

General technical data

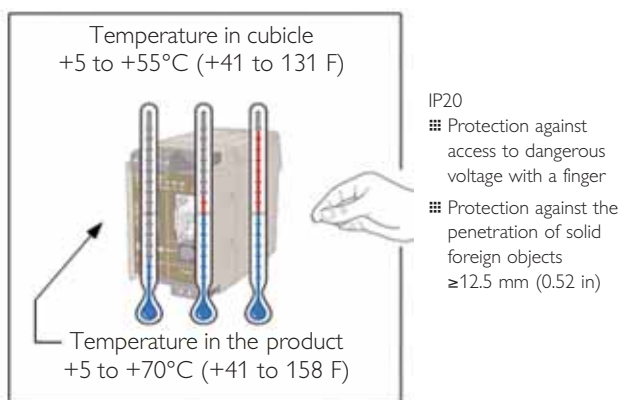
Environmental and mechanical conditions

Factor	Requirement		Comments
	Severity	Standard	
Temperature Operating	+5 to +55°C (+41 to 131°F) –25 to +70°C* (–13 to 158°F *)	IEC 721-3-3	
Temperature Storage & transport	–25 to +70°C (–13 to 158°F)	IEC 721-3-1/2	
Relative humidity Operating	5 to 95%, non-condensing	IEC 721-3-3	Do not use until temperature and humidity have stabilized
Relative humidity Storage & transport	5 to 95% condensation allowed outside packaging	IEC 721-3-1/2	Product in packaging
Airborne contaminants severity level	G2 (1000 Å=0.1 µm) Moderate	ISA 71.04	Product installed in IP 21 enclosure, or better, with limited air flow (no fan)

* Extended temperature range

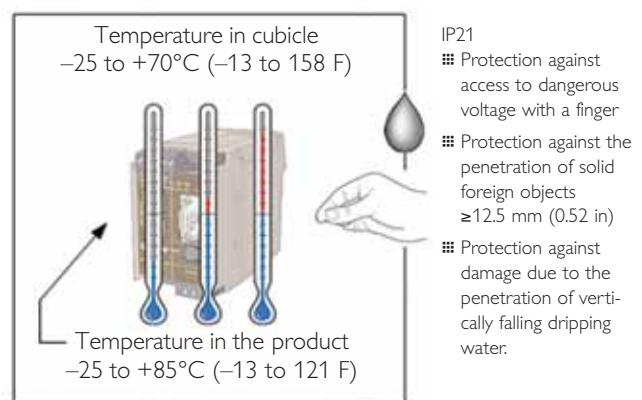
Industrial environment

Accepted operating temperature +5 to +40°C
(+41 to 104 F)



Outdoor environment

Accepted operating temperature –25 to +55°C
(–13 to 131 F)



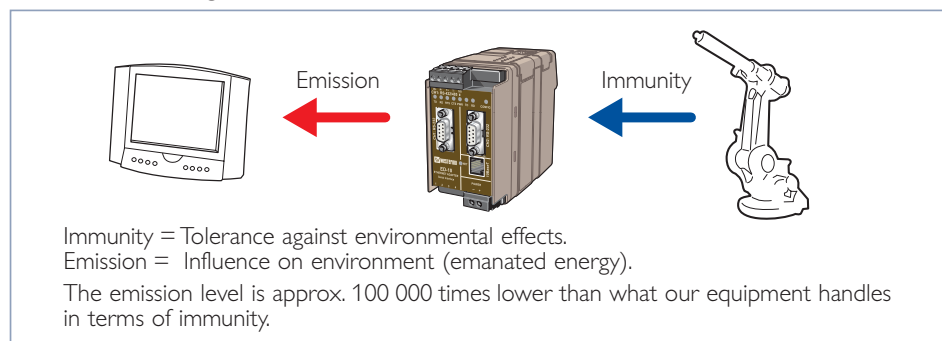
Specifications for temperature ranges and IP classification exist on different levels, we differ between industrial environments and outdoor installations. The components designed for respective variants must then withstand the ambient temperature as well as the inherent heat generated in enclosures and cubicles. In general, each enclosure is considered to generate a 15°C (59 F) increase in temperature, for example, components must be selected that withstand +85°C (+121 F) in order for us to guarantee an ambient temperature (outside of the cubicle) of +55°C (+131 F).

Electrical conditions

Factor	Requirement		Comments	Reference
	Severity	Standard		
Emission	EN 61000-6-3 Residential	EN 55022 class B		See 1.1 and 1.2
Immunity	EN 61000-6-2 Industrial	EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-5 EN 61000-4-6 EN 61000-4-8 EN 61000-4-11		See 1.1 and 1.2
	Information Technology Equipment	EN 55024		See 1.3
Power supply (LV)				See 2.1
Rated voltage range	12 to 48 VDC			See 2.2
Operating voltage range	9.6 to 57.6 VDC			
Power supply (HV)				See 2.2
Rated voltage range	95–240 VAC 110–250 VDC			
Operating voltage range	85.5–264 VAC 88–300 VDC			
Rated Power supply frequency range	48 – 62 Hz			
Reverse polarity protection	Yes			
Short circuit protection	As a part of the building installation			
TNV-3	Maximum 70.7 V peak / 120 VDC		PSTN or similar	See 2.5
TNV-1	Maximum 42.4 V peak / 60 VDC		RS-422/485, Ethernet or similar	See 2.4
SELV	Maximum 42.4 V peak / 60 VDC		RS-232 or similar	See 2.3

1.1 General emissions

EN 61000-6-3 EMC – Generic standards – Emission standard for residential, commercial and light-industrial environments.



Maximum levels for radio interference generated by equipment connected to the public network or DC-power source. The demands on emission levels are selected so that interference generated by equipment during normal operation in homes, offices, shops and similar environments do not exceed a level that obstructs other equipment (for example, radio receivers) from working as intended.

1.2 ITE emissions

EN 55022 Information technology equipment (ITE) – Radio disturbance characteristics – Limits and methods of measurement.

- ⚙ Measurement methods and limit values for radio interference generated by ITE.
- ⚙ Class B, ITE is intended for homes, offices, shops and similar environments. Does not provide with guaranteed protection against the effects of radio and TV reception when ITE is used at a distance less than 10 m (32.8 ft) from the receiver antenna.
- ⚙ Class A, ITE is intended for all other environments (for example, industrial). Does not provide with guaranteed protection against the effects of radio and TV reception when ITE is used at a distance less than 30 m (98.42 ft) from the receiver antenna.

1.3 ITE immunity

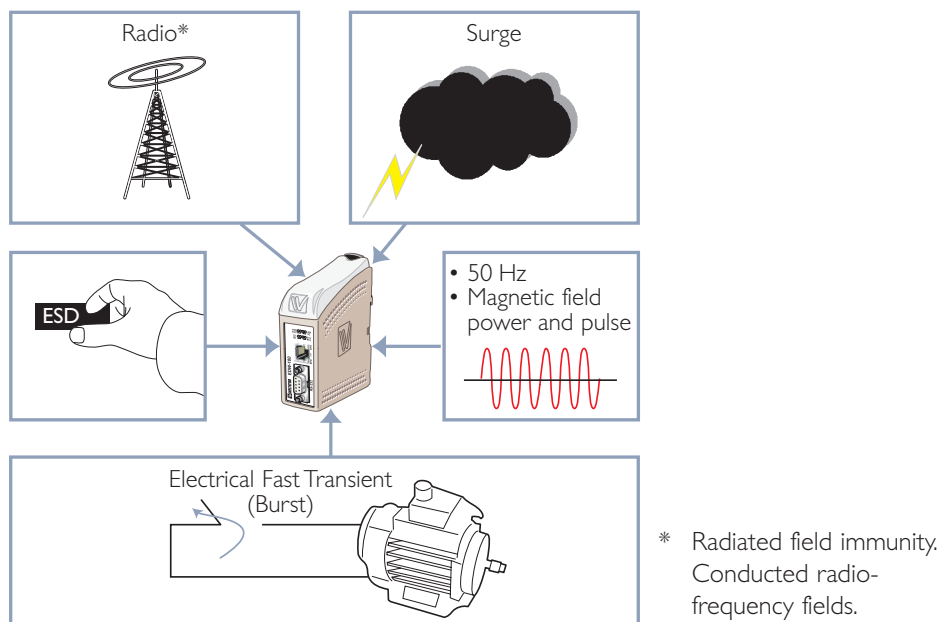
EN 55024 Information technology equipment (ITE) – Immunity characteristics – Limits and methods of measurement.

- ⚙ Test requirement on ITE equipment for immunity to continuous and transient, conducted and radiated disturbances, including electrostatic discharges. Immunity requirements provide a satisfactory level of inherent immunity so that equipment works in the intended manner in its environment.

1.4 General immunity

EN 61000-6-2 Electromagnetic compatibility (EMC). Generic standards.

Immunity standard for industrial environments.



Test requirement on equipment connected to networks in industrial environments for immunity to continuous and transient, conducted and radiated disturbances (including electrostatic discharges). Immunity requirements provide a satisfactory level of immunity for equipment in industrial environments.

1.5 EMC test method

EN 61000-4-2 Electromagnetic compatibility (EMC). Testing and measurement techniques. Electrostatic discharge immunity test.

- ⚙️ Method for testing the immunity of electrical equipment against electrostatic discharges, directly from operators or via adjacent objects. States a number of test levels that refer to different environmental and installation conditions.

EMC severity levels in different environments

Residential

Residential, commercial and light-industrial environments.

Industrial

Immunity for industrial environments.

Railway

Railway applications – Signalling and telecommunications apparatus.

Substation

Communication networks and systems in electrical substations.

Westermo

A combination of residential, industrial, railway, added with experiences from installed Westermo products.

Criteria, a classification of performance

Criteria A: Normal performance within specified limits (as defined in test specification).

Criteria B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.

Criteria C: Temporary loss of function or degradation of performance, the correction of which requires operator intervention.

Test	Port	Westermo	
		Level	Criteria
Emission			
Radiated	Enclosure	30/37 dB (μ V/m)	Class B
Conducted	AC Power	66-56/56/60 Qp dB (μ V)	Class B
	DC Power	66-56/56/60 Qp dB (μ V)	Class B
Immunity			
ESD	Encl. contact	\pm 6 kV	B
	Encl. air	\pm 8 kV	B
Radiated field immunity	Enclosure	20 V/m 1 kHz 80% AM	A
		20 V/m 200 Hz pulse	A
Electrical Fast Transient	Signal	\pm 2.0 kV	A
	AC Power	\pm 2.0 kV	A
	DC Power	\pm 2.0 kV	A
Surge	Signal L-E	\pm 2.0 kV	B
	Signal L-L	\pm 2.0 kV	B
	AC Pow. L-E	\pm 2.0 kV	B
	AC Pow. L-L	\pm 2.0 kV	B
	DC Pow L-E DC Pow L-L	\pm 2.0 kV \pm 2.0 kV	B B
Conducted radio-frequency field	Signal	10 V 1 kHz 80%AM	A
	Power	10 V 1 kHz 80%AM	A
Power magnetic field	Enclosure	100 A/m 50 Hz	A
Pulse magnetic field	Enclosure	300 A/m 6.4/16 μ s	–
AC power*	Power	30% 10/500 ms 60% 100/1000 ms Interrupt 10/5 ms	B B B
DC power	Power	30% 10 ms 60% 10 ms Interrupt 10/100 ms 20% above/below rated voltage	B B
Oscillatory waves	Signal L-E	–	–
	Signal L-L	–	–
	Power L-E Power L-L	– –	– –
50 Hz disturbances**	Signal L-E	10/100 V	A
	Signal L-L	250 V	A

* Voltage dips, short interruptions and voltage variations.

** Conducted common and differential mode.

Test	Port	Residential		Industrial		Railway		Substation	
		Level	Criteria	Level	Criteria	Level	Criteria	Level	Criteria
Emission									
Radiated	Enclosure	30/37 dB(μ V/m)	Class B	40/47 dB(μ V/m)	Class A	40/47 dB(μ V/m)	Class A	30/37 dB(μ V/m)	Class A&B
Conducted	AC Power	66-56/56/60 Qp dB(μ V)	Class B	79/73 Qp dB(μ V)	Class A	79/73 Qp dB(μ V)	Class A	66-56/56/60 Qp dB(μ V)	Class A&B
	DC Power	–	–	–	–	79/73 Qp dB(μ V)	Class A	–	–
Immunity									
ESD	Encl. contact	\pm 4 kV	B	\pm 4 kV	B	\pm 6 kV	B	\pm 6 kV	A***
	Encl. air	\pm 8 kV	B	\pm 8 kV	B	\pm 8 kV	B	\pm 8 kV	A***
Radiated field immunity	Enclosure	3 V/m 1 kHz 80% AM	A	10 V/m 1 kHz 80% AM	A	20 V/m 1 kHz 80% AM	A	10 V/m 1 kHz 80% AM	A
						20 V/m 200 Hz pulse	A		
Electrical Fast Transient	Signal	\pm 0.5 kV	B	\pm 1.0 kV	B	\pm 2.0 kV	A	\pm 2.0 kV	A***
	AC Power	\pm 1.0 kV	B	\pm 2.0 kV	B	\pm 2.0 kV	A	\pm 4.0 kV	A***
	DC Power	\pm 0.5 kV	B	\pm 2.0 kV	B	\pm 2.0 kV	A	\pm 4.0 kV	A***
Surge	Signal L-E	\pm 0.5 kV	B	\pm 1.0 kV	B	\pm 2.0 kV	B	\pm 4.0 kV	A***
	Signal L-L	–	–	–	–	\pm 2.0 kV	B	\pm 4.0 kV	A***
	AC Pow. L-E	\pm 2.0 kV	B	\pm 2.0 kV	B	\pm 2.0 kV	B	\pm 4.0 kV	A***
	AC Pow. L-L	\pm 1.0 kV	B	\pm 1.0 kV	B	\pm 2.0 kV	B	\pm 4.0 kV	A***
Conducted radio-frequency field	Signal	3 V 1 kHz 80%AM	A	10 V 1 kHz 80%AM	A	10 V 1 kHz 80%AM	A	10 V 1 kHz 80%AM	A
	Power	3 V 1 kHz 80%AM	A	10 V 1 kHz 80%AM	A	10 V 1 kHz 80%AM	A	10 V 1 kHz 80%AM	A
Power magnetic field	Enclosure	3 A/m 50 Hz	A	30 A/m 50 Hz	A	100 A/m 50 Hz	A	100 A/m 50 Hz	A
Pulse magnetic field	Enclosure	–	–	–	–	300 A/m 6.4/16 μ s	B	–	–
AC power*	Power	30% 0.5 s 60% 100 ms Interrupt 5 s	B C C	30% 10 ms 60% 0.1/1 s Interrupt 5 s	B C C	–	–	–	–
DC power	Power	–	–	–	–	–	–	Interrupt 10 ms	A
								Interrupt arbitrary	C
Oscillatory waves	Signal L-E	–	–	–	–	–	–	2.5 kV	A***
	Signal L-L	–	–	–	–	–	–	1.0 kV	A***
	Power L-E	–	–	–	–	–	–	2.5 kV	A***
50 Hz disturbances**	Signal L-E	–	–	–	–	–	–	30 V Cont. 300 V 1 s	A
	Signal L-L	–	–	–	–	–	–	250 V	A

* Voltage dips, short interruptions and voltage variations.

** Conducted common and differential mode.

*** During the disturbance in communication error accepted if no delays or data loss for critical functions. Changes in states of electrical, mechanical or communication signal outputs are not allowed, this includes alarms and status outputs.

EN 61000-4-3 Electromagnetic compatibility (EMC). Testing and measurement techniques. Radiated, radio-frequency, electromagnetic field immunity test.

⚡ Method for testing the immunity of electrical equipment against radiated, radio frequency, electromagnetic fields. States a number of test levels and test methods.

EN 61000-4-4 Electromagnetic compatibility (EMC). Testing and measurement techniques. Electrical fast transient/burst immunity test.

⚡ Method for testing the immunity of electrical equipment against fast transients and bursts. States a number of test levels and test methods.

EN 61000-4-5 Electromagnetic compatibility (EMC). Testing and measurement techniques. Surge immunity test.

⚡ Method for testing the immunity of equipment against surges caused by lightning or switching of large loads. States a number of test levels that refer to different environmental and installation conditions.

EN 61000-4-6 Electromagnetic compatibility (EMC). Testing and measurement techniques. Immunity to conducted disturbances, induced by radio-frequency fields.

⚡ Method for testing the immunity of electrical equipment against conducted disturbances caused by radio frequency fields within the frequency range 9 kHz to 80 MHz. States a number of test levels and test methods.

EN 61000-4-8 Electromagnetic compatibility (EMC). Testing and measurement techniques. Power frequency magnetic field immunity test.

⚡ Method for testing the immunity of electrical equipment against power frequency magnetic fields. States a number of test levels that refer to different environmental and installation conditions.

EN 61000-4-11 Electromagnetic compatibility (EMC). Testing and measurement techniques. Testing and measurement techniques. Voltage dips, short interruptions and voltage variations immunity tests.

⚡ Method for testing the immunity of electrical equipment against voltage dips, short interruptions and voltage variations. States a number of test levels and test methods.

Safety conditions

Factor	Requirement		Comments	Reference
	Severity	Standard		
Electrical safety	Information technology equipment	EN 60 950		See 1.6
Service life	10 years			
Supply connection	Permanently connected			
Accessibility	Restricted access location		Access, by service personnel and by tool	
Maintenance	No			
Isolation	To Circuit(s)		Electric strength	
Circuit				
Supply	All other		≥1 kVAC	See 2.3
Supply HV	All other		3 kVAC	
SELV	TNV-1, TNV-3		1 kVAC	See 2.4
TNV-1	TNV-3		1 kVAC	
TNV-1	TNV-1		1 kVAC	See 2.5
TNV-3	TNV-3		1 kVAC	

Installation conditions

Installation	Inst. Cat	Cable type	Port	Comments
Power supply	II		Power	
Power supply (HV)	II		Power	
TNV-3 (<70.7 V _p 120 VDC)	I	Unshielded	Signal balanced	PSTN or similar
TNV-1 (<42.4 V _p 60 VDC)	I	Twisted pair, unshielded	Signal balanced	RS-422/485, Ethernet or similar
SELV (<42.4 V _p 60 VDC)	I	Unshielded	Signal	RS-232 or similar

1.6 Electrical safety

EN 60950 Information technology equipment. Safety. General requirements.

- ⚡ ITE safety standard that defines the requirements to reduce the risk of fire, electric shock or injury to the user and those coming into contact with the equipment as well as service personnel. Applicable to mains connected and battery fed ITE as well as ITE intended for direct connection to the telephone network, irrespective of feeding source.

Enclosure

Factor	Severity	Standard	Comments	Reference
Dimension (W x H x D) mm (in)	55 x 100 x 128 (2.17 x 3.94 x 5.04 in) 35 x 121 x 119 (1.43 x 4.76 x 4.69 in)		2 card DIN-rail 1 card DIN-rail	
Weight kg (pounds)	< 0.6 (<1.3)			
Mounting	35 mm DIN-rail	EN 60715 (EN 50022)	Snap on mounting	
Degree of protection	IP 20	IEC 529		See 1.7
Cooling	Convection, spacing: 10 mm (0.4 in) (left/right) 25 mm (1.0 in) (above/below)		Spacing (left/right) recommended for full operating temperature range	
Enclosure material	PC / ABS			
Fire rating	Flammability class V-0	UL 94		See 1.8

1.7 Degree of protection

IEC 529 Degrees of protection provided by enclosures (IP Code)

- ⚡ Classification of the degree of protection provided by electrical enclosures.

Protection of:

- ⚡ Persons, against dangerous voltage inside the equipment
- ⚡ Inside the equipment, against the penetration of solid foreign objects
- ⚡ Inside the equipment, against damage due to the penetration of water.

For example IP 21:

- ⚡ Protection against access to dangerous voltage with a finger
- ⚡ Protection against the penetration of solid foreign objects ≥ 12.5 mm (0.51 in)
- ⚡ Protection against damage due to the penetration of vertically falling drip water.

1.8 Flammability

UL 94 The Standard for Flammability of Plastic Materials for Parts in Devices and Appliances

- ⌘ Methods to measure and describe the characteristics of specimen materials relating to flammability, when exposed to heat and flames under controlled forms in a laboratory environment.

2 Definitions

2.1 Rated voltage range

- ⌘ Voltage range specified by the manufacturer.

2.2 Operating voltage range

- ⌘ Voltage range within which the device, under the specified conditions, can perform its intended functions. Rated voltage range and upper and lower tolerances.

2.3 SELV

- ⌘ A secondary circuit which is so designed and protected that, under normal and single fault conditions, its voltages do not exceed a safe value.

2.4 TNV-1

- ⌘ A secondary circuit whose normal operating voltages do not exceed the limits for a SELV circuit under normal operating conditions and where overvoltages from telecommunication networks are possible.

2.5 TNV-3

- ⌘ A secondary circuit whose normal operating voltages exceed the limits for a SELV circuit under normal operating conditions and where overvoltages from telecommunication networks are possible.

