Main Catalogue

R.. Series Contactors
R1400, R1700, R2100

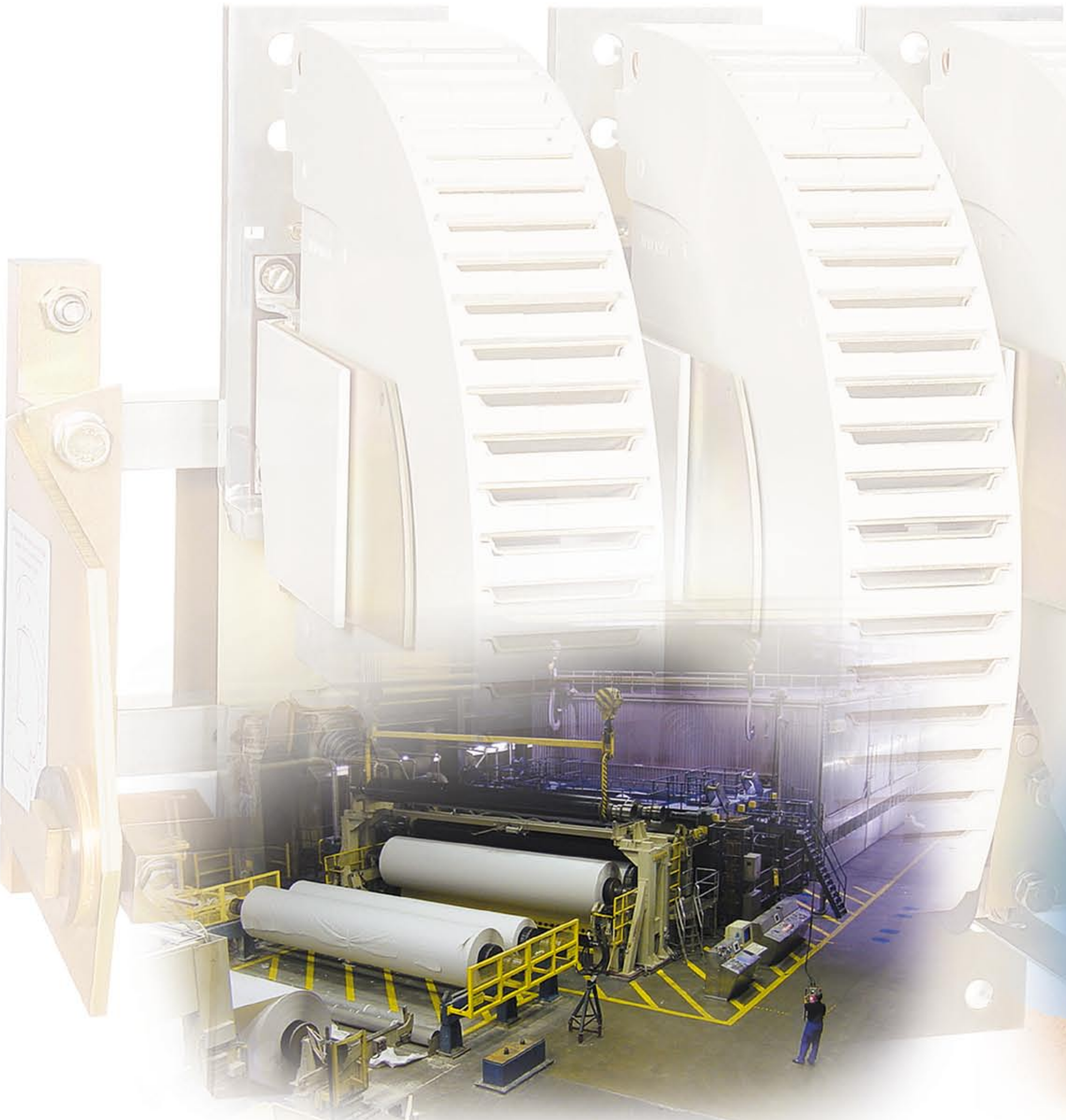
ABB

R.. Series Contactors

"Long-lasting operation for

R.. Series

Control of power circuits



The R.. series contactors are largely used for industry applications,

demanding applications"

Contactors

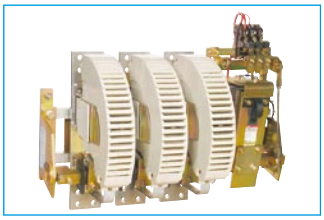
and motors in a.c. and d.c.

refineries and off-shore platforms, energy distribution systems...

R.. Series Contactors

Contactors

a.c. Circuit Switching

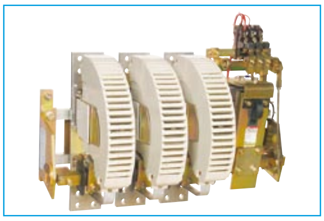


1 to 4 main poles - 500 V a.c.

2

Auxiliary contacts on request

Control circuit	Ratings	Types	Pages
a.c. - supply via a rectifier	1400 ... 2100 A	**IORR...**	**2**/8
d.c. - supply via an economy resistor	1400 ... 2100 A	**IORE...**	**2**/9



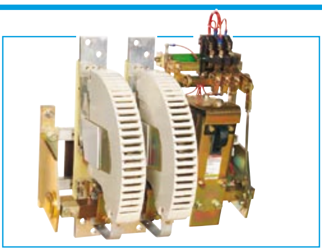
1 to 4 main poles - 1000 V a.c.

2

Auxiliary contacts on request

Control circuit	Ratings	Types	Pages
a.c. - supply via a rectifier	1400 ... 2100 A	**IORR..-MT**	**2**/10
d.c. - supply via an economy resistor	1400 ... 2100 A	**IORE..-MT**	**2**/11

d.c. Circuit Switching

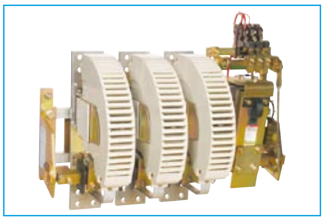


1 to 2 main poles - 600 and 1000 V d.c.

2

Auxiliary contacts on request

Control circuit	Ratings	Types	Pages
a.c. - supply via a rectifier	1000 ... 2100 A	**IORR..-CC**	**2**/12
d.c. - supply via an economy resistor	1000 ... 2100 A	**IORE..-CC**	**2**/12



3 main poles - 1500 V d.c.

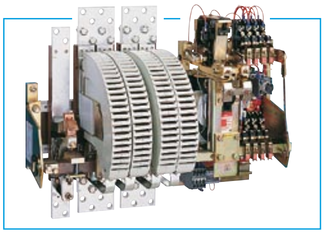
2

Auxiliary contacts on request

Control circuit	Ratings	Types	Pages
a.c. - supply via a rectifier	1000 ... 2100 A	**IORR..-CC**	**2**/13
d.c. - supply via an economy resistor	1000 ... 2100 A	**IORE..-CC**	**2**/13

Specific Contactors

a.c./d.c. Switching Mechanical Latching



1 to 4 main poles - 500 V a.c.

Auxiliary contacts on request

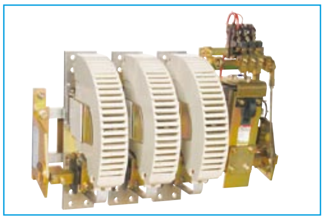
2

Control circuit	Ratings	Types	Pages
a.c. - supply via a rectifier	1400 ... 2100 A	**IORR..-AME**	**2**/15
d.c. - supply via an economy resistor	1400 ... 2100 A	**IORE..-AME**	**2**/15

Variants on request: main poles for 1000 V a.c. (MT-AME) and 600/1000/1500 V d.c. (CC-AME)

Contactors and Specific Application

Star-Delta Starting



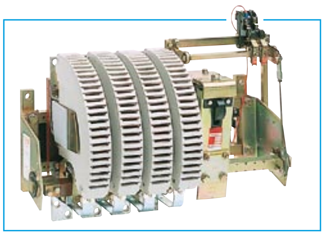
Main, Star and Delta Contactors

3 main poles - Auxiliary contacts on request

2

Control circuit	Ratings	Types	Pages
a.c. - supply via a rectifier	1400 ... 2100 A	**IORR...**	**2**/27
d.c. - supply via an economy resistor	1400 ... 2100 A	**IORE...**	**2**/27

Slip-Ring Motor Control



Stator, Rotor Short-Circuit and Acceleration Contactors

2 ... 4 main poles - Up to 6000 V a.c. - Auxiliary contacts on request

2

Control circuit	Ratings	Types	Pages
a.c. - supply via a rectifier	1400 ... 2100 A	**IORR/FORR**	**2**/28
d.c. - supply via an economy resistor	1400 ... 2100 A	**IORE/FORE**	**2**/28

Conformity with Standards

The standards and specifications cited for different types of devices, e.g. IEC, BS, VDE, NFC, EN Publications, should be considered as statements of conformity in the sense of article 10 of the E.E.C. Low Voltage Directive of 19 February 1973.

There is no label on ABB Low Voltage Control Apparatus identifying a national certification organization. The ABB logo figuring on devices, labels and documents certifies the conformity of devices with respect to the applicable standards.

CE marking is proof of conformity with the European Directives concerning the product. It must not be confused with a mark of quality.

CE marking is part of an administrative procedure designed to guarantee the free movement of the product inside the European Community.

Industrial IT enabled

As a key element of its business strategy, ABB has committed to a broad program of product development and positioning under the **Industrial** IT umbrella.

Most of the Low Voltage Products have already been **Industrial** IT enabled by the designation of **Control**IT.

Liability

The devices in this catalogue do not endanger safety when they are installed, mounted and used according to their application and in compliance with the installation rules and standards which apply to them.

Quality

ABB has set up a quality assurance organisation in compliance with the requirements of ISO 9001 standard.
ABB factories are ISO 9001 approved.

ABB Low Voltage Control Apparatus meet with a high quality standard. It is developed, manufactured and tested under the sole responsibility of ABB. **Our test platforms benefit from a quality assurance organisation accredited as per standard ISO/IEC 17025.**

In compliance with the regulations set out by the ISO 9000 series standard, ABB sets up and manages the procedures and files relating to product quality and actions having an effect on quality.

Guarantee

The information contained in this catalogue reflects the current state of our knowledge and aims to present our products and their possible applications. Thus, the information does not guarantee certain specific characteristics of products or their aptitude for a specific utilization. All filed legal patents or industrial property rights must be respected.

Sustainable Development

In 1999, ABB extended its Environment Management Programme to all the principles of the Corporate Charter for Sustainable Development. **All concerned factories are ISO 14001 certified.**

Eco-design
Some environmental information is accessible on ABB Website.
see www.abb.com/sustainability *select in left menu:* **"ABB's environmental policy".**

Environmental product declarations can be issued upon customer's request.

Packing
Generally speaking, the diversification of reusable packing satisfies ecological requirements and the specific needs of our customers.
Packing is designed and produced with a continuous concern for respect of the environment.
For instance, polystyrene packing materials are replaced by recyclable wrapping materials with an efficient protection of our products during their transportation.

R.. Series Contactors

Application

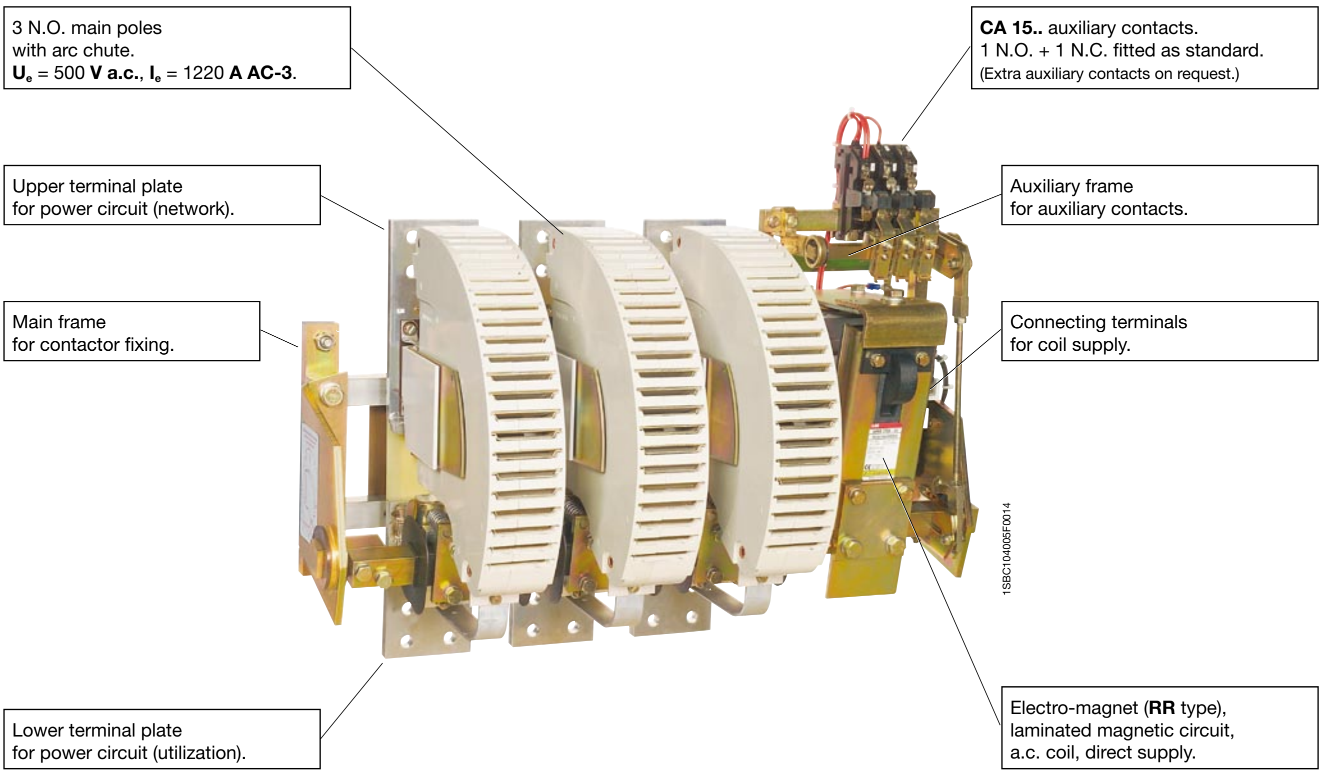
R.. series contactors, and variants described in this catalogue, are used for controlling motors, and generally for controlling power circuits, up to 500/1000 **V a.c.** or 600/1000/1500 **V d.c.**
The **R..** series contactors can be used, and adapted, for many industrial applications with high performances and severe operating conditions.
see "Overview", page **1**/9

Presentation

R.. series contactors, and variants (couplers, contactors for specific applications, ...) are designed with common standard components.
see "Construction", page **1**/8 and "Description", pages **2**/3 ... **2**/5.
With the combination of these elements, and the adaptation possibilities, special versions can be provided.

Based on a simple and sturdy construction this type of contactor is suitable for intensive duty and a high number of operations.
All component parts are easily accessible and removable from the front.

1



3-pole contactor, 1700 A rating

>> Overview .... page 1/9

R.. Series Contactors

Construction

For the ratings 1400 to 2100 **A** each contactor comprises of:

The frame
- 1 main frame
- 1 auxiliary frame

The main poles
They are defined by:
- the rated operational voltage **U_e**
- their number, according to the power circuit
- their N.O. function

The auxiliary contacts
All **R** series contactors have 1 N.O. auxiliary contact and 1 N.C. auxiliary contact fitted as standard
(except **AME** mechanically latched version)**.**
On request, all contactors can be provided with extra auxiliary contacts. See "Auxiliary Contact Allocation", page **2**/7

The electro-magnet
1 electro-magnet (2 electro-magnets if necessary) for a.c. operation or d.c. operation.
Different types of electro-magnets and their variants are proposed below.

Supply Source	**Utilization**	**Electro-magnet characteristics** Magnetic circuit	Coil	Economy resistor	Rectifier	**Electro-magnet (standard)** Type	**Electro-magnet with mechanical latching:** Type
~	50 ... 400 **Hz** High closing power of the contactor. Fluctuating supply.	Laminated		yes	yes	**RR**	**RR..-AME**
⎓	–	Laminated		yes	–	**RE**	**RE..-AME**

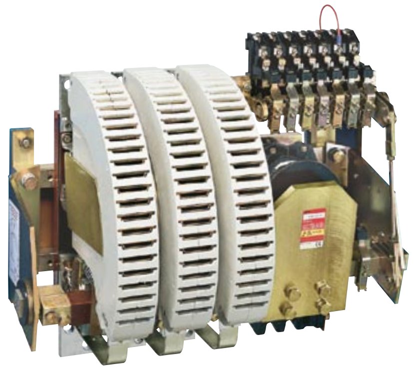
Symbols (for details, see page **2**/2)

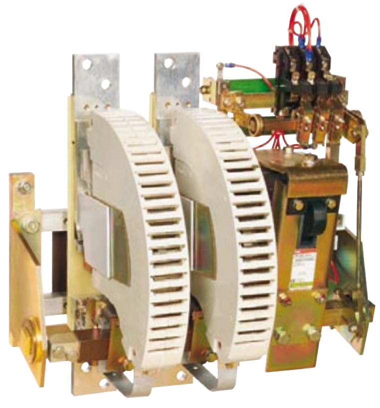
Description	**Power circuit**	**Main poles** Operational voltage **U_e**	Function	**Control circuit supply** ~ d.c. coil supply via a rectifier	**Control circuit supply** ⎓ d.c. coil + economy resistor
Contactor	~	500 V a.c.	N.O.	**IORR..**	**IORE..**
		1000 V a.c.	N.O.	**IORR..-MT**	**IORE..-MT**
	⎓	600 V d.c.	N.O.	**IORR..-CC**	**IORE..-CC**
		1000 V d.c.	N.O.	**IORR..-CC**	**IORE..-CC**
		1500 V d.c..	N.O.	**IORR..-CC**	**IORE..-CC**

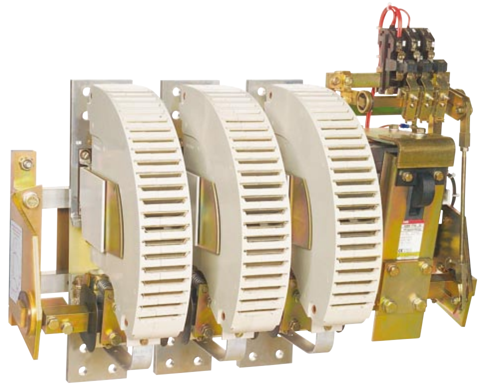
Contactors for specific applications:
- **AM-CC..** Specific contactor for field discharge of synchronous machines (please consult us)
- **FOR..** Specific contactor for control of slip-ring motors (see page **2**/28)
- **LOR..** Specific contactor for a.c. / d.c. coupling

>> Detailed Description..pages 2/3 ... 2/5

R series contactors with variable number of poles







Alternating current U_e max. = 500 V a.c.

Power AC-3, 400 V			450 kW	450 kW	630 kW	750 kW	900 kW	—
Control circuit	**Coil supply**	**Type**						
	Direct	**IOR**	**R 800**	**R 1000**	**—**	**—**	**—**	**—**
	Via a rectifier	**IORR**	**RR 800**	**RR1000**	**RR 1400**	**RR 1700**	**RR 2100**	**RR..**
	Via an economy resistor	**IORE**	**RE 800**	**RE 1000**	**RE 1400**	**RE 1700**	**RE 2100**	**RE..**
	Direct	**IORC**	**RC 800**	**—**	**—**	**—**	**—**	**—**
Current AC-3,	400-415 V	**A**	800	800	1060	1260	1520	—
	500 V	**A**	800	800	1080	1220	1340	—
Current AC-1,	40 °C	**A**	900	1000	1350	1650	2000	> 2000 on request

Alternating current U_e max. = 1000 V a.c.

Power AC-3, 690 V			780 kW	1000 kW	1200 kW	1300 kW	—
Control circuit	**Coil supply**	**Type**					
	Direct	**IOR..-MT**	**R 800-MT**	**—**	**—**	**—**	**—**
	Via a rectifier	**IORR..-MT**	**RR 800-MT**	**RR 1400-MT**	**RR 1700-MT**	**RR 2100-MT**	**RR..-MT**
	Via an economy resistor	**IORE..-MT**	**RE 800-MT**	**RE 1400-MT**	**RE 1700-MT**	**RE 2100-MT**	**RE..-MT**
	Direct	**IORC..-MT**	**RC 800-MT**	**—**	**—**	**—**	**—**
Current AC-3,	690 V	**A**	800	970	1170	1270	—
	1000 V	**A**	580	610	680	810	—
Current AC-1,	40 °C	**A**	800	1250	1650	2000	> 1850 on request

Direct current U_e max. = 1500 V d.c.

Power DC-3, DC-5, 1000 V			720 kW	1000 kW	1250 kW	1600 kW	2000 kW	—
Control circuit	**Coil supply**	**Type**						
	Direct	**IOR..-CC**	**R 800-CC**	**R 1000-CC**	**—**	**—**	**—**	**—**
	Via a rectifier	**IORR..-CC**	**RR 800-CC**	**RR 1000-CC**	**RR 1400-CC**	**RR 1700-CC**	**RR 2100-CC**	**RR..-CC**
	Via an economy resistor	**IORE..-CC**	**RE 800-CC**	**RE 1000-CC**	**RE 1400-CC**	**RE 1700-CC**	**RE 2100-CC**	**RE..-CC**
	Direct	**IORC..-CC**	**RC 800-CC**	**—**	**—**	**—**	**—**	**—**
Current DC-3, DC-5,	1000 V, 2 poles in series	**A**	720	1000	1250	1600	2000	> 2000 on request
	1500 V, 3 poles in series	**A**	720	1000	1250	1600	2000	> 2000 on request
Current DC-1,	750 V, 1 pole	**A**	800	1000	1250	1600	2000	> 2000 on request
	1000 V, 2 poles in series	**A**	800	1000	1250	1600	2000	> 2000 on request

Variants and accessories

- LOR couplers and contactors for specific applications
- CA 15 standard auxiliary contacts
- TP timed auxiliary contacts
- VM interlock
- AME mechanical latching

R.. Series Contactors

Codes for Completing Order Codes

Coil Voltage Code

U_c voltage acc. to the electro-magnet type.

RR **RR..-AME** 50-60 Hz **V a.c.**	**Code** **R☐..☐**		**RE** **RE..-AME** **V d.c.**
24	**0**	**1**	24
–	**1**	**4**	30
32	**1**	**5**	–
–	**1**	**6**	36
42	**0**	**2**	42
48	**1**	**7**	48
–	**0**	**3**	60
60	**1**	**9**	–
–	**2**	**0**	75
100	**2**	**2**	–
110-115	**0**	**4**	110
120	**2**	**3**	120
–	**0**	**5**	125-130
127	**2**	**4**	–
–	**2**	**7**	185
200	**2**	**8**	–
210	**4**	**5**	–
220-230	**0**	**6**	220
–	**4**	**6**	230
230-240	**2**	**9**	240
250	**4**	**0**	250
380-400	**0**	**7**	380
400	**3**	**9**	400
400-415	**3**	**4**	–
440	**3**	**5**	440
500	**0**	**8**	500
550 (1)	**3**	**6**	550
600 (2)	**3**	**7**	600

Note: In the cases below, select an other coil according to the indicated values for U_c voltage.

(1) RR 1400 to RR 2100: 550 V max.
RR 1400..-MT to RR 2100..-MT: 550 V max.
RR 1400..-CC to RR 2100..-CC: 550 V max.

(2) Please consult us.

Code for Extra Auxiliary Contacts

Number of CA 15.. contacts and TP.. timers, according to the electro-magnet type.

RR, RE 1400 A ... 2100 A ratings **RR..-AME, RE..-AME**			**Code**	
TP	**CA15F** NO	**CA15O** NC	**R.☐☐.**	
–	–	–	**0**	**0**
–	–	1	**0**	**1**
–	–	2	**0**	**2**
–	–	3	**0**	**3**
–	–	4	**0**	**4**
–	1	–	**1**	**0**
–	1	1	**1**	**1**
–	1	2	**1**	**2**
–	2	–	**2**	**0**
–	2	1	**2**	**1**
–	2	2	**2**	**2**
–	3	–	**3**	**0**
–	3	1	**3**	**1**
–	3	2	**3**	**2**
–	3	3	**3**	**3**
–	4	–	**4**	**0**
–	4	1	**4**	**1**
–	4	2	**4**	**2**
–	4	3	**4**	**3**
–	5	–	**5**	**0**
–	5	1	**5**	**1**
–	6	–	**6**	**0**
1	–	–	**6**	**1**
1	–	1	**6**	**2**
1	–	2	**6**	**3**
1	–	3	**6**	**4**
1	1	–	**6**	**5**
1	2	–	**6**	**6**
1	3	–	**6**	**7**
1	4	–	**6**	**8**
1	5	–	**6**	**9**
1	1	1	**7**	**1**
1	1	2	**7**	**2**
1	1	3	**7**	**3**
1	2	1	**7**	**5**
1	2	2	**7**	**6**
1	2	3	**7**	**7**
1	2	4	**7**	**8**
1	3	1	**8**	**0**
1	3	2	**8**	**1**
1	3	3	**8**	**2**
1	4	1	**8**	**6**
1	4	2	**8**	**7**
1	5	1	**9**	**1**
1	6	–	**9**	**6**

The above tables indicate the main auxiliary contact combinations.
For other combinations, please consult us.
F fixing dimension can change according to the number of **CA 15..** auxiliary contacts.
See section **5** "Dimensions".

R.. Series Contactors

Complementary Information

Ordering Details

When placing an order please specify the **Type** and the **Order Code** (see "Ordering Details" pages in this catalogue).

In the "Order codes" complete the boxes □ by the codes indicated in the opposite tables.

Example: IORR 1400-30 contactor - 500 V a.c. circuit switching.
The "Order Code" is indicated in the "Ordering Details" table (for this example see page **2**/8).
It must be completed by different codes:

- current frequency for the coil supply: example 50/60 Hz
- operating coil voltage: example 230-240 V
- extra auxiliary contacts, factory mounted (see pages **2**/6, **2**/7), in this example: + 2 N.C. and + 2 N.O.

Order Code to be completed: see page **2**/8	**FPL**	6	1	1	□	3	1	□	**R**	□	□	□	□
– code for coil frequency: 50/60 Hz					**5**								
– code for blow-out coil								**5**					
– code for operating coil voltage: 230-240 V										**2**			**9**
– code for extra auxiliary contacts: + 2 CA 15-F + 2 CA 15-O											**2**	**2**	
Complete Order Code:	**FPL**	6	1	1	5	3	1	5	**R**	2	2	2	9

Note: With 4 x CA 15.. extra auxiliary contacts, **F** fixing dimension of the contactor is increased (635 mm in this example instead of 540 mm) see section **5** "Dimensions".

R.. Series Contactors

Contents

R.. Series Contactors

Symbols

Type

Type of contactor	
N.O. poles	**I**

Mounting	
Open bar mounted	**O**

Electro-magnet c/w coil + magnetic circuit	
a.c. operated coil + laminated magnetic circuit + rectifier + economy resistor	**R R**
d.c. operated coil + laminated magnetic circuit + economy resistor	**R E**

Contactor rating	800, 1000, **1400, 1700, 2100**

Number of N.O. poles

Number of N.C. poles

Alternative options

– **MT** Poles for 500 V > $U_e \leq$ 1000 V a.c. switching
– **CC** Poles for d.c. switching as follows, $U_e \leq$ 1500 V: contactor ratings 800 A and above
– **AME** Mechanically latched contactors (ratings 800 ... 2100 A)

Operating coil voltage
voltages available (see page **1**/10)

Additions
Quote in plain text the additions required including qty, type and description e.g.:
+ 1 off CA... auxiliary contact block,
+ 1 off VM... mechanical interlock

Explanation of symbols

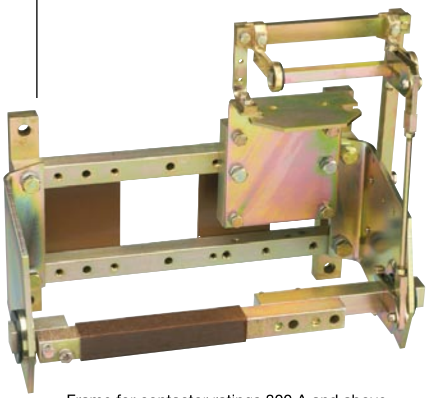
IORE 1400-40-MT 125 Vd.c. coil + 1 **CA 15-F** + 1 **CA 15-O**
Open type bar mounted contactor with **RE** type electro-magnet and laminated magnetic circuit for d.c. operation via an economy resistor, 1400 A rating, 4 N.O. main poles, without N.C. pole, **-MT** version for max. operating voltage 1000 V a.c., 125 V d.c. coil, + one extra **CA 15-F** (N.O.) and one extra **CA 15-O**. (N.C.) auxiliary contacts.

Notes:
– Additions which do not increase the fixing centers of the contactor can be ordered separately and mounted by the user. Variations which do affect the contactor features e.g. the fixing centers, must be carried out in our works (see page **2**/7 and section **5** for "Dimensions").
– Contactor rating must be specified when the TP.. timing block and the CA 15.. auxiliary contacts are ordered separately.

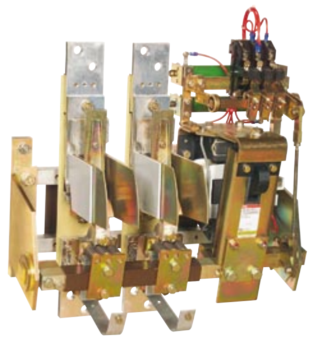
>> **Questionnaire for Product Specification** .... **pages 2/29, 2/30** >> **Ordering Details** .... **pages 2/8 ... 2/16**

R.. Series Contactors

Main Frame and Electro-magnet Description


1SBC388035F0302

Frame for contactor ratings 800 A and above


1SBC104008F0014

RE type electro-magnet

The **R** series contactors are built on a **main frame** supporting the **electro-magnet**, the **main poles** and the **auxiliary contacts**.

This design offers a great construction flexibility for the standard contactors as well as for the tailor made versions:

- variable number of poles acc. to requirements
- poles without or with blow-out coils, rated for the current flow in the poles
- large number of standard, timed, adjustable N.O. and N.C. auxiliary contacts
- electro-magnets with specific features depending on both the control voltage supply and the utilization characteristics.

All component parts are easily accessible and removable from the front.

Main Frame

The main frame comprises of two fixed bar equipped with two supports c/w two bearings and the moving shaft rotating between the two bearings.
In addition to the main frame, contactor ratings 800 **A** and above, are equipped with an auxiliary frame on which can be mounted some or all of the auxiliary contacts.

Electro-magnet

The electro-magnet comprises of the magnetic circuit plus the operating coil.
Generally placed on the R.H.S of the frame, the electro-magnet can be, on request, placed either on the frame centre or on the L.H.S of the frame. If required and depending on the application or the contactor construction involved, an additional electro-magnet can be mounted on the frame.
The choice of the electro-magnet depends primarily on the type of control circuit supply available as well as on the composition of the contactor and its intended application.

a.c. Control Circuit Supply

● **RR** type electro-magnet
The magnetic circuit is laminated and the operating coil fed from an a.c. supply via a rectifier and an economy resistor mounted and pre-wired on the contactor.
This type of electro-magnet provides a high closing power for the operation of the large size contactors fitted with a large number of poles or when the control supply frequency is > 50 **Hz** and < 400 **Hz**.

d.c. Control Circuit Supply

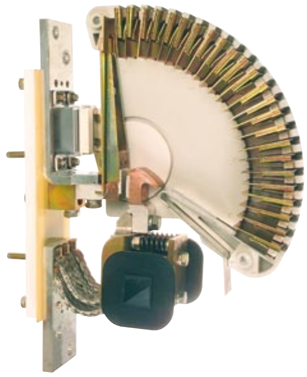
● **RE** type electro-magnet
The magnetic circuit is laminated and the operating coil fed from a d.c. supply via an economy resistor mounted and pre-wired on the contactor.

Alternative Versions
Electro-magnet with latching: the coil is briefly energized on contactor "latching" and "de-latching".
RR.. or **RE..-AME** types: mechanically latched.

>> Ordering Details .... pages 2/8 ... 2/16
>> Technical Data.......................... pages 2/17 ... 2/26
>> Accessories .... page 2/7
>> Terminal Marking and Positioning ....page 4/2
>> Wiring Diagrams.............................pages 4/3, 4/4
>> Dimensions ....section 5

R.. Series Contactors

Main Pole Description



1SBC104001F0014

De-ion arc chute

1SBC104004F0014

Main pole with arc chute

Main Poles

The main poles of the **R** series contactors are of a "butt-contact" pattern without sliding or rolling. Each pole comprises of the **main contacts** (fixed contact and moving contact), the **blow-out coil** and the **arc chute**.

Main Contacts

The main contacts are made of a silver alloy insert brazed on to a hard copper support. The fixed contact is mounted on an insulated support screwed onto the fixed bar, the moving contact is similarly mounted and rotates directly with the moving shaft
The contact pressure and the contact compression stroke are set separately.
The fixed and moving contacts also have arcing horns fitted to assist with the elongation and breaking of the electric arc.

Blow-out Coil -CC and -MT poles

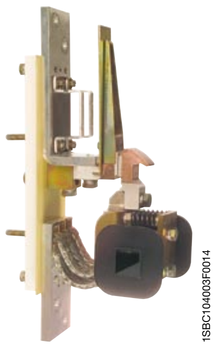
The total current flows through the blow-out coil. The coil generated flux is transmited to the internal faces of the arc chutes via a magnetic core.

Arc Chute

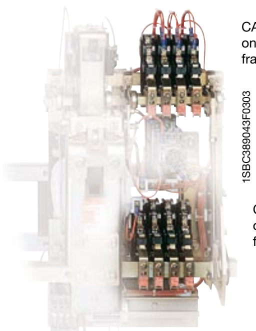
The arc chute is made of a polymer material and fiber-glass compound.
Whatever the operation voltage may be, the poles of contactor ratings 1400 **A**, 1700 **A** and 2100 **A** are equipped with arc chutes comprising of built-in de-ion arc splitters which ensure a rapid extinction of the arcs.
Quick and easy removal of the arc chutes allows an instant inspection of the main contacts and where necessary their replacement.

>> Accessories .... page 2/7
>> Ordering Details......................... pages 2/8 ... 2/16
>> Technical Data .... pages 2/17 ... 2/26
>> Terminal Marking and Positioning ....page 4/2
>> Wiring Diagrams...........................pages 4/3 ... 4/4
>> Dimensions ....section 5

R.. Series Contactors
Main Pole Variants
Auxiliary Contact Description



LOR coupler main pole



CA 15.. auxiliary contacts
on 800 ... 2100 A contactor ratings

Main Pole Variants (on request)

- **LOR..** couplers: Please consult us
  The main poles have no blow-out devices and no arc chutes. Nevertheless the poles have the same making and breaking capacity as the contactors of equivalent rating but the breaking capacity characteristics are restricted to max. 24 **V a.c./d.c.** power circuits.
- Contactor ratings from 1400 **A** and above with boosted blow-out device ("long pole version").
- Increased insulation can be provided on request: ratings 1400 **A** and above, with insulated protective coating of metal parts, and increased clearance between poles.

Auxiliary Contacts

Standard Auxiliary Contacts
One type available and suitable for a.c. and d.c. control circuit switching.

- **CA 15-..** 1-pole adjustable auxiliary contacts: $\mathbf{I_{th}}$ = 15 **A**

N.O. contact	**CA 15-F**
N.C. contact	**CA 15-O**

CA 15-.. auxiliary contacts are mounted first on the auxiliary frame directly above the electro-magnet and then on the contactor main frame to the R.H.S. of the electro-magnet.

Timed Auxiliary Contacts
TP.. pneumatic timing block with 1N.O. and 1N.C. electrically independent contacts, $\mathbf{I_{th}}$ = 10 **A**. Direct or inverse timing, with linear setting scale over a 350° rotation by means of a knurled knob with timing guide marks. Timing ranges from 0.1 to 40 **s** or from 10 to 180 **s**.
The **TP..** timing block is mounted on the auxiliary frame and takes up space of three **CA 15..** auxiliary contacts.

>> Accessories .... page 2/7
>> Ordering Details......................... pages 2/8 ... 2/16
>> Technical Data .... pages 2/17 ... 2/26
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>> Dimensions .... section 5

R.. Series Contactors

CA.. Auxiliary Contacts and TP.. Timing Blocks


1SBC348042F0302

CA 15-O (N.C.)


1SBC348052F0302

CA 15-F (N.O.)


1SBC575893F0301

TP 40 DA

Auxiliary Contacts Fitted as Standard

R series contactors are equipped as standard (except AME types) with 1N.O. auxiliary contact generally used for "hold-in" plus 1 N.C. adjustable auxiliary contact (except AME types) generally used for electrical interlocking or signal contact.
Contact types available: see opposite page.

Extra Auxiliary Contacts, without Increase of Fixing Dimension "F"

On request **R** series contactors can be equipped with extra **CA..** auxiliary contacts and **TP..** timed auxiliary contacts according to the indications given on the opposite page.

- **CA 15-..** 1-pole adjustable auxiliary contacts:
  - N.O. contact **CA 15-F**
  - N.C. contact **CA 15-O**
- **TP..** 2-pole pneumatic timing block with 1N.O. and 1N.C. auxiliary contacts.
  On ordering please quote:
  – timing mode, inverse or direct
  – timing range, 0.1 ... 40 **s** or 10 ... 180 **s**

Enter into the contactor **FPL...** Order Code, the appropriate two digit code according to the selected auxiliary contact combination.

FPL □□ □ □ □ □ □ **R** □ □ □ □

Code: see page **1**/10

Extra Auxiliary Contacts, with Increased Fixing Dimension "F"

On request **R** series contactors can be equipped with a larger number of factory assembled auxiliary contacts but the contactor basic fixing dimension must be increased.

For example 15 (or more) extra **CA 15..** auxiliary contacts together with 1 **TP..** timing block may be added:

- **CA 15..** 1-pole adjustable auxiliary contacts:
  - N.O. contact **CA 15-F** please quote "qty" required
  - N.C. contact **CA 15-O** please quote "qty" required
- **TP..** 2-pole pneumatic timing blocks with 1 N.O. and 1 N.C. auxiliary contacts.
  On ordering please quote:
  – timing mode, inverse or direct
  – timing range, 0.1 ... 40 **s** or 10 ... 180 **s**.

>> Ordering Details .... pages 2/8 ... 2/16	**>> Terminal Marking and Positioning................................ section 4**
>> Technical Data ....pages 2/17 ... 2/26	**>> Dimensions acc. to the Aux. Contact Number .... section 5**

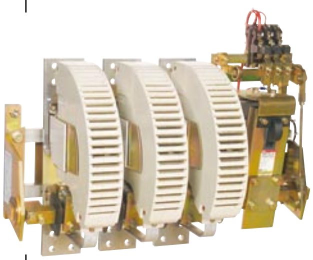
Auxiliary Contact Allocation

Contactor Type	Rating A	Aux. contacts available N.O.	Aux. contacts available N.C.	Extra CA.. standard aux. contacts and TP.. timed aux. contacts: Fitted by the user, without an increase in fixing dimension F	Extra CA.. standard aux. contacts and TP.. timed aux. contacts: Factory fitted, with an increase in fixing dimension F
IORR..	1400 ... 2100	1 **CA 15-F**	1 **CA 15-O**	1 ... 2 blocks **CA 15..** or 1 **TP..**	"n" contacts **CA 15..** + 1 **TP..**
IORE..	1400 ... 2100	1 **CA 15-F**	1 **CA 15-O**	1 ... 2 blocks **CA 15..** or 1 **TP..**	
IORR..-MT	1400 ... 2100	1 **CA 15-F**	1 **CA 15-O**	1 ... 2 blocks **CA 15..** or 1 **TP..**	"n" contacts **CA 15..** + 1 **TP..**
IORE..-MT	1400 ... 2100	1 **CA 15-F**	1 **CA 15-O**	1 ... 2 blocks **CA 15..** or 1 **TP..**	
IORR..-CC	1400 ... 2100	1 **CA 15-F**	1 **CA 15-O**	1 ... 2 blocks **CA 15..** or 1 **TP..**	"n" contacts **CA 15..** + 1 **TP..**
IORE..-CC	1400 ... 2100	1 **CA 15-F**	1 **CA 15-O**	1 ... 2 blocks **CA 15..** or 1 **TP..**	
IORR..-AME	1400 ... 2100	–	–	1 ... 5 contact **CA 15..**	"n" contacts **CA 15..**
IORE..-AME	1400 ... 2100	–	–	1 ... 5 contact **CA 15..**	

>> Ordering Details .... pages 2/8 ... 2/16
>> Technical Data .... pages 2/17 ... 2/26
>> Terminal Marking and Positioning.. section 4
>> Dimensions acc. to the Auxiliary Contact Number .... section 5

IORR.. Contactors - Poles 500 V a.c.

a.c. Operated



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IORR 1700-30

Application - Description

IORR.. contactors are used for controlling a.c. power circuits up to 500 **V**, 50/60 **Hz**.

The contactor magnetic circuit is of the laminated type and the operating coil is fed from an a.c. supply via a rectifier and an economy resistor.

On 3-pole + Neutral contactors (3 + N), the Neutral pole is rated at 900 **A** and is always mounted on the L.H.S. of the contactor frame.

Auxiliary contacts: 1 N.O. + 1 N.C. available.

Ordering Details

Power AC-3 380 V 400 V 415 V **kW**	440 V **kW**	500 V **kW**	**Rated operational current AC-3** ≤ 440 V **A**	**AC-1** θ ≤ 40 °C **A**	**No of poles**	**Type** to be completed with: – coil voltage in plain text └┘ see page **1**/10	**Order code** to be completed with codes: – extra aux. contacts □□ – coil voltage □ □ see page **1**/10	**Unit weight** without pack^ing **kg**
630	710	800	1060	1350	2	IORR 1400-20 └┘	FPL 611 5215 R □□□□	40.00
					3	IORR 1400-30 └┘	FPL 611 5315 R □□□□	50.00
					3 + N	IORR 1400-39 └┘	FPL 611 5615 R □□□□	62.00
					4	IORR 1400-40 └┘	FPL 611 5415 R □□□□	63.00
750	800	900	1260	1650	2	IORR 1700-20 └┘	FPL 621 5215 R □□□□	44.00
					3	IORR 1700-30 └┘	FPL 621 5315 R □□□□	56.00
					3 + N	IORR 1700-39 └┘	FPL 621 5615 R □□□□	70.00
					4	IORR 1700-40 └┘	FPL 621 5415 R □□□□	72.00
900	1000	1000	1520	2000	2	IORR 2100-20 └┘	FPL 631 5215 R □□□□	48.00
					3	IORR 2100-30 └┘	FPL 631 5315 R □□□□	62.00
					3 + N	IORR 2100-39 └┘	FPL 631 5615 R □□□□	76.00
					4	IORR 2100-40 └┘	FPL 631 5415 R □□□□	78.00

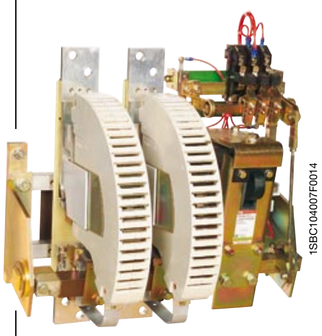
Additions and Variants

- An extra number of **CA..** standard auxiliary contacts or **TP..** timed auxiliary contacts can be added.
  see page **2**/7, "Auxiliary Contact Allocation":
  – no increase of fixing dimension F: for ratings **1400 A** and above, addition of 1 **TP..** or 1 or 2 **CA 15-..**
  – with increased fixing dimension F: for any ratings, addition of 1 **TP..** and "n" **CA 15-..**
- Single pole version: please consult us.

>> Technical Data ....pages 2/17 ... 2/19
>> Terminal Marking and Positioning .... section 4
>> Wiring Diagrams .... section 4
>> Dimensions .... section 5

IORE.. Contactors - Poles 500 V a.c.

d.c. Operated (with Economy Resistor)



IORE 1400-20

Application - Description

IORE.. contactors are used for controlling a.c. power circuits up to 500 **V**, 50/60 **Hz**.

The contactor magnetic circuit is of the laminated type and the operating coil is fed from a d.c. supply via an economy resistor.

On 3-pole + Neutral contactors (3 + N), the Neutral pole is rated at 900 **A** and is always mounted on the L.H.S. of the contactor frame.

Auxiliary contacts: 1 N.O. + 1 N.C. available.

Ordering Details

Power AC-3 380 V 400 V 415 V kW	440 V kW	500 V kW	Rated operational current AC-3 ≤ 440 V A	AC-1 θ ≤ 40 °C A	No of poles	Type to be completed with: – coil voltage in plain text ⌴⌴⌴ see page **1**/10	Order code to be completed with codes: – extra aux. contacts ☐☐ – coil voltage ☐ ☐ see page **1**/10	Unit weight without packing kg
630	710	800	1060	1350	2	IORE 1400-20 ⌴⌴⌴	FPL 611 9215 R ☐☐☐☐	40.00
					3	IORE 1400-30 ⌴⌴⌴	FPL 611 9315 R ☐☐☐☐	50.00
					3 + N	IORE 1400-39 ⌴⌴⌴	FPL 611 9615 R ☐☐☐☐	62.00
					4	IORE 1400-40 ⌴⌴⌴	FPL 611 9415 R ☐☐☐☐	63.00
750	800	900	1260	1650	2	IORE 1700-20 ⌴⌴⌴	FPL 621 9215 R ☐☐☐☐	44.00
					3	IORE 1700-30 ⌴⌴⌴	FPL 621 9315 R ☐☐☐☐	56.00
					3 + N	IORE 1700-39 ⌴⌴⌴	FPL 621 9615 R ☐☐☐☐	70.00
					4	IORE 1700-40 ⌴⌴⌴	FPL 621 9415 R ☐☐☐☐	72.00
900	1000	1000	1520	2000	2	IORE 2100-20 ⌴⌴⌴	FPL 631 9215 R ☐☐☐☐	48.00
					3	IORE 2100-30 ⌴⌴⌴	FPL 631 9315 R ☐☐☐☐	62.00
					3 + N	IORE 2100-39 ⌴⌴⌴	FPL 631 9615 R ☐☐☐☐	76.00
					4	IORE 2100-40 ⌴⌴⌴	FPL 631 9415 R ☐☐☐☐	78.00

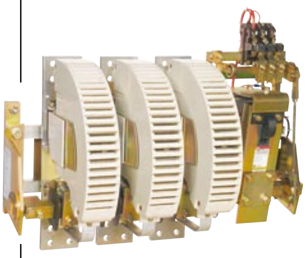
Additions and Variants

- An extra number of **CA..** standard auxiliary contacts or **TP..** timed auxiliary contacts can be added. see page **2**/7, "Auxiliary Contact Allocation":
  – no increase of fixing dimension F: for ratings **1400 A** and above, addition of 1 **TP..** or 1 or 2 **CA 15-..**
  – with increased fixing dimension F: for any ratings, addition of 1 **TP..** and "n" **CA 15-..**
- Single pole version: please consult us.

>> Technical Data ....pages 2/17 ... 2/19
>> Terminal Marking and Positioning .... section 4
>> Wiring Diagrams .... section 4
>> Dimensions .... section 5

IORR-.. MT Contactors - Poles 1000 V a.c.

a.c. Operated



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IORR 1700-30-MT

Application - Description

IORR..-MT contactors are used for controlling a.c. power circuits > 500 **V** and ≤ 1000 **V**, 50/60 **Hz**.
For operating voltage $\mathbf{U_e}$ > 1000 **V,** please consult us.
The contactor magnetic circuit is of the laminated type and the operating coil is fed from an a.c. supply via a rectifier and an economy resistor.
On 3-pole + Neutral contactors (3 + N), the Neutral pole is rated at 900 A and is always mounted on the L.H.S. of the contactor frame.

Auxiliary contacts: 1 N.O. + 1 N.C. available.

Ordering Details

Power AC-3 690 V kW	1000 V kW	**Rated operational current AC-3** ≤ 690 V A	**AC-1** θ ≤ 40 °C A	**No of poles**	**Type** to be completed with: – coil voltage in plain text └┘ see page **1**/10	**Order code** to be completed with codes: – extra aux. contacts □□ – coil voltage □ □ see page **1**/10	**Unit weight** without pack^{ing} kg
1000	900	970	1250	2	IORR 1400-20-MT └┘	FPL 612 5215 R □□□□	42.00
				3	IORR 1400-30-MT └┘	FPL 612 5315 R □□□□	52.00
				3 + N	IORR 1400-39-MT └┘	FPL 612 5615 R □□□□	64.00
				4	IORR 1400-40-MT └┘	FPL 612 5415 R □□□□	65.00
1200	1000	1170	1650	2	IORR 1700-20-MT └┘	FPL 622 5215 R □□□□	47.00
				3	IORR 1700-30-MT └┘	FPL 622 5315 R □□□□	61.00
				3 + N	IORR 1700-39-MT └┘	FPL 622 5615 R □□□□	73.00
				4	IORR 1700-40-MT └┘	FPL 622 5415 R □□□□	74.00
1300	1200	1270	1850	2	IORR 2100-20-MT └┘	FPL 632 5215 R □□□□	52.00
				3	IORR 2100-30-MT └┘	FPL 632 5315 R □□□□	68.00
				3 + N	IORR 2100-39-MT └┘	FPL 632 5615 R □□□□	82.00
				4	IORR 2100-40-MT └┘	FPL 632 5415 R □□□□	84.00

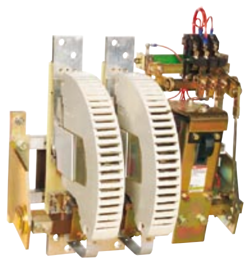
Additions and Variants

- An extra number of **CA..** standard auxiliary contacts or **TP..** timed auxiliary contacts can be added. see page **2**/7, "Auxiliary Contact Allocation":
  - no increase of fixing dimension F: for ratings **1400 A** and above, addition of 1 **TP..** or 1 or 2 **CA 15-..**
  - with increased fixing dimension F: for any ratings, addition of 1 **TP..** and "n" **CA 15-..**

>> Technical Data ....pages 2/20 ... 2/22
>> Terminal Marking and Positioning .... section 4
>> Wiring Diagrams .... section 4
>> Dimensions .... section 5

IORE-.. MT Contactors - Poles 1000 V a.c.

d.c. Operated (with Economy Resistor)



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IORE 1400-20-MT

Application - Description

IORE..-MT contactors are used for controlling a.c. power circuits > 500 **V** and ≤ 1000 **V**, 50/60 **Hz**.
For operating voltage $\mathbf{U_e}$ > 1000 **V,** please consult us.
The contactor magnetic circuit is of the laminated type and the operating coil is fed from a d.c. supply via an economy resistor.
On 3-pole + Neutral contactors (3 + N), the Neutral pole is rated at 900 **A** and is always mounted on the L.H.S. of the contactor frame.

Auxiliary contacts: 1 N.O. + 1 N.C. available.

Ordering Details

Power AC-3 690 V kW	Power AC-3 1000 V kW	Rated operational current AC-3 ≤ 690 V A	Rated operational current AC-1 θ ≤ 40 °C A	No of poles	Type to be completed with: – coil voltage in plain text ⌴⌴⌴ see page **1**/10	Order code to be completed with codes: – extra aux. contacts ☐☐ – coil voltage ☐ ☐ see page **1**/10	Unit weight without packing kg
1000	900	970	1250	2	IORE 1400-20-MT ⌴⌴⌴	FPL 612 9215 R ☐☐☐☐	42.00
				3	IORE 1400-30-MT ⌴⌴⌴	FPL 612 9315 R ☐☐☐☐	52.00
				3 + N	IORE 1400-39-MT ⌴⌴⌴	FPL 612 9615 R ☐☐☐☐	64.00
				4	IORE 1400-40-MT ⌴⌴⌴	FPL 612 9415 R ☐☐☐☐	65.00
1200	1000	1170	1650	2	IORE 1700-20-MT ⌴⌴⌴	FPL 622 9215 R ☐☐☐☐	47.00
				3	IORE 1700-30-MT ⌴⌴⌴	FPL 622 9315 R ☐☐☐☐	61.00
				3 + N	IORE 1700-39-MT ⌴⌴⌴	FPL 622 9615 R ☐☐☐☐	73.00
				4	IORE 1700-40-MT ⌴⌴⌴	FPL 622 9415 R ☐☐☐☐	74.00
1300	1200	1270	1850	2	IORE 2100-20-MT ⌴⌴⌴	FPL 632 9215 R ☐☐☐☐	52.00
				3	IORE 2100-30-MT ⌴⌴⌴	FPL 632 9315 R ☐☐☐☐	68.00
				3 + N	IORE 2100-39-MT ⌴⌴⌴	FPL 632 9615 R ☐☐☐☐	82.00
				4	IORE 2100-40-MT ⌴⌴⌴	FPL 632 9415 R ☐☐☐☐	84.00

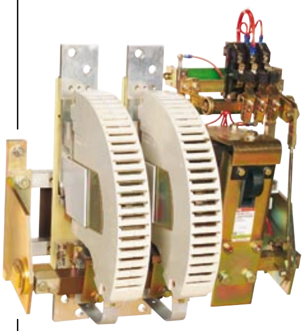
Additions and Variants

- An extra number of **CA..** standard auxiliary contacts or **TP..** timed auxiliary contacts can be added. see page **2**/7, "Auxiliary Contact Allocation":
  - – no increase of fixing dimension F: for ratings **1400 A** and above, addition of 1 **TP..** or 1 or 2 **CA 15-..**
  - – with increased fixing dimension F: for any ratings, addition of 1 **TP..** and "n" **CA 15-..**

>> Technical Data ....pages 2/20 ... 2/22
>> Terminal Marking and Positioning .... section 4
>> Wiring Diagrams .... section 4
>> Dimensions .... section 5

IORR..-CC, IORE..-CC Contactors for d.c. Application

a.c. Operated (RR) or d.c. Operated (RE)



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IORE 1400-20-CC

Application - Description

IORR..-CC and **IORE..-CC** contactors are used for controlling d.c. power circuits, at voltages **$U_e \leq$** 1500 **V d.c.** (time constant **L/R** $\leq$ 7.5 **ms**). (For **L/R** > 7.5 **ms**: please consult us.)

Auxiliary contacts: 1 N.O. + 1 N.C. available.

1-pole Contators - Ordering Details

Rated operational current $U_e \leq$ 750 V d.c. DC-1 A	$U_e \leq$ 600 V d.c. DC-3/DC-5 A	Number of poles	Type to be completed with: – coil voltage in plain text └┴┴┘ see page **1**/10	Order code to be completed with codes: – extra aux. contacts □□ – coil voltage □ □ see page **1**/10	Unit weight without pack[ing] kg
IORR..-CC contactors (a.c. operated)					
1000	1000	1	IORR 1000-10-CC └┴┴┘	FPL 871 6115 R □□□□	31.00
1250	1250	1	IORR 1400-10-CC └┴┴┘	FPL 611 6115 R □□□□	32.00
1600	1600	1	IORR 1700-10-CC └┴┴┘	FPL 621 6115 R □□□□	34.00
2000	2000	1	IORR 2100-10-CC └┴┴┘	FPL 631 6115 R □□□□	37.00

Note: The IORR 1000-10-CC contactor must be provided on request in IOR 1000-10-CC version for direct supply of the coil (coil 50 Hz or coil 60 Hz).

IORE..-CC contactors (d.c. operated - with economy resistor)					
1000	1000	1	IORE 1000-10-CC └┴┴┘	FPL 871 0115 R □□□□	31.00
1250	1250	1	IORE 1400-10-CC └┴┴┘	FPL 611 0115 R □□□□	32.00
1600	1600	1	IORE 1700-10-CC └┴┴┘	FPL 621 0115 R □□□□	34.00
2000	2000	1	IORE 2100-10-CC └┴┴┘	FPL 631 0115 R □□□□	37.00

2-pole Contactors (Connection of the 2 poles in series) - Ordering Details

Rated operational current $U_e \leq$ 1500 V d.c. DC-1 A	$U_e \leq$ 1000 V d.c. DC-3/DC-5 A	Number of poles	Type to be completed with: – coil voltage in plain text └┴┴┘ see page **1**/10	Order code to be completed with codes: – extra aux. contacts □□ – coil voltage □ □ see page **1**/10	Unit weight without pack[ing] kg
IORR..-CC contactors (a.c. operated)					
1000	1000	2	IORR 1000-20-CC └┴┴┘	FPL 871 6215 R □□□□	40.00
1250	1250	2	IORR 1400-20-CC └┴┴┘	FPL 611 6215 R □□□□	42.00
1600	1600	2	IORR 1700-20-CC └┴┴┘	FPL 621 6215 R □□□□	47.00
2000	2000	2	IORR 2100-20-CC └┴┴┘	FPL 631 6215 R □□□□	52.00

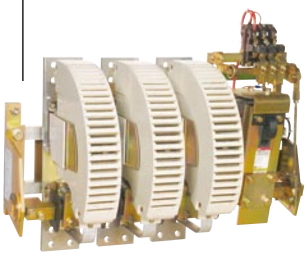
Note: The IORR 1000-20-CC contactor must be provided on request in IOR 1000-20-CC version for direct supply of the coil (coil 50 Hz or coil 60 Hz).

IORE..-CC contactors (d.c. operated - with economy resistor)					
1000	1000	2	IORE 1000-20-CC └┴┴┘	FPL 871 0215 R □□□□	41.00
1250	1250	2	IORE 1400-20-CC └┴┴┘	FPL 611 0215 R □□□□	42.00
1600	1600	2	IORE 1700-20-CC └┴┴┘	FPL 621 0215 R □□□□	47.00
2000	2000	2	IORE 2100-20-CC └┴┴┘	FPL 631 0215 R □□□□	52.00

>> Technical Data ....pages 2/23 ... 2/25
>> Terminal Marking and Positioning .... section 4
>> Wiring Diagrams .... section 4
>> Dimensions .... section 5

IORR..-CC, IORE..-CC Contactors for d.c. Application

a.c. Operated (RR) or d.c. Operated (RE)



IORR 1700-30-CC

3-pole Contactors (Connection of the 3 poles in series) - Ordering Details

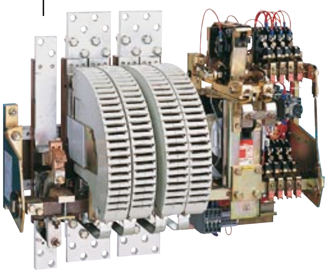
Rated operational current $U_e \leq$ 1500 V d.c. DC-1 A	DC-3/DC-5 A	Number of poles	Type to be completed with: – coil voltage in plain text ⌴⌴⌴ see page 1/10	Order code to be completed with codes: – extra aux.contacts □□ – coil voltage □ □ see page 1/10	Unit weight without packing kg
IORR..-CC contactors (a.c. operated)					
1000	1000	3	IORR 1000-30-CC ⌴⌴⌴	FPL 871 6315 R □□□□	50.00
1250	1250	3	IORR 1400-30-CC ⌴⌴⌴	FPL 611 6315 R □□□□	52.00
1600	1600	3	IORR 1700-30-CC ⌴⌴⌴	FPL 621 6315 R □□□□	61.00
2000	2000	3	IORR 2100-30-CC ⌴⌴⌴	FPL 631 6315 R □□□□	68.00

Note: The IORR 1000-30-CC contactor must be provided on request in IOR 1000-30-CC version for direct supply of the coil (coil 50 Hz or coil 60 Hz).

IORE..-CC contactors (d.c. operated - with economy resistor)					
1000	1000	3	IORR 1000-30-CC ⌴⌴⌴	FPL 871 0315 R □□□□	50.00
1250	1250	3	IORE 1400-30-CC ⌴⌴⌴	FPL 611 0315 R □□□□	52.00
1600	1600	3	IORE 1700-30-CC ⌴⌴⌴	FPL 621 0315 R □□□□	61.00
2000	2000	3	IORE 2100-30-CC ⌴⌴⌴	FPL 631 0315 R □□□□	68.00

>> Technical Data ....pages 2/23 ... 2/25
>> Terminal Marking and Positioning .... section 4
>> Wiring Diagrams .... section 4
>> Dimensions .... section 5

IORR..-AME and IORE..-AME Mechanically Latched Contactors



Special contactor (AM-CC.. type) with mechanical latching.

Application

IORR..-AME and **IORE..-AME** mechanically latched contactors are used for controlling power circuits up to ≤ 500 **V**, 50/60 **Hz**.

Examples of use

- installations where the control circuits are fed from batteries, and it is desirable to reduce the power consumption.
- contactors used in sequence control. In the case of an accidental supply failure one may want to know precisely the state (ON or OFF) of particular contactors at the instant the supply failure occured.
- contactors which must remain closed for safety reasons, even if the control circuit supply has come off.
- contactors in distribution circuits (the contactor can be used as an isolating switch operated by a signal to the coil).
- protection against accidental failure of the mains supply. The contactor would remain closed whatever the duration of the fault may be.
- contactors which remain almost permanently closed. Coil consumption energy savings are increased compared to standard contactors whose coils remain permanently energized.

Description

IORR..-AME and **IORE..-AME** mechanically latched contactors differ from **IORR** and **IORE** standard contactors by a double electro-magnet (with closing and tripping coils, electrically separate).
Making and breaking capacities are identical to those of standard contactors of the same rating.

The **IORR..-AME** mechanically latched contactors are a.c. operated. For the **IORR..-AME** types, the closing coil only, is fed from an a.c. supply via a rectifier and an economy resistor to limit the current value in control circuit.

The **IORE..-AME** mechanically latched contactors are d.c. operated. The closing coil is fed via an economy resistor to limit the current value in control circuit. The tripping coil is fed directly from a d.c. supply without economy resistor.

On 4-pole contactors, with 3 poles + neutral (3+N), the neutral pole is always rated at 900 **A** and mounted on the left hand side of the contactor frame.

Construction
A mechanical latch is mounted above the closing electro-magnet. The tripping electro-magnet releases the mechanical latch.

Operation

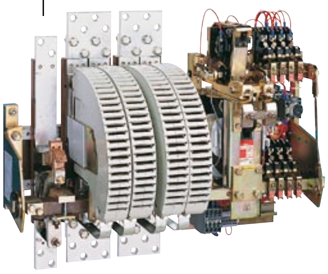
- Closing of contactor (latching)
  Once the closing coil is energized the contactor closes and will remain so indefinitely by the action of the mechanical latch which holds in the moving part of the closing electro-magnet.
  The closing coil is de-energized by an electrical interlocking contact mounted on the contactor.
- Opening of contactor (de-latching)
  Once the tripping coil is energized, the tripping electro-magnet releases the mechanical latch, de-latching the moving part of the closing electro-magnet, allowing the contactor to open. Once the contactor is open, the tripping coil is de-energized by an electrical interlocking contact mounted on the contactor.
  IORR..-AMF and **IORE..-AMF** variants are designed with 2 tripping coils (double de-latching control).

Auxiliary contacts
The auxiliary contacts fitted as standard are used for de-energization of closing and tripping coils.
None are available as standard.

Additions (see page **2**/7)
Extra **CA..** auxiliary contacts or **TP..** timed auxiliary contacts can be added.

>> **Technical Data** (except mechanical durability and electro-magnet) ....**equivalent to those on pages 2/17 ... 2/19**
>> **Electro-magnet Characteristics .... please consult us**
>> **Wiring Diagrams .... section 4**
>> **Terminal Marking and Positioning .... section 4**
>> **Dimensions .... section 5**

IORR..-AME
Mechanically Latched Contactors
a.c. Operated



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Special contactor (AM-CC.. type) with mechanical latching.

Ordering Details

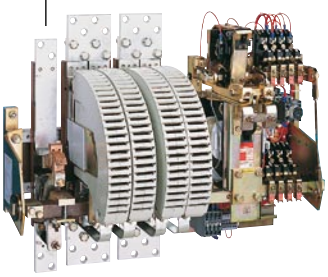
Power AC-3 380 V 400 V 415 V kW	440 V kW	500 V kW	Rated operational current AC-3 ≤ 440 V A	AC-1 θ ≤ 40 °C A	No of poles	Type to be completed with: – coil voltage in plain text └─┘ see page **1**/10	Order code to be completed with codes: – extra aux. contacts □□ – coil voltage □ □ see page **1**/10	Unit weight without packing kg
630	710	800	1060	1350	2	IORR 1400-20-AME └─┘	FPL 611 5225 R □□□□	50.00
					3	IORR 1400-30-AME └─┘	FPL 611 5325 R □□□□	60.00
					3 + N	IORR 1400-39-AME └─┘	FPL 611 5625 R □□□□	71.00
					4	IORR 1400-40-AME └─┘	FPL 611 5425 R □□□□	72.00
750	800	900	1260	1650	2	IORR 1700-20-AME └─┘	FPL 621 5225 R □□□□	54.00
					3	IORR 1700-30-AME └─┘	FPL 621 5325 R □□□□	66.00
					3 + N	IORR 1700-39-AME └─┘	FPL 621 5625 R □□□□	79.00
					4	IORR 1700-40-AME └─┘	FPL 621 5425 R □□□□	81.00
900	1000	1000	1520	2000	2	IORR 2100-20-AME └─┘	FPL 631 5225 R □□□□	58.00
					3	IORR 2100-30-AME └─┘	FPL 631 5325 R □□□□	72.00
					3 + N	IORR 2100-39-AME └─┘	FPL 631 5625 R □□□□	85.00
					4	IORR 2100-40-AME └─┘	FPL 631 5425 R □□□□	87.00

Variants

- **IORR..-MT-AME** types for 500 **V a.c.** < $\mathbf{U_e}$ < 1000 **V a.c.**
- **IORR..-CC-AME** types for $\mathbf{U_e}$ < 1500 **V d.c.**
- **IORR..-AMF** types with 2 tripping coils (double de-latching control).

>> **Technical Data** (except mechanical durability and electro-magnet) ....**equivalent to those on pages 2/17 ... 2/19**
>> **Electro-magnet Characteristics............please consult us** >> **Wiring Diagrams .... section 4**
>> **Terminal Marking and Positioning .... section 4** >> **Dimensions .... section 5**

IORE..-AME
Mechanically Latched Contactors
d.c. Operated



Special contactor (AM-CC.. type) with mechanical latching.

Ordering Details

Power AC-3 380 V 400 V 415 V kW	440 V kW	500 V kW	Rated operational current AC-3 ≤ 440 V A	AC-1 θ ≤ 40 °C A	No of poles	Type to be completed with: – coil voltage in plain text ⌴⌴⌴ see page **1**/10	Order code to be completed with codes: – extra aux. contacts □□ – coil voltage □ □ see page **1**/10	Unit weight without pack^ing kg
630	710	800	1060	1350	2	IORE 1400-20-AME ⌴⌴⌴	FPL 611 9225 R □□□□	50.00
					3	IORE 1400-30-AME ⌴⌴⌴	FPL 611 9325 R □□□□	60.00
					3 + N	IORE 1400-39-AME ⌴⌴⌴	FPL 611 9625 R □□□□	71.00
					4	IORE 1400-40-AME ⌴⌴⌴	FPL 611 9425 R □□□□	72.00
750	800	900	1260	1650	2	IORE 1700-20-AME ⌴⌴⌴	FPL 621 9225 R □□□□	54.00
					3	IORE 1700-30-AME ⌴⌴⌴	FPL 621 9325 R □□□□	66.00
					3 + N	IORE 1700-39-AME ⌴⌴⌴	FPL 621 9625 R □□□□	79.00
					4	IORE 1700-40-AME ⌴⌴⌴	FPL 621 9425 R □□□□	81.00
900	1000	1000	1520	2000	2	IORE 2100-20-AME ⌴⌴⌴	FPL 631 9225 R □□□□	58.00
					3	IORE 2100-30-AME ⌴⌴⌴	FPL 631 9325 R □□□□	72.00
					3 + N	IORE 2100-39-AME ⌴⌴⌴	FPL 631 9625 R □□□□	85.00
					4	IORE 2100-40-AME ⌴⌴⌴	FPL 631 9425 R □□□□	87.00

Variants

- **IORE..-MT-AME** types for 500 **V a.c.** < $\mathbf{U_e}$ < 1000 **V a.c.**
- **IORE..-CC-AME** types for $\mathbf{U_e}$ < 1500 **V d.c.**
- **IORE..-AMF** types with 2 tripping coils (double de-latching control).

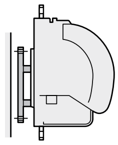
>> **Technical Data** (except mechanical durability and electro-magnet) ....**equivalent to those on pages 2/17 ... 2/19**
>> **Electro-magnet Characteristics .... please consult us**
>> **Wiring Diagrams .... section 4**
>> **Terminal Marking and Positioning .... section 4**
>> **Dimensions .... section 5**

IORR and IORE Contactors

Voltages up to 500 V a.c. - 1400 ... 2100 A Ratings

Technical Data

Electro-magnet type / Contactor rating		– RR 1400 RE 1400 –	– RR 1700 RE 1700 –	– RR 2100 RE 2100 –
General characteristics				
Number of poles (variable)		1 … 4		
Standards		Devices complying with international standards IEC 60947-1 / 60947-4-1 and European standards EN 60947-1 / 60947-4-1		
Rated insulation voltage U_i acc. to IEC 60947-4-1 and EN 60947-4-1	**V**	1000		
Rated impulse withstand voltage U_{imp}	**kV**	8		
Air temperature (close to contactor)				
– for operating (without thermal O/L relay)	**°C**	-20 to +70		
– for storage	**°C**	-20 to +80		
Climatic withstand		Standard version for industrial environment and tropical atmospheres (see page **3**/6) Special version for very corrosive atmospheres (on request)		
Operating altitude	**m**	≤ 2000		

Mounting characteristics		
Mounting position	Position 1 (horizontal bar) Maximum angle of inclination, in any direction: ± 22° 30'	
Mounting distances	see "Dimensions" section **5**	
Fixing by screws (not supplied)	4 x M12	

Connecting characteristics				
Types of terminals				
Main poles		Terminal plates for lugs or bars		
Coil terminals		M4 screws, with cable clamp		
Built-in auxiliary terminals		M4 screws, with cable clamp		
Connecting dimensions				
Main poles				
Width of the terminal plates	**mm**	60	80	100
Terminal screws (not supplied)		–	–	–
Drilling of the plates (without thread)	**mm**	2 x ø13	4 x ø11	4 x ø11
Auxiliary wires (built-in aux. terminals + coil terminals)				
– rigid (solid)	1 or 2 x **mm²**	1 … 2.5		
– flexible (without cable end)	1 or 2 x **mm²**	1 … 2.5		
Tightening torque (min. value)				
Coil terminals	**Nm**	1.5		
Built-in auxiliary terminals	**Nm**	1.5		

Note: These characteristics are suitable for AME contactor versions.

>> Main Pole Utilization Characteristics .... page 2/18
>> RE and RR Electro-magnet Characteristics .... page 2/19
>> General Technical Data .... section 3
>> Terminal Marking and Positioning .... section 4
>> Wiring Diagrams .... section 4
>> Dimensions .... section 5

IORR and IORE Contactors

Voltages up to 500 V a.c. - 1400 ... 2100 A Ratings

Technical Data (cont.)

Electro-magnet type / Contactor rating		– RR 1400 RE 1400 –	– RR 1700 RE 1700 –	– RR 2100 RE 2100 –
Main Pole Utilization Characteristics				
Rated operational voltage U_e max.	**V**	500		
Rated frequency limits	**Hz**	25 ... 60 (for > 60 Hz … 400 Hz please consult us)		
Conventional free-air thermal current I_{th} according to IEC 60947-4-1				
open contactors, θ ≤ 40 °C	**A**	1400	1700	2100
with conductor cross-sectional area	**mm²**	1000	1500	2000
Rated operational current I_e / AC-1 according to air temperature close to contactor				
θ ≤ 40 °C	**A**	1350	1650	2000
θ ≤ 55 °C	**A**	1180	1450	1750
θ ≤ 70 °C	**A**	1000	1250	1500
with conductor cross-sectional area	**mm²**	1000	1500	1500
Utilization category AC-3 Values for air temperature close to contactor ≤ 55 °C				
Rated operational current I_e / AC-3				
380-415-440 V	**A**	1060	1260	1520
500 V	**A**	1080	1220	1340
Rated operational power AC-3				
380-415 V	**kW**	630	750	900
440 V	**kW**	710	800	1000
500 V	**kW**	800	900	1000
Rated making capacity AC-3 according to IEC 60947-4-1		10 x I_e / AC-3		
Rated breaking capacity AC-3 according to IEC 60947-4-1		8 x I_e / AC-3		
Short-circuit protection for contactors without thermal O/L relay (motor protection excluded)				
Circuit breaker	**A**	1600	2000	2500
Rated short-time withstand current I_{cw} at 40°C ambient temp. in free air, from a cold state 1 s	**A**	11000	13000	15000
10 s	**A**	9000	11000	12200
30 s	**A**	5000	6000	7000
1 min.	**A**	3700	4400	5000
15 min.	**A**	2000	2400	2800
Maximum breaking capacity at cos φ = 0.35 at 500 V	**A**	10000	13500	
Impedance per pole	**mΩ**	0.10	0.09	0.08
Max. electrical switching frequency				
– for AC-1	**cycles/h**	150	120	
– for AC-3	**cycles/h**	150	120	
Max. mechanical switching frequency	**cycles/h**	600		
Mechanical durability in millions of operating cycles				
– **RR**, **RE** types		2		

Note: These characteristics are suitable for AME contactor versions (except for mechanical durability = 0.2 millions of operating cycles).

IORR and IORE Contactors
Laminated Magnetic Circuit
a.c. or d.c. Operated

Electro-magnet Characteristics - IORR Contactors (a.c. operated)

Electro-magnet type / Contactor rating		RR 1400	RR 1700	RR 2100
Rated control circuit voltage U_c 50/60 Hz	**V**	24 ... 550		
Coil operating limits according to IEC 60947-4-1		0.85 … 1.1 x U_c (for θ ≤ 55 °C)		
Drop-out voltage in % of U_c		roughly 20 … 75 %		
Coil consumption (for U_c) Average pull-in value 50/60 Hz	**VA**	2 and 3 Poles: 610		
	VA	4 Poles: 925	2 up to 4 Poles: 925	2 up to 4 Poles: 925
Average holding value 50/60 Hz	**VA**	2 and 3 Poles: 55		
	VA	4 Poles: 130	2 up to 4 Poles: 130	2 up to 4 Poles: 130
Operating time (average values for U_c) Between coil energization and N.O. contact closing	**ms**	100	90	90
Between coil de-energization and N.O. contact opening (switch-off the d.c. circuit)	**ms**	55	40	30

Note: For AME contactor versions, please consult us.

2

Electro-magnet Characteristics - IORE Contactors (d.c. operated)

Electro-magnet type / Contactor rating		RE 1400	RE 1700	RE 2100
Rated control circuit voltage U_c	**V d.c.**	24 ... 600		
Coil operating limits according to IEC 60947-4-1		0.85 … 1.1 x U_c (for θ ≤ 55 °C)		
Drop-out voltage in % of U_c		roughly 10 … 75 %		
Coil consumption (for U_c) Average pull-in value	**W**	2 up to 4 Poles: 930	2 up to 4 Poles: 930	2 up to 4 Poles: 930
Average holding value	**W**	2 up to 4 Poles: 110	2 up to 4 Poles: 110	2 up to 4 Poles: 110
Operating time (average values for U_c) Between coil energization and N.O. contact closing	**ms**	100	90	90
Between coil de-energization and N.O. contact opening	**ms**	55	40	30

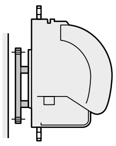
Note: For AME contactor versions, please consult us.

>> Coil Voltage Table .... page 1/10 >> Wiring Diagrams .... section 4

IORR..-MT and IORE..-MT Contactors

Voltages up to 1000 V a.c. - 1400 ... 2100 A Ratings

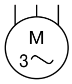
Technical Data

Electro-magnet type / Contactor rating		– RR 1400-MT RE 1400-MT –	– RR 1700-MT RE 1700-MT –	– RR 2100-MT RE 2100-MT –
General characteristics				
Number of poles (variable)		1 … 4		
Standards		Devices complying with international standards IEC 60947-1 / 60947-4-1 and European standards EN 60947-1 / 60947-4-1		
Rated insulation voltage U_i acc. to IEC 60947-4-1 and EN 60947-4-1	**V**	1000		
Rated impulse withstand voltage U_{imp}	**kV**	8		
Air temperature (close to contactor)				
– for operating (without thermal O/L relay)	**°C**	-20 to +70		
– for storage	**°C**	-20 to +80		
Climatic withstand		Standard version for industrial environment and tropical atmospheres (see page **3**/6) Special version for very corrosive atmospheres (on request)		
Operating altitude	**m**	≤ 2000		
Mounting characteristics				
Mounting position		Position 1 (horizontal bar) Maximum angle of inclination, in any direction: ± 22° 30'		
Mounting distances		see "Dimensions" section **5**		
Fixing by screws (not supplied)		4 x M12		
Connecting characteristics				
Types of terminals				
Main poles		Terminal plates for lugs or bars		
Coil terminals		M4 screws, with cable clamp		
Built-in auxiliary terminals		M4 screws, with cable clamp		
Connecting dimensions				
Main poles				
Width of the terminal plates	**mm**	60	80	100
Terminal screws (not supplied)		–	–	–
Drilling of the plates (smooth holes)	**mm**	2 x ø13	4 x ø11	4 x ø11
Auxiliary wires (built-in aux. terminals + coil terminals)				
– rigid (solid)	1 or 2 x **mm²**	1 … 2.5		
– flexible (without cable end)	1 or 2 x **mm²**	1 … 2.5		
Tightening torque (min. value)				
Coil terminals	**Nm**	1.5		
Built-in auxiliary terminals	**Nm**	1.5		

Note: These characteristics are suitable for MT-AME contactor versions.

>> Main Pole Utilization Characteristics .... page 2/21
>> RE and RR Electro-magnet Characteristics .... page 2/22
>> General Technical Data .... section 3
>> Terminal Marking and Positioning .... section 4
>> Wiring Diagrams .... section 4
>> Dimensions .... section 5

Technical Data (cont.)

Electro-magnet type / Contactor rating		– RR 1400-MT RE 1400-MT –	– RR 1700-MT RE 1700-MT –	– RR 2100-MT RE 2100-MT –
Main Pole Utilization Characteristics				
Rated operational voltage U_e max.	**V**	1000		
Rated frequency limits	**Hz**	25 ... 60 (for > 60 Hz … 400 Hz please consult us)		
Conventional free-air thermal current I_{th} according to IEC 60947-4-1				
open contactors, $\theta \leq 40$ °C	**A**	1300	1700	1850
with conductor cross-sectional area	**mm²**	1000	1500	1500
Rated operational current I_e / AC-1 according to air temperature close to contactor (U_e max. 690 V)				
$\theta \leq 40$ °C	**A**	1250	1650	1850
$\theta \leq 55$ °C	**A**	1100	1450	1620
$\theta \leq 70$ °C	**A**	900	1250	1400
with conductor cross-sectional area	**mm²**	1000	1500	1500
Utilization category AC-3 Values for air temperature close to contactor ≤ 55 °C 				
Rated operational current I_e / AC-3				
690 V	**A**	970	1170	1270
1000 V	**A**	610	680	810
Rated operational power AC-3				
690 V	**kW**	1000	1200	1300
1000 V	**kW**	900	1000	1200
Rated making capacity AC-3 according to IEC 60947-4-1	**A**	10 x I_e / AC-3		
Rated breaking capacity AC-3 according to IEC 60947-4-1	**A**	8 x I_e / AC-3		
Short-circuit protection for contactors without thermal O/L relay (motor protection excluded) Circuit breaker	**A**	1600	2000	2500
Rated short-time withstand current I_{cw} at 40°C ambient temp. in free air, from a cold state — 1 s	**A**	11000	13000	15000
10 s	**A**	9000	11000	12000
30 s	**A**	5000	6000	7000
1 min.	**A**	3600	4200	4600
15 min.	**A**	1900	2200	2600
Maximum breaking capacity at cos φ = 0.35				
at 690 V	**A**	8500	11000	
at 1000 V	**A**	5000	8500	
Impedance per pole	**mΩ**	0.24	0.18	0.17
Max. electrical switching frequency				
– for AC-1	**cycles/h**	150	120	
– for AC-3	**cycles/h**	150	120	
Max. mechanical switching frequency	**cycles/h**	600		
Mechanical durability in millions of operating cycles – **RR, RE** types		2		

Note: These characteristics are suitable for MT-AME contactor versions (except for mechanical durability = 0.2 millions of operating cycles).

IORR..-MT and IORE..-MT Contactors

Laminated Magnetic Circuit
a.c. or d.c. Operated

Electro-magnet Characteristics - IORR..-MT Contactors (a.c. operated)

Electro-magnet type / Contactor rating			RR 1400-MT	RR 1700-MT	RR 2100-MT
Rated control circuit voltage U_c	50/60 Hz	**V**	24 ... 550		
Coil operating limits according to IEC 60947-4-1			0.85 … 1.1 x U_c (for $\theta \leq 55$ °C)		
Drop-out voltage in % of U_c			roughly 20 … 75 %		
Coil consumption (for U_c)					
Average pull-in value	50/60 Hz	**VA** **VA**	2 and 3 Poles: 610 4 Poles: 925	2 up to 4 Poles: 925	2 up to 4 Poles: 925
Average holding value	50/60 Hz	**VA** **VA**	2 and 3 Poles: 55 4 Poles: 130	2 up to 4 Poles: 130	2 up to 4 Poles: 130
Operating time (average values for U_c)					
Between coil energization and N.O. contact closing		**ms**	100	90	90
Between coil de-energization and N.O. contact opening (switch-off the d.c. circuit)		**ms**	55	40	30

Note: For AME contactor versions, please consult us.

Electro-magnet Characteristics - IORE..-MT Contactors (d.c. operated)

Electro-magnet type / Contactor rating		RE 1400-MT	RE 1700-MT	RE 2100-MT
Rated control circuit voltage U_c	**V d.c.**	24 ... 600		
Coil operating limits according to IEC 60947-4-1		0.85 … 1.1 x U_c (for $\theta \leq 55$ °C)		
Drop-out voltage in % of U_c		roughly 10 … 75 %		
Coil consumption (for U_c)				
Average pull-in value	**W**	2 up to 4 Poles: 930	2 up to 4 Poles: 930	2 up to 4 Poles: 930
Average holding value	**W**	2 up to 4 Poles: 110	2 up to 4 Poles: 110	2 up to 4 Poles: 110
Operating time (average values for U_c)				
Between coil energization and N.O. contact closing	**ms**	100	90	90
Between coil de-energization and N.O. contact opening	**ms**	55	40	30

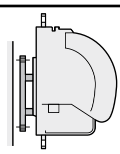
Note: For AME contactor versions, please consult us.

>> Coil Voltage Table .... **page 1/10** **>> Wiring Diagrams** .... **section 4**

IORR..-CC and IORE..-CC Contactors for d.c. Application

1000 ... 2100 A Ratings

Technical Data

Electro-magnet type / Contactor rating		– RR 1000-CC RE 1000-CC –	– RR 1400-CC RE 1400-CC –	– RR 1700-CC RE 1700-CC –	– RR 2100-CC RE 2100-CC
General characteristics					
Number of poles (variable)		1 … 4			
Standards		Devices complying with international standards IEC 60947-1 / 60947-4-1 and European standards EN 60947-1 / 60947-4-1			
Rated insulation voltage U_i acc. to IEC 60947-4-1 and EN 60947-4-1	**V**	1500 d.c.			
Rated impulse withstand voltage U_{imp}	**kV**	8			
Air temperature					
– close to contactor	**°C**	-20 to +70			
– for storage	**°C**	-20 to +80			
Climatic withstand		Standard version for industrial environment and tropical atmospheres (see page **3**/6) Special version for very corrosive atmospheres (on request)			
Operating altitude	**m**	≤ 2000			
Mounting characteristics					
Mounting position		Position 1 (horizontal bar) Maximum angle of inclination, in any direction: ± 22° 30'			
Mounting distances		see "Dimensions" section **5**			
Fixing by screws (not supplied)		4 x M12			
Connecting characteristics					
Types of terminals					
Main poles		Terminal plates for lugs or bars			
Coil terminals		M4 screws, with cable clamp			
Built-in auxiliary terminals		M4 screws, with cable clamp			
Connecting dimensions					
Main poles					
Width of the terminal plates	**mm**	48	60	80	100
Terminal screws (not supplied)		–	–	–	–
Drilling of the plates (smooth holes)	**mm**	2 x ø13	2 x ø13	4 x ø11	4 x ø11
Auxiliary wires (built-in aux. terminals + coil terminals)					
– rigid (solid)	1 or 2 x **mm²**	1 … 2.5			
– flexible (without cable end)	1 or 2 x **mm²**	1 … 2.5			
Tightening torque (min. value)					
Coil terminals	**Nm**	1.5			
Built-in auxiliary terminals	**Nm**	1.5			

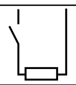
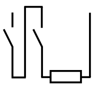
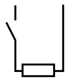
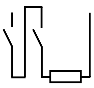
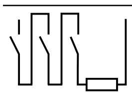
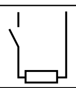
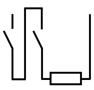
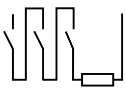
Note: These characteristics are suitable for AME contactor versions.

>> Main Pole Utilization Characteristics .... page 2/23
>> RE and RR Electro-magnet Characteristics .... page 2/25
>> General Technical Data .... section 3
>> Terminal Marking and Positioning .... section 4
>> Wiring Diagrams .... section 4
>> Dimensions .... section 5

IORR..-CC and IORE..-CC Contactors for d.c. Application

1000 ... 2100 A Ratings

Technical Data (cont.)

Electro-magnet type / Contactor rating		– RR 1000-CC RE 1000-CC –	– RR 1400-CC RE 1400-CC –	– RR 1700-CC RE 1700-CC –	– RR 2100-CC RE 2100-CC –
Main Pole Utilization Characteristics					
Rated operational voltage U_e	**V d.c.**	600 (750 in DC-1 category) / 1000 / 1500			
L/R time constant	**ms**	$\leq$ 7.5 (for L/R >7.5 ms please consult us)			
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1- Open contactors, $\theta \leq 40$ °C	**A**	1000	1300	1700	2000
with conductor cross-sectional area	**mm²**	600	1000	1500	1500
Rated operational current I_e **DC-1** category, **L/R $\leq$ 1 ms**					
 1 pole	$U_e \leq 750$ V **A**	1000	1250	1600	2000
 2 poles in series	$U_e \leq 1000$ V **A**	1000	1250	1600	2000
	$U_e \leq 1500$ V **A**	1000	1250	1600	2000
DC-3 category, **L/R $\leq$ 2 ms**					
 1 pole	$U_e \leq 600$ V **A**	1000	1250	1600	2000
 2 poles in series	$U_e \leq 1000$ V **A**	1000	1250	1600	2000
 3 poles in series	$U_e \leq 1500$ V **A**	1000	1250	1600	2000
DC-5 category, **L/R $\leq$ 7.5 ms**					
 1 pole	$U_e \leq 600$ V **A**	1000	1250	1600	2000
 2 poles in series	$U_e \leq 1000$ V **A**	1000	1250	1600	2000
 3 poles in series	$U_e \leq 1500$ V **A**	1000	1250	1600	2000
Contact resistance per pole	**mΩ**	0.12	0.10	0.048	0.032
Max. electrical switching frequency	**cycles/h**	40			
Max. mechanical switching frequency	**cycles/h**	1200	600		
Mechanical durability in millions of operating cycles – RR, RE types		5	2		

Notes: The arc switching on d.c. is more difficult than on a.c.
For selecting a contactor, is essential to determine the current, the voltage, an the **L/R time constant of the controlled load**.
For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces: **L/R** $\leq$ 1 **ms**; inductive loads such as shunt motor: **L/R** $\leq$ 2 **ms**; series motor: **L/R** $\leq$ 7.5 **ms**.
The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.

All the **poles** required for breaking must be connected, **in series**, between the load and the source polarity not linked to the earth.
Connection of the poles in series by the user, according to the above diagrams. The connection of the poles in series helps in the elimination of the arcs.

These characteristics are suitable for CC-AME contactor versions (except for mechanical durability = 0.2 millions of operating cycles).

For IOR 1000-CC contactor, please consult us.

IORR..-CC and IORE..-CC Contactors

Laminated Magnetic Circuit
a.c. or d.c. Operated

Electro-magnet Characteristics - IORR..-CC Contactors (a.c. operated)

Electro-magnet type / Contactor rating	RR 1000-CC	RR 1400-CC	RR 1700-CC	RR 2100-CC
Rated control circuit voltage U_c 50/60 Hz **V**	24 ... 550			
Coil operating limits according to IEC 60947-4-1	0.85 … 1.1 x U_c (for θ ≤ 55 °C)			
Drop-out voltage in % of U_c	roughly 20 … 75 %			
Coil consumption (for U_c)				
Average pull-in value 50/60 Hz **VA** **VA**	610	2 and 3 Poles: 610 4 Poles: 925	2 up to 4 Poles: 925	2 up to 4 Poles: 925
Average holding value 50/60 Hz **VA** **VA**	55	2 and 3 Poles: 55 4 Poles: 130	2 up to 4 Poles: 130	2 up to 4 Poles: 130
Operating time (average values for U_c)				
Between coil energization and N.O. contact closing **ms**	100		90	90
Between coil de-energization and N.O. contact opening (switch-off the d.c. circuit) **ms**	55		40	30

Note: For AME contactor versions, please consult us.

Electro-magnet Characteristics - IORE..-CC Contactors (d.c. operated)

Electro-magnet type / Contactor rating	RE 1000-CC	RE 1400-CC	RE 1700-CC	RE 2100-CC
Rated control circuit voltage U_c **V d.c.**	24 ... 600			
Coil operating limits according to IEC 60947-4-1	0.85 … 1.1 x U_c (for θ ≤ 55 °C)			
Drop-out voltage in % of U_c	roughly 10 … 75 %			
Coil consumption (for U_c)				
Average pull-in value **W**	700	2 up to 4 Poles: 930	2 up to 4 Poles: 930	2 up to 4 Poles: 930
Average holding value **W**	55	2 up to 4 Poles: 110	2 up to 4 Poles: 110	2 up to 4 Poles: 110
Operating time (average values for U_c)				
Between coil energization and N.O. contact closing **ms**	70	100	90	90
Between coil de-energization and N.O. contact opening **ms**	50	55	40	30

Note: For AME contactor versions, please consult us.

>> Coil Voltage Table .... page 1/10   >> Wiring Diagrams .... section 4

R.. Series Contactors

CA.. Standard and TP.. Timed Auxiliary Contact Blocks

Technical Data of the Standard Auxiliary Contacts

Types		CA 15..
Rated operational voltage U_e max.	**V**	690
Rated frequency limits	**Hz**	25 ... 400
Conventional free-air thermal current I_{th} θ ≤ 40 °C	**A**	15
Rated operational current		
I_e / AC-15 acc. to IEC 60947-5-1		
24-48 V 50/60 Hz	**A**	10
110-127 V 50/60 Hz	**A**	10
220-240 V 50/60 Hz	**A**	6
380-440 V 50/60 Hz	**A**	3.5
500-600 V 50/60 Hz	**A**	2.5
I_e / DC-13 acc. to IEC 60947-5-1		
24 V d.c.	**A**	6
48 V d.c.	**A**	2.8
72 V d.c.	**A**	1
110-125 V d.c.	**A**	0.55
220-250 V d.c.	**A**	0.3
Rated making capacity acc. to IEC 60947-5-1		10 x I_e / AC-15
Rated breaking capacity acc. to IEC 60947-5-1		10 x I_e / AC-15
Short-circuit protection gG type fuses	**A**	16

Technical Data of the Timed Auxiliary Contact Blocks

Types		TP 40 D..	TP 180 D..	TP 40 I..	TP 180 I..
Rated operational voltage U_e max.	**V**	690			
Rated frequency limits	**Hz**	25 ... 400			
Conventional free-air thermal current I_{th} θ ≤ 40 °C	**A**	10			
Rated operational current					
I_e / AC-15 acc. to IEC 60947-5-1					
24-127 V 50/60 Hz	**A**	6			
220-240 V 50/60 Hz	**A**	4			
380-400 V 50/60 Hz	**A**	3			
500-690 V 50/60 Hz	**A**	1/0.5			
I_e / DC-13 acc. to IEC 60947-5-1					
24 V d.c.	**A**	6			
48 V d.c.	**A**	2.8			
72 V d.c.	**A**	1			
125 V d.c.	**A**	0.55			
250 V d.c.	**A**	0.3			
Rated making capacity acc. to IEC 60947-5-1		10 x I_e / AC-15			
Rated breaking capacity acc. to IEC 60947-5-1		10 x I_e / AC-15			
Short-circuit protection gG type fuses	**A**	10			
Timing		Pneumatic			
Time delay		On energization		On de-energization	
Setting range	**s**	0.1 ... 40	10 ... 180	0.1 ... 40	10 ... 180

>> Auxiliary Contact Allocation .... page 2/7
>> Terminal Marking and Positioning .... section 4
>> Dimensions of the Contactors with Auxiliary Contacts .... section 5

Closed Transition Star-Delta Starting of Three-Phase Asynchronous Motors

R.. Series Contactors

2

Application

R.. series contactors can be used for closed transition star-delta starting of three-phase asynchronous motors up to **1200 kW**.

Principle

This starting method, mainly used for large motor powers, prevents the speed drop during the "star-delta" transition time and maintains the resulting current peak at a relatively low value.

For this purpose the extra **KM4** transition contactor closes first before the **KM2** star contactor opens. When the **KM4** contactor closes the motor windings are automatically delta connected, via resistances to compensate the lack of current during the transition time and thus the motor speed remains basically the same. The final delta connection step is then achieved by the **KM3** delta contactor closing which switches-off the coil supply to the **KM4** transition contactor. As in the basic star-delta starting mode, the closed transition star-delta starting mode is restricted to low resistive torque machines.

It is advisable, especially for big masses of inertia, to observe that the connection is made in acc. to the clockwise or anticlockwise rotation direction, as indicated in the block diagram shown below, in order to prevent damages due to torque throbs.

Equipment Sizing

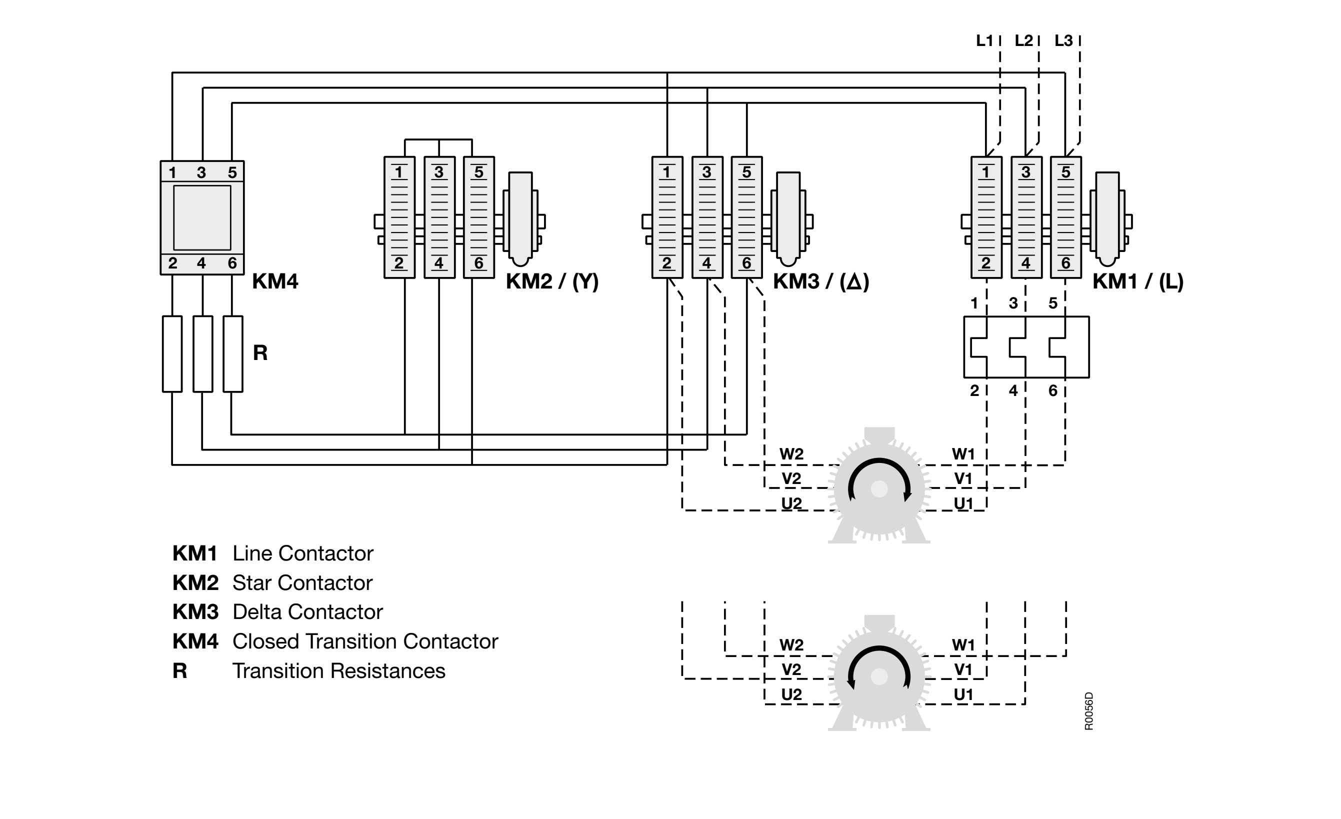
- **KM1** Main Contactor and **KM3** Star Contactor: rating = 0.58 x $\mathbf{I_n}$ for both contactors
- **KM2** Star Contactor: compared with a star contactor that would be used for a basic open transition star-delta starter the present **KM2** star contactor has to be over-rated as it is intended to break the star current (0.34 x $\mathbf{I_n}$) and the transition current too.
- **KM4** Transition Contactor: the rating is based on the calculation of the short permissible current duration ($\mathbf{I_{CW}}$).
  The value of the current flow is about 1.5 x $\mathbf{I_n}$ and the current flow duration < 100 **ms**.
  A block type contactor in the **A** series can be selected for this step.
- Transition Resistances: empiric value, generally as follows, $\mathbf{R}\ (\Omega) = \dfrac{0.4 \times \mathbf{U_e}}{\mathbf{I_n}}$

  Watt dissipation values for the transition resistances:

  – for 12 cycles/h max. $\quad \mathbf{P}\ (\mathbf{W}) = \dfrac{\mathbf{U_e}^2}{1200 \times \mathbf{R}}$

  – for 30 cycles/h max. $\quad \mathbf{P}\ (\mathbf{W}) = \dfrac{\mathbf{U_e}^2}{500 \times \mathbf{R}}$

Block Diagram



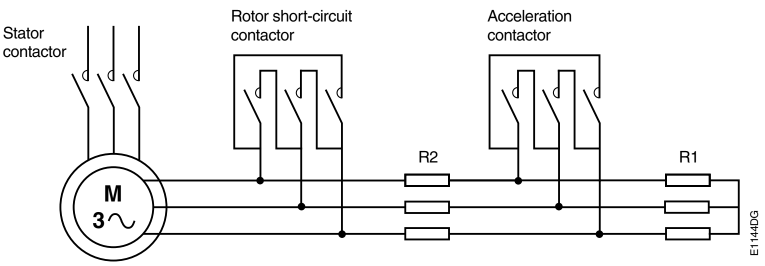
>> Ordering Details ....page 2/8 and following ones
>> Technical Data ....page 2/17 and following ones
>> "A" Series Block Contactors .... see Main Catalogue in force
>> Terminal Marking and Positioning .... section 4
>> Dimensions .... section 5

Control of Three-Phase Slip-Ring Motors
Contactor Selection

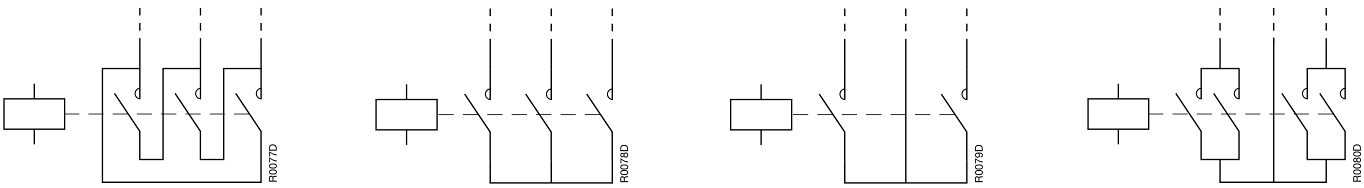
Application

Three kinds of contactors are used to control three-phase slip-ring motors: the **stator contactor**, the **acceleration contactor(s)**, and the **rotor short-circuit** contactor.

Example of a Three-Stroke Starter (Delta (Δ) connection diagram)



The starting resistances should be Delta (Δ), Star (人), V or W connected acc. to the following wiring diagrams. Contactors have to be selected accordingly.



Δ Y V W

The standard **R** series contactors, can be used acc. to the criteria indicated below. The **FORR..** or **FORE..** contactor types should be mainly used for the rotor short-circuiting. (Please consult us)

Stator Contactor

The **R** series contactor selection is based on the motor rated current acc. to the AC-2 utilization category, as well as on the rated operational voltage and the on-load factor.

Acceleration Contactors

The **R** series contactor selection is based on the contactor rated operational current I_e acc. to the AC-1 utilization category, multiplied by the coefficient which includes the resistance duty duration, the number of operating cycles, and depends on the applicable connection diagram.

The **LORR..** and **LORE..** couplers may be used for applications where equipment is breaking in **"Off-load"** conditions only. (Please consult us)

Rotor Short-Circuit Contactor

The **R** series contactor selection is based on the contactor rated operational current I_e acc. to the AC-1 utilization category but the rated operational current of the selected contactor has to be greater than the motor rotor current and the applicable connection diagram does matter too.

The **LORR..** and **LORE..** couplers may be used for applications where equipment is breaking in **"Off-load"** conditions only. (Please consult us)

At the time of the short-circuiting the contactor involved has to withstand the short duration rotor voltage peak which is fully acceptable by the contactor in spite of its lower rated insulation voltage. The standard **R** series contactors are therefore suitable to withstand rotor voltages up to 1500 **V.** (Coefficent 2 accepted acc.to IEC 60947-4-1 Standard)

● **FORR.., FORE.. Specific Contactors** (please consult us)
At the time of slip-ring motor starting and as soon as the motor nominal speed is reached, these contactors are used for the short-circuiting of the rotor current limitation starting resistances (e.g. vapour-liquid rheostats).

These contactors are derived from the standard **R** series contactors and are available in 2, 3 or 4-pole version acc. to the applicable connection diagram required (人, V, W).

They can control rotor currents from 800 to 2000 **A** and rotor voltages up to 6000 **V** (with increased insulation) acc. to the IEC 60947-4-1 Standard requirements. (Please consult us).

Although the breaking of the rotor circuit is normally carried out in **"Off-load"** conditions, the contactors are equipped with blow-out devices and can occasionally break **"On-load"**.

Ordering Details - Technical Data - Dimensions : please consult us

>> Ordering Details ....page 2/8 and following ones
>> Technical Data ....page 2/17 and following ones
>> Terminal Marking and Positioning .... section 4
>> FORR.., FORE.. Specific contactors ....please consult us
>> LORR.., LORE.. Couplers ....please consult us
>> Dimensions .... section 5

Questionnaire

Specification for R.. Series Contactors

Customer ....
Contact person .... **Date** ....
Tel. .... **e-mail** ....

ABB ....
Contact person ....
Tel. ....

Quantity .... **Requested delivery date** ....
Project / Application ....

Power Circuit

a.c. switching

Application type

- ☐ AC-1 (resistive load)
- ☐ AC-3 (starting, switching off running motors)
- ☐ No load breaking
- ☐ Other ....

Number of poles: N.O. ..... N.C. .....

Rated operational current I_e .... A
Rated operational voltage U_e .... V .... Hz

or

d.c. switching

Application type

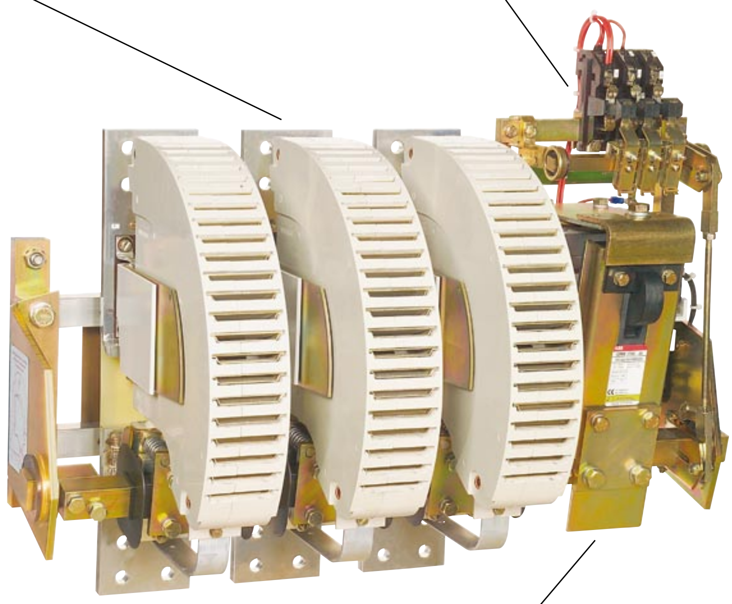
- ☐ DC-1 (resistive load)
- ☐ DC-3 (shunt motors)
- ☐ DC-5 (series motors)
- ☐ No load breaking
- ☐ Other .... L/R .... ms

Number of poles: N.O. ..... N.C. .....

Rated operational current I_e .... A
Making current .... A
Breaking current min. ...... A max. ..... A
Rated operational voltage U_e .... V d.c.

Auxiliary contacts

Number of N.O. auxiliary contacts ....
Number of N.C. auxiliary contacts ....



Operating conditions

Switching frequency .... cycles/h
Mech. Durability required (millions of operating cycles) ....
Remarks ....

Control circuit (coil)

a.c. ☐ Voltage .... V .... Hz
d.c. ☐ Voltage .... V d.c.

Options

- ☐ Magnetical latching
- ☐ Mechanical latching

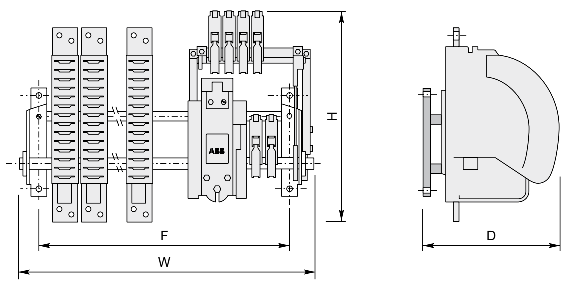
Accessories ....

Please add any other useful documents for further information e.g. technical specification, drawing, wiring diagram, etc.

Replacement of an existing contactor

Brand ....
Typ ....

Fixing dimension F = ... mm
Overall dimensions W = ... mm
H = ... mm
D = ... mm



Please photocopy and forward (see catalogue last back cover page).

Questionnaire also available on the ABB Website
www.abb.com/lowvoltage *left menu:* **"Low Voltage On-Line"** *select:* **"Support Tools".**

Questionnaire

Specification for R.. Series Contactors

Other Information / Application Type

This document is used to define the contactor specification according to the complete information on the application

Please photocopy and forward (see catalogue last back cover page).

Questionnaire also available on the ABB Website

www.abb.com/lowvoltage *left menu:* **"Low Voltage On-Line"** *select:* **"Support Tools".**

Motor Rated Operational Powers and Currents

The currents given below concern standard three-phase four-pole cage motors (1500 r.p.m. at 50 Hz. 1800 r.p.m. at 60 Hz).
These values are given for guidance and may vary according to the motor manufacturer and depending on the number of poles.

IEC Motor power kW	**Motor nominal current** (according to IEC 60947-4-1 Annex G) 220 V A	230 V A	240 V A	380V A	400 V A	415 V A	440 V A	500 V A	660 V A	690 V A
0.06	0.37	0.35	0.34	0.21	0.2	0.19	0.18	0.16	0.13	0.12
0.09	0.54	0.52	0.50	0.32	0.3	0.29	0.26	0.24	0.18	0.17
0.12	0.73	0.7	0.67	0.46	0.44	0.42	0.39	0.32	0.24	0.23
0.18	1	1	1	0.63	0.6	0.58	0.53	0.48	0.37	0.35
0.25	1.6	1.5	1.4	0.9	0.85	0.82	0.74	0.68	0.51	0.49
0.37	2.0	1.9	1.8	1.2	1.1	1.1	1.0	0.88	0.67	0.64
0.55	2.7	2.6	2.5	1.6	1.5	1.4	1.3	1.2	0.91	0.87
0.75	3.5	3.3	3.2	2.0	1.9	1.8	1.7	1.5	1.15	1.1
1.1	4.9	4.7	4.5	2.8	2.7	2.6	2.4	2.2	1.7	1.6
1.5	6.6	6.3	6.0	3.8	3.6	3.5	3.2	2.9	2.2	2.1
2.2	8.9	8.5	8.1	5.2	4.9	4.7	4.3	3.9	2.9	2.8
3	11.8	11.3	10.8	6.8	6.5	6.3	5.7	5.2	4.0	3.8
4	15.7	15	14.4	8.9	8.5	8.2	7.4	6.8	5.1	4.9
5.5	20.9	20	19.2	12.1	11.5	11.1	10.1	9.2	7.0	6.7
7.5	28.2	27	25.9	16.3	15.5	14.9	13.6	12.4	9.3	8.9
11	39.7	38	36.4	23.2	22	21.2	19.3	17.6	13.4	12.8
15	53.3	51	48.9	30.5	29	28.0	25.4	23	17.8	17
18.5	63.8	61	58.5	36.8	35	33.7	30.7	28	22.0	21
22	75.3	72	69	43.2	41	39.5	35.9	33	25.1	24
30	100	96	92	57.9	55	53	48.2	44	33.5	32
37	120	115	110	69	66	64	58	53	40.8	39
45	146	140	134	84	80	77	70	64	49.1	47
55	177	169	162	102	97	93	85	78	59.6	57
75	240	230	220	139	132	127	116	106	81	77
90	291	278	266	168	160	154	140	128	97	93
110	355	340	326	205	195	188	171	156	118	113
132	418	400	383	242	230	222	202	184	140	134
160	509	487	467	295	280	270	245	224	169	162
200	637	609	584	368	350	337	307	280	212	203
250	782	748	717	453	430	414	377	344	261	250
315	983	940	901	568	540	520	473	432	327	313
355	1109	1061	1017	642	610	588	535	488	370	354
400	1255	1200	1150	726	690	665	605	552	418	400
500	1545	1478	1416	895	850	819	745	680	515	493
560	1727	1652	1583	1000	950	916	832	760	576	551
630	1928	1844	1767	1116	1060	1022	929	848	643	615
710	2164	2070	1984	1253	1190	1147	1043	952	721	690
800	2446	2340	2243	1417	1346	1297	1179	1076	815	780
900	2760	2640	2530	1598	1518	1463	1330	1214	920	880
1000	3042	2910	2789	1761	1673	1613	1466	1339	1014	970

General Technical Data

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Contents

General Technical Data

Specifications, Standards and Certifying

Definitions

ABB low voltage devices are developed and manufactured according to the rules set out in IEC international publications and in EN European specifications.
In most countries, low voltage apparatus is built according to such rules with checking being the responsibility of the manufacturer. The devices are therefore not subject to any further obligation for approval. A test report from our laboratories can be remitted to our customers, on request, for presentation to different qualified local organizations.

Prescriptions and Standards

● **International Specifications**

The International Electrotechnical Commission, IEC, which is part of the International Standards Organization, ISO, publishes IEC publications which act as a basis for the world market.

● **European Specifications and National Specifications**

The European Committee for Electrotechnical Standardization (CENELEC), which groups together 18 European countries, publishes EN standards. These European standards differ very little from IEC international standards and have similar numbering.
The same applies for national standards which use, without exception, the same numbering and reproduce the texts of these unified standards in their entirety. Contradicting national standards are withdrawn.

● **European Directives**

The guarantee of the free movement of goods within the European Community means that any regulatory differences between member states have been eliminated. The European directives set up common rules that are included in the legislation of each state while contradictory regulations are cancelled.

Three directives are essential:

- Low Voltage Directive 73/23/EEC concerns electrical equipment from 0 to 1000 V a.c. and from 75 to 1500 V d.c.
  This specifies that compliance with the requirements that it sets out is acquired if the equipment conforms to the standards harmonized on a European level: EN 60947-1 and EN 60947-4-1 for contactors.
- Machines Directive 89/392/EEC for safety specifications of machines and equipment on complete machines. Machines bearing the CE mark comply with these specifications.
- Electromagnetic Compatibility Directive 89/336/EEC which concerns all devices able to create electromagnetic disturbance.
  Standard EN 60947-4-1 does not set out any requirement concerning the level of emission or immunity of contactors which do not have any active electronic components. Owing to this fact, compliance with standard EN 60947-4-1 meets the requirements for CE marking, with respect to this directive.

CE Marking :

CE marking must not be confused with a quality label.
CE marking is proof of conformity with the European Directives concerning the product.
CE marking is part of an administrative procedure and guarantees free movement of the product within the European Community.

● **International Standards**

IEC 60947-1	Low-voltage switchgear and controlgear – Part 1: General rules.
IEC 60947-4-1	Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters. Section 1: Electromechanical contactors and motor starters.
IEC 60947-5-1	Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements. Section 1: Electromechanical control circuit devices.

● **European Standards**

EN 60947-1	Low-voltage switchgear and controlgear – Part 1: General rules.
EN 60947-4-1	Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters. Section 1: Electromechanical contactors and motor starters.
EN 60947-5-1	Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements. Section 1: Electromechanical control circuit devices.

Test Certifying Organizations

ABB Control is a member of the **ASEFA** (Association of French Test Stations for Electrical Apparatus) whose platforms are accredited by **COFRAC** (national test network).
This independent organization is authorized to deliver certificates of testing and conformity with standards, especially IEC. **ASEFA** is one of the signatories of the **LOVAG** (Low Voltage Agreement Group) agreement which ensures reciprocal recognition between the main European certifying organizations for low voltage electrical tests by delivering certificates of **LOVAG** conformity.

Terminology

Altitude
Characterizes the place of use. It is expressed in metres above sea level.

Circuits
- Auxiliary circuit:
  All the conductive parts of a contactor designed to be inserted in a different circuit from the main circuit and the contactor control circuits.
- Control circuit:
  All the conductive parts of a contactor (other than the main circuit and the auxiliary circuit) used to control the contactor's closing operation or opening operation or both.
- Main circuit:
  All the conductive parts of a contactor designed to be inserted in the circuit that it controls.

Rated Operational Current I_e
Current rated by the manufacturer. It is mainly based on the rated operational voltage U_e, the rated frequency, the utilization category, the rated duty and the type of protective enclosure, if necessary.

Conventional Free Air Thermal Current I_{th}
Current that the contactor can withstand in free air for a duty time of 8 hours without the temperature rise of its various parts exceeding the maximum values given by the standard.

Electrical Durability
Number of on-load operating cycles that the contactor is able to carry out. It depends on the utilization category.

Mechanical Durability
Number of no-current operating cycles that a contactor is able to carry out.

Switching Frequency
Number of switching cycles per hour.

Coil Operating Limits
Expressed in multiples of the nominal control circuit voltage U_c for the upper and lower limits.

Mounting Position
Comply with the manufacturer's instructions.

Rated Breaking or Making Capacity
Root mean square value (r.m.s.) of the current that the contactor is able to break or make at a given voltage according to the conditions specified by standards and for a given utilization category.

Ambient Temperature
Air temperature close to the contactor.

Time
- Time constant :
  Ratio of the inductance to the resistance (L/R = mH/Ω = ms).
- Short-time withstand current I_{cw}:
  Current that the contactor is able to withstand in closed position for a short time interval and in specified conditions.
- Minimum switching time:
  This is the minimum closing or opening order time necessary for the contactor to reach complete closing or opening.
- Closing time:
  Time interval between the beginning of the closing operation and the instant the contacts touch on all the poles.
- Opening time:
  Time interval between the specified starting instant of the opening operation and the instant the arcing contacts separate on all the poles.

Rated Control Voltage U_c
Control voltage value for which the control circuit is sized.

Rated Operational Voltage U_e
Voltage to which the contactor's utilization characteristics refer. In three-phase it is the phase-to-phase voltage.

Rated Insulation Voltage U_i
Reference voltage for dielectric tests and creepage distances.

Rated Impulse Withstand Voltage U_{imp}
Peak value of an impulse voltage, having a specified form and polarity, which does not cause breakdown in specific test conditions.

Shock Withstand
Requirement for vehicles, crane drives, installations on board ships and plug-in equipment. The contactors must not change position and the overload relays must not trip.

Resistance to Vibrations
Requirements for vehicles, boats and other means of transport. For the specified vibration amplitude and frequency values the device must remain able to operate.

General Technical Data

Utilization Categories

Standards

IEC publications 60941-1, 60947-4-1 and 60947-5-1 should be referred to on an international level with respect to contactors.
A contactor's duty is characterised by the utilization category together with the rated operational voltage and current indicated.

● **Utilization Categories for Contactors According to IEC 60947-4-1**

Alternating current:	**AC-1**	Non-inductive or slightly inductive loads, resistance furnaces.
	AC-2	Slip-ring motors: starting, switching off.
	AC-3	Cage motors: starting, switching off running motors.
	AC-4	Cage motors: starting, plugging, inching.
	AC-5a	Discharge lamp switching.
	AC-5b	Incandescent lamp switching.
	AC-6a	Transformer switching.
	AC-6b	Capacitor bank switching.
	AC-7a	Slightly inductive loads for domestic devices and similar applications.
	AC-7b	Motors for domestic applications.
	AC-8a	Hermetic refrigeration compressor motor control with manual resetting of overload releases.
	AC-8b	Hermetic refrigeration compressor motor control with automatic resetting of overload releases.
Direct current:	**DC-1**	Non inductive or slightly inductive loads, resistance furnaces.
	DC-3	Shunt motors: starting, plugging, inching, dynamic breaking of d.c. motors.
	DC-5	Series motors: starting, plugging, inching, dynamic breaking of d.c. motors.
	DC-6	Incandescent lamp switching.

● **Utilization Categories for the Auxiliary Contacts According to IEC 60947-5-1**

Alternating current:	**AC-12**	Control of resistive loads and static loads with opto-coupler isolation.
	AC-13	Control of static loads with transformer isolation.
	AC-14	Control of weak electromagnetic loads (≤ 72 VA).
	AC-15	Control of electromagnetic loads (> 72 VA).
Direct current:	**DC-12**	Control of resistive loads and static loads with opto-coupler isolation.
	DC-13	Control of d.c. electromagnets.
	DC-14	Control of d.c. electromagnets having economy resistors.

In fact some applications, and the specific criteria characterizing the various loads controlled by contactors, may modify the utilization characteristics of the contactors.

d.c. Power Circuit Switching
Arc suppression is more difficult in direct current than in alternating current and this is all the more true the higher the circuit time constant which is why it is necessary to connect several poles in series in order to improve breaking conditions. (see page **2**/24.)

a.c. High Current Circuit Switching
Possibility of increasing performances by connecting poles in parallel. (Please consult us.)

Influence of the Length of the Conductors used in the Contactor Control Circuit
According to the operational voltages and the coil consumption, take line resistances and capacitances into consideration, for the length and the cross-sectional of the conductors.

Making and Breaking Conditions for Utilization Categories

Utilization category		Durability test conditions						Occasional operation					
		Making conditions			Breaking conditions			Making conditions			Breaking conditions		
		I/I_e	U/U_e	Cos. φ or L/R (ms)	I/I_e	U/U_e	Cos. φ or L/R (ms)	I_c/I_e	U_r/U_e	Cos. φ or L/R (ms)	I_c/I_e	U_r/U_e	Cos. φ or L/R (ms)
Contactors for a.c. circuit switching													
AC-1		1	1	0.95	1	1	0.95	1.5	1.05	0.8	1.5	1.05	0.8
AC-2		2.5	1	0.65	2.5	1	0.65	4	1.05	0.65	4	1.05	0.65
AC-3	$I_e \leq 100$ A	6	1	0.35	1	0.17	0.35	10	1.05	0.45	8	1.05	0.45
	$I_e > 100$ A	6	1	0.35	1	0.17	0.35	10	1.05	0.35	8	1.05	0.35
AC-4	$I_e \leq 100$ A	6	1	0.35	6	1	0.35	12	1.05	0.45	10	1.05	0.45
	$I_e > 100$ A	6	1	0.35	6	1	0.35	12	1.05	0.35	10	1.05	0.35
Contactors for d.c. circuit switching													
DC-1		1	1	1	1	1	1	1.5	1.05	1	1.5	1.05	1
DC-3		2.5	1	2	2.5	1	2	4	1.05	2.5	4	1.05	2.5
DC-5		2.5	1	7.5	2.5	1	7.5	4	1.05	15	4	1.05	15
Auxiliary contacts for a.c. circuit switching													
AC-14	(≤ 72 VA)	–	–	–	–	–	–	6	1.1	0.7	6	1.1	0.7
AC-15	(> 72 VA)	10	1	0.7	1	1	0.4	10	1.1	0.3	10	1.1	0.3

Auxiliary contacts for d.c. circuit switching

	Standard operation						Occasional operation					
	Making conditions			Breaking conditions			Making conditions			Breaking conditions		
	I/I_e	U/U_e	$T_{0.95}$	I/I_e	U/U_e	$T_{0.95}$	I/I_e	U/U_e	$T_{0.95}$	I/I_e	U/U_e	$T_{0.95}$
DC-13	1	1	6 P(1)	1	1	6 P(1)	1.1	1.1	6 P(1)	1.1	1.1	6 P(1)
DC-14	–	–	–	–	–	–	10	1.1	15 ms	10	1.1	15 ms

(1) The value "6 x P" is the result of an empirical relation which is estimated to represent most d.c. magnetic loads up to the highest limit of P = 50 W (6 x P = 300 ms). It is accepted that loads having drawn energy above 50 W are made up of weaker loads in parallel. As a consequence, the 300 ms value must form the highest limit whatever the value of the power drawn.

Key:

U (I) = applied voltage (current)
U_r = recovery voltage
L/R = test circuit time constant
U_e (I_e) = rated operational voltage (current)
I_c = making and breaking current expressed in d.c. or in a.c. like the r.m.s. value of the symmetrical components
$T_{0.95}$ = time required to reach 95% of the current in steady-state conditions, expressed in milliseconds

3

General Technical Data

Climatic Withstand of Devices

General

The life time and dependability of devices are mainly influenced by a series of climatic factors which cause their corrosion.
In practice, besides climatic conditions, there are other factors which may damage equipment such as fungi, insects (termites), dust, work site dirt and aggressive environment (salty or sulphurous atmosphere, etc.) which can often only be identified at the place of installation.
The entrance of dust, insects, dirt, etc. in devices may be prevented if the appropriate degree of protection according to IEC 60529 is chosen.

ABB contactors have been used for many years in the most varied countries, with hot and humid climates for example: Brazil, Indonesia, India etc. Experience has shown that **ABB** devices can be used in most countries throughout the world.

The climate of the country in which the device is installed is not the determining choice factor.

Account must be taken of:

– the immediate environment of the devices (sheltered, ventilated, temperature),
– the aggressivity of the immediate atmosphere at the place of installation,
– the length and frequency of non operating periods.

In the case of frequent condensation (i.e. the formation of steam caused by rapid changes in temperature), heating resistors must be installed in cubicles (100 to 250 W per m^3 of enclosure).

The table below gives the cases where heating is necessary.

Environment		**Operating conditions**	**Climate**	**Internal heating of enclosure**
Inside premises	No running water No condensation	Continuous or not	All climates	Without
	With running water	Continuous	All climates	Without
		Frequent or long stops	Temperate	Without
			Tropical	With
Outside, sheltered	No running water no condensation	Continuous or not	Temperate	Without
			Tropical	With
Outside or by the seaside	With running water	Continuous	All climates	Without
		Frequent or long stops	Temperate	Without
			Tropical	With

● The standard **R** series contactors are suitable for industrial environment and tropical atmospheres.
Special versions can be supplied, on request, for very corrosive atmospheres.

Notes

Terminal Marking and Positioning

Wiring Diagrams for Control Circuits

Contents

R.. Series Contactors

Terminal Marking and Positioning

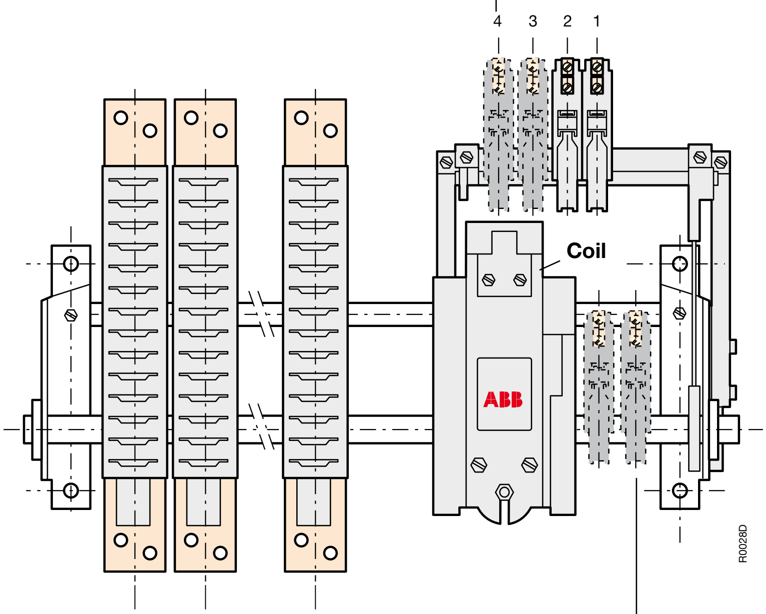
1400 ... 2100 A Ratings

The main poles, in variable number, can be distributed on both sides of the electro-magnet

CA 15.. auxiliary contacts
mounted on auxiliary frame

Position of the CA 15.. from the right:
No 1: CA 15-O for electrical interlocking
No 2: CA 15-F for "hold-in" function
No 3: CA 15.. extra aux. contact (1)
No 4 ... "n": CA 15.. extra aux. contact

(1) **RR** or **RE** electro-magnet:
The contact No 3, factory wired, is of **CA 15-O** type. It is intended for insertion of economy resistor.



Main poles
The L.H.S. main pole is marked **1-2**, the following poles are marked **3-4**, **5-6**, etc according to their number

CA 15.. auxiliary contacts
mounted on main frame

Main poles	N.O. main poles are respectively marked **1-2**, **3-4**, **5-6**, **7-8**. For N.C. main poles the letter **R** precedes the figures.
Coil	**a.c. coil:** the terminals are marked **A1** and **A2**. **d.c. coil:** the terminals are marked **A1 (-)** and **A2 (+)**
CA 15.. aux. contact No 1	**CA 15-O (N.C.)** contact intended for electrical interlocking. Terminal marking: **21-22**
CA 15.. aux. contact No 2	**CA 15-F (N.O.)** contact intended for "hold-in" function. Terminal marking: **13-14**

CA 15.. extra aux. contacts	**No "n"**	**No 10**	**No 9**	**No 8**	**No 7**	**No 6**	**No 5**	**No 4**	**No 3**
CA 15-F (N.O.)	..3 / ..4	173 / 174	163 / 164	153 / 154	143 / 144	133 / 134	123 / 124	113 / 114	103 / 104
or CA 15-O (N.C.)	..1 / ..2	171 / 172	161 / 162	151 / 152	103 / 104	131 / 132	121 / 122	111 / 112	101 / 102

The **CA 15..** auxiliary contacts are fitted **from the right**, first on the auxiliary frame and next on the main frame of the contactor, acc. to this marking.

Contactors equipped with **RR** or **RE** electro-magnet: contact No 3 is a **CA 15-O (N.C.)** type intended for insertion of the economy resistor and wired in factory. Terminal marking: **15-16**

TP timed auxiliary contacts block

TP 40 DA / TP 180 DA

55 67
56 68

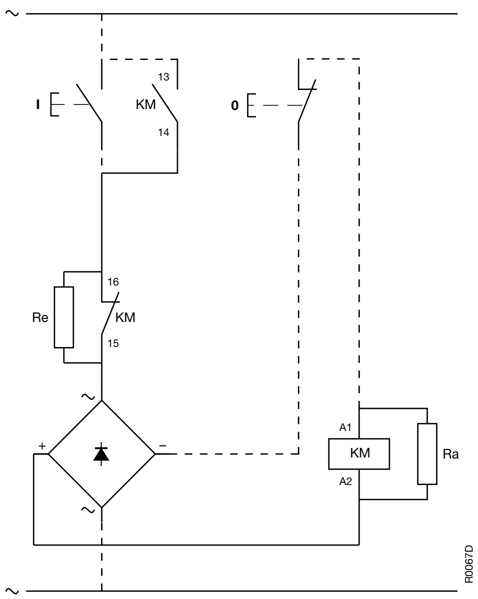
TP 40 IA / TP 180 IA

57 65
58 66

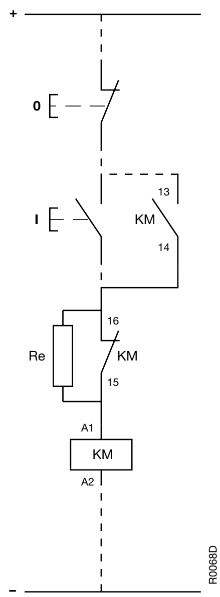
The **TP..** timed auxiliary contact block is mounted on the auxiliary frame and takes space of 3 **CA 15..** auxiliary contacts.

>> Aux. Contact Allocation for Contactors .... page 2/7 >> Dimensions .... section 5

Control by 2 Impulse Pushbuttons and Hold-in Contact



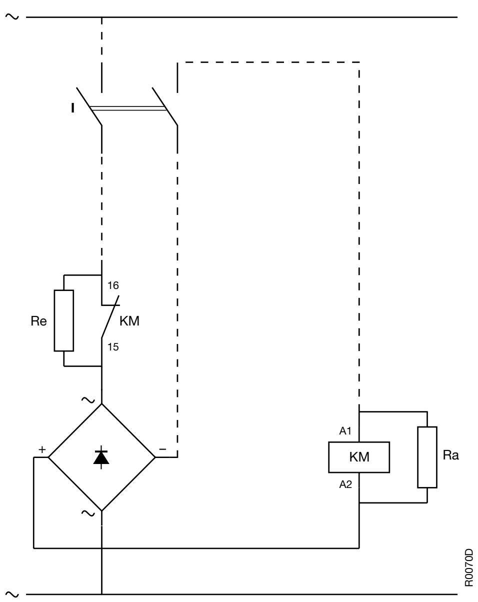
IORR, IORR-MT, IORR-CC



IORE,
IORE-MT,
IORE-CC

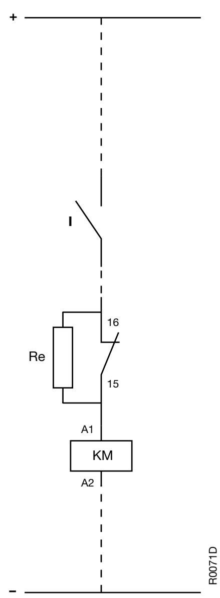
4

Control by Switch



IORR, IORR-MT, IORR-CC

Note: to remove the factory wired strap 14 - 16

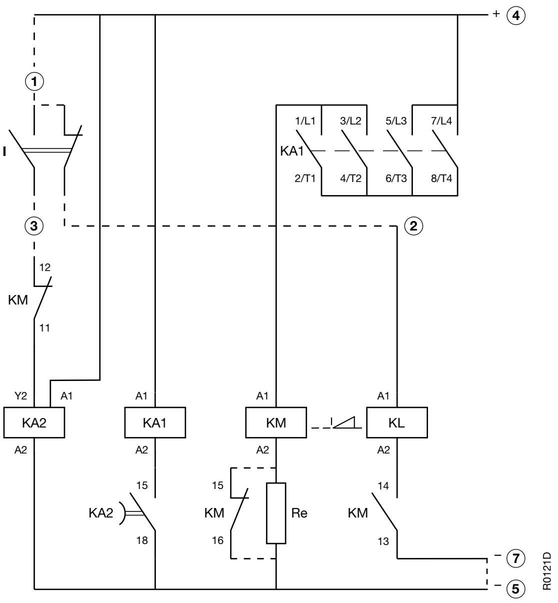


IORE,
IORE-MT,
IORE-CC

Note : to remove the factory wired strap 14 - 16

>> Terminal Marking and Positioning.. pages 4/2

Control by Switch



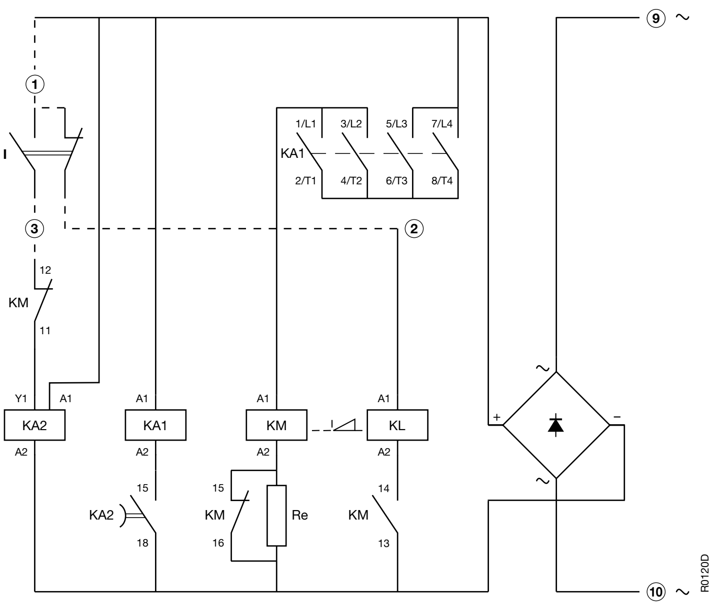
KM = Closing coil
KL = Tripping coil
KA1 = Contactor relay
KA2 = Delay timer
Re = Economy resistor

Supply between **4** and **5**
Closing between **1** and **3**
Tripping between **1** and **2**

For the contactors equipped with coils for control voltage > 250 V use a special wiring diagram. Please consult us.

Notes:
If the closing coil voltage and the tripping coil voltage are different remove the strap between terminals 5 and 7.

IORE-AME
IORE-MT-AME
IORE-CC-AME



KM = Closing coil
KL = Tripping coil
KA1 = Delay timer
KA2 = Timed contactor relay
Re = Economy resistor

Supply between **9** and **10**
Closing between **1** and **3**
Tripping between **1** and **2**

Note:
If the closing coil voltage and the tripping coil voltage are different, please consult us.

For the contactors equipped with coils for control voltage > 250 V use a special diagram. Please consult us.

IORR-AME
IORR-MT-AME
IORR-CC-AME

>> Terminal Marking and Positioning.. pages 4/2

Notes

Dimensions

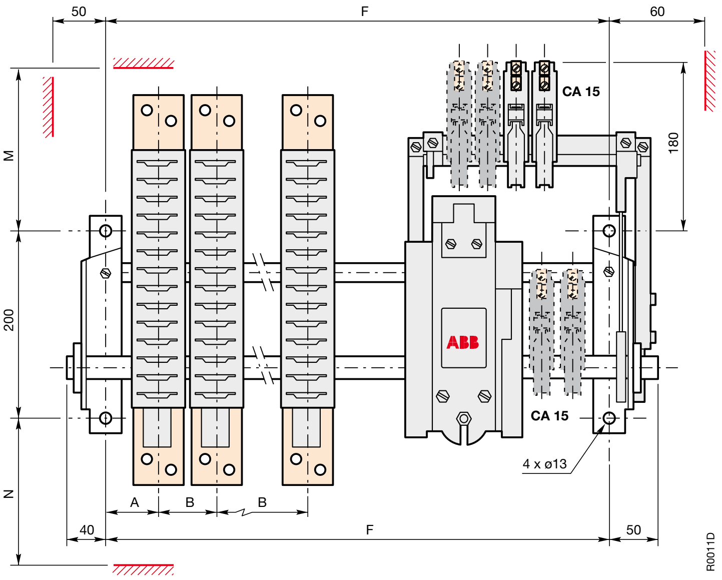
Fixing - Dimensions
Clearing Distances
Connecting

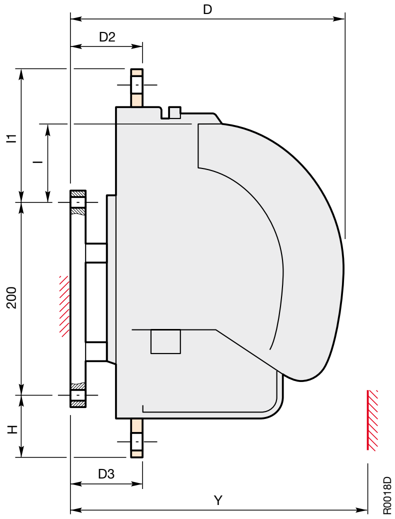
5

Contents

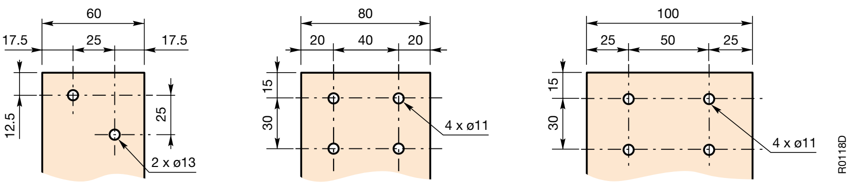
IORR.., IORE.., LORR.., LORE.. Types
Ratings 1400 ... 2100 A

Dimensions (in mm)





Terminal plate details



1400 A **1700 A** **2100 A**

Terminal plate thickness for 1400 A to 2100 A ratings: top terminal plates = 10 mm, bottom terminal plates = 12 mm

Fixing

Ratings (A)	Number of poles	Fixing dimension - F acc. to number of extra CA 15.. auxiliary contacts: 0	1	2	3	4	5	6	7	8	9	10	–	Fixing holes Ø
1400	1	345	345	345	345	345	345	345	385	385	385	385	–	
	2	445	445	445	540	540	540	540	540	540	540	540	–	4 x 13
	3	540	540	540	635	635	635	635	635	635	635	635	–	
1700	1	345	345	345	345	345	345	345	385	385	385	385	–	
	2	445	445	445	540	540	540	540	540	540	540	540	–	4 x 13
	3	540	540	540	635	635	635	635	635	635	635	635	–	
2100	1	345	345	345	345	345	345	345	385	385	385	385	–	
	2	445	445	445	540	540	540	540	540	540	540	540	–	4 x 13
	3	540	540	540	635	635	635	635	635	635	635	635	–	

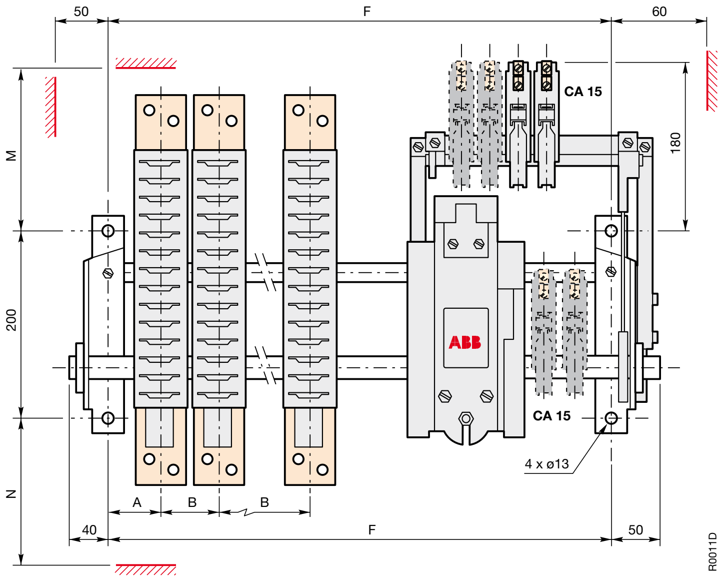
Dimensions - Clearing distances - Connecting

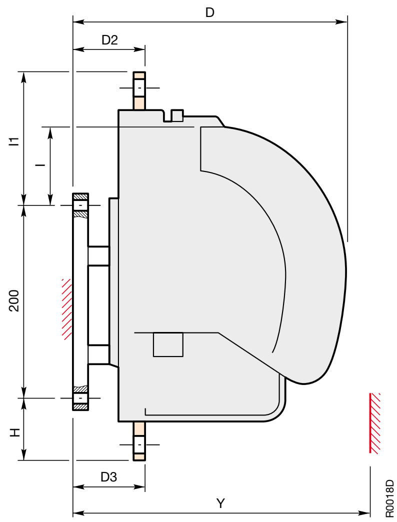
Ratings (A)	Number of poles	A	B	D (1)	D1	D2	D3	H	I (1)	I1	M (1)	M1	N	T	Y (1)	Y1
1400	1	85	–	325	260	75	77	70	108	98	228	165	100	–	400	280
	2	85	140	325	260	75	77	70	108	98	228	165	100	–	400	280
	3	85	120	325	260	75	77	70	108	98	228	165	100	–	400	280
1700	1	85	–	325	260	75	77	84	108	112	258	165	125	–	425	280
	2	85	140	325	260	75	77	84	108	112	258	165	125	–	425	280
	3	85	120	325	260	75	77	84	108	112	258	165	125	–	425	280
2100	1	85	–	325	260	75	77	84	108	112	258	165	125	–	425	280
	2	85	140	325	260	75	77	84	108	112	258	165	125	–	425	280
	3	85	120	325	260	75	77	84	108	112	258	165	125	–	425	280

(1) **LORR.., LORE..** types: poles are not equipped with arc chutes. Use D1 dimension instead of D, M1 instead of M, Y1 instead of Y, I dim. is not applicable.

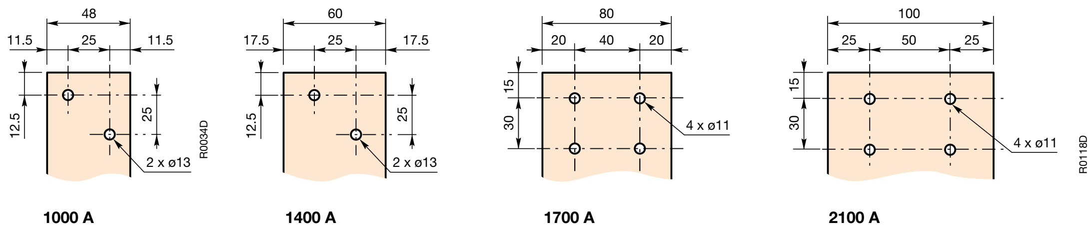
IORR..-MT and IORE..-MT Types
IORR..-CC and IORE..-CC Types
Ratings 1400 ... 2100 A (MT), 1000 ... 2100 A (CC)

Dimensions (in mm)





Terminal plate details



Terminal plate thickness for 1000 A to 2100 A ratings: top terminal plates = 10 mm, bottom terminal plates = 12 mm

Fixing

Ratings (A)	Number of poles	Fixing dimension - F acc. to number of extra CA 15.. auxiliary contacts: 0	1	2	3	4	5	6	7	8	9	10	–	Fixing holes Ø
1000	1	285	285	285	345	345	345	345	345	345	345	345	–	
	2	345	345	345	385	385	385	385	445	445	445	445	–	4 x 13
	3	445	445	445	445	445	445	445	540	540	540	540	–	
1400	1	285	285	285	345	345	345	345	385	385	385	385	–	
	2	385	385	385	445	445	445	445	540	540	540	540	–	4 x 13
	3	540	540	540	635	635	635	635	635	635	635	635	–	
1700	1	345	345	345	345	345	345	345	385	385	385	385	–	
	2	445	445	445	540	540	540	540	540	540	540	540	–	4 x 13
	3	540	540	540	635	635	635	635	635	635	635	635	–	
2100	1	345	345	345	345	345	345	345	385	385	385	385	–	
	2	445	445	445	540	540	540	540	540	540	540	540	–	4 x 13
	3	540	540	540	635	635	635	635	635	635	635	635	–	

Dimensions - Clearing distances - Connecting

Ratings (A)	Number of poles	A	B	D (1)	–	D2	D3	H	I	I1	M	–	N	Y	–
1000	1	60	–	325	–	76	77	70	108	175	195	–	90	375	–
	2	60	90	325	–	76	77	70	108	175	195	–	90	375	–
	3	60	80	325	–	76	77	70	108	175	195	–	90	375	–
1400	1	80	–	325	–	76	77	70	108	175	258	–	100	425	–
	2	80	100	325	–	76	77	70	108	175	258	–	100	425	–
	3	80	120	325	–	76	77	70	108	175	258	–	100	425	–
1700	1	85	–	325	–	89	77	84	108	189	288	–	125	450	–
	2	85	140	325	–	89	77	84	108	189	288	–	125	450	–
	3	85	120	325	–	89	77	84	108	189	288	–	125	450	–
2100	1	85	–	325	–	89	77	84	108	189	288	–	125	450	–
	2	85	140	325	–	89	77	84	108	189	288	–	125	450	–
	3	85	120	325	–	89	77	84	108	189	288	–	125	450	–

As part of its on-going product improvement, ABB reserves the right to modify the characteristics or the products described in this document.
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ABB France
Automation Products Division
Export Department

10, rue Ampère Z.I. - B.P. 114
F-69685 Chassieu cedex / France

Tel: +33 (0)4 7222 1722
Fax: +33 (0)4 7222 1935