

INSTALLATION, USE AND MAINTENANCE INSTRUCTIONS

BU: EPBP – GPG: DIN Rail Products

Electrical switchboards for medical locations

QSO





More information than that reported in this manual can be found at the below reported link:

<https://new.abb.com/low-voltage/products/system-pro-m/abb-h-plus-line>

General information

The purpose of this manual is to provide the user with the information necessary for proper installation, use and maintenance of the electrical switchboard.

This manual is an integral part of the equipment. For specific information on the electronic apparatus and accessories installed in the switchboard, refer to the dedicated user manuals.

Intended use of the QSO

The switchboards for operating theatres (QSOs) are used to power the electrical system of locations used for group 2 medical activities in full compliance with IEC 60364-7-710.

Protecting the patient from micro and macro-shocks is done through the use of insulation transformers for medical use and devices for insulation control with earthing.

Classification of medical locations

The medical locations are classified according to a criterion of increasing hazard:

- **Group 0 medical locations** (locations where you do not use electromedical equipment with parts applied);
- **Group 1 medical locations** (locations where electromedical equipment is used with parts applied, also within the body but not in the cardiac area);
- **Group 2 medical locations** (locations where surgery, intracardiac interventions or monitoring or intensive care is carried out).

The classification of the medical locations and the identification of the “patient area” must be made by medical personnel in accordance with the health organization.

To classify a location the medical personnel must indicate which medical treatments should be carried out within this location.

Proper classification must take into account, for example:

- the extent of risk;

- the type of intervention to be performed;
- the electromedical equipment to be used;
- any type of anaesthesia administered;
- the danger to the life of the patient in the event there is a lack of any type of energy.

The risk assessment should in particular take into account the possible presence of electromedical equipment with parts applied and if the parts applied are used in an invasive way affecting the cardiac area (risk of macro and microshocks).

Fields of application

For information purposes, the following table shows examples of classification of medical locations corresponding to group 2 of IEC 60364-7-710.

Locations conditioned for medical use	Group			Class	
	0	1	2	≤0.5	>0.5≤15
Anaesthetic room			X	X*	X
Room for surgery			X	X*	X
Preparation room for operations			X**	X*	X
Room for surgical casts			X**	X*	X
Postoperative recovery room			X***	X*	X
Room for cardiac catheterization applications			X	X*	X
Intensive care room			X	X*	X
Room for angiographic and hemodynamic testing			X	X*	X
Premature room			X	X*	X
* Lighting equipment and electromedical equipment for life support functions that require a power supply within 0.5 s or less.					
** If general anaesthesia is performed.					
*** It houses patients in the phase of awakening from general anaesthesia.					

Symbols

The manual contains the following main typographical conventions.

Symbol	Meaning	Description
	Important	To read before beginning any operation
	Pay attention	Highlights procedures whose absence can cause malfunctions and/or possibly serious risks/dangers
	Specialists	Indicates operations to be carried out exclusively by specialists
	Information	Highlights suggestions, practical advices and special cases

Be very careful when reading the manual in the paragraphs showing the following symbols:

Product conformity

The operating theatre QSO electrical switchboards comply with existing laws and regulations regarding health and safety.

The electric switchboards produced by ABB and introduced into the market comply with the applicable directives and harmonized standards declared by the manufacturer by means of the “Declaration of Conformity” and by affixing the “CE marking”.

EU Declaration of conformity

With this document, which is an integral part of the documentation accompanying the electrical equipment, ABB declares under their own responsibility that the product complies with the safety requirements referred to in the directives and harmonized standards.



EU Declaration of Conformity

EU Konformitätserklärung
Déclaration UE de conformité
Dichiarazione di conformità UE

This declaration of conformity is issued under the sole responsibility of the manufacturer
Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller /
La présente déclaration de conformité est établie sous la seule responsabilité du fabricant /
La presente dichiarazione di conformità è rilasciata sotto la responsabilità esclusiva del fabbricante

ABB S.p.A. – ABB SACE Division
Viale dell'Industria, 18
I 20010 Vittuone (MI) - Italy

Object of declaration

Gegenstand der Erklärung / Objet de la déclaration / Oggetto della dichiarazione

Electric panels for group 2 medical location / Elektroplatten für Gruppe 2 medizinische Standorte / Panneaux électriques pour le groupe 2 emplacement médicale / Quadri ospedalieri per locali di gruppo 2
Type / Typ / Type / Tipo QSO

The object of the declaration described above is in conformity with the relevant Community harmonisation legislation

Der oben beschriebene Gegenstand der Erklärung erfüllt die einschlägigen / Harmonisierten Rechtsvorschriften der Gemeinschaft /
L'objet de la déclaration décrit ci-dessus est conforme à la législation communautaire d'harmonisation applicable /
L'oggetto della dichiarazione di cui sopra è conforme alla pertinente normativa comunitaria di armonizzazione

Low Voltage Directive / Niederspannungsrichtlinie / Directive basse tension / Direttiva Bassa Tensione
No. 2014/35/EU

EMC Directive / EMV-Richtlinie / Directive CEM / Direttiva EMC
No. 2014/30/EU

RoHS Directive / RoHS Richtlinie / Directive RoHS / Direttiva RoHS
No. 2011/65/EU

and are in conformity with the following harmonised standards or other normative documents
nachgewiesen durch die Einhaltung der nachfolgenden Normen oder anderen normativen Dokumenten /
et justifié par le respect des Normes mentionnées ci-dessous ou autres documents normatifs /
e sono stati applicati le norme o altri documenti normativi indicati di seguito

EN 61439-1:2011
CEI 64-8/7-710:2007
IEC 60364-7-710:2002

Year of CE-marking: 2009

Jahr der CE-Kennzeichnung / Année d'apposition du marquage CE / Anno in cui è stata affissa la marcatura

Signed for and on behalf of

Unterzeichnet für und im Namen von / Signé par et au nom de / Firmato in vece e per conto di

ABB S.p.A. – ABB SACE Division, Vittuone, 20 April 2016

Tommaso Abbattista
Quality & OpEx Manager
LPG DIN IT

Document No.: 2CSC445002D2702

Matteo Chiaravalli
R&D Manager
LPG DIN IT

ABB SpA – ABB Sace Division

CE marking

The equipment produced by ABB is marked with the CE community symbol for health and safety and guarantees its customers and users.

The plate affixed to each electrical switchboard also acts to recognize the manufacturer for any tracing of the product by the user, in addition to the verification of the technical data essential for installation, use and maintenance.

The position of the plate varies depending on the QSO model.

The following is an example of the CE plate.

 ABB S.p.A V.le dell'industria 18 20010 Vittuone (MI), Italy Web Link : www.abb.com/lowvoltage/directives	
Relevant standard <i>Norma corrispondente</i> IEC 61439-2	 
Model <i>Modello</i>	
Serial number <i>N° Matricola</i>	
Frequency/Rated voltage <i>Frequenza/tensione nominale</i>	Hz V
Number of power supply phases <i>Numero di fasi alimentazione</i>	
Rated current <i>Corrente nominale</i>	A
Short time current Icw <i>Corrente di breve durata</i>	kA RMS
Rated conditional short-circuit current Icc <i>Corrente nominale di cortocircuito condizionata</i>	kA RMS
Weight <i>Massa</i>	kg

Reference standards

QSO ABB switchboard is made in compliance with the regulations governing the construction of apparatus for medical locations.

In particular the following standards are observed:

- IEC 60439-2 “Low-voltage switchgear and controlgear assemblies” ;
- IEC 60364-7-710 “Medical locations”;
- IEC 61558-2-15 “Particular requirements for insulation transformers for the supply of medical locations”;
- IEC 60364-4-414 “Low voltage electrical installations – Protection for safety – Protection against electric shock ”.

Identification of the electrical switchboards

The QSO electrical switchboards are identified as follows.

Wall-mounted electrical switchboards for the operating theatre, S series

Applications: outpatient surgery, postoperative recovery rooms, laboratories, dental clinics, veterinary clinics.

Type	Power [kVA]	ABB code
QSO 3S Classic	3	2CSM261122R1551
QSO 5S Classic	5	2CSM273692R1551
QSO 3S Premium	3	2CSM273602R1551
QSO 5S Premium	5	2CSM273682R1551

Floor-mounted electrical switchboards for the operating theatre, M series

Applications: Day hospital rooms, medium-sized operating theatres, intensive care units.

Type	Power [kVA]	ABB code
QSO 3M Classic	3	2CSM273592R1551
QSO 5M Classic	5	2CSM273672R1551
QSO 7.5M Classic	7.5	2CSM273582R1551
QSO 3M Premium	3	2CSM273662R1551
QSO 5M Premium	5	2CSM273572R1551
QSO 7.5M Premium	7.5	2CSM273652R1551

Floor-mounted electrical switchboards for the operating theatre, L series

Applications: operating rooms, intensive care rooms, cardiac surgery.

Type	Power [kVA]	ABB code
QSO 10L Classic	10	2CSM273562R1551
QSO 7.5L Premium	7.5	2CSM273642R1551
QSO 10L Premium	10	2CSM273552R1551

General description of the QSO electrical switchboards for the operating theatre

The QSO electrical switchboards are complete with **ISOLTESTER-DIG-RZ** insulation monitoring devices for research and signalling the first earthing fault and insulation transformers for medical use, equipped with two PT100 probes on the primary and secondary for detection and temperature control.

All models are built using the modular enclosure of the ABB distribution switchboard model ArTu in RAL 7032 colour.

Each switchboard is equipped with free spaces for adding other components:

Type	Free modules TN-S	Free modules IT-M
QSO 3S Classic	16	3
QSO 5S Classic	16	3
QSO 3S Premium	6	3
QSO 5S Premium	6	3
QSO 3M Classic	(line 1) 18+ (line 2) 16	43
QSO 5M Classic	(line 1) 18+ (line 2) 16	43
QSO 7.5M Classic	(line 1) 18+ (line 2) 16	43
QSO 3M Premium	(line 1) 10+ (line 2) 12	30
QSO 5M Premium	(line 1) 10+ (line 2) 12	30
QSO 7.5M Premium	(line 1) 10+ (line 2) 12	30
QSO 10L Classic	(line 1) 10+ (line 2) 18	56
QSO 7.5L Premium	(line 1) 10+ (line 2) 14	41
QSO 10L Premium	(line 1) 10+ (line 2) 14	35

All versions are equipped with a terminal block in order to ensure easy and immediate connection of the conductors supplying power to the service apparatus.

The electrical cabinet has a glass inner door complete with a Yale type key.

The versions with the power supply for 24 V AC services, are provided with the **SELVTESTER-24** device for detection of resistance dispersion currents in the SELV circuits powered at very low voltage (eg, scialitic lamps).



More specifications and technical details are described in the relevant chapters and technical documentation provided with this manual.

Technical data

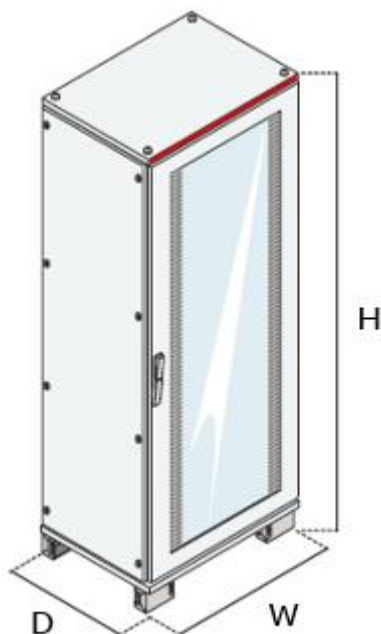
General technical features

Number	QSO wall-mounted	QSO floor-mounted	
Rated service voltage (Ue)	~ 230 V ± 15%		
Network rated frequency	50-60 Hz		
Number of phases	1+ N ~/PE		
Rated voltage of aux. circuit	~ 24-230 V		
Rated insulation voltage (Ui)	300-2500 V * * dielectric rigidity testing voltage		
Earthed power system	TT/TN-S* * TN-C not permitted in group 1 and 2 medical locations and buildings for medical use downstream of the distribution board		
Maximum prospective short circuit current at the input terminals (Icc)	10 * (kA RMS Sym) * Value subjected to coordination with upstream fuse NH D0 100A gL-gG		
Maximum altitude	2000 m a.s.l.		
Pollution degree	1* * Corresponds to the absence of pollution or only dry non conductive pollution		
Degree of resistance to impact (IK code) EN 50102	IK 09 (5 kg – 200 mm)		
Protection degree EN 60529			
Type	Front IP	Type	Front IP
QSO 3S Classic	40	QSO 5M Premium	54
QSO 5S Classic	40	QSO 7.5M Premium	54
QSO 3S Premium	40	QSO 10L Classic	54
QSO 5S Premium	40	QSO 7.5L Premium	54
QSO 3M Classic	54	QSO 10L Premium	54
QSO 5M Classic	54		
QSO 7.5M Classic	54		
QSO 3M Premium	54		
Degree of relative humidity at temperature	Internal installations 50 % with max. temp. of 40°C		

Number	QSO wall-mounted	QSO floor-mounted
Operating ambient air temperature	-5...+55°C	
Transport and storage ambient air temperature	-25...+40°C	

Weight and dimensions

Type	Net weight [kg]	Gross weight (packaged) [kg]	Dimensions (WxHxD) [mm]	Overall dimensions (packaged) [mm]
QSO 3S Classic	73	113	700x1100x200	725x1200x250
QSO 5S Classic	88	128	700x1100x200	725x1200x250
QSO 3S Premium	75	115	700x1100x200	725x1200x250
QSO 5S Premium	90	130	700x1100x200	725x1200x250
QSO 3M Classic	126	180	924x1796x250	975x1850x315
QSO 5M Classic	141	195	924x1796x250	975x1850x315
QSO 7.5M Classic	147.5	202	924x1796x250	975x1850x315
QSO 3M Premium	127	181	924x1796x250	975x1850x315
QSO 5M Premium	142	196	924x1796x250	975x1850x315
QSO 7.5M Premium	147.5	202	924x1796x250	975x1850x315
QSO 10L Classic	190	244	948x2031x362	1000x2100x450
QSO 7.5L Premium	168	222	948x2031x362	1000x2100x450
QSO 10L Premium	193.5	248	948x2031x362	1000x2100x450



Specific technical features based on power

S-Series, wall-mounted installation

Configurations	Classic	Classic	Premium	Premium
Rated power [kVA]	3	5	3	5
Operating rated voltage [V]	230/230	230/230	230/230	230/230
Rated current TN-S/IT-M (In) [A]	-/13	-/21.73	42/13	10/13

M-Series, floor-mounted installation

Configurations	Classic	Classic	Classic	Premium	Premium	Premium
Rated power [kVA]	3	5	7.5	3	5	7.5
Operating rated voltage [V]	230/230	230/230	230/230	230/230	230/230	230/230
Rated current TN-S/IT-M (In) [A]	10/13	10/21.7	10/32.6	42/13	42/21.7	42/32.6

L-Series, floor-mounted installation

Configurations	Classic	Premium	Premium
L-Series			
Rated power [kVA]	10	7.5	10
Operating rated voltage [V]	230/230	230/230	230/230
Rated current TN-S/IT-M (In) [A]	42/43.5	42/32.6	42/43.5

Schematic diagram

This paragraph lists the QSO components and quantities.

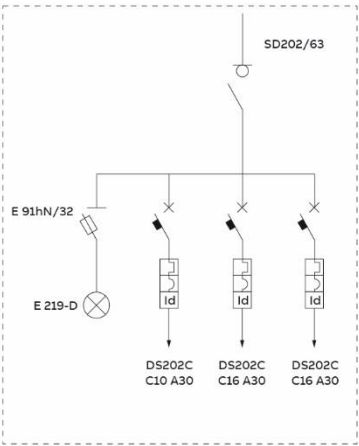
S-Series, wall-mounted installation

	Description	Type	QSO 3S Classic	QSO 5S Classic	QSO 3S Premium	QSO 5S Premium
	2P DISCONNECTOR 40A SD202/40	SD202/40	2	2	2	2
	2P DISCONNECTOR 63A SD202/63	SD202/63	-	-	1	1
	FUSE HOLDER E91Hn/32	E91Hn/32	2	2	3	3
	GREEN LIGHT INDICATOR POWER SUPPLY PRESENCE E219-D	E219-D	1	1	2	2
	INSULATION MONITORING DEVICE ISOLTESTER-DIG-RZ	ISOLTESTE R-DIG-RZ	1	1	1	1

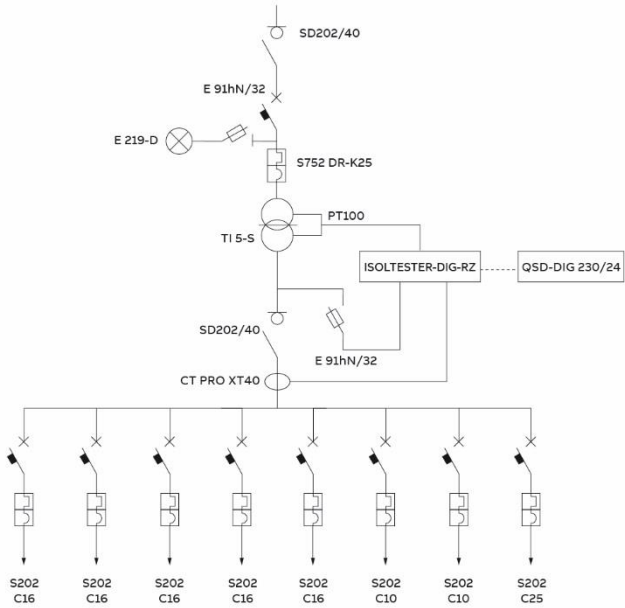
	Description	Type	QSO 3S Classic	QSO 5S Classic	QSO 3S Premium	QSO 5S Premium
	MAGNET SWITCH 6KA 2P C10 S202	S202-C10	2	2	2	2
	MAGNET SWITCH 6KA 2P C16 S202	S202-C16	5	5	5	5
	MAGNET SWITCH 6KA 2P C25 S202	S202-C25	1	1	1	1
	MAGNET SWITCH 25 KA 2P S752 DR-K25	S752 DR- K25	1	1	1	1
	MAGNETOTHERM. DIFF. SWITCH 1N10A 0.03A	DS202C C10 A30	-	-	1	1
	MAGNETOTHERM. DIFF. SWITCH 1N16A 0.03A	DS202C C16 A30	-	-	2	2
	4PC DAMPER SET	AMM	4	4	4	4
	CURRENT TRANSFORMER CT PRO XT40	CT PRO XT40	1	1	1	1
	MEDICAL INS. TRANSF. + PROBES 3 KVA 230/230v	TI 3-S	1	-	1	-

	Description	Type	QSO 3S Classic	QSO 5S Classic	QSO 3S Premium	QSO 5S Premium
	MEDICAL INS. TRANSF. + PROBES 5 KVA 230/230v	TI 5-S	-	1	-	1
	FUSE 10X38mm gG 2A	E 9F 10 gG2	4	4	6	6

QSO S



The devices inside the dotted areas are available only in the Premium versions.



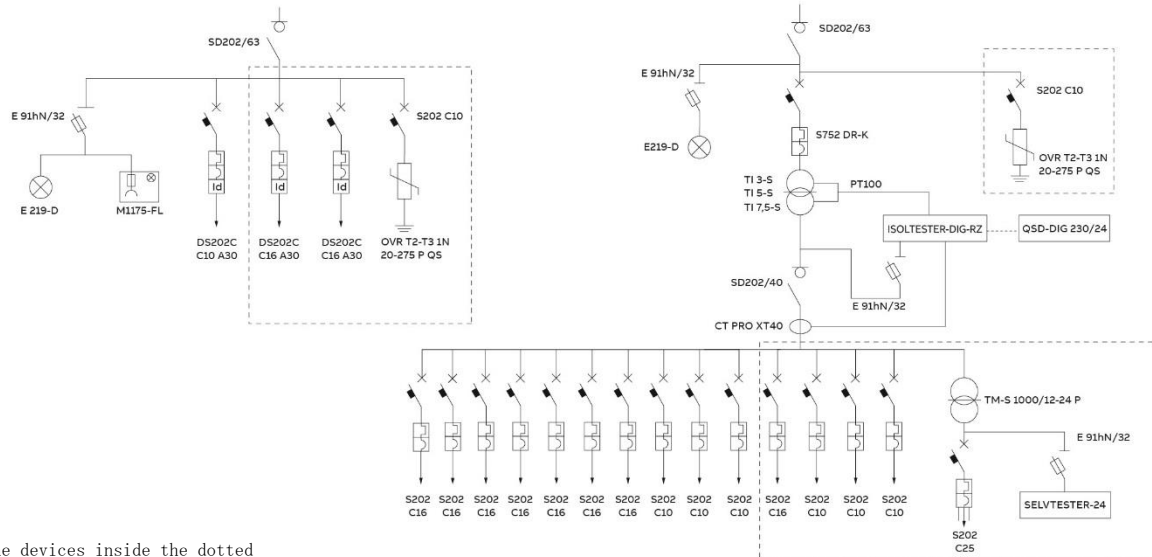
M-Series, floor-mounted installation

	Description	Type	QSO 3M Classic	QSO 5M Classic	QSO 7.5M Classic	QSO 3M Premium	QSO 5M Premium	QSO 7.5M Premium
	2P DISCONNECTOR 63A SD202/63	SD202/63	3	3	3	3	3	3
	FUSE HOLDER E91Hn/32	E91Hn/32	3	3	3	4	4	4
	GREEN LIGHT INDICATOR POWER SUPPLY PRESENCE E219-D	E219-D	2	2	2	2	2	2
	INSULATION MONITORING DEVICE ISOLTESTER-DIG- RZ	ISOLTESTER- DIG-RZ	1	1	1	1	1	1
	INSULATION MONITORING DEVICE SELVTESTER-24	SELVTESTER- 24	-	-	-	1	1	1
	SURGE PROTECTION DEVICE OVR T2-T3 1N 20-275 P QS	OVR T2-T3 1N 20-275 P QS	-	-	-	2	2	2
	MAGNET SWITCH 6KA 2P C10 S202	S202-C10	3	3	3	8	8	8
	MAGNET SWITCH 6KA 2P C16 S202	S202-C16	7	7	7	8	8	8

	Description	Type	QSO 3M Classic	QSO 5M Classic	QSO 7.5M Classic	QSO 3M Premium	QSO 5M Premium	QSO 7.5M Premium
	MAGNET SWITCH 6KA 2P C25 S202	S202-C25	-	-	-	1	1	1
	SOCKET 2P+T 16A SHUCKO+IND. LMP.+FUSE M1175- FL	M1175-FL	1	1	1	1	1	1
	MAGNET SWITCH 25 KA 2P S752 DR- K25	S752 DR-K25	1	1	-	1	1	-
	MAGNET SWITCH 25 KA 2P S752 DR- K40	S752 DR-K40	-	-	1	-	-	1
	MAGNETOTHERM. DIFF. SWITCH 1N10A 0.03A	DS202C C10 A30	1	1	1	1	1	1
	MAGNETOTHERM. DIFF. SWITCH 1N16A 0.03A	DS202C C16 A30	-	-	-	2	2	2
	4PC DAMPER SET	AMM	4	4	4	8	8	8
	CURRENT TRANSFORMER CT CT PRO XT40 PRO XT40	CT PRO XT40	1	1	1	1	1	1
	CONTROL AND SAFETY TRANSF. TM-S 1000/12-24 P 230-400 v S 24 v	TM-S 1000/12-24	-	-	-	1	1	1

	Description	Type	QSO 3M Classic	QSO 5M Classic	QSO 7.5M Classic	QSO 3M Premium	QSO 5M Premium	QSO 7.5M Premium
	MEDICAL INS. TRANSF. + PROBES 3 KVA 230/230V	TI 3-S	1	-	-	1	-	-
	MEDICAL INS. TRANSF. + PROBES 5 KVA 230/230V	TI 5-S	-	1	-	-	1	-
	MEDICAL INS. TRANSF. + PROBES 5 KVA 230/230V	TI 7.5-S	-	-	1	-	-	1
	FUSE 10X38mm gG 2A	E 9F 10 gG2	6	6	6	8	8	8

QSO M



The devices inside the dotted areas are available only in the Premium versions.

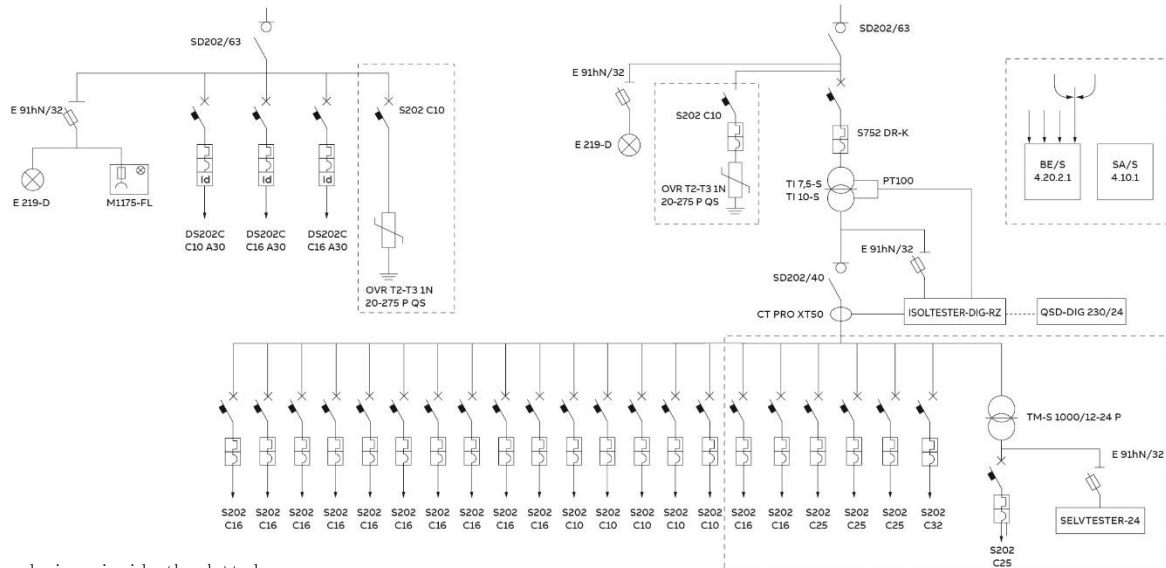
L-Series, floor-mounted installation

	Description	Type	QSO 10L Classic	QSO 7.5L Classic	QSO 10L Premium
	3P DISCONNECTOR 80A OT80F3C	OT80F3C	-	-	-
	2P DISCONNECTOR 63A SD202/63	SD202/63	3	3	3
	FUSE HOLDER E91Hn/32	E91Hn/32	3	4	4

	Description	Type	QSO 10L Classic	QSO 7.5L Classic	QSO 10L Premium
	GREEN LIGHT INDICATOR POWER SUPPLY PRESENCE E219-D	E219-D	2	2	2
	BE/S 4.20.2.1 4 CH. BINARY INPUT TERMINAL	BE/S 4.20.2.1	-	-	1
	INSULATION MONITORING DEVICE ISOLTESTER-DIG-RZ	ISOLTESTER-DIG-RZ	1	1	1
	INSULATION MONITORING DEVICE SELVTESTER-24	SELVTESTER-24	-	1	1
	SA/S 4.10.1 4 CH TERMINAL OUTPUT 10A	SA/S 4.10	-	-	1
	SURGE PROTECTION DEVICE OVR T2-T3 1N 20-275 P QS	OVR T2-T3 1N 20-275 P QS	-	-	-
	S2-CS/H6R AUX CONTACT 1 EXCHANGE	S2-CS/H6R	-	-	1
	MAGNET SWITCH 6KA 2P C10 S202	S202-C10	6	8	8
	MAGNET SWITCH 6KA 2P C16 S202	S202-C16	9	11	11
	MAGNET SWITCH 6KA 2P C25 S202	S202-C25	-	3	3

	Description	Type	QSO 10L Classic	QSO 7.5L Classic	QSO 10L Pre- mium
	MAGNET SWITCH 6KA 2P C32 S202	S202-C32	-	1	1
	SOCKET 2P+T 16A SHUCKO+IND. LMP.+FUZE M1175- FL	M1175-FL	1	1	1
	MAGNET SWITCH 25 KA 2P S752 DR- K40	S752 DR-K40	-	1	-
	MAGNET SWITCH 25 KA 2P S752 DR- K50	S752 DR-K50	1	-	-
	MAGNET SWITCH 25 KA 2P S752 DR- K40+S750 DR-AUX	S752 DR- K40+S750 DR-AUX	-	-	-
	MAGNET SWITCH 25 KA 2P S752 DR- K50+S750 DR-AUX	S752 DR- K50+S750 DR-AUX	-	-	1
	MAGNETOTHERM. DIFF. SWITCH 1N10A 0.03A	DS202C C10 A30	1	1	1
	MAGNETOTHERM. DIFF. SWITCH 1N16A 0.03A	DS202C C16 A30	2	2	2
	4PC DAMPER SET	AMM	4	8	8

	Description	Type	QSO 10L Classic	QSO 7.5L Classic	QSO 10L Premium
	CURRENT TRANSFORMER CT CT PRO XT40 PRO XT40		-	-	-
	CURRENT TRANSFORMER CT CT PRO XT50 PRO XT50		1	1	1
	CONTROL AND SAFETY TRANSF. TM-S 1000/12-24 P 230-400 v S 24 v	TM-S 1000/12-24	-	1	1
	MEDICAL INS. TRANSF. + PROBES 10 KVA 230/230V	TI 7.5-S	-	1	-
	MEDICAL INS. TRANSF. + PROBES 10 KVA 230/230V	TI 10-S	1	-	1
	FUSE 10X38mm gG 2A	E 9F 10 gG2	6	8	8
	SHAFT SECT. 6mm LONG SQUARE 360mm x DISCONNECTOR	-	-	-	-
	HAN. DOOR LOCK I-O-II 45mm OHB45J6E011	PISTOL BLACK HANDLE 45mm I-O-II	-	-	-



The devices inside the dotted areas are available only in the Premium versions.

Installation

Transport



Avoid stacking the packaged equipment during transport and in storage: the weight of the equipment may cause crushing with the resulting damage to the equipment itself.



Do not turn the electrical switchboard over from its original position during packaging.



Do not turn the electrical switchboard over from its original position during packaging.

Handling



The following manoeuvres are recommended to avoid the danger of overturning.

Cart

Suitable for handling switchboards with reduced depth

Pallet jack

Check the centre of gravity before handling

Forklift truck

During transport is recommended to clamp the switchboard to the forklift truck

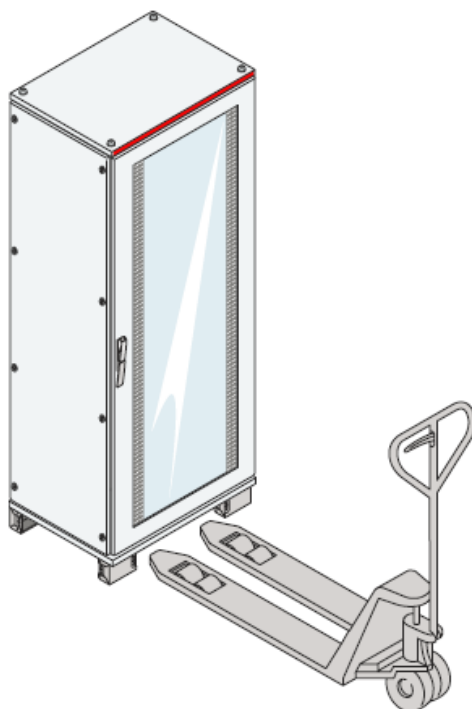
Lifting



The lifting of the QSO must always be carried out with the adequate means for the weight to be moved in order to prevent damage to persons and/or things (the weight of the switchboard is indicated in *"Weight and dimensions"*.

The QSO can be lifted by a forklift truck or a pallet jack:

- remove the cover flange of the base strip;
- insert the forks of the forklift truck or pallet jack into the space below the QSO.



Storage

The ABB electrical switchboards are delivered protected by a plastic wrapping and enclosed in a wooden box. If the switchboard delivered is not to be installed immediately it should be stored in a clean, dry and dust free place without removing the plastic wrapping.

Do not stick labels, plastic or similar substances on to the surface areas because they can damage the structure.

The environmental conditions of storage must respect the values reported in “General technical features”.

For ambient conditions other than those listed, specific packaging should be used.

Disposal of packaging



Dispose of packaging materials by separating materials of different types and in accordance with the laws in force in the country of use.



Indicates recyclable materials.

In order to be recovered they must be deposited in the appropriate places and/or containers.

For more information contact the competent body.

Installation and connections

Positioning

The place where the electrical switchboard is located must comply with that described in paragraph *“Classification of medical locations”* of this manual.



The equipment must be installed in a suitable place, so that it can be supervised by medical personnel at all times (with optical and acoustic signals).

The installation area must also be clean, away from heat sources, water, humidity and free of obstacles of any kind.

Make sure the floor is level and flat.

If possible apply anti-dust paint to the floor.

Ventilation

To facilitate heat dissipation it is necessary to leave at least 30 cm of space free around the sides of the switchboard, excluding the rear.

The natural circulation of air inside the enclosure should also be allowed, carefully avoiding the occlusion of the ventilation systems.

Fixing

The QSO electrical switchboards for operating theatres are designed to avoid the risk of overturning, falling or accidental movement.

In any case, it must be fixed in an upright position, with an appropriate anchoring system.



Please carefully read the following in order to ensure adequate stability of the QSO.

Wall mounting:

- check that the electrical switchboard rests evenly on the wall;
- mark the points to be drilled;
- drill the holes in the wall;
- clean the dust from the holes;
- insert the anchor into the hole through the brackets;
- tighten all the screws in an appropriate manner;

Floor mounting:

- check that the electrical switchboard rests evenly on the floor;
- mark the points to be drilled;
- drill the holes into the floor on all four corners of the base strips of the electrical switchboard;
- clean dust from the holes made in the floor;
- insert the anchor into the hole in the floor through the holes in the switchboard;
- tighten all the screws in an appropriate manner;

Electrical installations

Supply network

The power of the electrical switchboard, derived from the distribution system of the building, must correspond to the specifications indicated on the plate and technical data described in paragraph *“Technical data”* and the wiring diagram.

The power feed device upstream of the QSO switchboard for operating theatres must have adequate protection devices adjusted for short circuits and overloads. If a protection device is installed against indirect contacts this is in coordination with the protection circuit, respecting the legislative and regulatory requirements in the country of installation.

Connecting power leads



The cables to power the electrical switchboard must fit in the spaces provided and must always be near the input terminals [L1-N1-PE].

These cables must be unique in size, with no intermediate switches from the overload protection device to the connection point of the electrical switchboard, the terminals of the conductors shall be fitted with crimped lugs.

The connections must be arranged so that they are clearly identifiable and accessible and can be disconnected individually.

The section of the supply conductors must be sized according to the rated current indicated on the plate and in paragraph *“Technical data”*.

1. Remove the protective panels to gain access to the terminals of the terminal block;
2. Always first connect the protection conductor (earth wire green/yellow) to the respective terminal block marked [PE];
3. Connect the remaining neutral and phase conductors.

Connecting user conductors

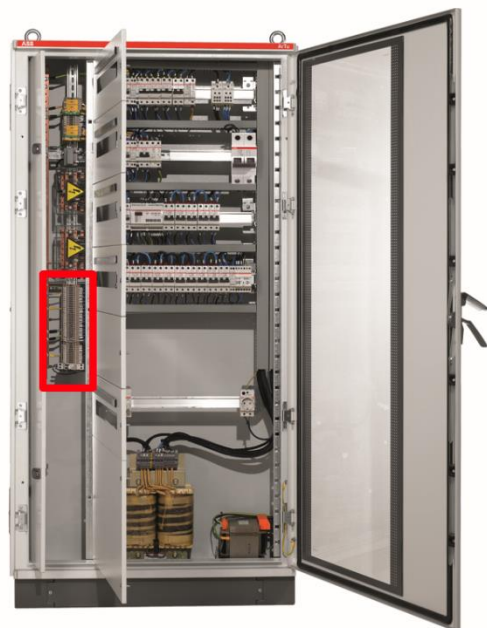
The QSO switchboard for operating theatres can supply different sections of the equipment: circuits derived from the insulation transformer (IT-M users) and direct circuits from the power supply (ordinary users).

The electromedical equipment must be connected to the QSO switchboard for operating theatres in accordance with the following technical requirements:

- the cable connection from the fixed equipment and/or socket outlets must be done according to the degree of protection of the electrical switchboard, without which the latter will suffer a reduction;
- the cables from the system must be sized and have features that meet the specifications contained in the wiring diagram;
- the conductor terminals, if the component to which they are connected requires them, shall be fitted with crimped lugs;
- connect one protection wire for each terminal/ground stud in place;
- comply with the requirements of the manufacturer for any component connected to the electrical system;
- the terminal blocks for connection of the conductors are positioned as shown in the figure below.



Cables with a size other than that indicated may change the current values of short circuit and therefore compromise their protection in the event of failure.



Connecting IT-M user conductors

Any conductor installed within medical locations for group 2 activities must be destined exclusively for the use of the electrical equipment and accessories in said location.

Cables from the system of the apparatus supplied by the IT-M system must fit into the spaces provided to ensure the physical separation of the conductors from the other normal circuits near to the respective terminals.

Connecting circuits for sockets/plugs in group 2 medical locations

The arrangement of the plug sockets powered by IT-M system and the relative circuits shall be as follows:

- at least two separate circuits must be installed which feed the plug sockets, or;
- the plug sockets must be protected individually or in groups (at least two) against overloads.

The socket outlets powered by the IT-M system must not be interchangeable with sockets powered by other systems used in the same location.

Connection of protective conductors – equipotential nodes

In each room conditioned for group 2 medical use an equipotential node must be installed, connected to which are:

- masses (protective conductors);
- external masses (equipotential conductors); the metal parts that have a resistance to ground $R_T < 0.5 \text{ M}\Omega$ are considered “external masses” in group 2 medical locations (with risk of microshocks);
- shields against electrical interference;
- any conductive grids in the floor.

The nominal section of the equipotential conductors must not be less than 6 mm^2 in copper.

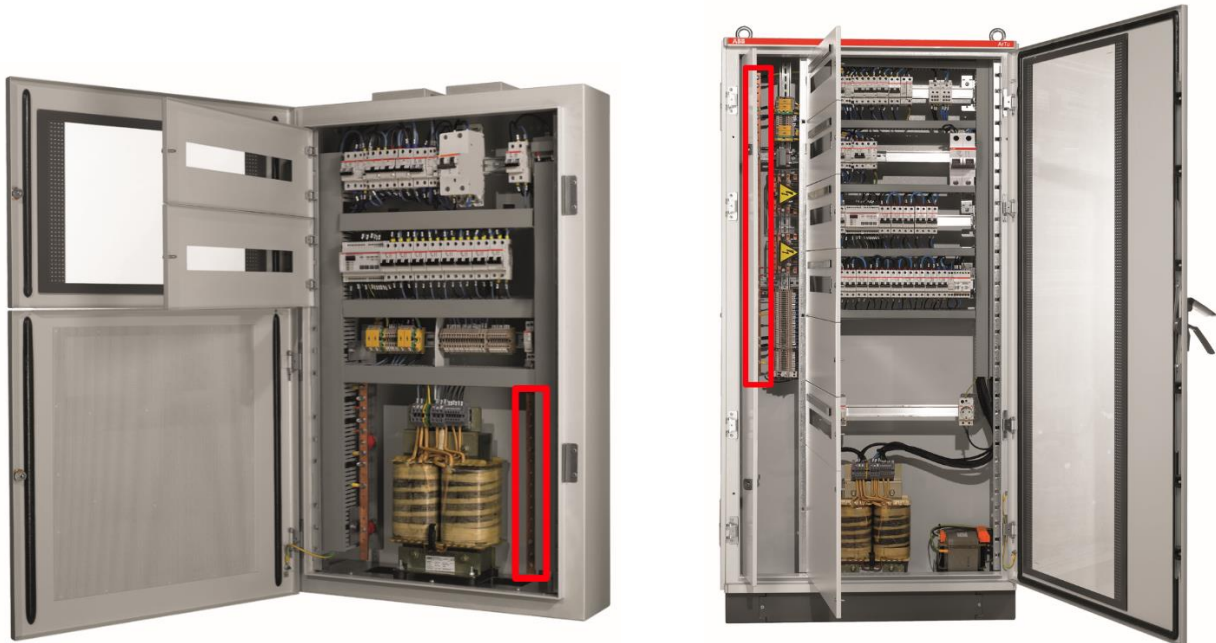


The equipotential node is that element to which the protective conductors (PE) and equipotential conductors converge.

Between a mass (or an external mass) and the equipotential node, a single intermediate node (sub-node) may be placed that joins together more protective conductors and/or equipotential conductors.

The QSO electrical switchboards for operating theatres are designed for connection of the protective conductors by means of a copper bar.

All the masses of the electrical components located in the patient area of the group 2 locations powered by the QSO switchboard, must be connected via the protective conductor, the protective equipotential collector of the switchboard itself, including scialitic type lighting equipment.



The equipotential node of the QSO switchboard can only be used as a equipotential node for the location, if:



- the conductor used has a section greater than or equal to that of the conductor with the higher section and connected to the node itself
- the connections are arranged so as to be clearly identifiable
- the connections can be individually disconnected



If a single QSO switchboard powers more rooms and/or groups of locations, each location must have a single separate node.

Operation

Checks prior to commissioning



Commissioning of the electrical equipment is permitted only after declared conformity with the provisions of this manual has been made.

Before enabling the electrical switchboard for commissioning it is advisable to verify the following conditions:

- Make sure that the conductor cables delivering power are properly connected to their respective terminal blocks before powering the electrical equipment.
- Make sure that the remaining conductors to the terminal blocks of these IT-M insulated power lines, the 24 V line and service lines for ordinary use are properly connected to their respective terminal blocks.
- Make sure the earth conductor (yellow/green) of the network cable is connected to the PE terminal block: the lack of a protection circuit fails to protect against indirect contact.
- Check with the appropriate instrument (multimeter) the voltage at the terminals in the terminal blocks verifying that the U_f voltage at the terminal blocks [L1-N1] is that indicated on the plate.
- Check the proper tightening of the bolts at the terminals in the terminal blocks by referring to the tightening torque Nm reported on the wiring diagram.
- Verify the presence of the protective device upstream of the electrical switchboard and that it meets the requirements of the ABB adjustment switchboard plate which notes the following manual.

Check that all switches and disconnectors on the QSO switchboard are in the OFF and/or 0 position before powering the electrical switchboard.



Verify the following conditions before attempting to operate the distribution apparatus:

- **Close all the safety guards removed during installation**
 - **Verify that all the operations described in this manual have been correctly carried out**
-

Commissioning of the QSO



For any group of functionally connected facilities at least an IT-M system is necessary.



For the operation, programming and use of electronic monitoring devices on the switchboard, refer to specific documentation provided with the electrical switchboard, separate from this instruction manual.

QSO S-series

Actions to be done on circuit breakers (c.b.) and fuse holder bases (f.h.b.) are listed below (follow the order to do actions):

1. power f.h.b. of the switchboard;
2. power c.b. that provides power to the IT-M insulation line ON;
3. power f.h.b. of the external control units (if any);
4. power f.h.b. of the ISOLTESTER-DIG-RZ insulation monitoring device;
5. check the activation of the insulation monitoring device (for operation, refer to the specific documentation provided).

QSO M, L-series

Actions to be done on circuit breakers (c.b.) and fuse holder bases (f.h.b.) are listed below (follow the order to do actions):

1. power the general c.b. of the switchboard ON;
2. power the surge protective device c.b. ON: the indicator on the front of the equipment must be switched ON and must result in white indicating normal operation;
3. power c.b. which powers ordinary use at 230 V ON checking the powering of the connected users;
4. power c.b. that provides power to the IT-M insulation transformer primary winding ON;
5. power f.h.b. of the ISOLTESTER-DIG-RZ insulation monitoring device;
6. check the activation of the insulation monitoring device (for operation, refer to the specific documentation provided);
7. power c.b. which powers the IT-M insulation lines including the presence of the 24 V AC transformer of the line at very low safety voltage ON;
8. (If present) power c.b. for protection of the scialitic lamp circuit ON;

9. (If present) power f.h.b. that feed the SELVTESTER-24 insulation control unit (for operation, refer to the specific documentation provided).

Turning the QSO OFF

QSO S-series



**It is forbidden to disconnect the fuse holder under load.
Disable the power to each insulation line and to any very low voltage
24V AC systems.**

Turning off the QSO switchboard and then the distribution system must be carried out with the order presented below:

1. disconnect the power from all loads downstream of the IT-M switchboard;
2. put the power fuse holder base of the switchboard into the open position

QSO M, L-series



**It is forbidden to disconnect the general switch under load.
Disable the power to each insulation line and to any very low voltage
24V AC systems.**

Turning off the QSO switchboard and then the distribution system must be carried out with the order presented below:

1. disconnect the power from all loads downstream of the IT-M switchboard;
2. put the general switch to the OFF position.

Maintenance



It is advisable to regularly carry out the checks listed below.
The maintenance intervals indicated may be suitably modified and customized according to the state in which the component is found after the first checks.



The maintenance intervals are those envisaged by IEC 64-7/8.

General safety warnings



Maintenance activities can only be carried out by properly authorized personnel in possession of electrical technical knowledge.



Pay close attention to the labels in close proximity and/or attached to the electrical equipment itself.



It is absolutely forbidden to alter or disconnect the safety devices and/or guards during maintenance activities.

Insulation from the mains



Before performing any cleaning or maintenance operation, put the electrical equipment into a state of zero energy.



Ensure that the protective device upstream of the supply line is locked in the zero position and, if possible, padlocked.



Signal the equipment to be in operation only after having finished the interventions and having refitted all the protections.



Before beginning the maintenance, warn with a clearly visible sign that there are interventions in progress.

Periodic checks

Checks applicable to medical locations of group 1 and 2



The qualified technician to perform the checks must record the date of the checks and the results of the tests and measurements.

The following checks should be made respecting the frequency indicated:

- a) functional testing of the insulation monitoring devices: **6 months;**
- b) visual check of the settings of the adjustable protective devices: **12 months;**
- c) measurements to verify the additional equipotential connections: **36 months;**
- d) intervention test, with I_{dn} , of the residual current devices: **12 months.**

In particular it is recommended to check the correct operation of control devices by referring to the specific information and illustrations supplied with the electrical switchboard.

Take measurements to check the resistance of the conductors

In group 2 medical locations the resistance of the conductors and connections, between the equipotential node and the terminal blocks for the protective conductor of the plug sockets and fixed user apparatus or for any external mass, must not exceed 0.2Ω .

The measurement must be AC or DC with a no-load voltage from 4 to 24 V and a current of at least 10 A.

Cleaning



All cleaning must be performed with the electrical equipment turned off and disconnected.

For details, refer to paragraph *“Turning off the QSO”*.

Any dust should be vacuumed using a regular vacuum cleaner, it is forbidden to blow the dust with compressed air, as the same may be pushed inside the casing of individual devices.

Avoid allowing the formation of conductive dust (eg coal dust) or combustible dust inside the QSO electrical switchboard.

It is absolutely forbidden to use solvents, gasoline, flammable and/or corrosive liquids to clean the housing and components of the QSO electrical switchboard.

When cleaning, be careful not to damage the safety screens and remove or hide the warning labels.

In the case of illegibility, request replacements from the manufacturer and replace as soon as possible.

Check ventilation devices

At least every 6 months check the proper functioning of the ventilation devices fitted to the QSO.

Check for the presence of foreign bodies and/or matter that could obstruct the flow and changing of air in the electrical switchboard.

Remove the filter and carry out a thorough clean using a jet of compressed air.

Replacement of parts

In the event of damage to the parts of the electrical equipment they must be replaced immediately with appropriate components that have the same characteristics.

Modifications to the original characteristics of the electrical equipment must be communicated in advance and agreed upon with the manufacturer.

Following repairs or replacements, and prior to commissioning, it is mandatory to carry out the inspections, registrations and checks specified in this manual.

For the replacement of individual components refer to the commercial documentation of the component itself.

Demolition and disposal

General information

For the disposal of the electrical switchboard, the applicable laws must be observed in the country where the equipment will be dismantled.

The electrical switchboard is composed mainly of the following materials:

- a) steel parts
- b) plastic parts
- c) copper parts (electrical wiring)
- d) electronic components (semiconductors and insulators)

The following provides an indication of the demolition and disposal operations:

1. empty the QSO electrical switchboard separating the components from the electric cables;
2. the steel frame must be disposed of as a ferrous material;
3. the electrical components and cables must be separately collected and deposited in the appropriate collection point for recycling electrical and electronic equipment.



Components with this symbol meet the requirements of the regulation introduced to protect the environment (WEEE): they must be disposed in a proper way at the end of their useful life.

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Contact the technical assistance or refer to specific document for application don't described in this manual.

Remark

In consideration of the evolution of the products and standards, the company reserves the right to modify at any time the features of the product described in this literature, therefore we recommend to always verify them beforehand. The manufacturer's liability for damages resulting from product defects "may be reduced or deleted (...) when the damage is attributable jointly to a product defect and to the negligence of the injured party or to a third party for whom the injured one is responsible" (Article 8, 85/374/CEE)

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