SCHALTBAU
Connect Contact Control

3

Contactors

CL1115/02
CL1215/02
CL1315/02

1-, 2- and 3- pole
Medium-Power and
Pre-Charge contactors
for AC and DC

Installation and
maintenance instructions

Manual C25-M.en

Conventions for this Manual

To highlight particularly important instructions, the following symbols are used in this handbook.

NOTICE refers to technical features and methods aimed at facilitating work or to particularly important information.

DANGER refers to processes/operations which have to be followed exactly in order to avoid personal injuries.

CAUTION refers to processes/operations which must be followed to avoid damaging structural components, the system or other user materials.

WARNING refers to hazardous electrical voltages.

General legal notice

- CL1000 contactors must only be used under operating conditions according to the technical specification and the instructions in this manual.
- CL1000 contactors must only be used when all protective devices are present, have been installed properly and are fully operational.
- CL1000 contactors must not be converted or otherwise modified without prior consent of SCHALTBAU GmbH. Violations against this will result in the exclusion of liability on the part of the manufacturer.
- We reserve the right to make technical alterations without prior notice.
- For updated product information visit www.schaltbau-gmbh.com.
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- Furthermore, we refer to our “General Terms and Conditions of Sale (GCS) for Goods and Services”.

Copyright notice

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Introduction

CL1015/02 contactors are medium power contactors for AC and DC applications. They can especially be used in standard converter configurations as pre-charge contactors. The design is based on Schaltbau contactor C295 with metallic splitter plates for arc breaking.
CL1015/02 P contactors have a permanent magnetic blow-out for DC operations. CL1015/02 X contactors without magnets are for AC operations.

CL1015/02 contactors are designed for nominal voltages of 1,500 V.

CL1015/02 contactors are designed for conventional thermal currents of 200 A.

CL1015/02 contactors are available in 1-, 2-, and 3- pole versions.

CL1015/02 contactors can be mounted horizontally and vertically.

CL1015/02 contactors have been designed and tested according to National and International Railway Standards. Due to their unique features they can also be used in a variety of industrial applications.
CL1015/02 contactors offer the following design-related advantages:

Compact, rugged design

Double-break contacts, cadmium-free contact tips

1-, 2-, and 3- pole versions

Easy maintenance:

- Easy inspection of main contact tips, easy replacement of main contacts
- Easy replacement of complete arc chamber

Magnetic drive system suitable for standard railway supply voltages and tolerances. No economy circuit required. Magnetic drive systems for industrial applications on demand.

Insulation coordination:

- Functional insulation for main circuit
- Basic insulation between main circuit and protective earth
- Reinforced insulation between main circuit and control circuit / main circuit and auxiliary circuits

Long mechanical and electrical life

No regular maintenance required. Inspection intervals and exchange of wear parts depending on specific application.

Safety information

Electrical hazards

CL1000 contactors are high-voltage switches. Getting into contact with conductive parts of the contactors can result in serious injury or even death!

Active parts are all piece parts associated with the main circuit. All metal parts visible may potentially become active under fault conditions. A respective label is attached to the contactor. This label must not be removed.

For safety reasons the contactors must be connected to earth. An earth terminal is provided for that purpose. The wire gauge must be observed according to the specific short-circuit conditions.

Before carrying out any inspection and maintenance work on CL1000 contactors, the contactors must be de-energized and in addition life wires made safe by earthing. If the environment has no disconnecting and earthing device, other suitable measures must be used to ensure that no voltage is present. Please make sure that any capacitors in the main circuit are discharged before touching main wires. We recommend securing the supply lines to prevent switching back on.

Safety notices

All inspections and the replacement of components may only be performed by qualified personnel and must be done according to Schaltbau specification.

All components which have to be replaced must be original components defined by Schaltbau.

During continuous operation the contactors will warm up. It is recommended to wait an appropriate time before starting any service and touch the contactors.

General application notes

CL1000 contactors are designed to be mounted in environments defined by pollution degree PD3 according to EN60077-1:

Pollution degree PD3

Conductive pollution or dry non-conductive pollution occurs which becomes conductive due to condensation which is to be expected.

Example: Indoor location not directly exposed to rain, snow and heavy dust.

CL1000 contactors for DC operation contain magnets for the permanent-magnetic blow-out. Make sure that these magnets do not attract any ferromagnetic particles into the contactors, either opened or closed.

These magnets may destroy data on credit cards or such.

During the short time of the switching-off operation strong magnetic fields are generated in the vicinity of the pole plates. They may affect other components close to the contactor.

Technical data

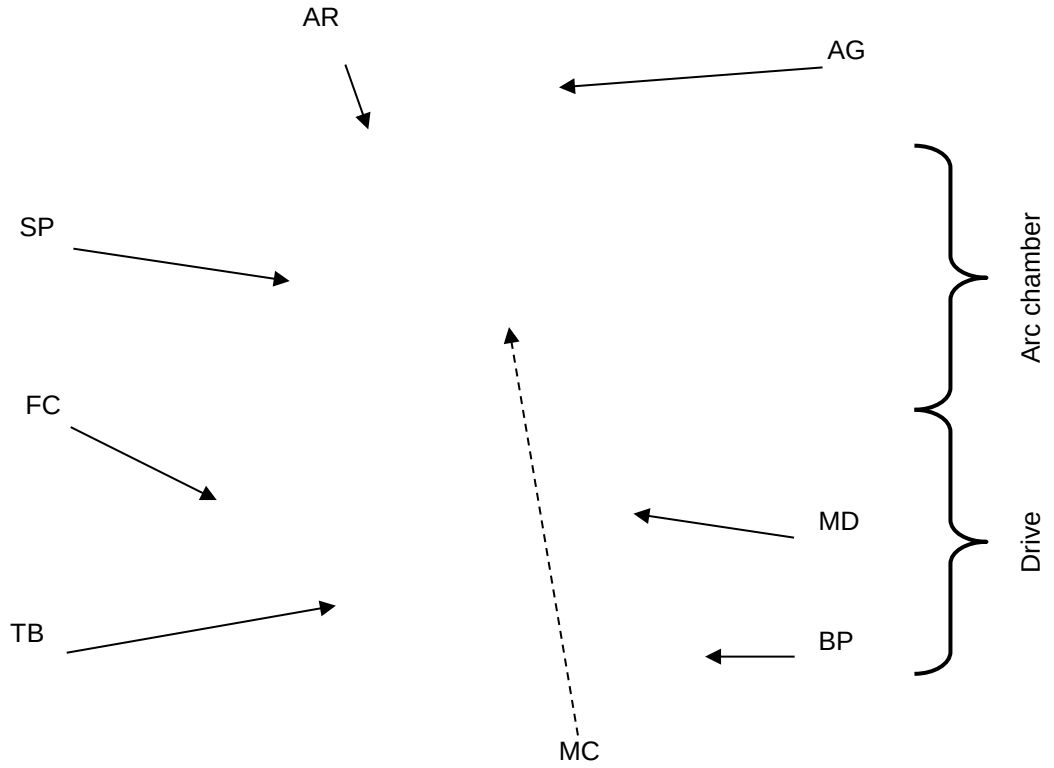
Refer to catalogue C25, data sheets and measured drawings.

Applied standards

Refer to catalogue C25.

EN 60077-1: 2003	04	Railway applications – Electric equipment for rolling stock Part 1: General service conditions and general rules (IEC 60077-1:1999, modified)
EN 60077-2: 2003	04	Railway applications – Electric equipment for rolling stock Part 2: Electrotechnical components; General rules (IEC 60077-2:1999, modified)
EN 50124-1: 2016	11	Railway applications – Insulation coordination Part 1: Basic requirements – Clearances and creepage di tances for all electrical and electronic equipmen
EN 61373	2011-04	Railway applications – Rolling stock equipment Shock and vibration tests
EN 50125-1: 2014	10-11	Railway applications – Environmental conditions for equipm Part 1: Equipment on board rolling stock

Description



CL1015/02 contactors consist of two main parts:

Drive:
Magnetic drive (MD) with base plate (BP); coil terminal block (TB) including the suppressor diode for overvoltage suppression

Arc chamber:
Arc chamber (AR) with fixed contacts / main terminals (FC), splitter plates (SP) and auxiliary contacts (AG); not visible: moving contact bridge (MC).

Magnetic drive

Magnetic drive (MD) with moving armature

- Compact magnetic drive system for DC voltages.
- Designed for standard railway supply voltages and tolerances. Standard nominal supply voltages are U_s = 24 V; U_s = 36 V; U_s = 72 V and U_s = 110 V, tolerances from 70% up to 125% of U_s. Other nominal supply voltages are available on request.
- Double-break moving contact bridge

Coil terminal block (TB)

- M3 terminals (Option: 6.3 x 0.8 mm fast-on terminals)
- Polarity independent overvoltage protection device (Suppressor diode).

The value of the overvoltage limitation is part of the magnetic system and must not be changed or short-circuited by external means. It is explicitly stated that the use of diodes is prohibited for that purpose. Take care there is no such diode in the external control circuit.

Base plate (BP)

- 3 to 6 fixation holes depending on number of poles (some holes are compatible to the footprint of a competitor's product, but are not accessible comfortably. The Schaltbau footprint is designed for access from the top with regular screw drivers)
- Earthing terminal

The contactor should be mounted on a metal rack to provide a secure mounting as well as a heat sink for the magnetic drive.

Arc chamber

Arc chamber (AC)

- Permanent-magnetic blow-out system with magnets and pole plates for DC applications (Designation P or G)
- No magnets for AC applications (Designation X)
- Arc guidance plates
- Splitter plates (SP) for arc extinction (brass for DC and steel for AC applications)

Fixed contacts with main terminals (FC)

- Screws M8 with Schnorr washer and nut
- Minimum wire gauges for connecting cables or current bars must be observed.
- Double-break contacts

Auxiliary contacts (AG)

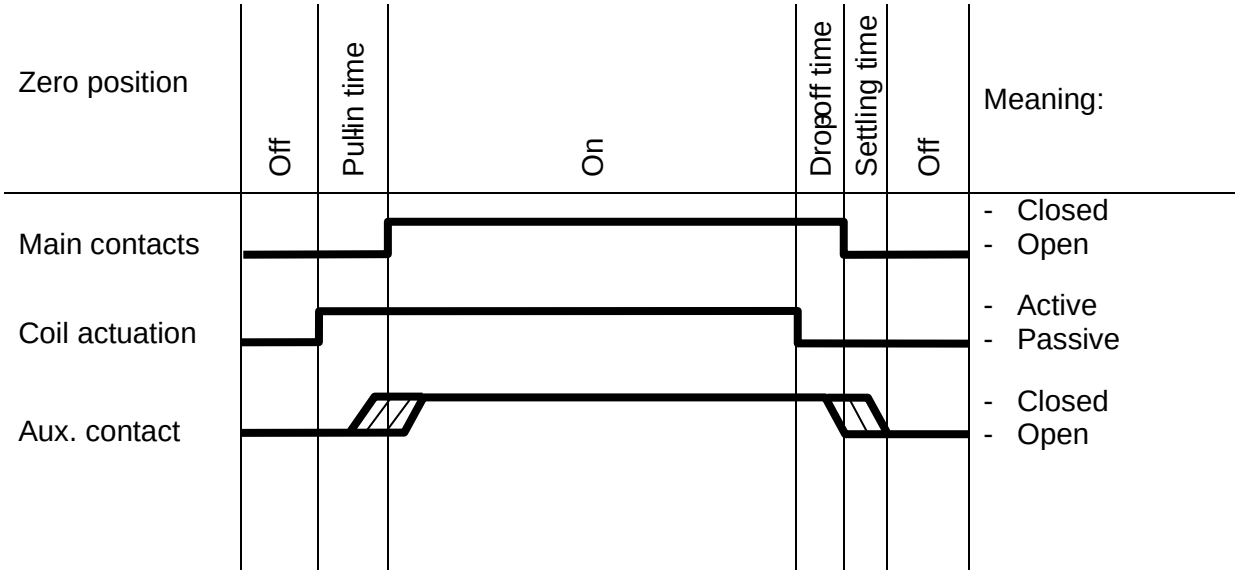
- 2 switches S870 per pole
- Standard: 2 switches per contactor
- Option: 4 switches for 2-pole and 6 switches for 3-pole contactors
- 6.3 x 0.8 mm fast-on terminals

Functional description

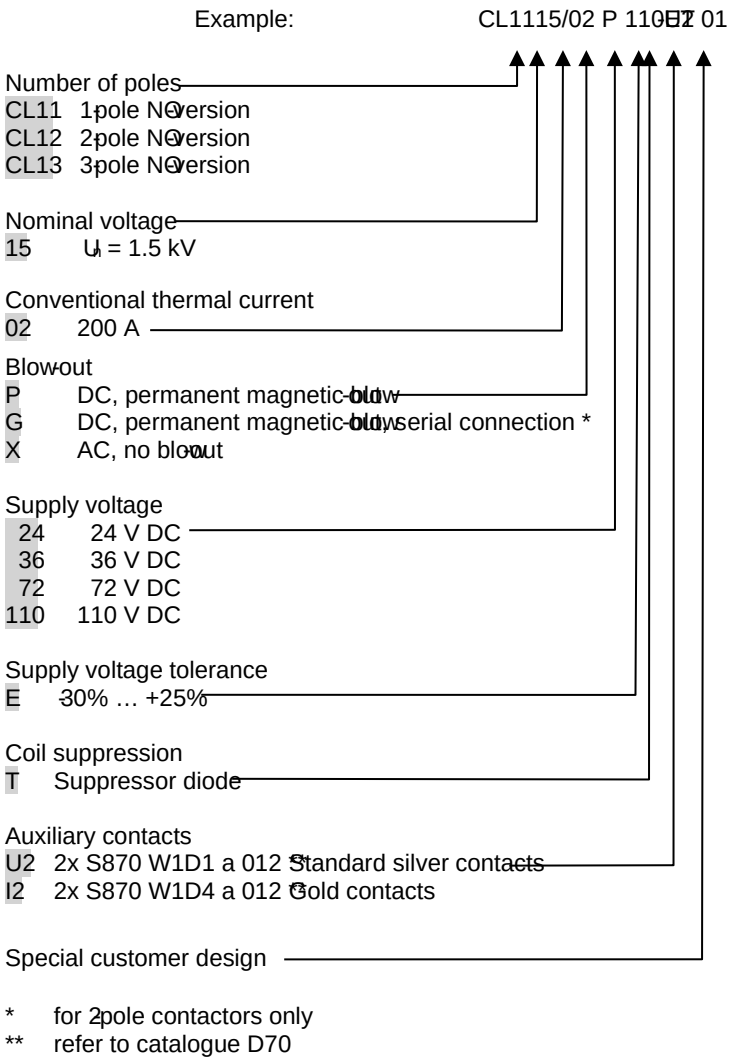
The diagram below shows the switching states of the CL1015/02 contactors.
Typical values:

Pull-in time:	80 ms
Drop-off time:	20 ms

Note: The exact On/Off transition of the auxiliary contacts is not specified.



Order code


Example:
CL1115/02 P 110 E T U2 01
Number of poles
CL11 1-pole NO version
CL12 2-pole NO version
CL13 3-pole NO version
Nominal voltage
15 Ui = 1.5 kV
Conventional thermal current
02 200 A
Blow-out
P DC, permanent magnetic blow-out
G DC, permanent magnetic blow-out, serial connection *
X AC, no blow-out
Supply voltage
24 24 V DC
36 36 V DC
72 72 V DC
110 110 V DC
Supply voltage tolerance
E -30% … +25%
Coil suppression
T Suppressor diode
Auxiliary contacts
U2 2x S870 W1D1 a 012 ** Standard silver contacts
I2 2x S870 W1D4 a 012 ** Gold contacts
Special customer design
* for 2-pole contactors only
** refer to catalogue D70

Storage

Storage

Schaltbau recommends storing the contactors in the original packing box. The contactors should be stored in a dry and suitable place.

Return shipments

Schaltbau recommends using the original packing box for any return shipments. If no original packing box is available care should be taken to pack the contactor in a way that prevents damage during the shipment.

Installation

Unpacking and handling

Before opening the packaging, perform a visual inspection for any signs that could indicate damage having occurred during transport (impacts, bumps, falling etc.).

Unpack the contactor and put it on the table in an upright position. Check the contactor for damage.

Make sure that you have received the correct contactors according to your order.

> If the contactor has been subject to excessive shock influence (e.g. during transport) do not install the contactor.

Operating position

CL1015/02 contactors can be mounted in horizontal and vertical mounting positions.

In most cases, the contactors are mounted on mounting plates or mounting frames. They must be solid enough to carry the weight of the contactors under the shock and vibration conditions of the railway environment.

The contactors are fixed with 4 or more mounting screws, depending on the number of poles. The screws (and if applicable the nuts) must be steel grade 8.8. Schaltbau strongly recommends Schnorr-Washers (or similar) to secure the screws. The screws must be tightened with the rated torque permissible for the screws and the nuts.

Horizontal mounting position Vertical mounting position 1 Vertical mounting position 2

Mechanical requirements

Device dimensions

Refer to the dimensioned drawings of the contactors.

Installation dimensions

Refer to the dimensioned drawings of the contactors.

Electrical requirements

The minimum clearances to earth or other components must be observed. Refer to the dimensioned drawings for details.
Switching electrical currents at high voltages will produce arcing and plasma might exit out of the arc chamber. It is essential to observe the minimum clearance to earth to avoid the risk of a flash-over. The minimum clearance has been tested and specified in relation to the switching capacity of the contactors.

For switching heavy loads allow a minimum time of app. 30 s between switchings. Allow a recovery time of at least 10 min after 3 heavy load switchings in succession.

Ensure sufficient ventilation, especially in the case of heavy arc switching. Allow the exchange of surrounding atmosphere to avoid the risk of flashovers and excessive corrosion.

The minimum wire/current bars gauges for the main terminals and the earth terminal must be observed. Smaller gauges for the main terminals will reduce the rated thermal current. Smaller gauges for the earth terminal may produce a safety hazard.

Refer to catalogues for the power consumption of the magnetic drive system and the electrical data of the auxiliary switches.

C25 (Catalogue for Contactors CL1015/02)

D70 (Catalogue for Snap Action Switches S870)

Mechanical installation

Clean the surface of the mounting plate and the base-plate of the contactor.

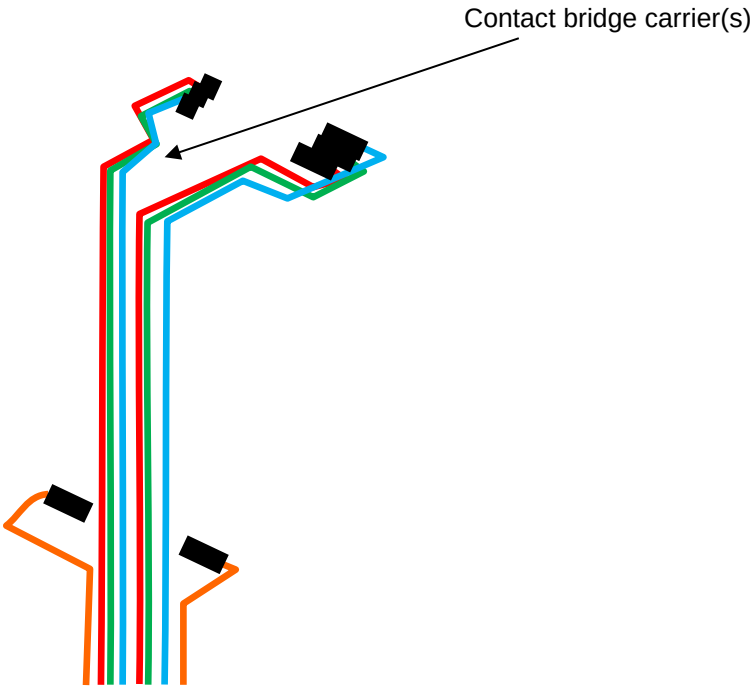
Put the contactor on the mounting plate and secure with the appropriate screws using the correct tightening torque. Schaltbau strongly recommend Schnorr-Washers (or similar) to secure the screws.

Electrical installation of the auxiliary switches

Connect the wires for the auxiliary contacts. For switches S870 no polarity must be observed. The terminal numbers of the switches are shown on labels on top of the switches (11, 12, 14; 21, 22, 24; …). Bundle and fix the wires as shown in the schematically drawing below.

Make sure that the wires do not obstruct the movement of the contact bridge carriers.

Make sure that the control wires have sufficient distance to the main contacts and the openings of the arc chamber(s).



Electrical installation of the magnetic drive

Connect the coil control wires to the coil terminal block using closed cable lugs for M4 screws. No polarity must be observed. Bundle and fix the wires as shown above.

The coil is protected against excessive overvoltages (which will occur when the coil is switched off) by a bi-directional suppressor diode.

> The value of the overvoltage limitation is part of the magnetic system and must not be changed or short-circuited by external means. It is explicitly stated that the use of diodes is prohibited for that purpose. Take care there is no such diode in the external control circuit.