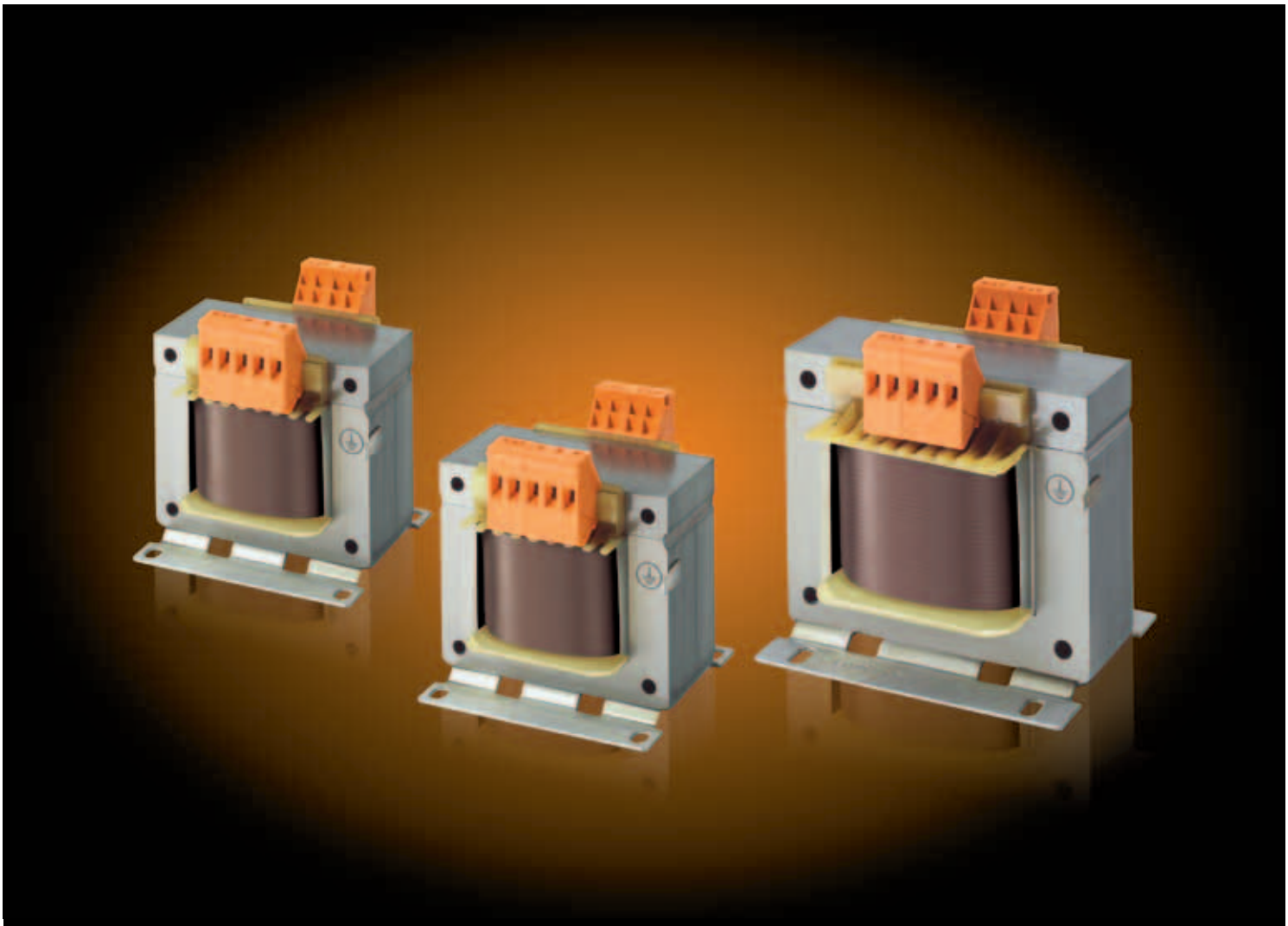


Simply reliable.
ABB Single-phase Transformers.
When transformation means safety and control.

Power and productivity
for a better world™

Robust and reliable.

The two ranges of ABB transformers - to meet every need.

The operational control of machines and automatic systems is performed by auxiliary (or control) circuits. Because of this function, these circuits must satisfy increasingly complex requirements. As a result, they must be particularly reliable, both in terms of function and of safety against direct and indirect contacts.

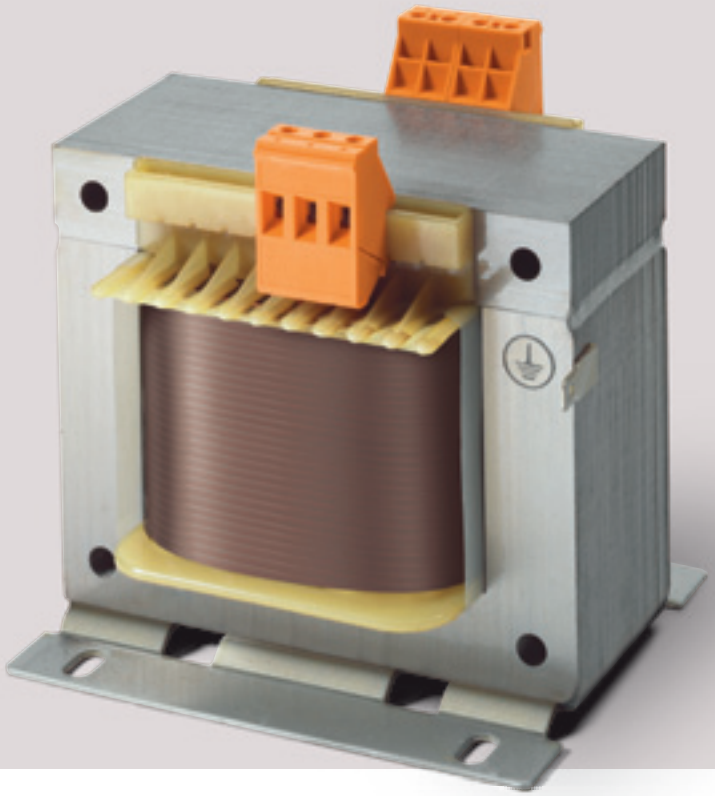
Control

TM-C control series

Primary 230-400V
Secondary 12-24V

Primary 230-400V
Secondary 115-230V

Standards
IEC EN 61558-2-2
UL506, CSA C22-2-N66



Auxiliary circuits can be powered directly from the network or through a transformer. For electrical equipment of machines, the IEC EN 60204-1 standard requires the use of a transformer[1], an option that should be preferred in any case.

Control, Safety, Insulation

TM-S safety series

Primary 230-400V ±15
Secondary 12-24V

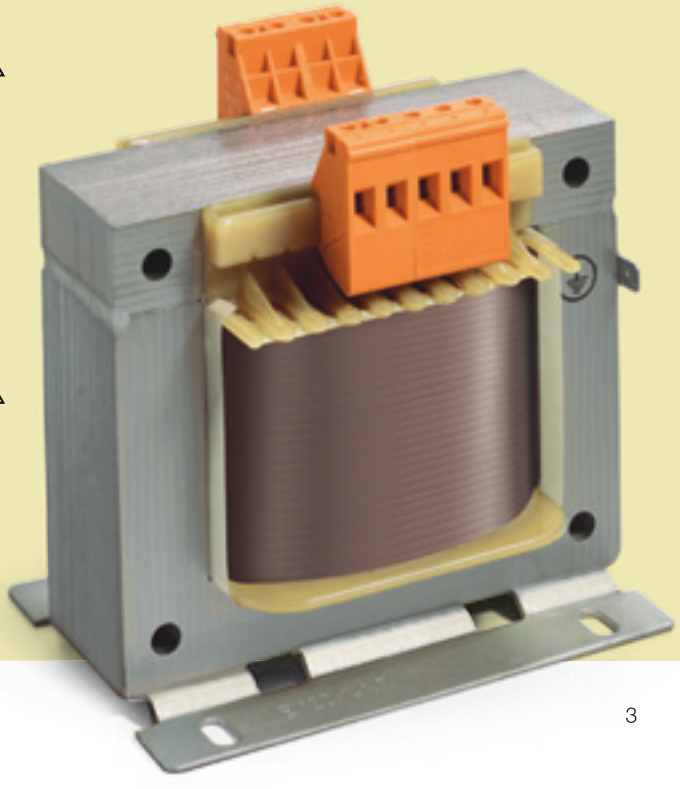
Primary 230-400V ±15
Secondary 24-48V

Standards
IEC EN 61558-2-2, 2-6
UL506, CSA C22-2-N66

TM-I isolation series

Primary 230-400V ±15
Secondary 115-230V

Standards
IEC EN 61558-2-2, 2-4
UL506, CSA C22-2-N66

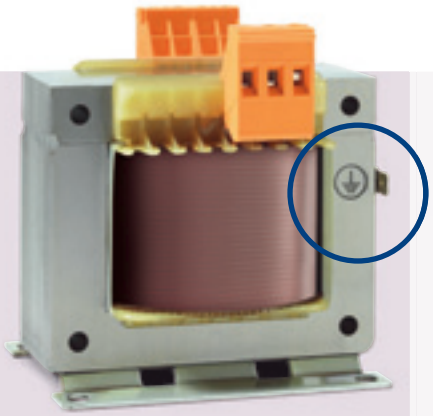


[1] Except for machines equipped with a single motor with power not exceeding 3 kW and for control circuits including not more than two control devices.

Choosing an ABB transformer
Choosing experience.

ABB stands for sure quality and effective results.

Unlike direct connection to power supply, the use of transformer allows the secondary circuit to have control voltage with no variations, even in the presence of unbalanced loads, thus ensuring greater safety of operation.

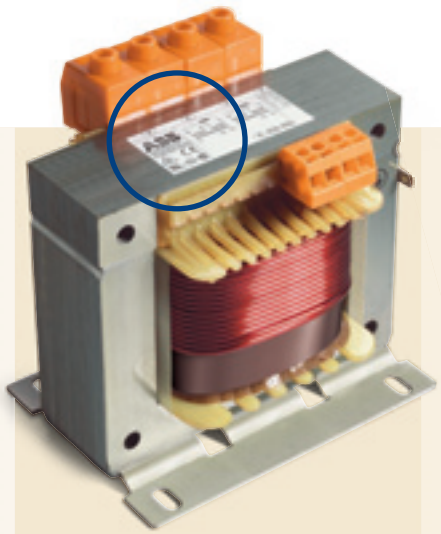


Simplicity

Easier earthing.

With 6.3 x 0.8 mm Faston welded to the core, the earthing operation is easier.

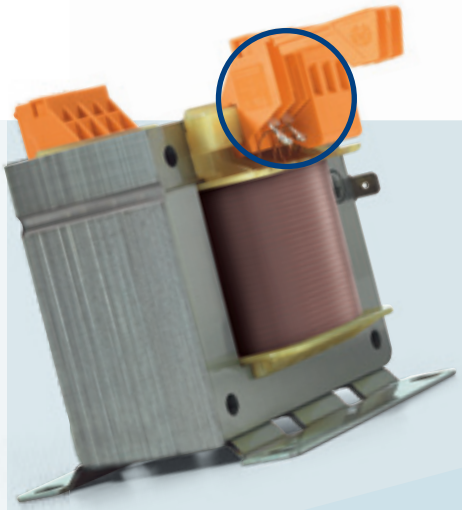
By fixing the transformer to the switchboard plate by means of washer-head screws, the cable connection operation is also saved.



Conformity

Quality certified by the most important bodies.

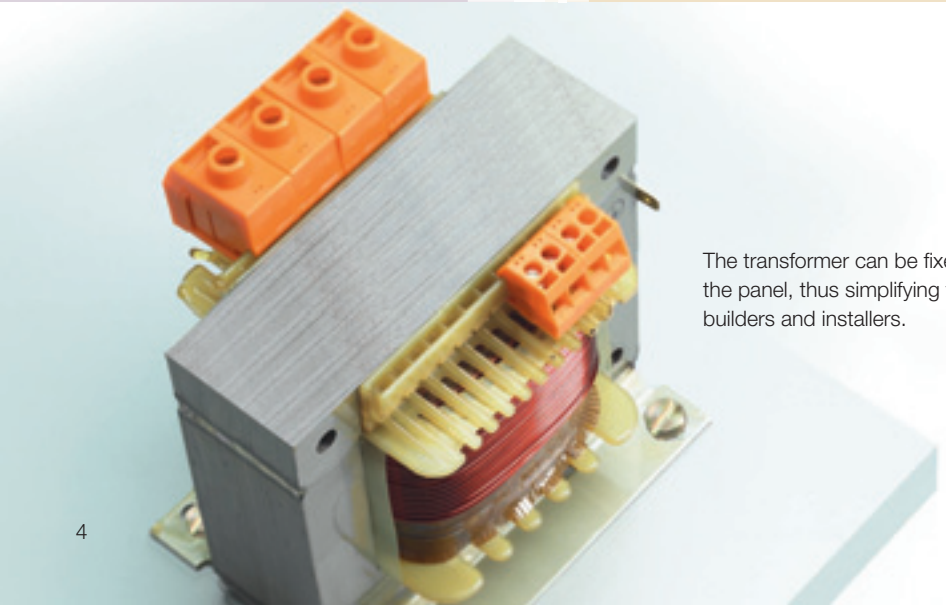
The transformers have been designed and developed in compliance with the strictest standards.



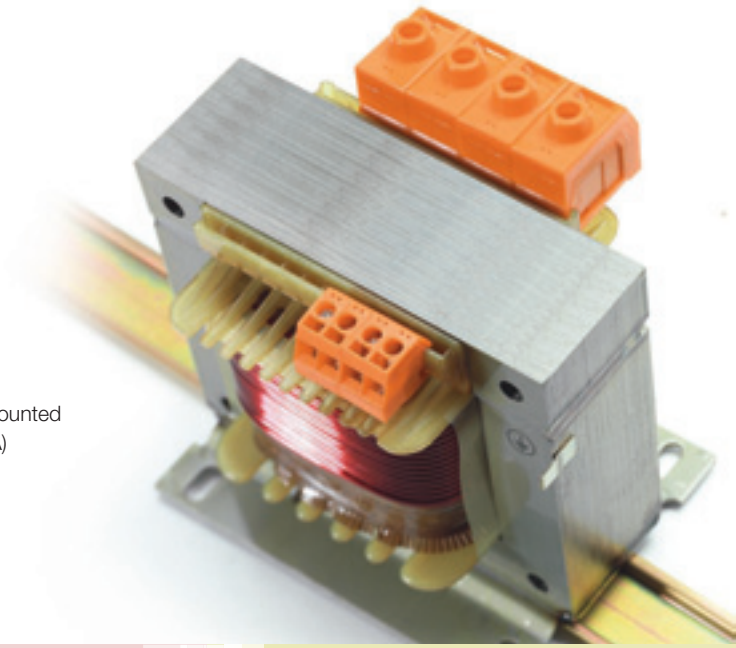
Safety

Easy and safe wiring.

The use of tunnel terminals ensures maximum safety of connections, for cable sections of up to 6 mm^2.



The transformer can be fixed directly onto the panel, thus simplifying the job of panel builders and installers.

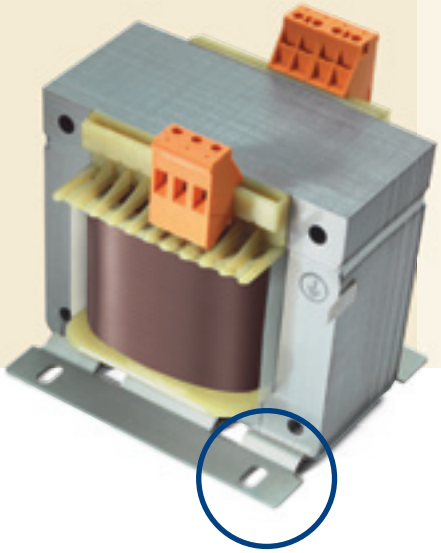


Using a specific adapter,
the transformer can be mounted
on a DIN rail (up to 160VA)

Flexibility

Fixing in compliance with the DIN 41307 standard by means of core welding.

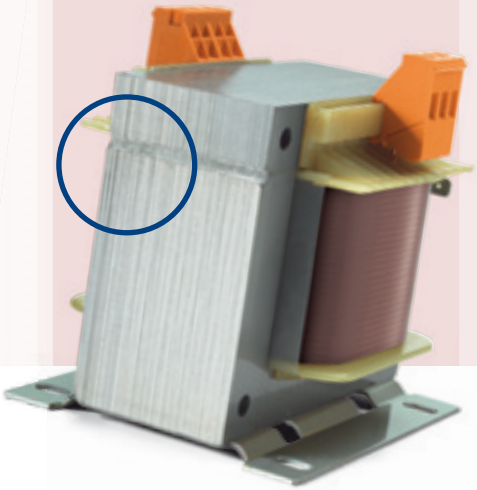
The transformer can be installed on the mounting plate or, up to 160VA, on DIN rail using the TM-C DIN accessory.



Noiselessness

Core welding on the entire range.

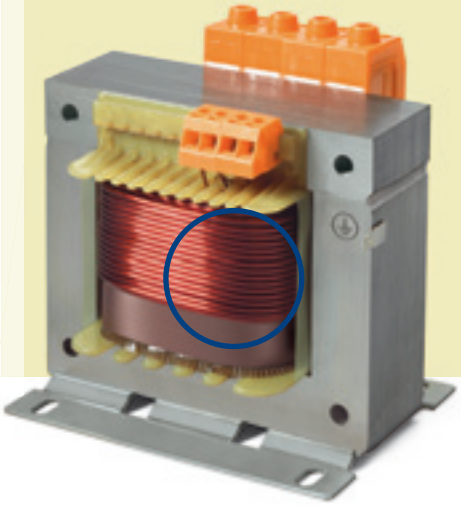
This type of welding minimizes the sheets vibration, making the transformer a lot quieter.



Stability

Windings are entirely made of enamelled copper for even more stable secondary voltage.

The maximum tolerance of a control transformer is ±10% on secondary voltage, both with no load and at full load; for a safety or an isolating transformer this tolerance is reduced to ±5% at full load.



Specificity and competence in differences.

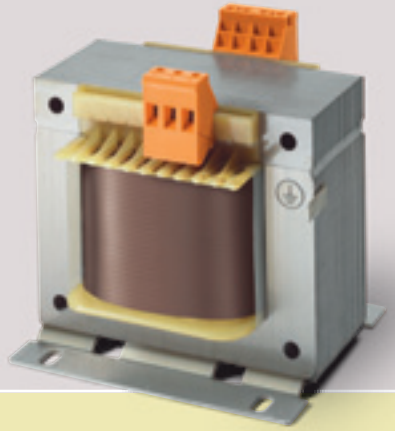
Unique features for different applications.

When an auxiliary circuit is powered by a transformer, galvanic separation between auxiliary circuit and power circuit is successfully realized. In this way, an insulation failure of the auxiliary circuits does not affect the power circuit and, at the same time, the protection level against accidents and operational reliability is enhanced.

TM-C

Control circuit.

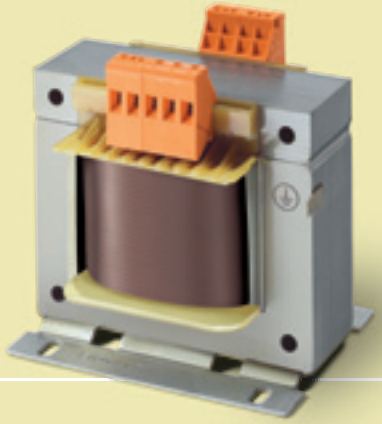
Power supply of loads with different voltage or requiring separation from the primary circuit.



TM-S

SELV circuit.

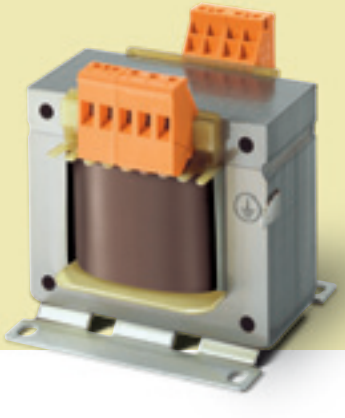
Maximum protection against direct and indirect contacts with safety extra-low voltage.



TM-I

Electrical insulation and IT systems.

Maximum service continuity in all critical applications.

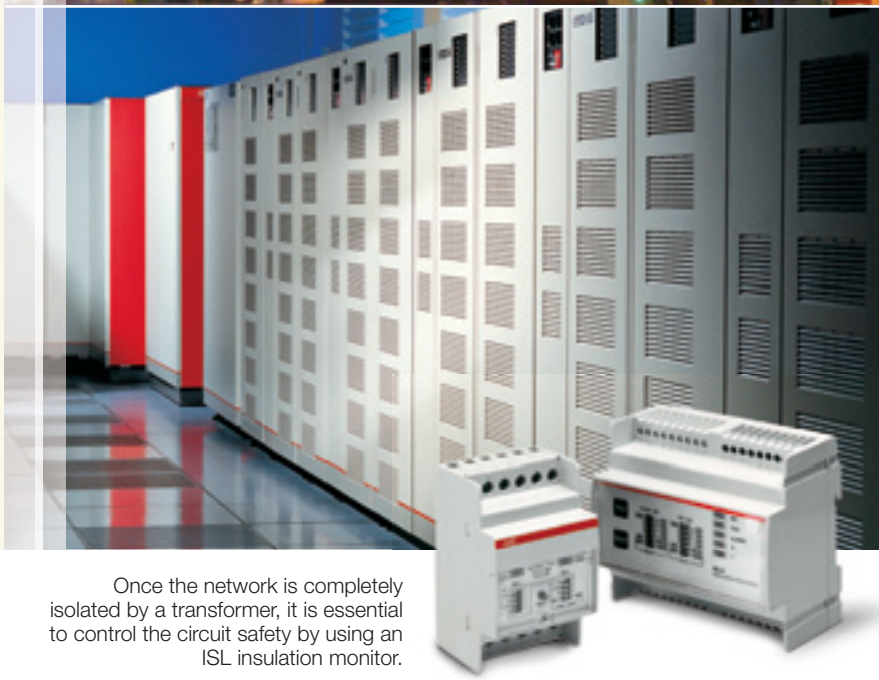


TM-C Control Transformers

- Ideal for power supply of control and auxiliary circuits, both in distribution and automation boards
- Wide range of power from 50 to 2500VA
- Full power on all secondary outputs
- Double secondary outputs (12-24V or 115-230V) on the whole range

TM-S and TM-I Control, Isolating and Safety Transformers

- Reinforced insulation between primary and secondary circuit ensures reliable operation in any application conditions
- Wide range of power from 50 to 2500VA
- Primary circuit 230-400V with ±15V outlets for precise regulation of input voltage
- Full power on all secondary outputs
- Double secondary outputs 12-24V or 24-48V for TM-S safety transformers
- Double secondary outputs 115-230V for TM-I isolating transformers

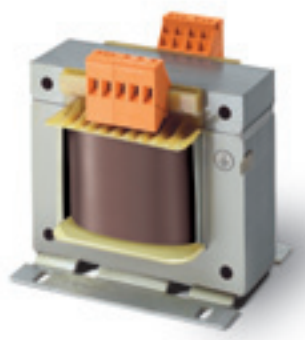


Once the network is completely isolated by a transformer, it is essential to control the circuit safety by using an ISL insulation monitor.

All you have to know to choose always the best solution.

Transformer and protection quick selection table.

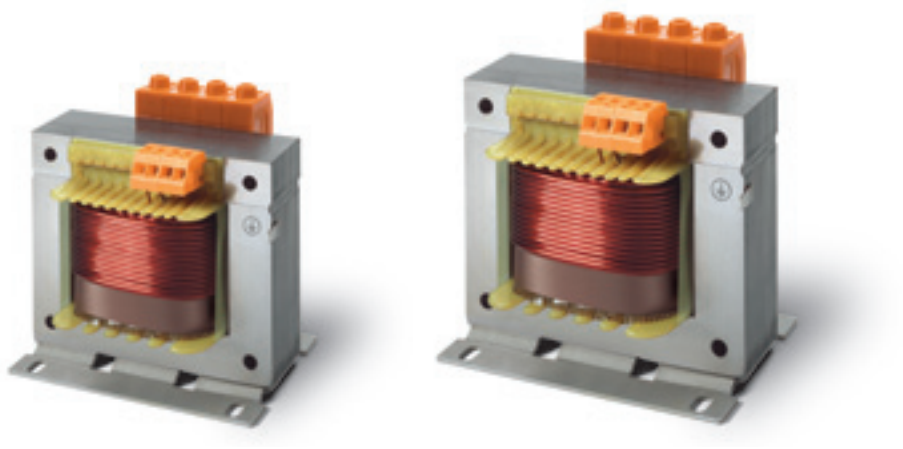


Power VA		TM-C Control				TM-S Control/Safety				TM-I Control/Isolating	
	Secondary voltage	12V	24V	115V	230V	12V	24V	24V	48V	115V	230V
50	Transformer	2CSM207113R0801		2CSM207213R0801		2CSM236893R0801		2CSM204653R0801 [2]		2CSM204583R0801	
	Fuse gauge [1]	4A	2A	0,4A	0,2A	4A	2A	2A	1A	0,4A	0,2A
100	Transformer	2CSM207103R0801		2CSM236933R0801		2CSM207163R0801		2CSM204643R0801		2CSM201123R0801	
	Fuse gauge [1]	8A	4A	0,8A	0,4A	8A	4A	4A	2A	0,8A	0,4A
	Circuit breaker type	S202 C8	S202 C4	S202 C1	S202 C0,5	S202 C8	S202 C4	S202 C4	S202 C2	S202 C1	S202 C0,5
160	Transformer	2CSM236853R0801		2CSM207203R0801		2CSM202073R0801		2CSM204633R0801		2CSM204533R0801	
	Fuse gauge [1]	12A	6,3A	1,25A	0,63A	12A	6,3A	6,3A	3,15A	1,25A	0,63A
	Circuit breaker type	S202 C13	S202 C8	S202 C1,6	-	S202 C13	S202 C8	S202 C8	S202 C4	S202 C1,6	-
200	Transformer	2CSM236823R0801		2CSM236883R0801		2CSM260043R0801		-		2CSM204513R0801	
	Fuse gauge [1]	16A	8A	1,6A	0,8A	16A	8A	-	-	1,6A	0,8A
	Circuit breaker type	S202 C16	S202 C8	S202 C2	S202 C1	S202 C16	S202 C8	-	-	S202 C2	S202 C1
250	Transformer	2CSM207093R0801		2CSM207153R0801		2CSM260113R0801		2CSM204683R0801		2CSM204503R0801	
	Fuse gauge [1]	20A	10A	2A	1A	20A	10A	10A	5A	2A	1A
	Circuit breaker type	S202 C20	S202 C10	S202 C2	S202 C1	S202 C20	S202 C10	S202 C10	S202 C6	S202 C2	S202 C1
320	Transformer	2CSM236843R0801		2CSM236923R0801		2CSM260063R0801		2CSM204673R0801		2CSM204493R0801	
	Fuse gauge [1]	25A	12A	2,5A	1,25A	25A	12A	12A	6,3A	2,5A	1,25A
	Circuit breaker type	S202 C25	S202 C13	S202 C3	S202 C1,6	S202 C25	S202 C13	S202 C13	S202 C8	S202 C3	S202 C1,6
400	Transformer	2CSM289703R0801		2CSM207193R0801		2CSM260103R0801		2CSM204613R0801		2CSM201073R0801	
	Fuse gauge [1]	32A	16A	3,15A	1,6A	32A	16A	16A	8A	3,15A	1,6A
	Circuit breaker type	S202 C32	S202 C16	S202 C4	S202 C2	S202 C32	S202 C16	S202 C16	S202 C8	S202 C4	S202 C2
630	Transformer	2CSM236813R0801		2CSM207183R0801		2CSM260053R0801		2CSM204603R0801		2CSM204423R0801	
	Fuse gauge [1]	50A	25A	5A	2,5A	50A	25A	25A	12A	5A	2,5A
	Circuit breaker type	S202 C50	S202 C25	S202 C6	S202 C3	S202 C50	S202 C25	S202 C25	S202 C13	S202 C6	S202 C3
1000	Transformer	2CSM292873R0801		2CSM236913R0801		2CSM260093R0801		-		2CSM204413R0801	
	Fuse gauge [1]	80A	40A	8A	4A	80A	40A	-	-	8A	4A
	Circuit breaker type	S292 C80	S202 C40	S202 C8	S202 C4	S292 C80	S202 C40	-	-	S202 C8	S202 C4
1600	Transformer	2CSM292863R0801		2CSM201813R0801		2CSM260083R0801		-		2CSM204403R0801	
	Fuse gauge [1]	125A	63A	16A	8A	125A	63A	-	-	16A	8A
	Circuit breaker type	S292 C125	S202 C63	S202 C16	S202 C8	S292 C125	S202 C63	-	-	S202 C16	S202 C8
2000	Transformer	2CSM292853R0801		2CSM236903R0801		2CSM260073R0801		-		2CSM204383R0801	
	Fuse gauge [1]	160A	80A	16A	8A	160A	80A	-	-	16A	8A
	Circuit breaker type	-	S292 C80	S202 C20	S202 C10	-	S292 C80	-	-	S202 C20	S202 C10
2500	Transformer	2CSM236943R0801		2CSM207173R0801		2CSM204663R0801		-		2CSM204363R0801	
	Fuse gauge [1]	200A	100A	20A	10A	200A	100A	-	-	20A	10A
	Circuit breaker type	-	S292 C100	S202 C25	S202 C13	-	S292 C100	-	-	S202 C25	S202 C13

(1) FUSES
- Gauge ≤ 6.3A use aM fuses with high breaking capacity and IEC60127-compliant
- Gauge > 6.3A use gG fuses IEC60269-2 or IEC60269-3-compliant

(2) TM-S 50/24-48 P complies with IEC EN 61558-2-4 on the secondary circuit at 48V and with IEC EN 61558-2-6 on the secondary circuit at 24V



Minimum protection on the primary circuit

Power VA		230V single-phase	400V single-phase
50	**Transformer**		
	aM fuse	0,5A	0,315A
100	**Transformer**		
	aM fuse	1A	0,63A
	Circuit breaker rated current	1,6A	1A
	Circuit breaker characteristic	D	D
160	**Transformer**		
	aM fuse	1,6A	1A
	Circuit breaker rated current	3A	2A
	Circuit breaker characteristic	D	D
200	**Transformer**		
	aM fuse	2A	1,25A
	Circuit breaker rated current	3A	2A
	Circuit breaker characteristic	D	D
250	**Transformer**		
	aM fuse	2,5A	1,6A
	Circuit breaker rated current	4A	3A
	Circuit breaker characteristic	D	D
320	**Transformer**		
	aM fuse	3,15A	2A
	Circuit breaker rated current	5A	3A
	Circuit breaker characteristic	D	D
400	**Transformer**		
	aM fuse	4A	2,5A
	Circuit breaker rated current	8A	5A
	Circuit breaker characteristic	D	D
630	**Transformer**		
	aM fuse	6,3A	4A
	Circuit breaker rated current	13A	8A
	Circuit breaker characteristic	D	D
1000	**Transformer**		
	Delayed fuse	10A	6A
	Circuit breaker rated current	20A	13A
	Circuit breaker characteristic	D	D
1600	**Transformer**		
	aM fuse	16A	10A
	Circuit breaker rated current	32A	20A
	Circuit breaker characteristic	D	D
2000	**Transformer**		
	aM fuse	20A	12A
	Circuit breaker rated current	40A	25A
	Circuit breaker characteristic	D	D
2500	**Transformer**		
	aM fuse	25A	16A
	Circuit breaker rated current	50A	32A
	Circuit breaker characteristic	D	D

Notes:

- The protection indicated in the table is the minimum "recommended" protection for the power supply line
- The breaking capacity of the primary circuit-breakers depends on the power supply line

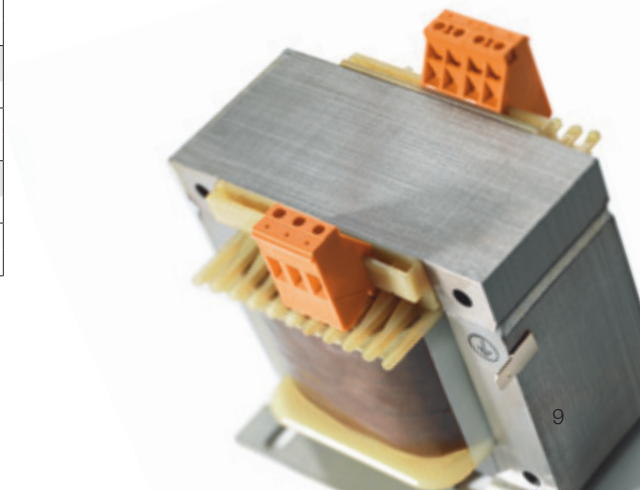
Protected transformers

On the primary side, the transformer cannot generate any overload by itself. During power up, however, a very high inrush current (approx. 25-30 *In*) is generated.
Protections should therefore be calibrated in order to prevent their tripping during the transformer connection phase.
The most indicated types of protection are:

- aM fuses
- S202 circuit-breakers with D characteristic.

The secondary circuit must be protected against overload and short-circuit. Moreover, additional protection may need to be adopted depending on the distribution system type.

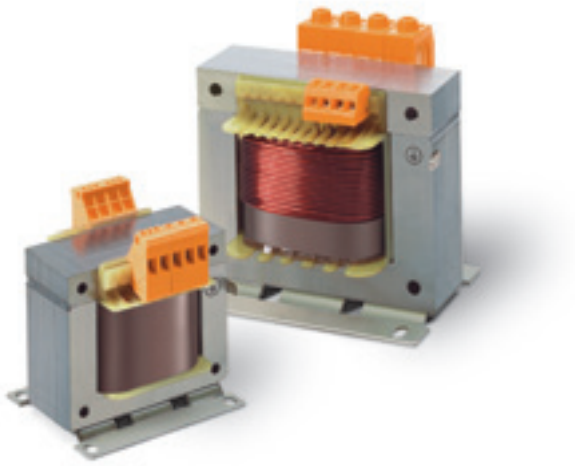
- **Overload:** The tripping current value of the protection used should be equal to or lower than the secondary current of the transformer.
- **Short-circuit:** Any short-circuit in the most distant point of the line should make the protection device trip in less than 5 seconds (IEC 60364). The protection of the transformer and the protection of the line may coincide when the transformer supplies power to a single line and a full compatibility has been ensured.



With ABB theory turns into practice.

Technical details. The concepts of single-phase transformers.

When choosing the voltage value for supplying power to control circuits, two aspects should be taken into consideration: operators safety and functional reliability of the circuits, which may depend on voltage drop. For the safety of operators, machines and systems, you need to ensure that any accidental earth contact in one or more points of the auxiliary circuits cannot cause any unwanted start of the machine or cannot prevent the stop of the machine.



Control Transformer

This transformer is intended for power supply of control circuits, i.e. checking, signalling, interlock, etc.

Isolating Transformer

An isolating transformer is a transformer where primary and secondary windings are electrically separated by a double or reinforced insulation, in order to minimize (in the secondary-side powered circuit) any risk due to simultaneous accidental contacts with the ground or with active parts or masses that can be energized in case of failure of the main insulation.

Safety Transformer

This is an isolating transformer intended for powering safety extra-low voltage circuits (<50 V with no load).
Any accidental contact on the secondary winding phases does not cause any danger to the operators.

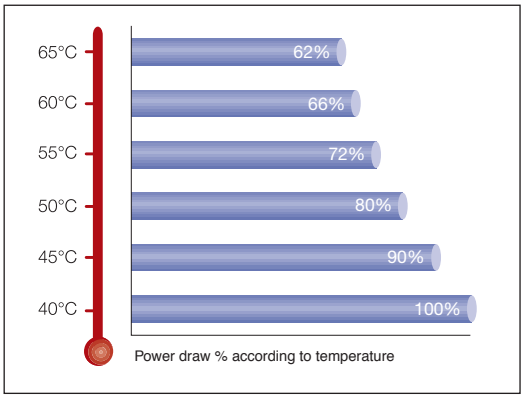
Impregnation and tropicalization

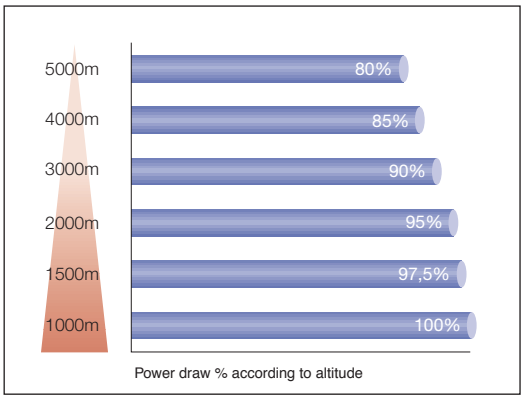
ABB transformers are completely impregnated using a resin with insulation class F.
This treatment improves the characteristics of the insulators used, making the transformer suitable for installation in severe environments, improves heat exchange by reducing transformer temperature, prevents moisture from penetrating into the windings and core, and minimizes vibrations and resulting noise.

Insulation classes

The durability of product insulation is affected by several factors and, if the insulating material electrically separates parts accessible for use and live parts, any alteration of its characteristics may generate risks for user safety.
The standards lay down maximum temperature limits for transformer windings according to the insulation class.
The ABB transformers are made with class B materials.
The maximum room temperature to be considered is indicated in the transformer nameplate data.

Power draw according to temperature and altitude





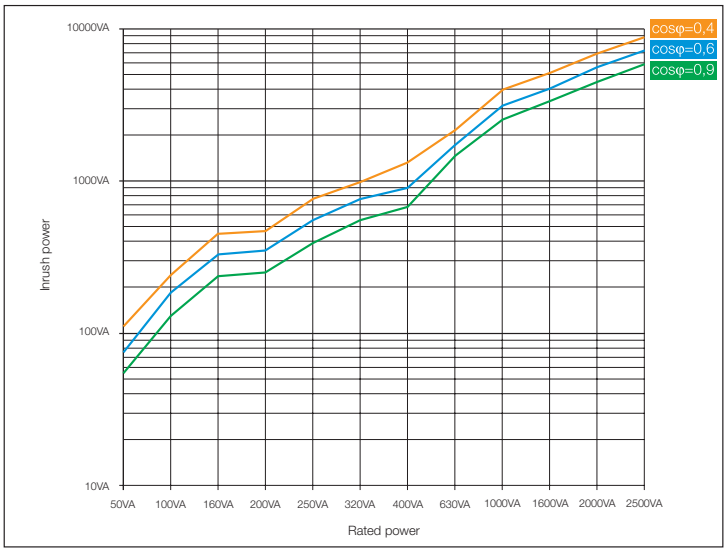
Insulation class	T MAX
A	100 °C
E	115 °C
B	120 °C
F	140 °C
H	165 °C

Short circuit voltage, no-load output voltage variations and power loss data

Power (VA)		50	100	160	200	250	320	400	630	1000	1600	2000	2500
Ucc	(%)(1)	10,6	7,5	5,2	4,8	9,5	6,9	6	4	3,5	3	2,8	2,3
ΔV	(%)(2)	11	7,8	6	5,8	6,7	7	5,4	4,3	3,3	2,8	2	1,8
Power loss	(W)	9	15	19	21	38	36	41	47	60	70	85	100

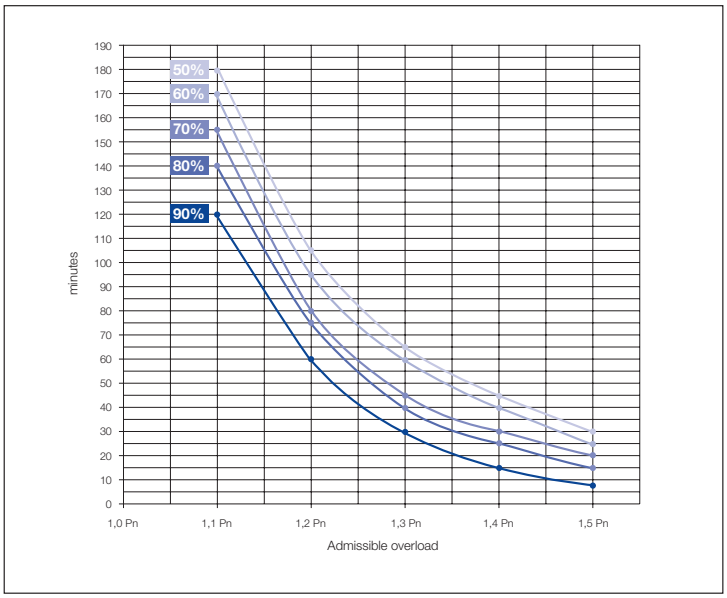
(1) Percent of rated supply voltage
(2) Percent of rated output voltage

Inrush power trend



Admissible overload

If the transformer rated power is not drawn on a continuous basis, the transformer may be overloaded, according to the diagram below:



When a transformer is used with an intermittent work cycle, it can be dimensioned according to the formula below:

$$P_{transformer} = P_{intermittent} * \sqrt{\frac{\text{operation time}}{\text{total cycle time (operation+pause)}}}$$

with time expressed in minutes.

ABB trustworthy answers to every need.

In a control equipment can I use the two secondary outputs of a single transformer to supply two different auxiliary circuits?

Both secondary outputs of an ABB transformer can be simultaneously used to supply two circuits with a different rated voltage. The total power drawn from both circuits may not exceed the rated power of the transformer.

What kind of transformer should be used to supply safety extra-low voltage circuits (SELV)?

To create a SELV circuit you need to use a safety transformer compliant with the IEC EN 61558-2-6 standard, that can guarantee both separation between the systems by means of double insulation and the extra-low voltage required (12-24V±5%).

Is it possible to connect in parallel the secondary windings of two or more ABB single-phase transformers ?

Up to 3 ABB transformers with equal power can be parallel connected, keeping in mind that the total power supplied will be equal to 90% of the sum of the single powers. Pay great attention to terminal connection and, if necessary, test the circuit first in series and then in parallel.

In a 24V AC powered equipment if I need to power a cooling fan with 230V AC supply rated voltage, can I use a transformer and power it from the secondary circuit?

Transformers can be powered “upwards” from the secondary circuits; however, for construction reasons, the primary circuit output voltage can deviate by 10-30% from the rated power.

How can I quickly size the power of a transformer?

P = 0,8 (Σ Pm + Σ Pr + Pa)
Σ Pm = Sum of all continuous power consumptions of contactors
Σ Pr = Sum of all resistive powers
Pa = Inrush power of the largest contactor

The numbers of quality.

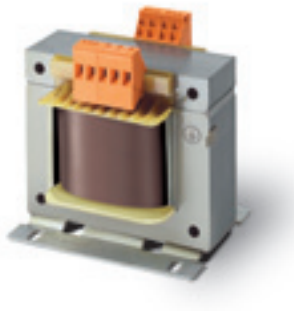
The list of ABB codes, to choose the most suitable transformer.

TM-C single-phase control transformers, 230-400V primary circuit

Rated power	Secondary voltage	Order details	
VA	V	Type code	Order code
50	12-24	**TM-C 50/12-24**	2CSM207113R0801
100	12-24	**TM-C 100/12-24**	2CSM207103R0801
160	12-24	**TM-C 160/12-24**	2CSM236853R0801
200	12-24	**TM-C 200/12-24**	2CSM236823R0801
250	12-24	**TM-C 250/12-24**	2CSM207093R0801
320	12-24	**TM-C 320/12-24**	2CSM236843R0801
400	12-24	**TM-C 400/12-24**	2CSM289703R0801
630	12-24	**TM-C 630/12-24**	2CSM236813R0801
1000	12-24	**TM-C 1000/12-24**	2CSM292873R0801
1600	12-24	**TM-C 1600/12-24**	2CSM292863R0801
2000	12-24	**TM-C 2000/12-24**	2CSM292853R0801
2500	12-24	**TM-C 2500/12-24**	2CSM236943R0801
50	115-230	**TM-C 50/115-230**	2CSM207213R0801
100	115-230	**TM-C 100/115-230**	2CSM236933R0801
160	115-230	**TM-C 160/115-230**	2CSM207203R0801
200	115-230	**TM-C 200/115-230**	2CSM236883R0801
250	115-230	**TM-C 250/115-230**	2CSM207153R0801
320	115-230	**TM-C 320/115-230**	2CSM236923R0801
400	115-230	**TM-C 400/115-230**	2CSM207193R0801
630	115-230	**TM-C 630/115-230**	2CSM207183R0801
1000	115-230	**TM-C 1000/115-230**	2CSM236913R0801
1600	115-230	**TM-C 1600/115-230**	2CSM201813R0801
2000	115-230	**TM-C 2000/115-230**	2CSM236903R0801
2500	115-230	**TM-C 2500/115-230**	2CSM207173R0801

TM-S single-phase control and safety transformers, 230-400V±15 primary circuit

Rated power	Secondary voltage	Order details	
VA	V	Type code	Order code
50	12-24	**TM-S 50/12-24 P**	2CSM236893R0801
100	12-24	**TM-S 100/12-24 P**	2CSM207163R0801
160	12-24	**TM-S 160/12-24 P**	2CSM202073R0801
200	12-24	**TM-S 200/12-24 P**	2CSM260043R0801
250	12-24	**TM-S 250/12-24 P**	2CSM260113R0801
320	12-24	**TM-S 320/12-24 P**	2CSM260063R0801
400	12-24	**TM-S 400/12-24 P**	2CSM260103R0801
630	12-24	**TM-S 630/12-24 P**	2CSM260053R0801
1000	12-24	**TM-S 1000/12-24 P**	2CSM260093R0801
1600	12-24	**TM-S 1600/12-24 P**	2CSM260083R0801
2000	12-24	**TM-S 2000/12-24 P**	2CSM260073R0801
2500	12-24	**TM-S 2500/12-24 P**	2CSM204663R0801
50	24-48	**TM-S 50/24-48 P**	2CSM204653R0801
100	24-48	**TM-S 100/24-48 P**	2CSM204643R0801
160	24-48	**TM-S 160/24-48 P**	2CSM204633R0801
250	24-48	**TM-S 250/24-48 P**	2CSM204683R0801
320	24-48	**TM-S 320/24-48 P**	2CSM204673R0801
400	24-48	**TM-S 400/24-48 P**	2CSM204613R0801
630	24-48	**TM-S 630/24-48 P**	2CSM204603R0801



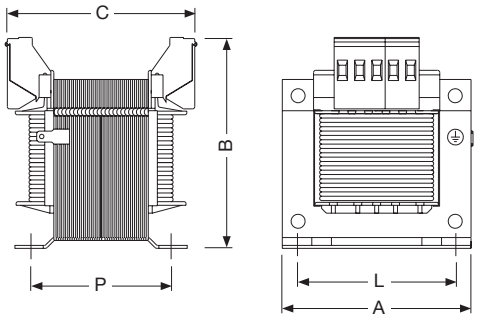
TM-I single-phase control and isolating transformers, 230-400V±15 primary circuit

Rated power	Secondary voltage	Order details	
VA	V	Type code	Order code
50	115-230	**TM-I 50/115-230 P**	2CSM204583R0801
100	115-230	**TM-I 100/115-230 P**	2CSM201123R0801
160	115-230	**TM-I 160/115-230 P**	2CSM204533R0801
200	115-230	**TM-I 200/115-230 P**	2CSM204513R0801
250	115-230	**TM-I 250/115-230 P**	2CSM204503R0801
320	115-230	**TM-I 320/115-230 P**	2CSM204493R0801
400	115-230	**TM-I 400/115-230 P**	2CSM201073R0801
630	115-230	**TM-I 630/115-230 P**	2CSM204423R0801
1000	115-230	**TM-I 1000/115-230 P**	2CSM204413R0801
1600	115-230	**TM-I 1600/115-230 P**	2CSM204403R0801
2000	115-230	**TM-I 2000/115-230 P**	2CSM204383R0801
2500	115-230	**TM-I 2500/115-230 P**	2CSM204363R0801

Accessories

	Order details	
	Type code	Order code
Accessory for mounting on a DIN rail (up to 160VA)	**TM-C-DIN**	2CSM201033R0801

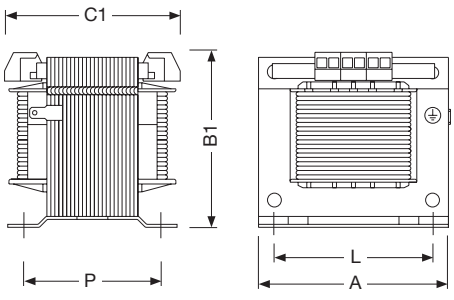
Weight and overall dimensions



from 50 to 400VA

Single-phase control (TM-C), safety (TM-S) and isolating (TM-I) transformers

Power (VA)	Dimensions (mm)					Screw	Weight (Kg)
	A	B	C	P	L		
50	76	89	69	46	56	M4	1,1
100	85	95	87	63	64	M4	2
160	97	106	89	73	84	M5	3
200	97	106	89	73	84	M5	3,2
250	97	106	105	89	84	M5	3,6
320	121	122	91	73	90	M5	4,4
400	121	122	104	85	90	M5	5,5



from 630 to 2500VA

Single-phase control (TM-C), safety (TM-S) and isolating (TM-I) transformers

Power (VA)	Dimensions (mm)					Screw	Weight (Kg)
	A	B1	C1	P	L		
630	151	150	122	90	122	M6	7,8
1000	151	150	166	133	122	M6	13,2
1600	193	184	163	125	155	M8	21,2
2000	193	184	181	143	155	M8	25,5
2500	193	184	191	153	155	M8	26,8

Completely effective.

The range of ABB single-phase transformers is now complete.

Modular

TM, TS and TS-C range

One of the most complete and best performing range in the market of modular safety transformers and bell transformers, totally integrated with the System pro *M* compact® products.

Medical

TI range

The most compact transformers in their class available on the market, always complying with the strictest standards for power supply in medical locations.

Control

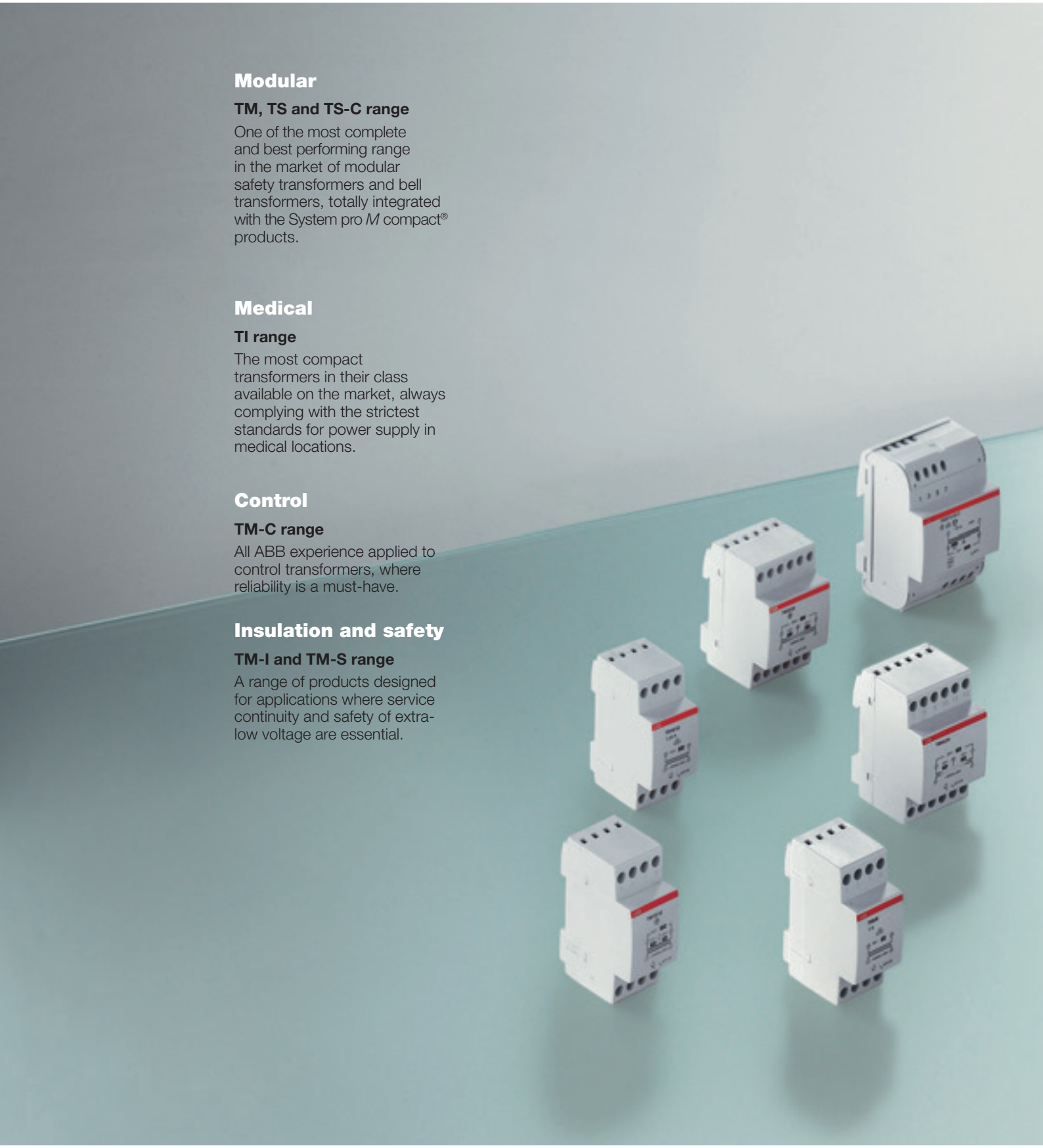
TM-C range

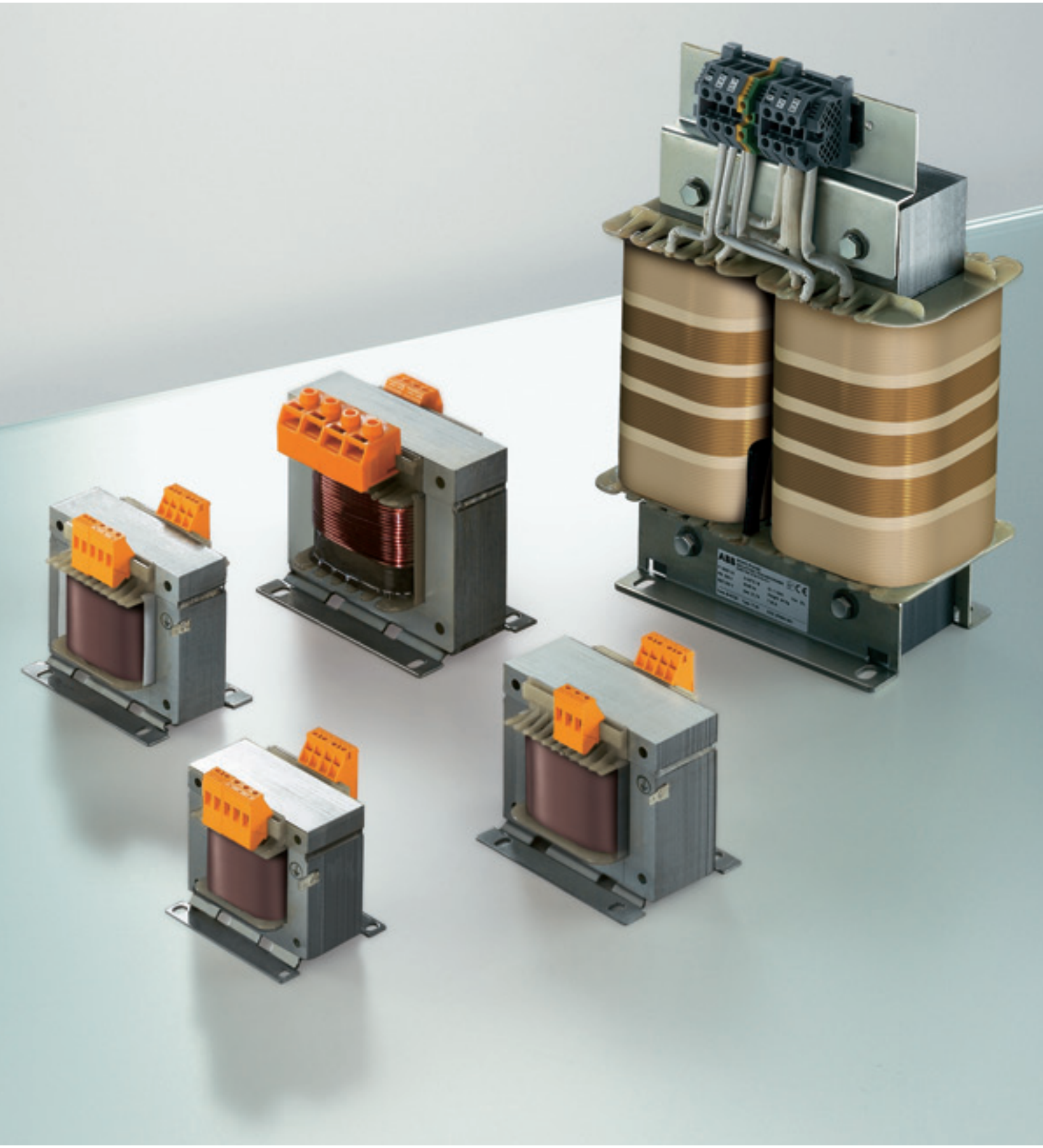
All ABB experience applied to control transformers, where reliability is a must-have.

Insulation and safety

TM-I and TM-S range

A range of products designed for applications where service continuity and safety of extra-low voltage are essential.





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