

Switches



Contactors

LTHS line

LTC line

LTHH/LTE/LTP line

LTNS line

N line

Disconnectors

LTHM/P-U/D line

LTMP line

Integrated Functional Units (IFU)

LPRC line



Microelettrica Scientifica



Applications
Rail On-board
DC Substations
Industry

Microelettrica Scientifica is a global leader in the design and manufacturing of Contactors and Disconnectors for Vehicles, DC Substations and Industrial applications. Our Switches Division offers 5 lines of contactors and 2 of disconnectors, each including a wide variety of types and sizes that can be personalized in most details. At the same time, we are capable of tailor-engineering and validating customized versions of most of our products, to fit the Customers' applications needs in the most efficient way. Our quality system is in compliance with standards ISO9001:2008;

ISO14001:2004 and IRIS Rev.2. Our contactors experience and tradition begins in the 1950s as the company develops its first bar mounted contactors for crane and motor control and industrial switchgear. It then evolved in the 1980s with the development of the LT lines; LTHS and LTNS first, followed by LTHH and in the 1990s by the LTE and LTC lines, as well as the LTHM/P disconnecter line. In the 1980s the Company rapidly expanded on the Rail Vehicles market, going global in the 1990s and is today a leading global supplier of Contactors and Disconnectors for traction and industrial applications.

Microelettrica Scientifica is a global leader in state-of-the-art electromechanical and electronic components and systems for Rail vehicles, DC Traction power and Energy & Industry applications. Since 2005 Microelettrica Scientifica is part of Knorr-Bremse Group, the German world leader in rail and commercial vehicles braking systems. The Knorr-Bremse Group product portfolio also includes doors and entrance systems and HVAC systems for Rail vehicles, as well as platform screen doors and gates for railway stations.



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Products	
Contactors	LTHS line
	LTC line
	LTHH/LTE/LTP line
Disconnectors	LTNS line
	N line
Integrated Functional Units (IFU)	LTHM/P-U/D line
	LTMP line
	LPRC line

LTHS line

Applications

Line contactor

Power or auxiliary converter input

Filter pre-charging

Traction motors on-load disconnection

Electromagnetic brakes

Heating/Air conditioning systems

Microelettrica Scientifica contactors for railway applications are designed to be used on electrical equipment in presence of the most severe shocks and vibrations, which occur on-board traction vehicles.

The LTHS series of contactors displays a traditional design which enables them to withstand the highest current ratings in harsh working conditions.

To accomplish most of the possible applications, all the LTHS series contactors can be manufactured in single or multipolar form and, upon request, allow a very high degree of customisation. For example, versions with normally open or normally closed poles are manufactured, and mechanical latching can be supplied. In order to work efficiently both with high and low currents, the contactors are equipped with indirect blow out circuit. This arc-extinguishing technology allows to work indifferently both in AC and DC. The DC control coil operates without economy resistor within a wide working range. A "varistor" cuts off the peak voltage when the coil is deenergized.

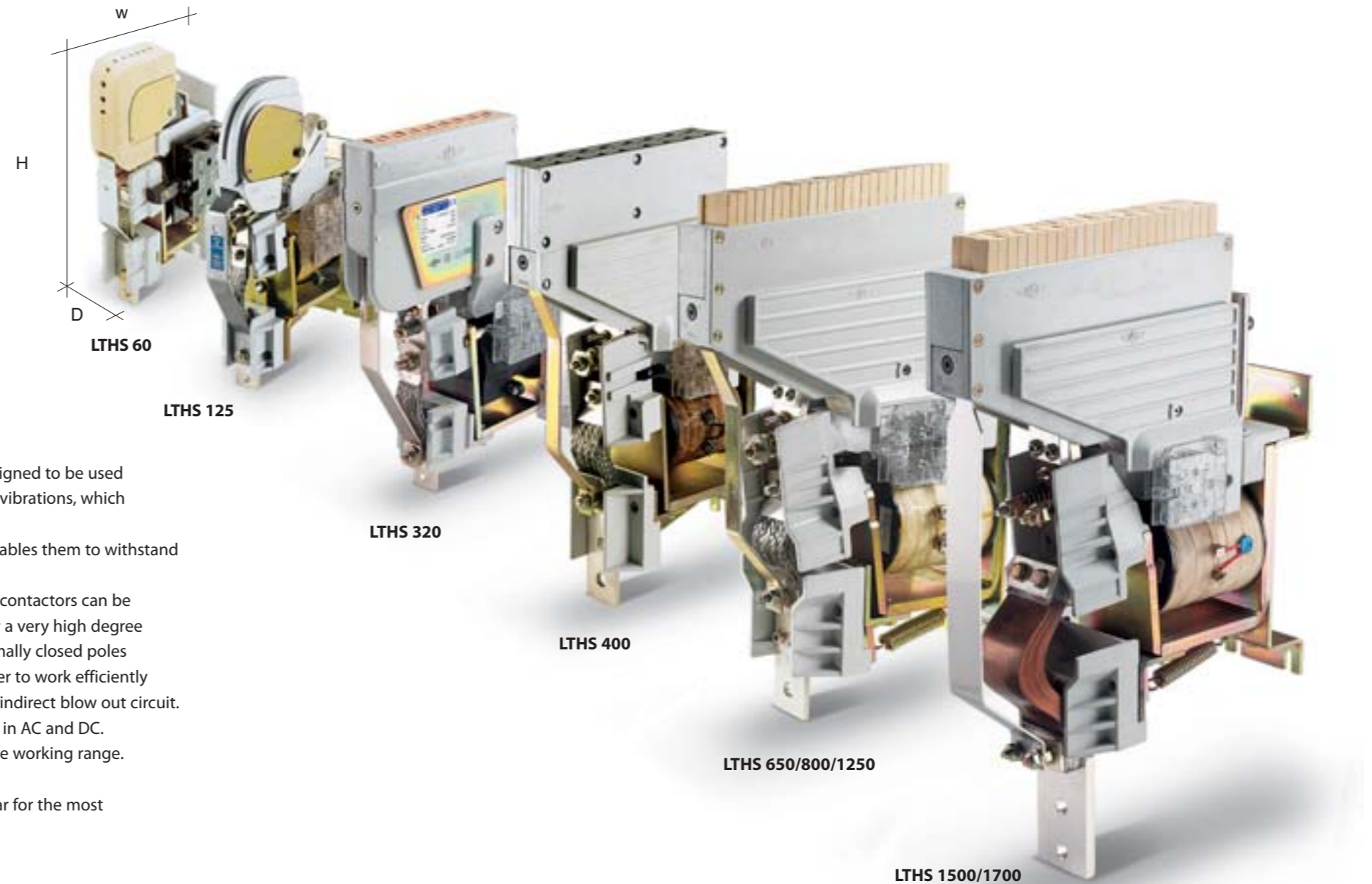
More than 20000 LTHS contactors are delivered worldwide each year for the most demanding projects and applications.

General Characteristics

- The long experienced extra heavy duty flexible line, up to $2000V_{DC/AC}$ application, up to 1600A/pole
- On-board and stationary applications
- Combination of up to 4 NO or NC poles and auxiliary contact options
- High unit customization available

Auxiliary contact blocks type SL11

- Normally mounted on LTHS and LTC contactors
- Made in self extinguishing Latamid polyamide, guarantee high electrical and mechanical performances as well as very low temperature resistance
- Double interrupting, self cleaning, solid silver contacts
- On request special execution with gold plate contacts



Type	U_{max} [V _{AC/DC}]	I_{th} [A]	W [mm]	H [mm]	D1/D2 [mm] (1/2 poles)
LTHS 60	1000	80	143	197	72/93
LTHS 125	1000	150	185	276	86/114
LTHS 320	2000	350	220.5	300.5	86/114
LTHS 400	2000	500	329	423	115.5/202
LTHS 650/800	2000	700/920	335	438(D1)/441(D2)	119/206.5
LTHS 1250	2000	1300	350	473(D1)/476(D2)	127.2/206.5
LTHS 1500	2000	1350	350	533.5(D1)/536.5(D2)	111/215
LTHS 1700	2000	1600	350	533.5(D1)/536.5(D2)	127/235

LTC line

Applications

- Auxiliary converter input
- Filter pre-charging
- Electromagnetic brakes
- Heating/Air conditioning systems
- Line contactor

The LTC series contactors, thanks to their excellent balance between dimensions, performances and robustness, are suitable for all those applications on-board which demand a small, smart device. Their design encourages applications where high operating frequencies and small available spaces are important requirements.

Like all Microelettrica Scientifica contactors, the LTC series are based on a standard concept, but a very high level of customization can be achieved by replacing a few key components. Normally open and normally closed poles can be fitted, as well as mechanical latching. The breaking circuit is equipped with permanent magnets to work efficiently both with high and low currents.

The DC control coil operates without economy resistor within a wide working range.

A "varistor" cuts off the peak voltage when the coil is deenergized.

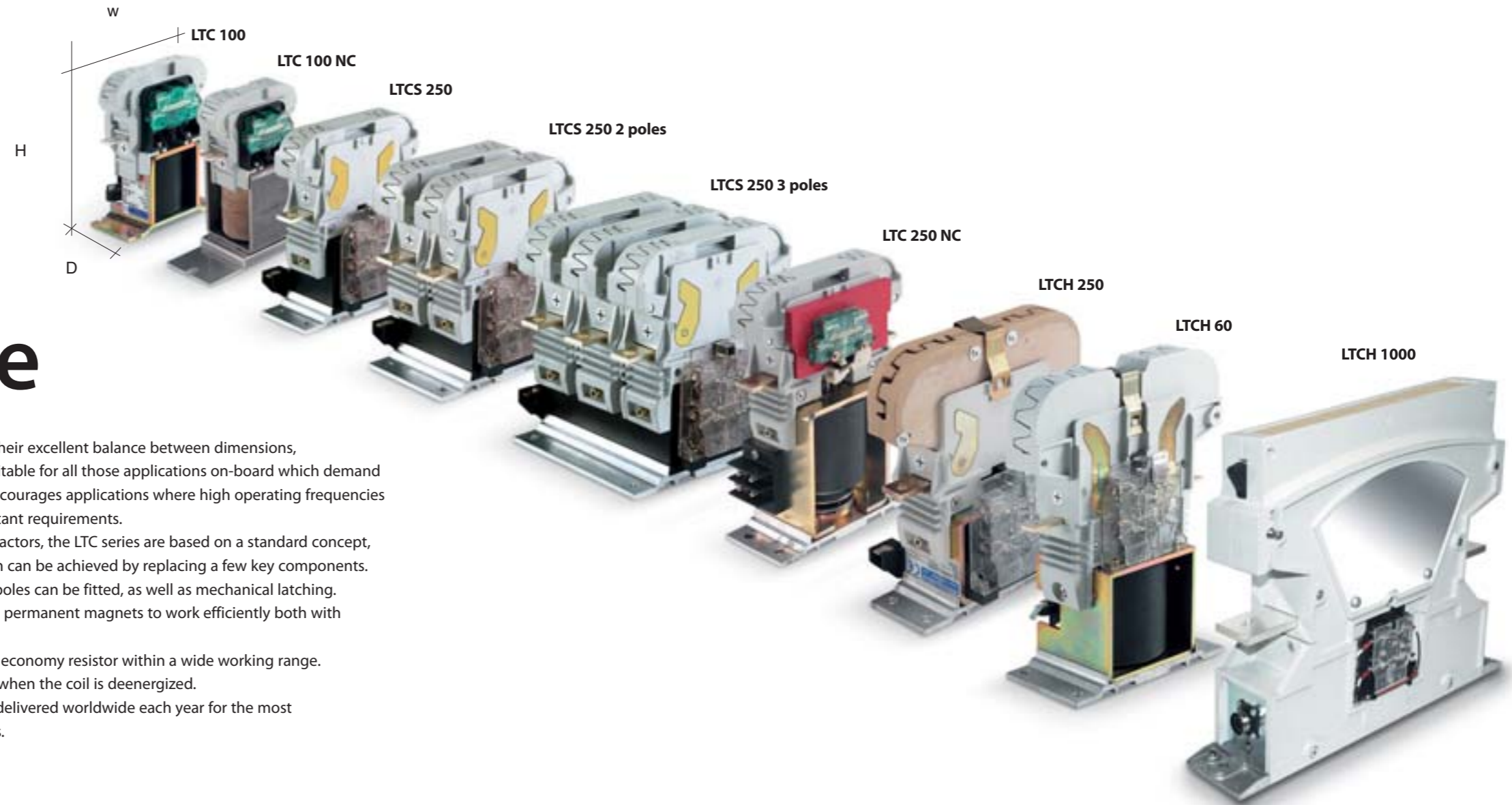
More than 20000 LTC contactors are delivered worldwide each year for the most demanding projects and applications.

General Characteristics

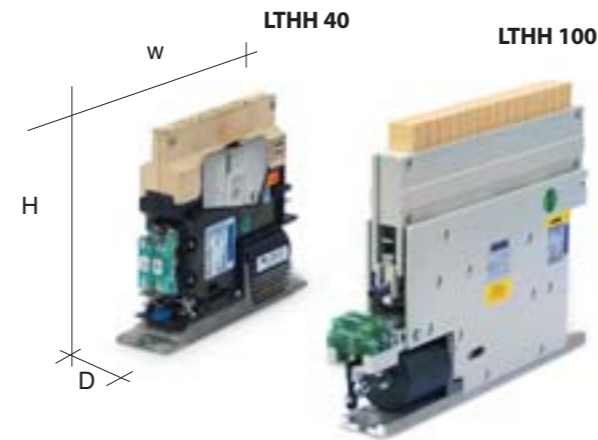
- The modern and compact heavy duty line, up to 4000V_{DC/AC} application, up to 1000A/pole
- On-board and stationary applications
- 1-2-3 and 4 pole configuration available, NO and NC poles, permanent magnets or indirect arc blow outs
- Flexible control and auxiliary contacts options, customization available

Auxiliary contact blocks type SL11

- Normally mounted on LTHS and LTC contactors
- Made in self extinguishing Latamid polyamide, guarantee high electrical and mechanical performances as well as very low temperature resistance
- Double interrupting, self cleaning, solid silver contacts
- On request special execution with gold plate contacts



Type	U _{max} [V _{AC/DC}]	I _{th} [A]	W [mm]	H [mm]	D1/D2/D3 [mm] (1/2/3 poles)
LTC 100	1000	100	106	127.5	63
LTC 100 2 poles	1000	100/200	120	127	93
LTC 100 NC	1000	100	106	155	60
LTCS 250	2000	250	140	156.5	86
LTCS 250 2 poles	2000	250/500	140	156.5	109.2
LTCS 250 3 poles	2000	250	140	156.5	165.5
LTC 250 NC	2000	250	140	196	78
LTCH 250	2000	250	154	176	86
LTCH 60	4000	60	168	221	88
LTCH 60 2 poles	4000	60/120	168	221	125
LTCH 1000	2000	1000	385	300	93



LTHH/LTE/LTP line

Applications

- Auxiliary converter input
- Filter pre-charging
- Capacitor discharging
- Heating/Air conditioning systems
- Line contactor
- Train supply line
- Resistors based traction systems, for starting and braking of electric motors

The Microelettrica Scientifica LTHH/LTE/LTP series contactors for electric traction are supplied to railways and underground systems throughout the world.

Where high voltage ratings are required, the LTHH series contactors are the right solution. The creepage and clearance distances are widely dimensioned for safe application in polluted ambients. Their narrow outline is especially conceived for applications where space is a critical issue - as more and more often happens on railway vehicles. To meet all possible applications, they are available both with electric (LTHH/LTE) and pneumatic (LTP) control, and poles can be manufactured in normally open or normally closed configurations.

The indirect blow out circuit makes the LTHH contactors suitable to work both with high and low currents and with relatively high frequency (1500Hz).

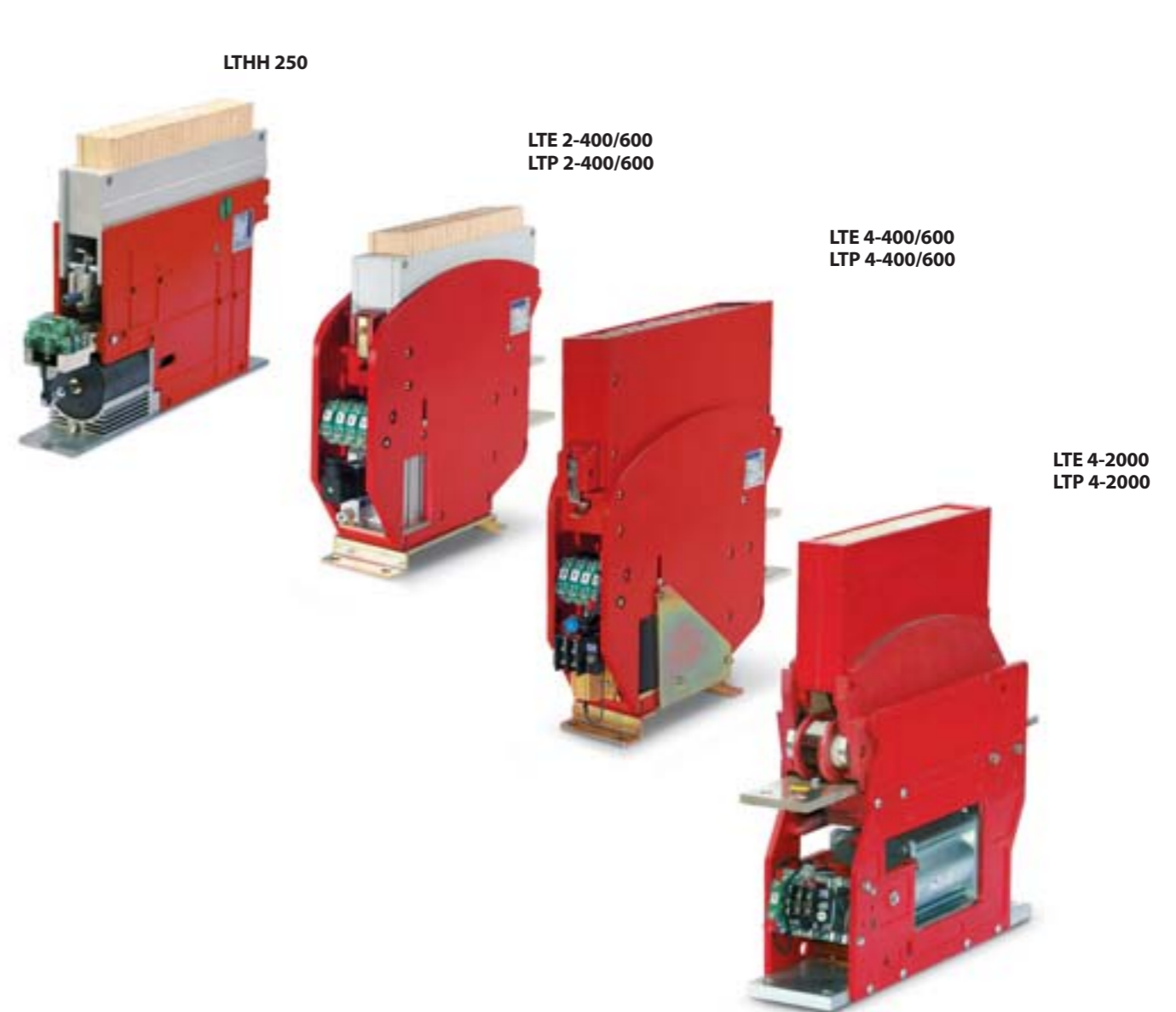
The DC control coil operates without economy resistor within a wide working range. More than 10000 LTHH contactors are delivered worldwide every year for the most demanding projects and applications.

General Characteristics

- The higher voltage single pole heavy duty line, up to 4000V_{DC/AC} application, up to 1350A/pole
- On-board and stationary applications
- Multipole assemblies, NO and NC poles, indirect arc blow out
- Flexible control and auxiliary contacts options, high unit customization available

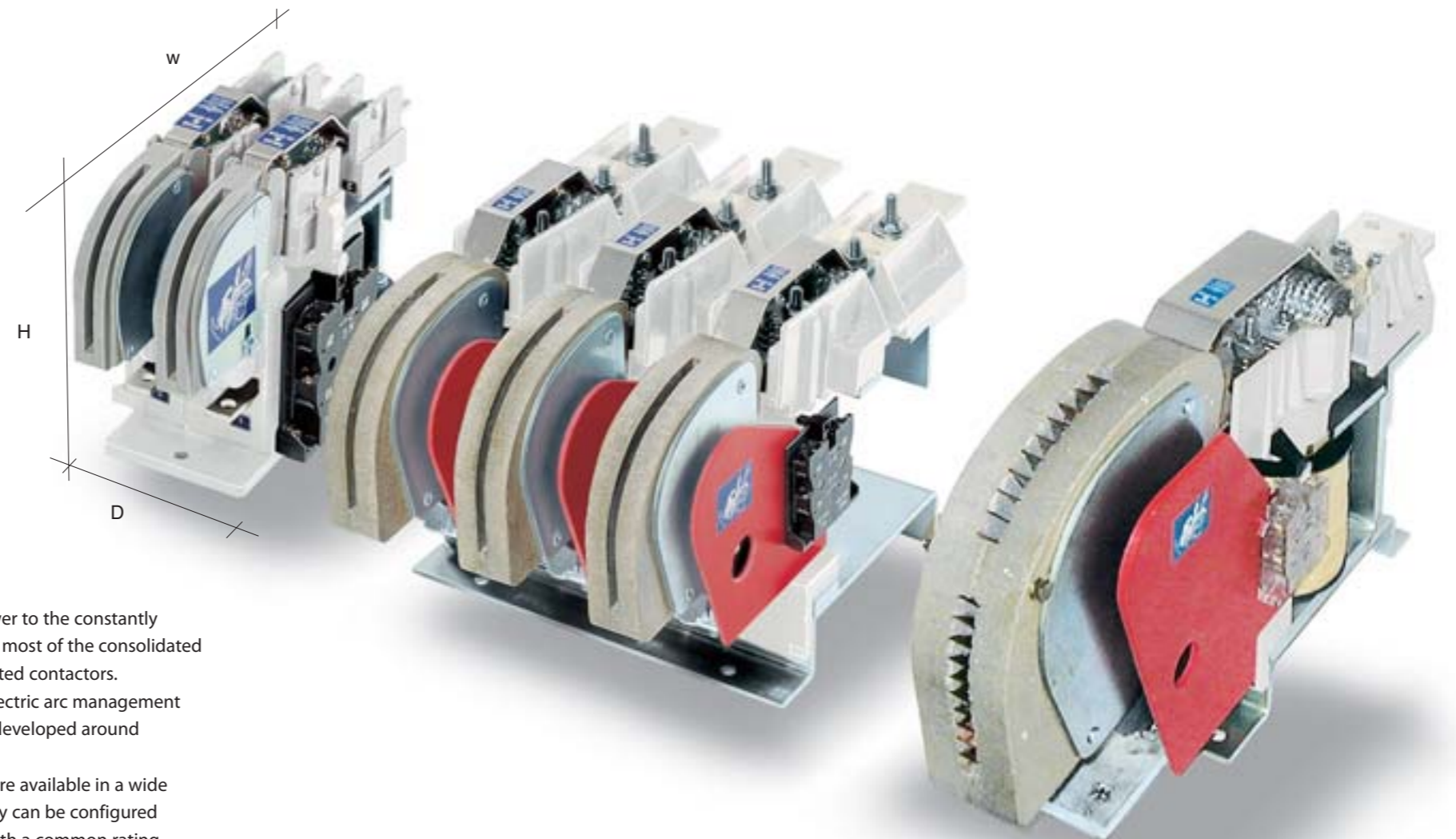
Auxiliary Contact Blocks Type SJ11

- Normally mounted on LTHH contactors and on disconnectors/changeovers
- Execution in Makrolon, self extinguishing and transparent polycarbonate
- Double interrupting, self cleaning, solid silver, snap action contacts
- On request, special execution with gold plated contacts



Type	U _{max} [V _{AC/DC}]	I _{th} [A]	W [mm]	H [mm]	D1/D2 [mm] (1/2 poles)
LTHH 40	2000	60	200(D1)/244(D2)	162.5(D1)/174.5(D2)	48/106
LTHH 100	4000	120	377(D1)/410(D2)	274(D1)/279(D2)	60/130
LTHH 250	4000	300	380.5(D1)/424(D2)	297(D1)/302(P2)	70/160
LTE 2-400	2000	900	428	367	80/-
LTE 2-600	2000	900	430	370(D1)/365(D2)	80/220
LTP 2-400	2000	900	402	367	80/-
LTP 2-600	2000	900	402	370	80/-
LTE 4-400	4000	900	429.4(D1)/379.3(D2)	394	85/175
LTE 4-600	4000	900	429.4	423	85/-
LTP 4-400	4000	900	402	394	85/-
LTP 4-600	4000	900	402	423	85/-
LTE 4-2000	4000	1350	501	473	119/-
LTP 4-2000	4000	1350	501	473	151.5/-

LTNS line



Applications

Transit and railway systems

Control of cranes

Rolling mills

Mining equipment

Renewable energy

Microelettrica Scientifica LTNS series have been developed to answer to the constantly increasing market need of reduced dimensions and weight, taking most of the consolidated know-how in designing and manufacturing of industrial bar mounted contactors.

These contactors have been designed starting from the N series electric arc management concept, grafted on the light and compact structure of a rail unit, developed around the control electromagnet.

The LTNS contactors, characterised by a nominal voltage of 750V, are available in a wide range of current ratings, from 80A up to 1300A (up to 3 poles). They can be configured in any combination of Normally Open or Normally Closed poles, with a common rating. They have been designed and tested according to the international standard IEC 60947-4-1 and are suitable for almost any industrial low voltage application, such as: cranes, rolling mills, electric energy production and transformation, photovoltaic panels and inverters, induction furnaces, galvanic treatments.

General Characteristics

- The extra heavy duty flexible line, up to 1000V_{DC/AC} application, up to 1500A/pole
- Stationary application only, derived from LTHS line
- 1-2-3 pole configuration, NO and NC poles indirect or direct arc blow out options available
- Flexible control and auxiliary contacts options, high unit customization available

Type	I _{th} [A]	Rated Nominal Voltage U _n [V]	Rated Insulation Voltage U _i [V]	W [mm]	H [mm]	D1/D3 [mm] (1/3 poles)
LTNS 60	80	600	750	193	138	72/130
LTNS 125	150	750	1000	260	185	86/169
LTNS 320	320	750	1000	350	260	105/277
LTNS 450	450	750	1000	360	260	105/277
LTNS 650	700	750	1000	405	280	105/277
LTNS 800	900	750	1000	405	280	105/277
LTNS 1000	1100	750	1000	459	350	125/340
LTNS 1250	1300	750	1000	459	350	125/340

N line

Applications

Transit and railway systems

Power generation

Control high power motors

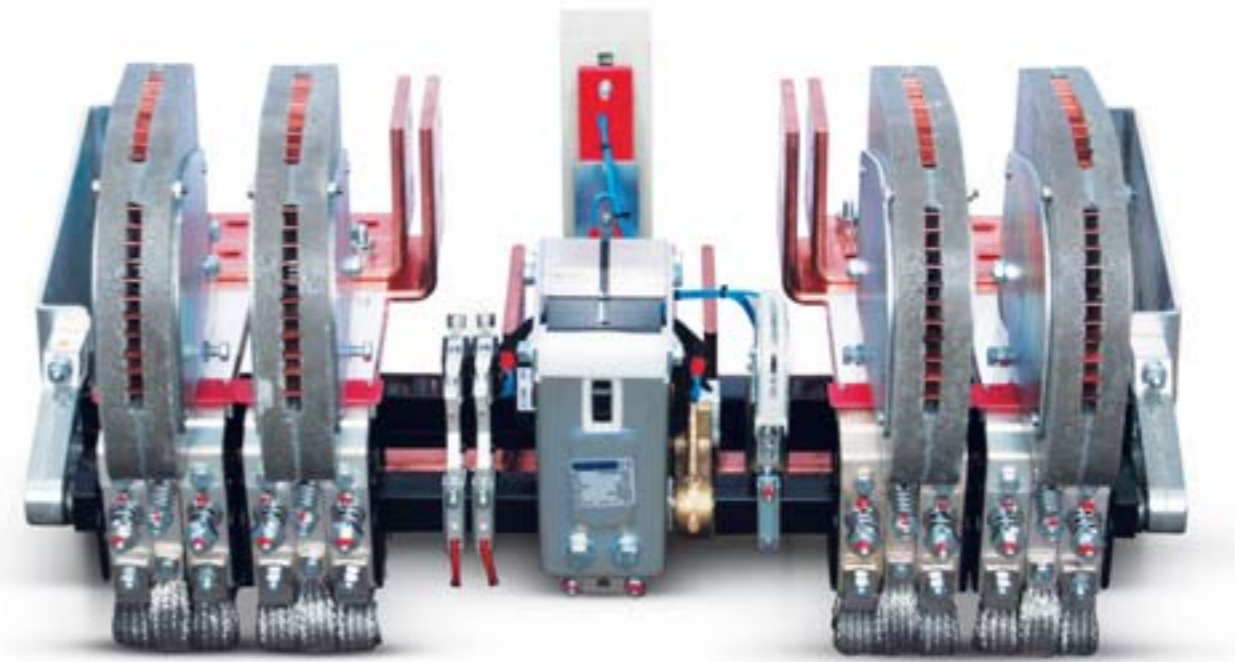
Heavy industries

Crane control

Microelettrica Scientifica N series bar mounted contactors, in spite of their 50 years old technical concept are still state of the art for many industrial, low voltage, heavy duty applications. These contactors are designed and tested according to the standard IEC 60947-4-1. They provide excellent operational performances, making them the best choice for high power load connection, often covering the function of a fault clearing protection device.

The N series contactors are characterised by modular design so that their configuration can be tailored to the specific requirements of each application. In fact, the pole ratings cover a wide range, from 85A up to 6000A, and can be mounted side by side regardless of their size and number on a customizable length shaft set, this way offering custom solutions to a wide range of technical needs.

The maintenance is simplified by direct accessibility to all parts due to open construction so that, in most cases, it is not necessary to remove the contactor from the enclosure. Microelettrica Scientifica has been certified since 1993 according to the International Quality Standard UNI EN ISO 9001 Microelettrica has always paid great attention to the environment and is certified according to the standard UNI EN ISO 14001:2004 and all materials used are RoHS compliant.

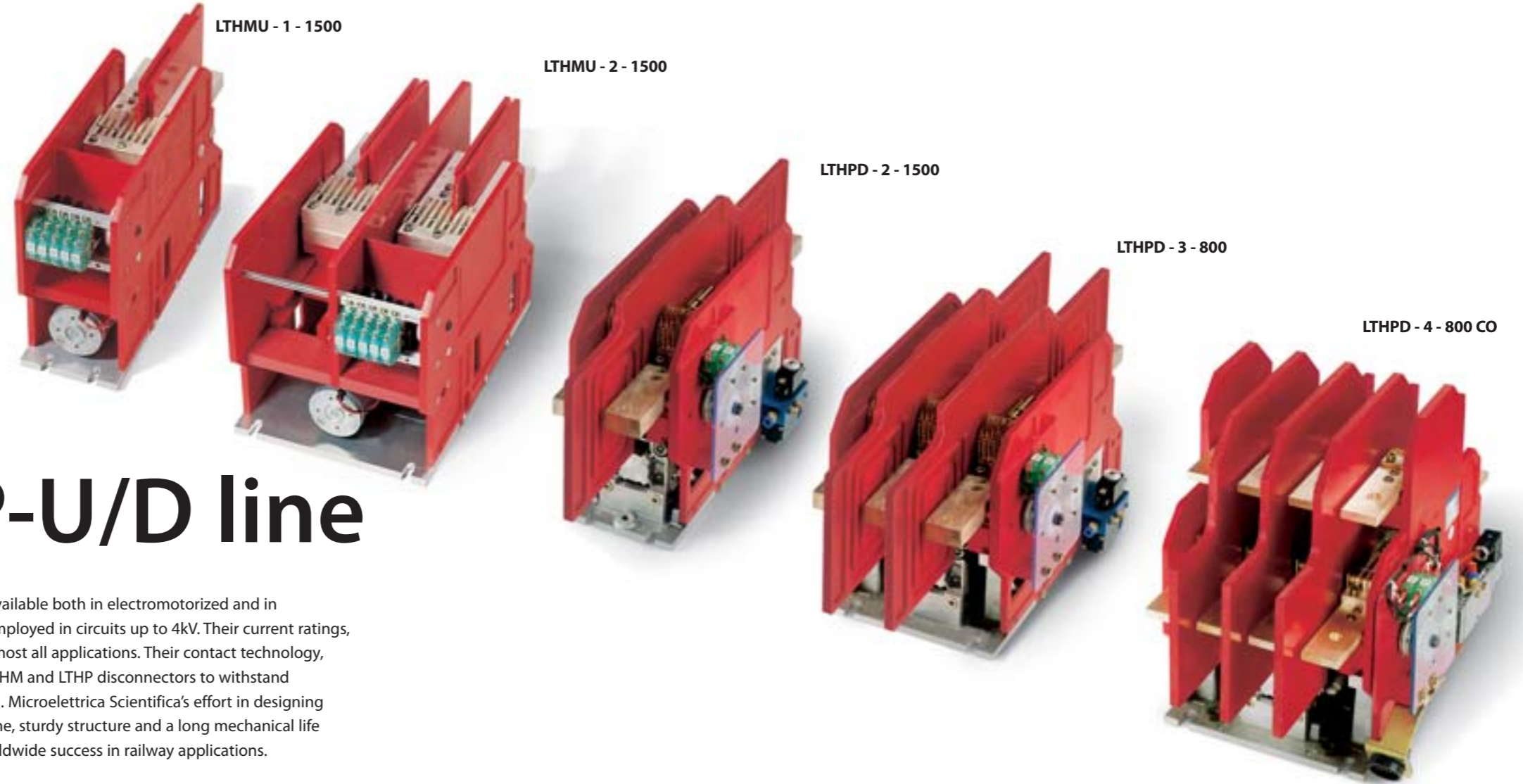


General Characteristics

- The bar mounted modular extra heavy duty line, up to 1000V_{DC/AC} application, up to 6000A/pole
- Stationary applications only
- Up to 6 pole configuration, NO and NC poles direct arc blow out various aux contacts options
- Flexible control and adjustment configurations, total unit customization possible

Type	Thermal Current I _{th} [A]	Rated Nominal Voltage U _n [V]	Rated Insulation Voltage U _i [V]	W [mm]	H [mm]	D1/D4 [mm] (1-4 poles)
N 85	85	600	1000	165	155	250-400
N 125	125	600	1000	175	155	250-400
N 190	190	600	1000	205	170	250-400
N 270	270	600	1000	265	215	250-500
N 350	350	600	1000	275	215	250-500
N 550	550	600	1000	300	160	300-600
N 650	800	600	1000	320	160	300-600
N 800	650	600	1000	365	300	350-650
N 1000	1000	600	1000	365	300	350-650
N 1250	1250	600	1000	380	345	350-700
N 1600	1600	600	1000	420	420	350-800
N 2000	2000	600	1000	425	420	350-800
N 3000	3000	600	1000	475	470	400-1000
N 4000	4000	600	1000	425	420	500-1250
N 6000	6000	600	1000	475	470	600-1500

Contactor	Breaking capacity						Making capacity I _{ch} [A]	Consumption of coils				Operation time (m sec.)		Mech. endurance in million operations
	A.C. cos φ = 0.5 I'ca [A] RMS value			D.C. L/R = 15 ms I'cc [A] (2 poles)				A.C. [VA]		D.C. [W]		Closing	Opening	
	440 V	750 V	1000 V	220 V	440 V	660 V		Pick-up	Holding	Pick-up	Holding			
N 85	1600	700	600	1700	1000	800	2750	350	50	110	15	26	13	15
N 125	2100	1000	900	2500	1500	1000	3500	450	60	130	15	23	13	15
N 190	2500	1600	1300	3000	2000	1400	4200	450	60	130	15	23	12	15
N 270	4300	2500	2000	4500	3000	2500	7000	1300	110	180	12	30	18	15
N 350	4800	3000	2500	5000	3500	3000	8500	1300	110	180	12	30	18	15
N 550	6000	4500	3900	7000	5000	4000	10000	1500	110	300	20	65	15	15
N 650	8000	5500	4500	9000	6000	5000	12000	–	–	300	20	65	15	10
N 800	9500	6500	6000	10000	7000	6000	16000	–	–	650	30	80	16	10
N 1000	12500	8000	7000	13000	9000	7500	21000	–	–	650	30	80	16	10
N 1250	15000	10000	9000	16000	12000	10000	30000	–	–	1000	50	90	10	10
N 1600	20000	15000	10000	25000	16000	12000	35000	–	–	1000	50	95	11	10
N 2000	20000	15000	10000	30000	20000	15000	35000	–	–	1000	50	95	11	10
N 3000	30000	15000	10000	35000	25000	18000	50000	–	–	1500	80	90	10	10
N 4000	35000	20000	10000	40000	30000	20000	50000	–	–	1500	80	90	10	10
N 6000	40000	20000	10000	40000	35000	20000	80000	–	–	2500	100	90	10	10



LTHM/P-U/D line

Applications

- Traction circuit configuration change in multi-system locos
- Isolation of power converter
- Isolation of traction motors

Microelettrica Scientifica disconnectors, available both in electromotorized and in pneumatic versions, are designed to be employed in circuits up to 4kV. Their current ratings, up to 1500A per pole, allow them to fit almost all applications. Their contact technology, based on multi-finger jaws, enables the LTHM and LTHP disconnectors to withstand consistent dynamic currents (up to 220kA). Microelettrica Scientifica's effort in designing a product range with reduced space outline, sturdy structure and a long mechanical life (over 100000 operations), has led to a worldwide success in railway applications.

- Poles can be connected in parallel to obtain higher thermal currents on single contact (up to 6000 Amps)
- On D versions, poles can be reversed forming NC poles, or single-double pole changeover without additional structure
- On D versions, additional upper structure is available to create 1 to 4 changeover poles
- 24 combinations are available with more than 130 pole configurations
- Several options available for control circuits and for auxiliary contacts connection
- Integrated solutions: multiple switches are assembled on frame with customised busbar system and integrated control circuits

General Characteristics

- The long experienced heavy duty line for DC and AC applications up to 4000V
- On-board and stationary applications, 2 thermal current ratings per pole: 800 or 1500A
- Normally open, normally closed, changeover poles from 1 to 4 poles units with single control
- Electric DC motor or pneumatic cylinder control, with customized auxiliary contacts execution
- High customization level is available and mostly applied
- Integrated multifunctional units designed and customized on request

Auxiliary Connections

- To meet all customer requirements, special connections and cabling can be supplied both on the high voltage and on the low voltage circuits. On the HV side, poles can be connected in series or parallel. Terminals can be shaped according to customers' requirements
- LV circuits can be cabled to perform different logical functions. Any kind of connector available in commerce can be fitted to these circuits



LTH	M	U	1	800
LTH	M	U	1	1500
LTH	M	U	2	800
LTH	M	U	2	1500

LTH	P	U	1	800
LTH	P	U	1	1500
LTH	P	U	2	800
LTH	P	U	2	1500

LTH	M	D	1	800
LTH	M	D	1	1500
LTH	M	D	2	800
LTH	M	D	2	1500
LTH	M	D	3	800
LTH	M	D	3	1500
LTH	M	D	4	800
LTH	M	D	4	1500

LTH	P	D	1	800
LTH	P	D	1	1500
LTH	P	D	2	800
LTH	P	D	2	1500
LTH	P	D	3	800
LTH	P	D	3	1500
LTH	P	D	4	800
LTH	P	D	4	1500

- M/P: Electromotorized (M) or Pneumatic (P) bistable control
- U/D: Power terminals on same side (U) or on opposite side (D)
- 1/2/3/4: Number of poles
- 800/1500: Thermal current of each pole (in Amps)



LTMP line

Applications

Traction circuit configuration change in multi-system locos

Isolation of power converter

Isolation of traction motors

Modular multipole-multiposition off-load disconnectors with binary control option.

The disconnectors are configurable assembling side by side poles, every one completely independent and controlled by a motor through an integrate electronic control device that allows all possible status combinations.

The modular structure allows easy maintenance through independent replaceability of every single pole. The electronic control unit provides the possibility of interfacing every kind of control logic by means of a master/slave broadcast serial BUS. Poles control BUS is separated by field BUS. Feedbacks may be managed, on demand, through a low voltage connector installed on every pole. The control unit has an interface that optionally allows, using a dedicated software, diagnostics (n° of operations, current consumption, environment temperature, switching time...) and is directly accessible by PC.

Reference standard IEC 60077-2.

Main Features of each Pole:

- 2 versions: 1000 or 2000A thermal current
- 3 configurations: NO or NO+NC or CO
- Integrated control device for command logic
- Fully modular construction

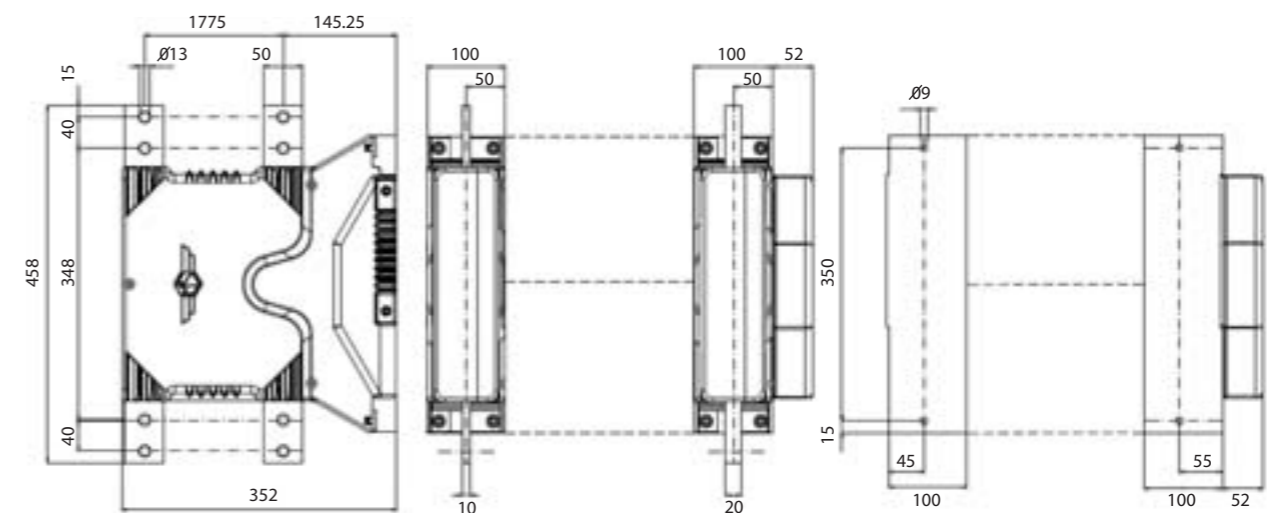
Main Features Control:

- Electric motor actuated
- Electronic control of poles positions
- Virtually infinite combinations of poles positions
- Predetermined positions accessed sequentially or by dedicated control signal

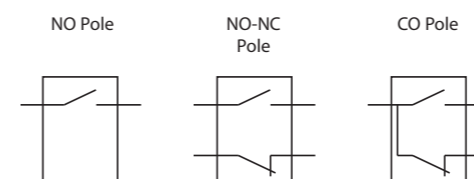
Technical Data

Rated Max Voltage (Umax)	4000V _{ac/dc}	
Rated Operational Current (I_a) at 75°C	1000A	2000A
Auxiliary Contacts (type SJ 11)	2 CO per pole	

Overall dimensions (mm)



Pole Configuration



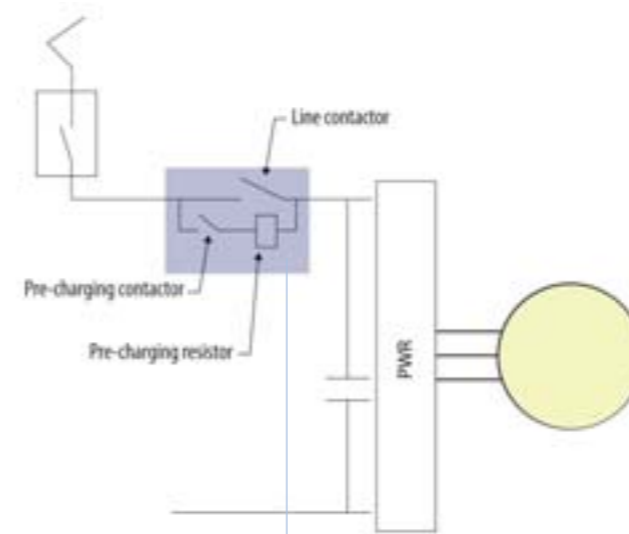
Integrated Functional Units

A key of Microelettrica Scientifica success is the ability to provide specific solutions to meet customers' requirements. One of these are IFUs: different Microelettrica Scientifica contactors and disconnectors are supplied already assembled on a structure. A few solutions have been supplied also including charging and discharging resistors on the same frame. In this way customers do not have to worry of installing several components on a vehicle: it's just a matter of inserting the whole assembly in its own cubicle and tightening some screws. For example, all the traction circuit switchgears can be part of just one IFU. Such a solution helps also in case of maintenance: a IFU is removed from the train in a short time and is replaced with another assembly, to speed up processes. Then, the removed IFU can be checked and revamped in the workshop, with no concerns of time and space.

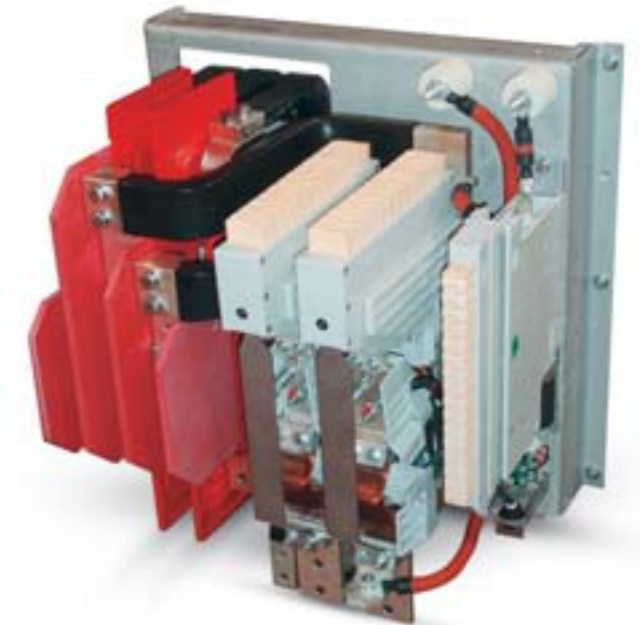


Special product LTRM 300

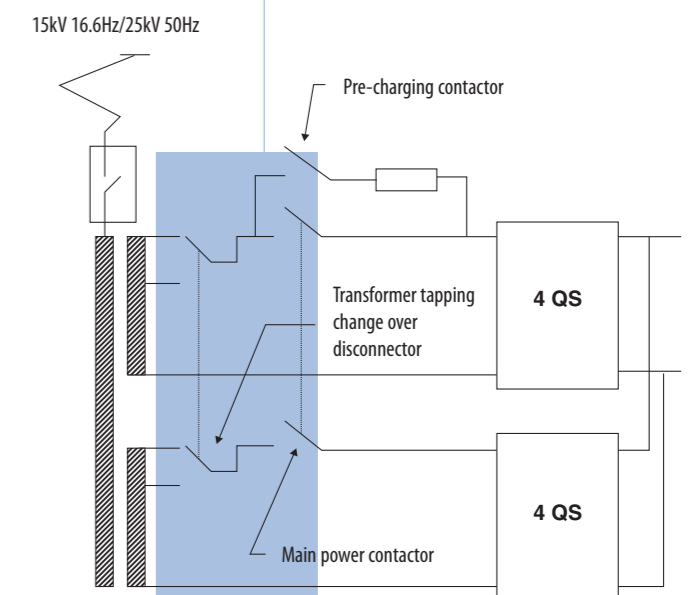
- 300A 4kV motorized reverser with 4 NO/NC poles
- Expandable number of poles
- Poles can also be used as auxiliary lower current contacts on LTHM / LTHP disconnectors



Line and pre-charging contactor + pre-charging resistor



Main power and pre-charging contactors + change over disconnector





LPRC line

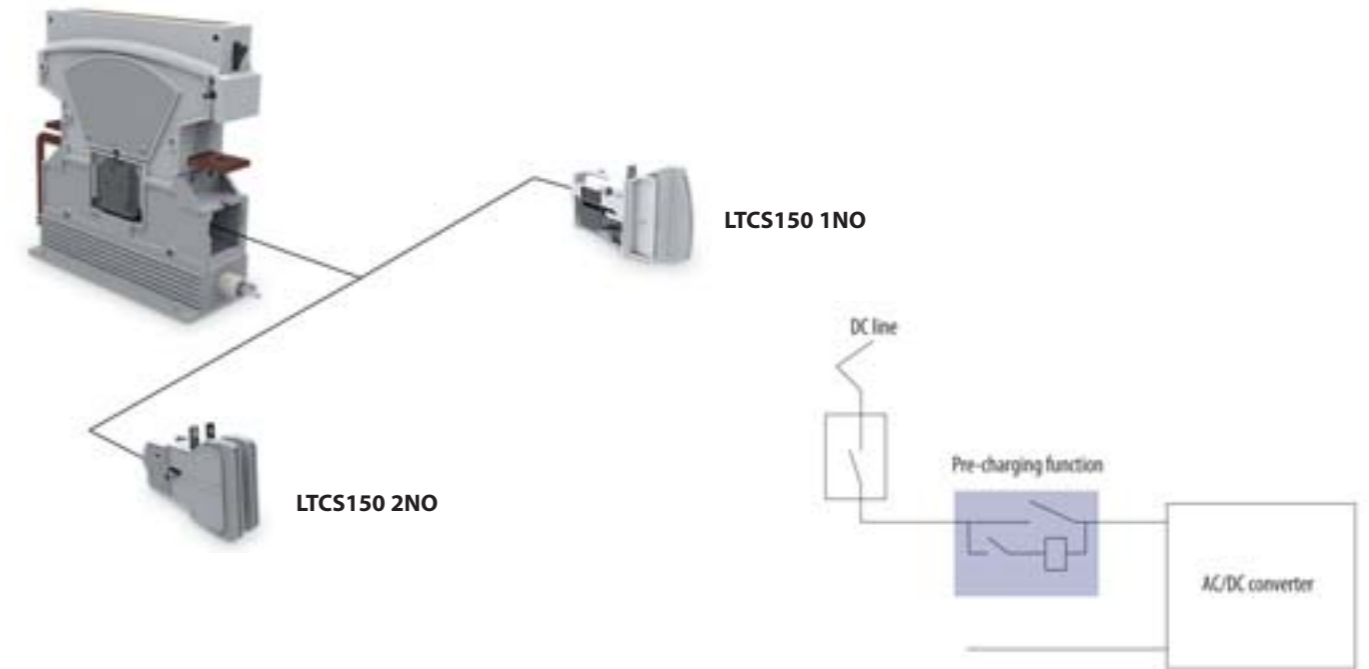
New modular integrated system LPRC 1000 consisting of LTCH1000 line contactor associated with LTCS150 pre-charge contactor and pre-charge resistor.

General characteristics

- The LTCH1000 line contactor has a dedicated base-plate and works up to 2kV – 1000A.
- The new LTCS150 pre-charge contactor is available in 1 or 2 poles configuration for applications up to 1kV or up to 2kV. Its overall dimensions are limited as it is enclosed in the volume of the LTCH 1000 for the most part.
- The pre-charge resistor, integrated in the base, has a thermal capacity of 180kJ and has different resistance values depending on the application.

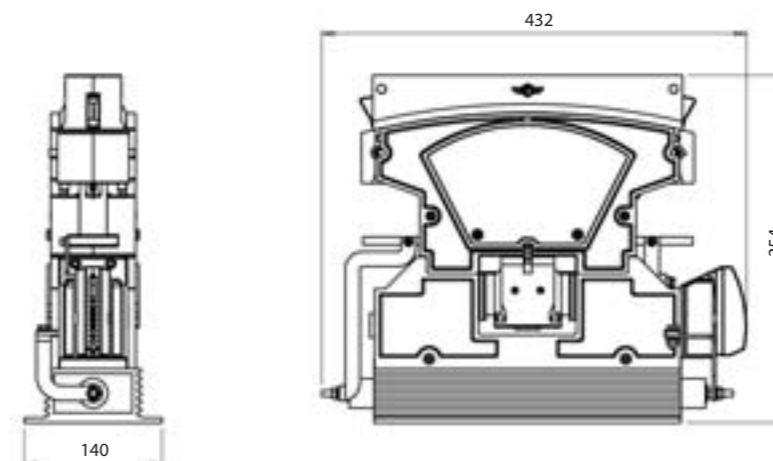
Benefits

- The electrical connections are integrated so that the terminals are limited to "In" and "Out" only.
- Excellent performances with reduced weight and volume.
- Quick installation: common interface for HV and for LV.
- Quick maintenance: low time to substitute all the system or the single components.



Type	U _{max} [V _{AC/DC}]	I _{th} [A]	Resistance [Ω]
LTCH1000	2000	1000	-
LTCS150 1NO	1000	150	-
LTCS150 2NO	2000	150	-
Resistor	-	-	10 ÷ 50

Dimensions



1. Parts Lists

Our latest manuals cover 100% of all assembled components shown in 3D exploded views.

All information needed to order the spare parts are clearly listed (part numbers, quantities and descriptions).

2. Maintenance manuals

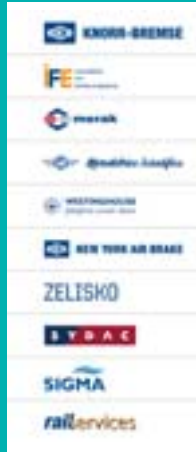
The latest manuals have been created taking into consideration the needs of our clients.

All operations are meticulously documented in order to optimize field service and maintainability both on- and off-board

3. Spare-part kits

A wide variety of kits are offered to cover all aspects of required maintenance. A complete line of overhaul and preventive kits have been created to ensure the optimum lifetime of our products. However, we also offer customized kits to satisfy our clients' special needs.





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Knorr-Bremse India Private Ltd. (productive localization)
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