROOF TYPE CAGE MOTORS

These motors are built on the basis of many years of study and rich experience with the main objective of smallness in size, lightness in weight, powerfulness, long life and ease in maintenance. The profile of

these motors is composed of simple faces and lines to make them appear dynamic, so that they may match with any kind of machine.

1. Features

- 1) Employment of polyester insulation system throughout

The life of a motor in most cases depends upon the life of its insulation. With this point especially considered, our company employs a polyester insulation system along with slot insulation and magnet wire, thus ensuring long service life to the motor without the possibility of insulation deteriorating.

- 2) Employment of sealed ball bearing

Lithium grease sealed ball bearings of high quality—a product of modern technology—are used which will preclude the trouble through marring of the bearings by alien materials. This also saves the necessity of grease replenishment and the upkeep of the motor is rendered very simple.

- 3) Excellent characteristics

In spite of its smallness and lightness, the motor is capable of a high efficiency as select materials only are used to build it. What is more, since the starting torque and momentary maximum output are big, occasional fluctuations in load and voltage will not affect the running of the motor.

- 4) High accuracy and quality free from inconsistencies

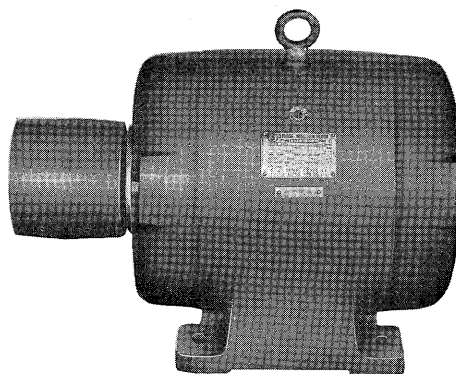


Fig. 1 Cage motor, model BR

Since all the parts of the motor are machined on fully automatic special purpose machine tools and their accuracy fully controlled, the quality of motor is free from inconsistencies.

Each motor, moreover, is perfectly dynamic-balanced to eliminate vibration so that this motor is highly suitable for machine tools requiring high accuracy.

5) Freedom in changing direction of ventilation opening

Through a simple change, the direction of ventilation opening may be made in any way, up, down or askance. Thus the motor may be mounted in any manner to ensure perfect functioning of drip-proof.

6) Terminal section suited to local situation

- (1) The 9-line terminal with the possibility of a change-over for 220/440 v is suited to the actual situation in Canada and America.
- (2) In addition to the exterior grounding terminal, the interior grounding terminal is provided in the terminal box.
- (3) As for the terminal box, the direction of the the power intake may be changed to the 90° or 180° position according to the location at which the motor is to be mounted.
- (4) The terminal box of cast iron is built dust-proof, and water-proof. The cable intake section is not of knock-out system but is provided with threading for electric conduit tubes.

2. Table of Output

CSA File No.: LR 20380-2

Motor Model	Output (kw)					
	50 c/s or 50/60 c/s			60 c/s		
	4 poles	6 poles	8 poles	4 poles	6 poles	8 poles
BR 2421 S	0.2	0.15	—	0.25	0.2	—
BR 2521	0.4	0.25	—	0.45	0.3	—
BR 391	1.1	0.45	0.4	1.1	0.55	0.55
BR 392	1.5	1.1	0.75	2.1	1.1	1.1
BR 491	2.2	1.5	1.1	3	1.9	1.5
BR 492	3.7	2.2	1.5	4.5	3	1.9
BR 591	5.5	3.7	2.4	6.5	4.5	3.4
BR 592	7.5	5.5	3.7	11	6.5	4.5

Remarks: (1) Class A insulation, limit of temperature rise 50 deg.
(2) Low voltage (under 600 v.)

III. MAGNETIC CONTACTORS

Since magnetic contactors are suited to frequent controls and, as a consequence, are essential to the opening and closing of all kinds of electric circuits and to the control of electric motors, they are either built in the control board or used in combination with thermal overload relays as magnetic switches

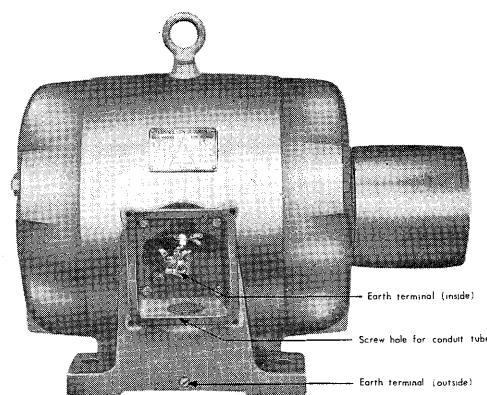


Fig. 2 Structure of terminal section

and reversible magnetic switches. Model RC 3631-5-1 CS is also widely used as an auxiliary relay.

Our magnetic contactors supply approximately 70% of Japan's total domestic production thanks to their super-small size and highest rate of performance.

They are also exported to many different countries of the world as control equipment of all sorts of industrial machinery.

1. Features

1) Super-small size and light weight

Moulded parts are used as much as possible and because of the extremely small size and light weight little space is required for fitting these contactors.

2) Highest rate of performance

These contactors perfectly guarantee Class A, No. 1 and Grade 1 of the Japan Industrial Standards (JIS) and may be described as having an extremely high rate of performance.

3) Long life for highly frequent use

The contactors are capable of an electric servicing life (life of contacts) of over a million times and of a mechanical life of also over 10 million times of opening and closing operations. Since they sufficiently guarantee consecutive opening and closing functions of 1800 sw/hour, they may be used for circuits of highly frequent use.

4) Sure function

Since they employ contacts of pure silver and a bridge contact system, they are subjected to little contact distortion and wear and they always perform a sure function for frequent openings and closings.

5) Easy maintenance and checking

Of rational design making use of moulded parts, they have their parts replaced or dismantled and remounted with a single driver very easily.

2. Specifications

CSA File No.;	LR 20479-2
Model:	RC 3931-5-1 CS
	RC 3631-2 CS
	RC 3631-4 CS

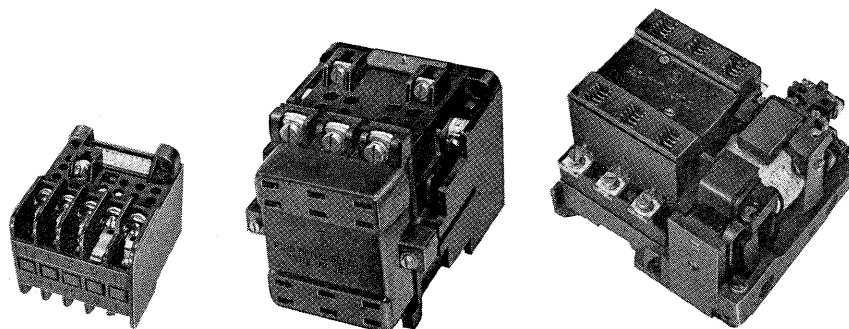


Fig. 3 Magnetic contactors

Type of protection : open type (without case or cover)
 Number of poles : 3 poles
 Voltage : under 600 v.
 Cycles : 50/60 c/s
 Rated current, applied motor output, auxiliary contacts

Model	Rated current (amp)	Maximum allowable output of applied motor (kw)			
		110 v	220 v	440 v	550 v
RC 3631-5-1 CS	16	1.9	3.7	3	2.2
RC 3631-2 CS	25	3	5.5	7.5	7.5
RC 3631-4 CS	60	7.5	15	30	30

Auxiliary contact :

Model	Rated current (amp)	No. of contacts
RC 3631-5-1CS	16	1NO, 1NC, 2NO or 2NC
RC 3631-2CS	10	2NO, 2NC
RC 3631-4CS	10	2NO, 2NC

IV. THERMAL OVERLOAD RELAYS

These relays are protective relays which utilize the curving or bending phenomenon of bimetal through temperature rise and are used in combi-

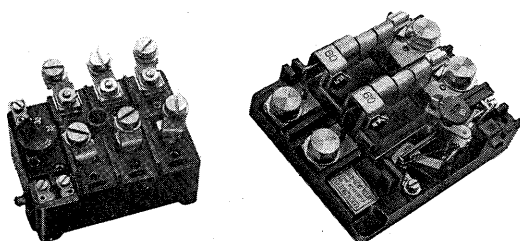


Fig. 4 Thermal overload relays

nation with magnetic contactors for the purposes of protecting the motor from overload and from burning by single-phase running.

1. Features

1) Accurate and compact structure

Accurate parts with one phase grouped together as a set each are housed in a moulded frame in a very compact style.

2) Accurate functioning

These relays are produced with the minutest possible attention to material, construction and trait of each part and their functioning is highly accurate.

3) Furnished with ambient temperature compensating device

The relays are furnished with an ambient temperature compensating device which will ensure a constant functioning trait in a changing ambient temperature so that the functioning trait will not show any variation either in summer or in winter.

4) Adjustable in a wide range

The working current may be adjusted in a wide range by simply turning the setting dial so that the relay may be used for motors of different outputs. 5) Model RC 3737-4 CS may be manufactured in three-pole type so that perfect protection of the motor is ensured even for three-phase four-wire distribution circuit. By simply turning the side screw, this may be adapted either for manual resetting or self-resetting.

2. Specifications

CSA File No. : LR 20479-3

Model	RC 3737-4 CS	RCa 3737-II
Type of protection	Open type (without case or cover)	
Rated voltage	Under 600 v	
Set current	0.25-50 amp	1-60 amp
No. of poles	2 or 3 poles	2 poles
Contact capacity	4 amp	5 amp
Reset system	Manual-automatic change-over possible	Manual

COMMAND SWITCHES

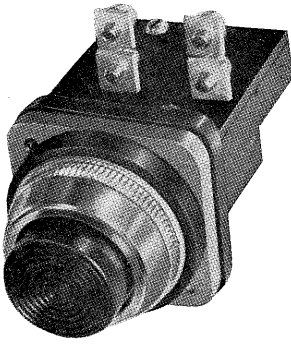


Fig. 5 Command switch

Command switches are used in machine tools such as lathes and grinding machines or in their control board for opening and closing controls of magnetic contactors and auxiliary relays.

The command switches which have passed the CSA test recently have commanding parts of the push button type. Besides these, however, we build command switches of large push button type, push button type with guard ring, of knob type, of lever type and of key type. We have applied to the association for a test on these and we expect that they will pass it in the near future.

Features

-) The switching part is of a combination of moulded unit of closed construction with a set of NO and 1 NC contacts. From 1 NO 1 NC to NO, 4 NC are available.
-) Commanding parts are provided with special packing which is free from oil and the switching action is water and oil-proof so that this switch may be used in places where lubricating oil or coolant water splashes.
-) Contacts are made of pure silver which have enough electrical allowance. They ensure perfect contact for a long service life even in a situation of highly frequent control.
-) There are eleven kinds of commanding parts such as push button type, knob type, lever type and key type, for example, and the push button may be available in green, red, yellow or black color so that the right choice may be made for any kind of need.

Specifications

CSA File No.:	LR 20479
Model:	RC 470 - FCS
Type of protection:	Open type
Voltage:	Under 600 v
Contact capacity:	Heavy duty pilot duty
No. of contacts:	1 NO 1 NC, 2 NO 2 NC, 3 NO 3 NC or 4 NO 4 NC

CONTROL TRANSFORMERS

The control transformers are used to obtain electric

power for control circuits of magnetic contactors and auxiliary relays and also for lamp circuits.

1. Features

- 1) These transformers are of dry system and so small and light that they may be conveniently housed inside machine tools and control boards of various

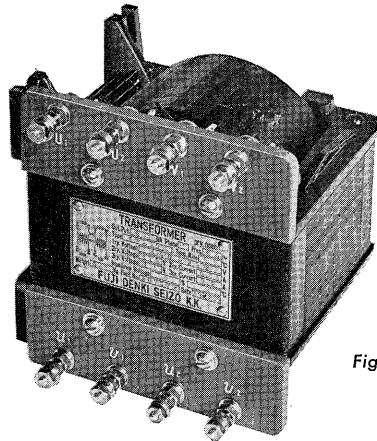


Fig. 6 Control transformer

kinds.

- 2) The primary voltage is set for both 220 and 440 v. to fit in with the voltage in North America. Regardless of the primary voltage, therefore, the secondary voltage (control circuit voltage) and the third voltage (lamp circuit voltage) may be kept constant at all times.

2. Specifications

CSA File No.:	LR 20526
Model:	FP - 20 SCS
Type of cooling and protection:	Dry system open type
Phase:	Single phase
Cycles:	60 c/s
Primary voltage:	220/440 v (series, parallel connection adjustable)
Secondary voltage:	115 v (for control circuit)
Third voltage:	15 v (for lamp circuit)
Secondary output:	40 va (inrush 320 va)
Third output:	3 va

VII. CONCLUSION

Besides the above-mentioned electrical appliances, we have applied to the CSA for testing out totally enclosed fan cooled cage rotor type electric motors, electric oil pumps, cam switches and auto breakers and we expect to have fair number of machines and apparatus with the CSA qualification in the near future.

In addition to these electrical equipment for industrial use, we have applied to CSA for tests on household electrical goods such as juicers for instance.

(By Y. Yamakawa, Central Technical Dep't.)

Outline of Our Products

(I) Power Station

- a) Generators :
Synchronous generators up to 150,000 kva.
Direct current generators up to 10,000 kw.
Other generators of all kinds
- b) Water Turbines & Pump Turbines :
Francis type, Pelton type, Kaplan type turbines and pump turbines up to 150,000 kw.
- c) Steam Turbines up to 150,000 kw.
- d) Gas Turbines :
Closed-cycle type up to 50,000 kw.

(II) Nuclear Reactor

Power Reactors, Experimental Reactors, Sub-critical Assemblies

(III) Transmission & Distribution

- a) Transformers :
Power transformers up to 300 Mva, 480 kv.
Furnace transformers up to 60 Mva, 154 ka.
Measuring transformers up to 287 kv.
Other transformers of all kinds
- b) Standard Transformers (for general use), Single-phase & Three-phase Distribution Transformers from 3 kva to 1000 kva.
- c) Rotary Condensers up to 75,000 kva.
- d) Static Condensers
- e) Circuit Breakers :
Expansion circuit breakers up to 287 kv.
Oil circuit breakers up to 154 kv.
- f) Switchboards :
Sheet iron made switchboards for all kinds of service
- g) Switch Equipment :
Disconnecting switches up to 480 kv.
- h) Induction Voltage Regulators up to 1000 kva.
- i) Lightning Arresters up to 161 kv.

(IV) Rectifier

- a) Mercury-arc Rectifiers :
Single-anode or multi-anode type, air-cooled pump-less up to 6000 amp.
- b) Selenium Rectifiers
- c) Silicon Rectifiers
- d) Rotary Converters up to 3000 kw, 1500 v.

(V) Motor & Application

- a) Motors :
Three-phase synchronous motors up to 150,000 kw.
Three-phase induction motors up to 10,000 kw.
Three-phase commutator motors up to 300 kw.
Direct current motors up to 10,000 kw.
Other motors of all kinds
- b) Standard Motors (for general use):
Three-phase squirrel cage motors from 0.4 kw to 75 kw.
Three-phase wound motors from 20 kw to 75 kw.
Single-phase split-phase start induction motors, 100 & 200 w.
Single-phase repulsion start induction motors from 200 to 750 w.
Single-phase condenser start induction motors from 200 to 750 w.
- c) Ventilating Fans for radial & axial types

- d) Mine Winder Set for vertical shaft & inclined shaft
- e) All kinds of Winches for cargo boat use
- f) Steering Engines for boat use
- g) Fuji-Voith Schneider Propellers
- h) Torque Converters
- i) Steam Converting Valves

(VI) Control

- a) Regulating Apparatus :
Motor starters, controllers, speed regulators, voltage regulators & other regulating apparatus for all kinds of service
- b) Circuit Breakers :
Air circuit breakers up to 500 v, 3000 amp.
High speed air circuit breakers up to 1500 v 6000amp.
- c) Switch Equipment :
Knife switches, magnetic switches & other kinds of switch equipment

(VII) Instrument

- a) Watt-hour Meters :
Single-phase WhM for low tension circuit use
Three-phase WhM for low & high tension circuit use
- b) Relays :
All kinds of relays for power & industry use
- c) Electric Measuring Instruments :
Switchboard meters, portable type meters, precision meters, recording meters, telemetering & telecontrolling equipment
- d) Industrial Measuring Instruments :
Thermometers, pyrometers, gas analysers, hydrometers, salinometers, pH meters, pressure gauges, flow meters (for water, steam, gas & air), level meters, indicators and recorders
- e) Automatic Controlling Equipment :
Electro-pneumatic controllers for temperature, pressure, flow, liquid level etc.; ratio controllers for gas & liquid mixing
Magnetic controllers, electrical indicating controllers with on-off contacts

(VIII) Radiation Equipment

Linear accelerators, synchrotron, Cockcroft-Walton type d-c high voltage generators

(IX) Household Appliances

- a) Electric Washing Machines & Spin Dryers
- b) Vacuum Cleaners
- c) Electric Refrigerators
- d) Electric Fans
- e) Air Conditioners
- f) Transistor Radios
- g) Tape Recorders
- h) Television Sets
- i) Stereo Players
- j) Electric Juicers
- k) Toasters, Hot Plates & Irons
- l) Heating Apparatus :
Electric foot warmers, bed warmers, body warmers, electric stoves, etc.
- m) Electric Home Pumps for deep or shallow well
- n) Dry Batteries
- o) Flashlights & Gas Lighters
- p) Electric Illuminating Apparatus