



User Manual

JetMove 3000 - Supply Unit

608880299

We automate your success

Item no.: 60880299

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The German version is the original of this user manual.

How to use this document

To be able to start using your new JM-3000 supply unit quickly and without problems, we ask you to read this user manual thoroughly beforehand.

Step	Action	Comment
 1.	This user manual will enable you to install and commission the JM-3000 supply unit very quickly and easily.	Quick start guide
 2.	Simply follow the step-by-step tables in the chapters.	Let's get started!

NOTE:

This user manual only describes the JM-3000 supply unit. Information on the JSC-3000* safety controller and the JM-3000 servo amplifier is provided in the respective user manuals.

** in preparation*



Order number code supply unit

The order designation provides information on the related configuration variant of the supply unit supplied. The significance of the individual characters of the order designation is given in the following order number code.

JM	-		3	P	xx	x	-	Mx	Px	Rx	Cx	Lx	Ax
3 = Series 3000			P = Supply unit passive			10 = 10 kW			Device revision (optional) = First version B = 1. Revision			= 3x230-480 V AC	
= without			P1 = 24 V DC/20 A power supply unit integrated			P2 = 24 V DC/20 A integrated for grid support			= No option = Without internal BR -> ext. BR required			R1 = internal BR included	
= Standard, air cooling			C1 = Coldplate			...			= No protective lacquer (standard)			L1 = Protective lacquer	
Ax = Current hardware revision			A0 = Hardware revision 0			A1 = Hardware revision 1			A2 = Hardware revision 2			...	

Fig. 0.1 Order number code JM-3000 supply unit

NOTE:

It is recommended that the servo amplifiers are installed in **descending** order of performance from left to right.

NOTE:

A maximum of 9 servo amplifiers can be connected to a supply unit (max. $9 \times 3 = 27$ axis).

Data of manufacturer

On the nameplate of the JM-3000 supply unit you will find the serial number from which you can identify the date of manufacture based on the following key. For the location of the nameplate on the JM-3000 refer to Fig. 0.3 on page 6.

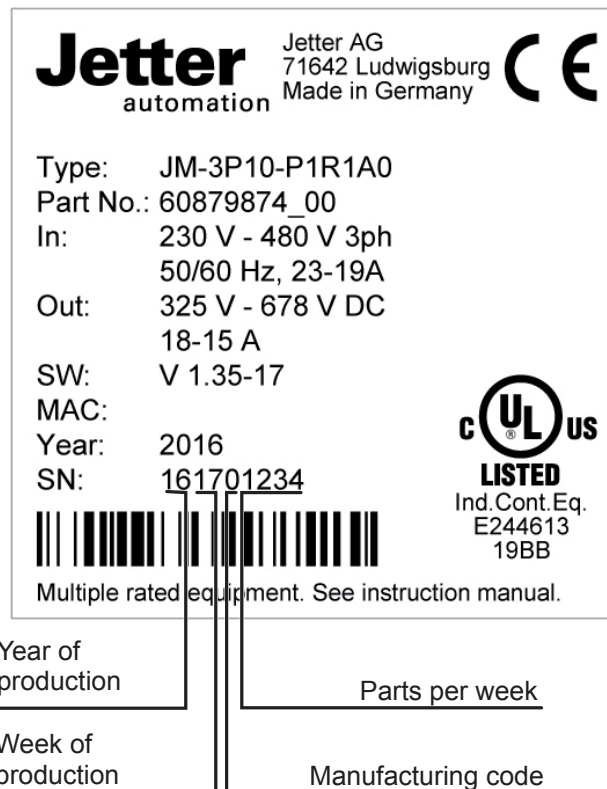


Fig. 0.2 Nameplate hardware JM-3000 supply unit

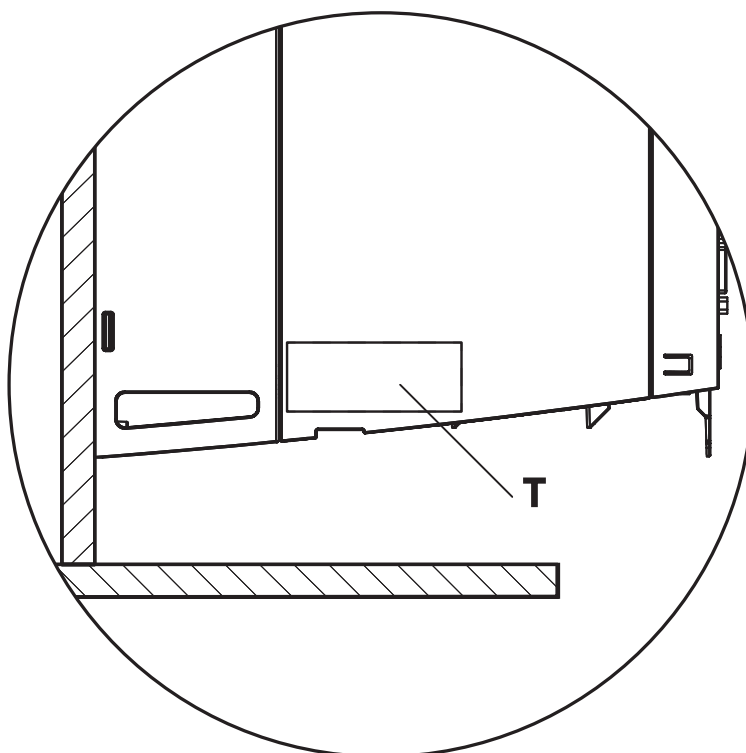


Fig. 0.3 Nameplate hardware JM-3000 (T)

A second nameplate (T1) which only contains the most important particulars is located on the top of the busbar cover. As a result, the nameplates are also visible when the devices are installed in a row.

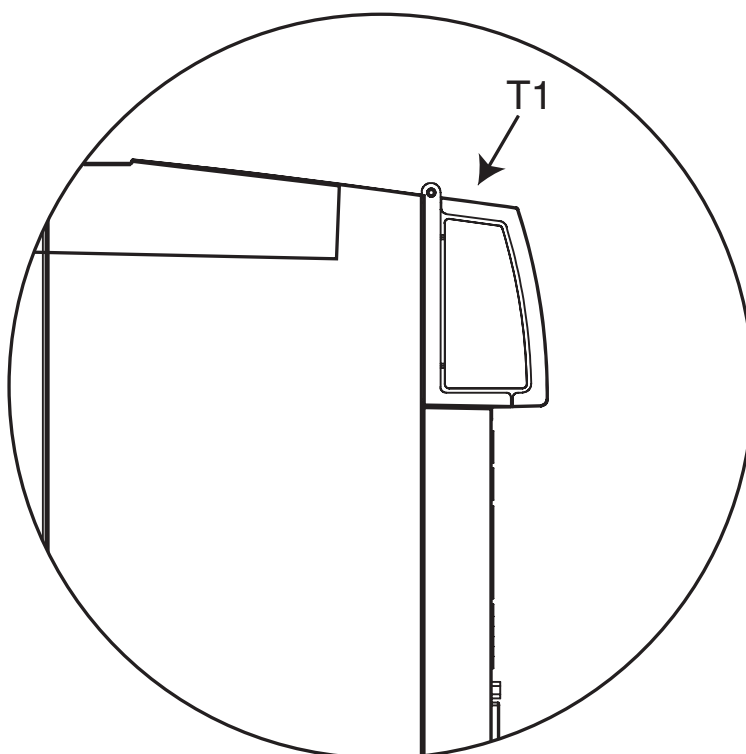


Fig. 0.4 Nameplate hardware JM-3000 (T1)

Scope of delivery

The scope of delivery includes:

- JM-3000 supply unit
- Pre-fabricated connecting cables for communication between supply unit and servo amplifier
- Pre-installed busbar elements for 24 V control supply (U_{st}) and DC link supply (U_{zk})
- Product DVD

Pictograms

For improved clarity, this user manual uses pictograms. Their meanings are set out in the following table. The pictograms always have the same meanings, even if they are placed without text, such as next to a connection diagram.

Warnings (see also chapter 1.1)

**ATTENTION!**

Incorrect operation may result in damage to the drive or in malfunctions.

**DANGER DUE TO HIGH VOLTAGE!**

Incorrect behavior may endanger human life.

**DANGER DUE TO ROTATING PARTS!**

Drive may start up automatically.

Hints & tips

NOTE:

Useful information or reference to other documents.

**STEP:**

Action in a sequence of multiple actions.

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1 Safety

1.1 For your safety

The instructions set out below should be read through prior to initial commissioning to prevent injury and/or damage. The safety instructions must be followed at all times.



Read the user manual first!

- Implementation should only start when you have understood these instructions.



Electric motion systems are always dangerous:

- Electrical voltages of 400 V AC or 565 V DC to 480 V AC or 678 V DC
- Dangerously high voltages of ≥ 50 V may still be present 3 minutes after the power is cut (capacitor charge). Therefore, ensure that the device is voltage-free!
- Note the warning sign on the device (see front of the device).



Protection from hot surfaces:

Temperatures up to 100 °C can occur at the heat sink of the device. Adjacent components, in particular those above the heat sink, can be damaged as a result. Burns can occur on contact.

- Keep sufficient distance to neighbouring components!
- Ensure that there is suitable touch protection at the heat sink.



Protection against magnetic and/or electromagnetic fields during installation and operation.

Persons fitted with heart pacemakers, metallic implants and hearing aids etc. must not be allowed access to the following areas:

- Areas where drive systems are installed, repaired and operated.
- Areas where motors are installed, repaired and operated. Motors with permanent magnets pose a particular danger.
- If it is necessary to access such areas, suitability to do so must be determined beforehand by a doctor.

**Your qualification:**

- To prevent personal injury or damage, only personnel with electrical engineering qualifications may work on the device.
- The qualified personnel must be familiar with the contents of the user manual (cf. IEC 364, DIN VDE 0100).
- Awareness of national accident prevention regulations (e.g. BGV A3 in Germany).

**During installation observe the following instructions:**

- Always comply with the connection conditions and technical specifications.
- Comply with the standards for electrical installations, e.g. wire cross-section, protective conductor connections and earth connections.

**During installation observe the following instructions:**

- Do not touch electronic components and contacts (electrostatic discharge may destroy components).

1.2 Warning symbols

The safety instructions detail the following hazard classes.
The hazard class defines the risk posed by failing to comply with the safety instructions.

Warning symbols	Hazard classification to ANSI Z 535	Risk due to non-compliance
	Danger!	Means that death or serious physical injury will occur if the relevant precautions are not taken.
	Warning!	Means that death or serious physical injury may occur if the relevant precautions are not taken.
	Caution!	Means that damage to property or minor physical injury may occur if the relevant precautions are not taken.
	Danger due to high voltage!	Death or serious physical injury will occur if the relevant precautions are not taken.
	Caution hot surface!	Means that damage to property or minor physical injury may occur if the relevant precautions are not taken.

Table 1.1 Warning symbols explanation

1.3 Intended use

The JM-3000 supply unit is a component designed for installation in industrial and commercial plants and machines.

Installation is only permitted in stationary equipment.

The JM-3000 multi-axis system consists at least of one supply unit and at least one servo amplifier. In motor operating mode, the supply unit draws power from the supply network and provides it to the connected servo amplifiers via the DC link.

When installed in machines, the commissioning of the supply unit (i.e. start-up of intended operation) is prohibited, unless it has been ascertained that the machine fully complies with the provisions of the Machinery Directive 2006/42/EC. Commissioning (i.e. start-up of intended operation) is only permitted in compliance with the EMC Directive (2004/108/EC).



CAUTION!

The use of the supply unit in specific application areas (such as areas subject to explosion hazard) is not allowed.

Usage in mobile equipment does not comply with the standard regarding the ambient conditions. It is therefore only permissible upon special agreement.



The JM-3000 supply unit conforms to the Low Voltage Directive 2006/95/EC. They have been tested and certified according to applicable standards (see Declaration of Conformity).

1.4 Unintended use

The use of the supply unit outside of a control cabinet is not permitted.

Third-party servo amplifiers of other manufacturers may not be operated on the supply unit.

1.5 EC declaration of conformity

In accordance with Low Voltage Directive 2006/95/EC

Konformitätserklärung *Declaration of Conformity*

Jetter

Hersteller
manufacturer **Jetter AG**
Gräterstr. 2
D-71642 Ludwigsburg

Geräteart / model: Versorgungseinheit / *power supply unit*

Produkt / product: Serie JM-3Pxx / *product family JM-3Pxx*

Die aufgeführten Produkte entsprechen unter Beachtung der zugehörigen Produktdokumentation den folgenden EG-Richtlinien und Normen.

The listed products comply with the following EU Directives and standards provided the appurtenant product documentation is observed during installation.

- EG-Richtlinien
EU directives
 - 2006/95/EG Niederspannungsrichtlinie
low voltage directive
- harmonisierte, internationale oder nationale Normen
harmonized, international or national standards
 - EN 61800-5-1:2007
elektrische Leistungsantriebssysteme mit einstellbarer Drehzahl - Anforderungen an die Sicherheit - Elektrische, thermische und energetische Anforderungen
adjustable speed electrical power drive systems - safety requirements - electrical, thermal and energy

Die Sicherheitshinweise der Betriebsanleitung sind zu beachten. Die Produkte sind zum Einbau in Maschinen bestimmt. Die Inbetriebnahme ist solange untersagt, bis festgestellt wurde, dass die Maschine, in welche diese Produkte eingebaut werden sollen, den Bestimmungen der EU Maschinen-Richtlinie entspricht.

The safety instructions of the manual are to be considered. These products are intended for installation in machines. Operation is prohibited until it has been determined that the machines in which these products are to be installed, conforms to the EU machinery directive.

zur Zusammenstellung technischer Unterlagen bevollmächtigte Person
authorised person for compiling technical files

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Jahr der CE-Kennzeichnung / year of CE marking: 2015

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Ort und Datum / *date & place*: Ludwigsburg, 05.11.2015
Unterzeichner / *signed by*: Christian Benz
Vorstandsvorsitzender / CEO



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1.6 Responsibility

Electronic devices are not fail-safe as a rule. The company setting up or operating the machine or plant is solely responsible for ensuring that the drive is rendered safe if the device fails.

In the section on "Electrical equipment of machines" the standard EN 60204-1/DIN VDE 0113-1 "Safety of machines" stipulates safety requirements for electrical control systems. They are intended to protect personnel and machinery, and to maintain the function capability of the machine or plant concerned, and must be observed.

The function of an emergency stop system (in accordance with EN 60204) leads to the power supply unit of the motion systems being switched off, which means that the drives coast to a stop in an uncontrolled manner. To ward off dangers, it is useful to make provision for an emergency stop function, which keeps individual motion systems running or initiates specific safety sequences. Emergency stop means that movement is stopped using Voltage Off or Safe Torque Off (STO).

The design of the emergency stop measure is assessed by means of a risk assessment of the machine or plant, including the electrical equipment in accordance with DIN EN ISO 12100:2011-03 (previously EN 14121), and is determined in accordance with EN ISO 13849-1 (previously DIN EN 954-1), "Safety of machines - General principles for design - Risk assessment and risk reduction" by selecting the circuit category.

1.7 Maintenance

Procedures for the maintenance of the device are not required. In the event of a fault, the device must be replaced and returned to the manufacturer.

1.8 Repair

Repairs may only be carried out by authorized repair workshops. Unauthorized opening and incorrect intervention could lead to death, physical injuries and damage to property. The warranty provided by Jetter AG is rendered void.

2 Installation

2.1 Notes on installation

**STRICTLY AVOID THAT ...**

- Moisture enters into the device,
- Drill chippings, screws or foreign bodies fall into the device.

Note the following points:

- The device is only intended for installation in a stationary control cabinet. The control cabinet must at least comply with IP44 degree of protection. In accordance with EN ISO 13849-2, the control cabinet must have a degree of protection of IP54 or higher when the safety functions (STO and SBC) are used in the servo amplifier.
- The supply unit must not be installed in areas where it would be exposed to continuous vibration. You will find more information in the Appendix.
- Maximum pollution degree 2 in accordance with EN 60664-1. You will find further information on environmental conditions in the Appendix.
- To attain the best result for effective EMC installation, use a conductive, well earthed, chromated or galvanized panel. If panels are varnished, remove the coating from the contact area! The devices themselves have a blue chromated zinc frame.

NOTE:

For the installation of the supply unit within the axis group, it is imperative that the user manuals of the other devices (servo amplifier, control system) are observed.

2.1.1 Sequence and layout

The following general guidelines apply for the layout and installation of the supply unit or the servo amplifiers:

Butt mounting and orientation

- The devices can be installed directly next to each other without any gaps between them. They are mounted on the panel using two/four screwed connections. Control and power are supplied to the servo amplifiers (JM-3000) via the DC link and the 24 V DC busbar. With the same cooling concept, this is possible without additional compensation measures or device depth.
- The devices must be butt mounted in the prescribed order as shown in Fig. 2.1. A different order is not permitted, as this causes problems with the busbar and heat dissipation.
- It is recommended that the servo amplifiers are installed in descending order of performance from left to right.
- A maximum of 9 servo amplifiers can be connected to a supply unit (max. $9 \times 3 = 27$ axis).

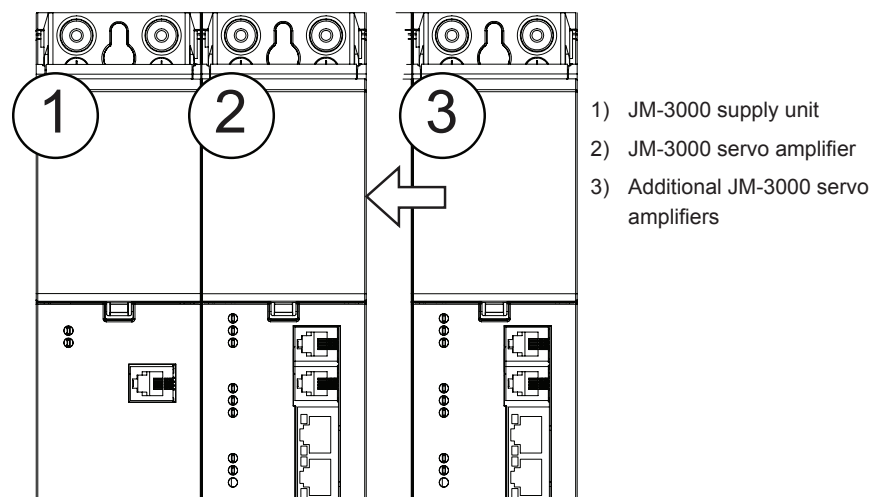


Fig. 2.1 Order of butt mounting



CAUTION! Hot surfaces

Protection from hot surfaces during operation. Temperatures up to 100 °C can occur at the back of the housings. Please ensure there is sufficient distance to neighboring components, in particular above the heat sink.



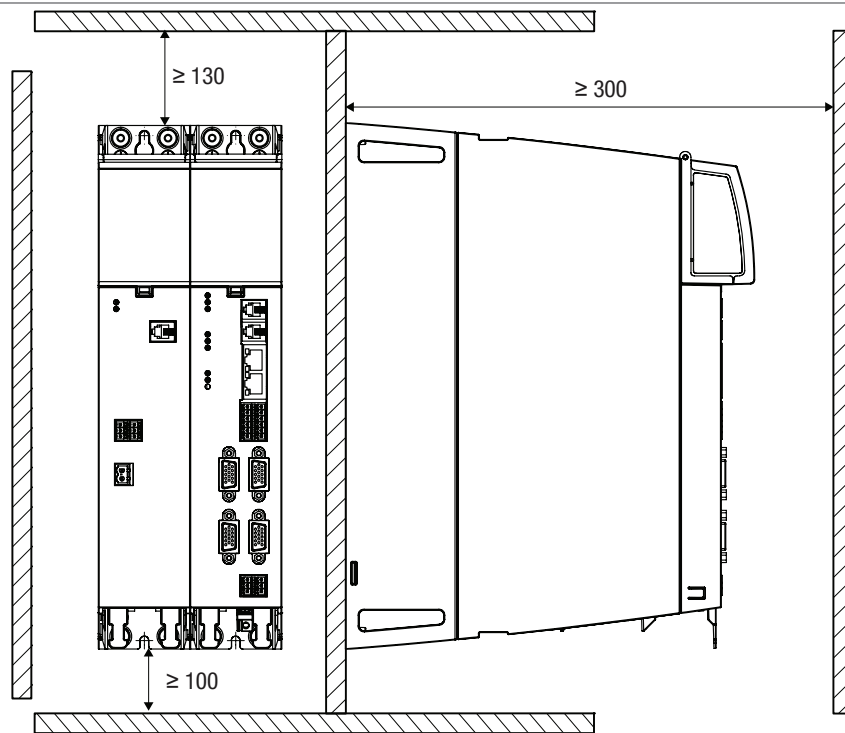
CAUTION!

Protection from hot surfaces during operation. Ensure that there is suitable touch protection at the heat sink.

2.2 Mounting clearances

**CAUTION!**

The minimum distance specified in Fig. 2.2 for above, below and in front applies to all devices (JM-3000 supply unit and JM-3000 servo amplifier). The distance above is important to avoid heat build-up, the distance below and in front is important to facilitate correct cable guidance.



*) The bending radii of the connecting cables must be taken into account

Fig. 2.2 Installation distances JM-3000

2.3 Cooling of devices

Cooling air must be able to flow through the device (interior and heat sink) without restriction. On installation in switch cabinets with natural convection (= heat loss is discharged to the outside via the control cabinet walls), always mount an internal air circulation fan. If a temperature cut-out occurs, the cooling conditions must be improved.

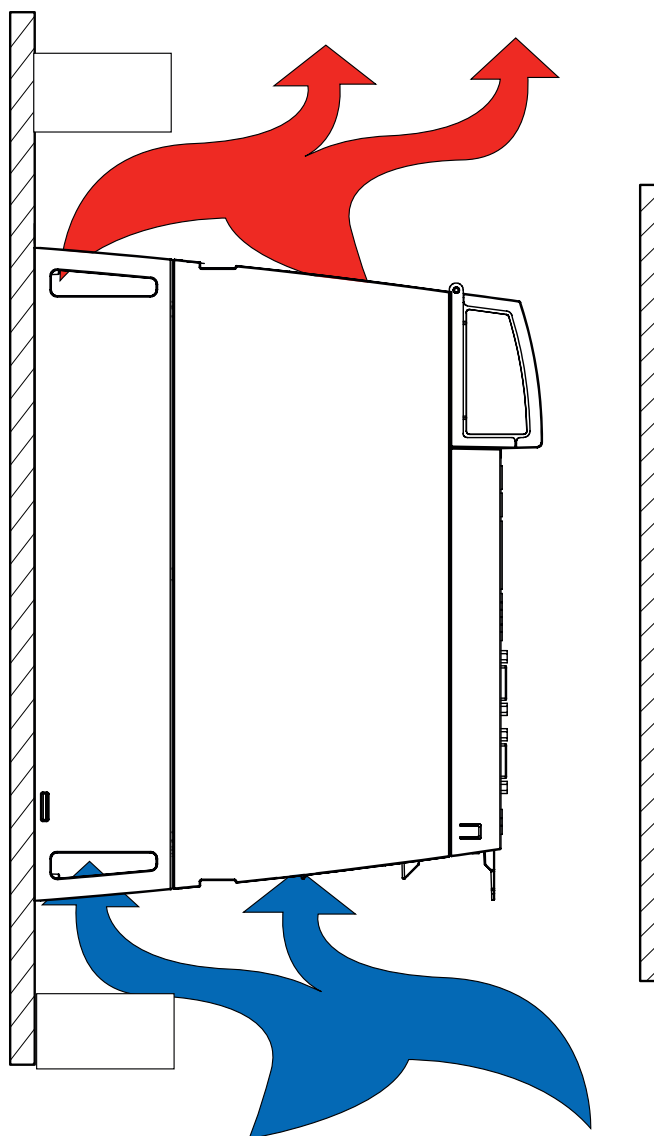


Fig. 2.3 Cooling air flows through the device without restriction

2.4 Device installation for wall mounting

Step	Action	Comment
 1.	Arrange the devices on the panel in accordance with Fig. 2.1. Align all devices of the multi-axis group on a line along the upper edge of the device.	This is necessary to carry out the DC link connection to the rails.
 2.	Mark out the position of the tapped holes on the panel. Drill holes into the panel and tap a thread for each fixing screw.	The bending radii of the connecting cables must be taken into account! Hole distances and dimensional drawings see table 2.1, Fig. 2.4 and Fig. 2.5.
 3.	Mount the supply unit vertically on the panel, butt mounted with the servo amplifiers.	The contact area must be bare metal and conductive.

2.4.1 Dimensions configuration wall mounting

JM-3Pxx	BG1	BG2
	JM-3P10-P1R1 JM-3P10-R1	JM-3P22-P1R1 JM-3P22-R1
Weight [kg]	2.7 kg	5.1 kg
H (height) ¹⁾	310	
H1	299	
H2	6	
B (width)	55	110
T (Depth)	241	
T1	222	
A	27.5	27.5
Lateral distance	For direct butt mounting	
C (screws)	2 x M4	4 x M4

All dimensions in mm

Drawing see fig. 2.3 and fig. 2.5

Table 2.1 Dimensions and installation distances

NOTE:

The supply unit must always be mounted side by side and on the left of the servo amplifiers. The most powerful servo amplifier should be located close to the power supply unit. The total output counts for twin axis and triple axis servo amplifiers.

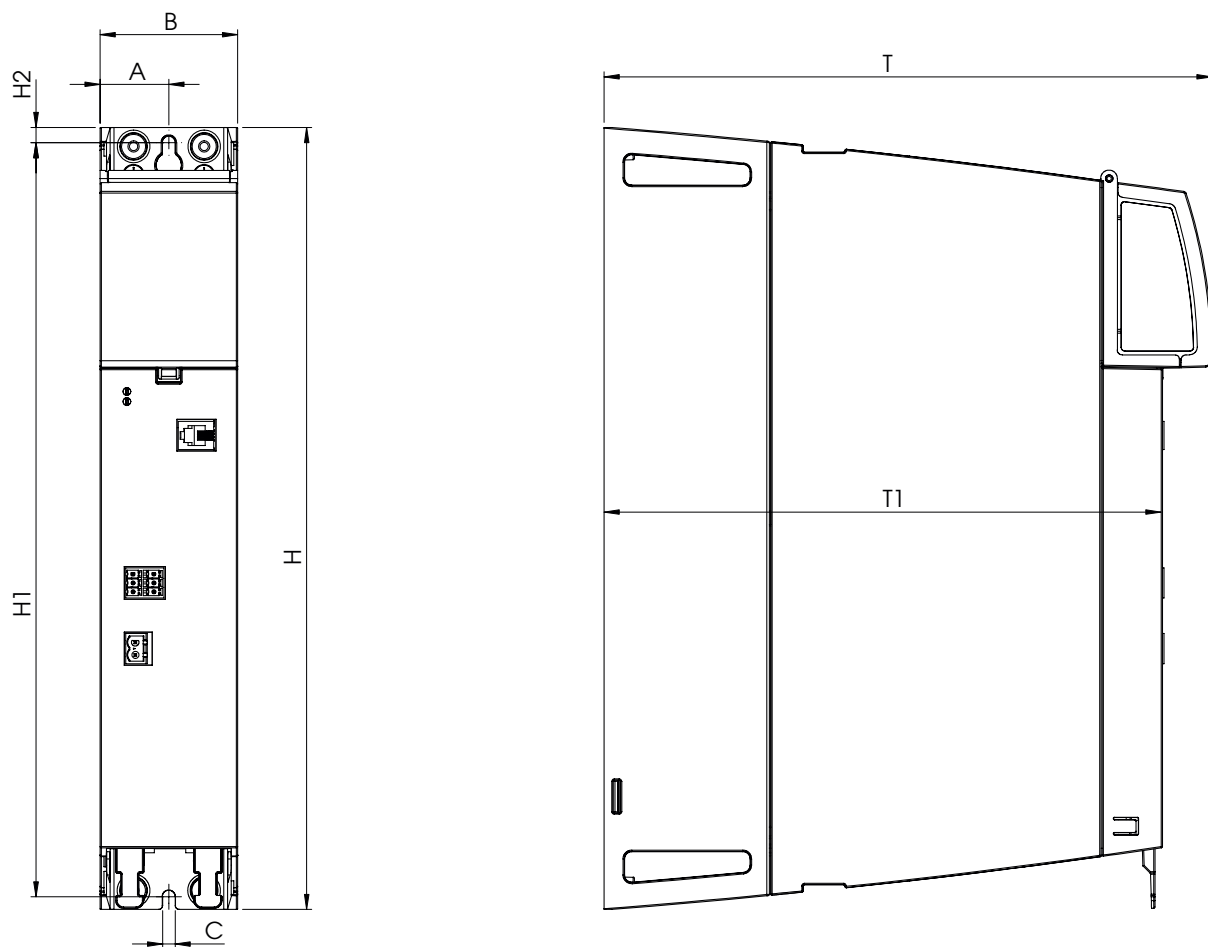


Fig. 2.4 Dimensional drawing JM-3000 supply unit BG1 (dimensions see Table 2.1)

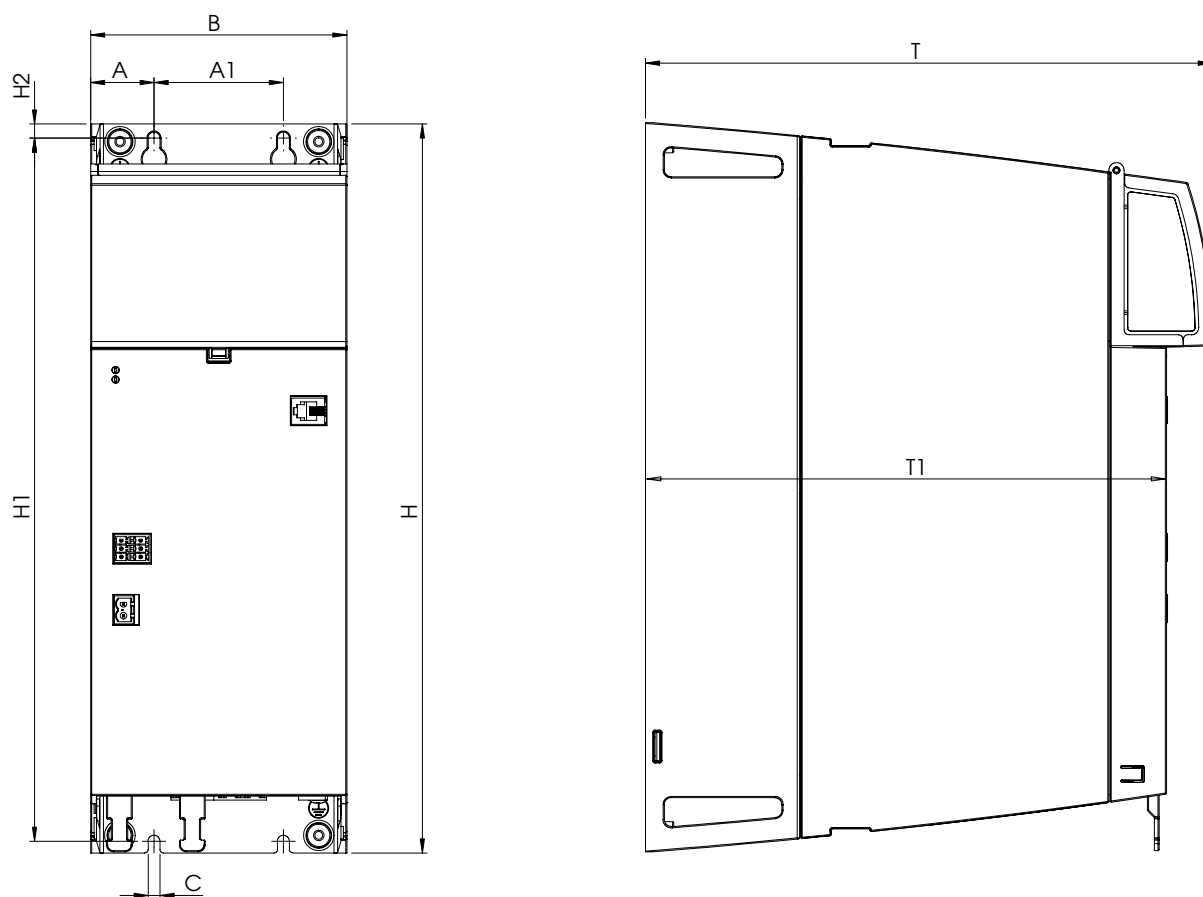


Fig. 2.5 Dimensional drawing JM-3000 supply unit BG2 (dimensions see Table 2.1)

2.5 Installation of devices for Coldplate

Step	Action	Comment
 1.	Arrange the devices on the panel in accordance with Fig. 2.1. Align all devices of the multi-axis group on a line along the upper edge of the device.	This is necessary to carry out the DC link connection to the rails. See Table 2.2 for the mounting clearances.
 2.	Mark out the position of the tapped holes on the cooler provided. Drill holes into the cooler and tap a thread for each fixing screw.	The bending radii of the connecting cables must be taken into account! Hole distances and dimensional drawings see Table 2.1.
 3.	The heat conductive foil is already glued to the back wall of the Coldplate devices. Butt mount the devices vertically on the cooler. Tighten the screws evenly, so that the thermal resistance remains as low as possible.	Ensure that the surface of the cooler is free from drill chippings or other contamination.
The next steps for the electrical installation are listed in chapter 3.		

2.5.1 Dimensions configuration Coldplate installation

JM-3Pxx	BG1	BG2
	JM-3P10-C1	JM-3P22-C1
Weight [kg]	2.2 kg	4.2 kg
H (height)	310	
H1	299	
H2	6	
B (width)	54.5	109
T (Depth)	188.5	
T1	170	
A	27.25	27.25
Lateral distance	For direct butt mounting	
C (screws)	2 x M4	4 x M4

All dimensions in mm

Drawing see fig. 2.3 and fig. 2.5

Table 2.2 Dimensions and installation distances at Coldplate

NOTE:

The supply unit must always be mounted side by side and on the left of the servo amplifiers. The most powerful servo amplifier should be located close to the power supply unit. The total output counts for twin axis and triple axis servo amplifiers.

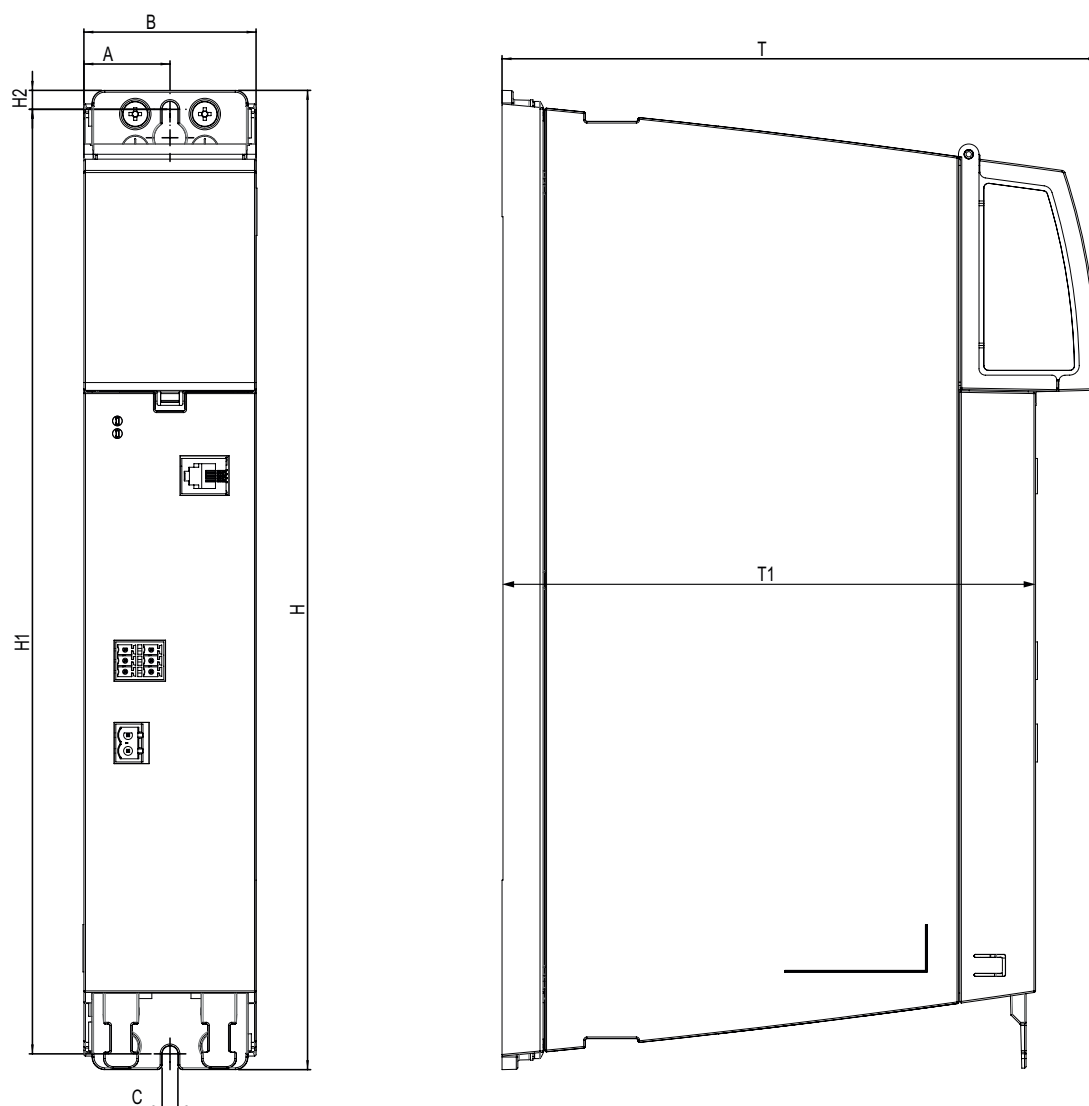


Fig. 2.6 Dimensional drawing JM-3000 supply unit BG1 Coldplate (dimensions see Table 2.2)

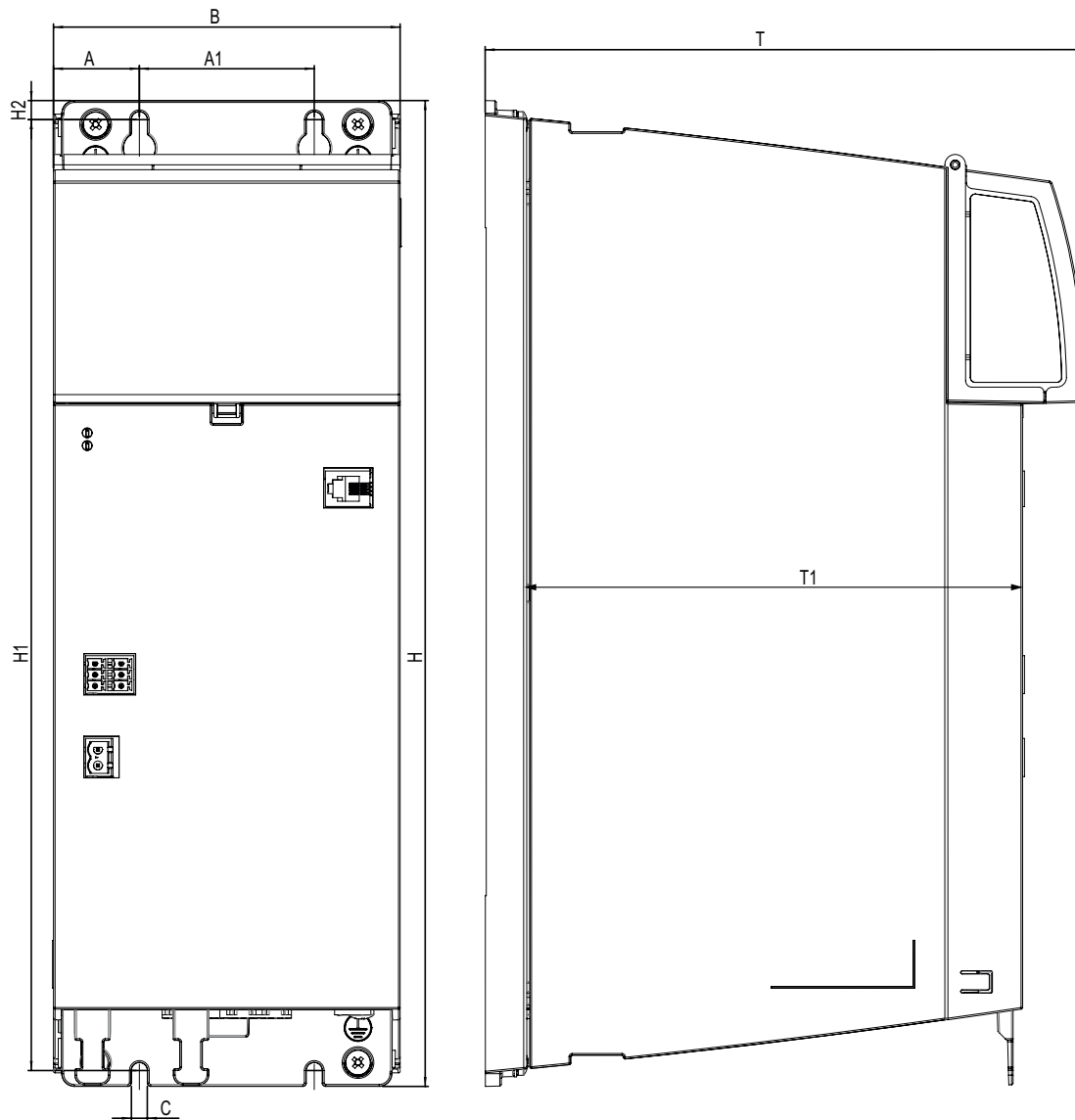


Fig. 2.7 Dimensional drawing JM-3000 supply unit BG2 Coldplate (dimensions see Table 2.2)

2.5.2 Installation on the cooler

For optimal heat transfer from the back wall of the device to the cooler provided, a heat conductive film is already glued to the Coldplate of the device (see Fig. 2.8). The film is laminated with aluminum on the cooler side. The device can be mounted and removed with the film.

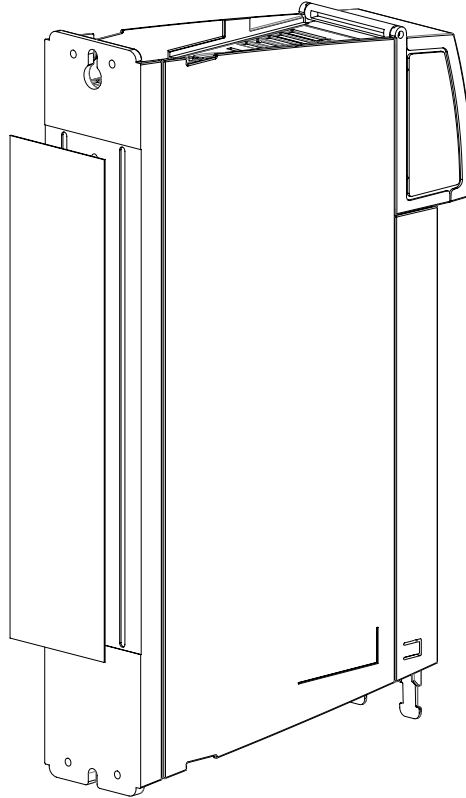


Fig. 2.8 Back wall with film JM-3000 servo amplifier BG1 (Coldplate)



CAUTION!

Ensure that there is no dirt between the cooler and the back wall of the device during installation. Failure to observe this would cause the device to overheat, due to impaired heat transfer. This would lead to device failure.

Because devices with frame size BG2 are twice as wide, a correspondingly wider heat conductive film is applied to the Coldplate of the device (see Fig. 2.9).

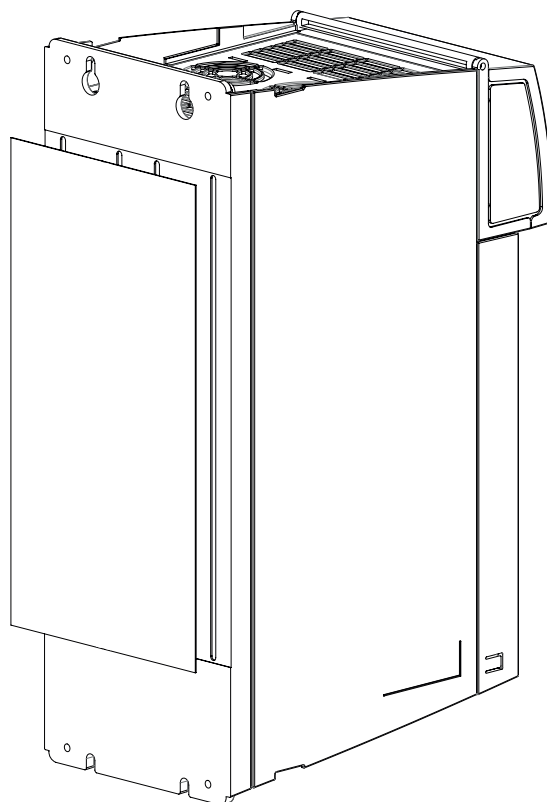


Fig. 2.9 Back wall with film JM-3000 servo amplifier BG2 (Coldplate)

2.5.3 Dimensioning of cooler

	JM-3Pxx BG1	JM-3Pxx BG2
Thermal resistance $R_{th} K^{1)}$	0.02 K/W	0.01 K/W
Thermal capacity of Coldplate at device	390 Ws/K	780 Ws/K
Max. temperature Coldplate device	85 °C	
Surface of cooler	maximum surface roughness $R_z = 6.3$	

1) Thermal resistance between active cooling surface of the device and cooler

Table 2.3 Characteristics Coldplate variant

3 Installation

3.1 Notes on installation

**ATTENTION!** Qualified personnel:

Installation must only be carried out by electrical engineering experts who have been specially instructed in the necessary accident prevention measures.

During installation work:

Strictly avoid that ...

- Screws, cable rests or foreign bodies drop into the device
- Moisture enters into the device

**DANGER DUE TO HIGH VOLTAGE!**

Danger to life!

- Never wire or disconnect electrical connections while they are live!
Always disconnect the device from the mains supply (400 V AC or 565 V DC to 480 V AC or 678 V DC) before working on it.
Dangerously high voltages of $\geq 50V$ may still be present 3 minutes after the power is cut (capacitor charge). Therefore, ensure that the device is voltage-free!
- Note the warning sign on the device (see front of the device)
- A hazardous voltage may be present on the device, even if the device is not emitting any visual or audible signals/indications!

NOTE:

For the installation of the supply unit within a JM-3000 multi-axis system, it is imperative that the user manuals of the other devices (servo amplifier, control system) are observed.

3.2 Effective EMC installation

The following general guidelines apply to the installation of servo amplifiers:

- *Compliance with the EMC product standard*
 - Commissioning (i.e. starting intended operation) is only permitted in compliance with EMC product standard EN 61800-3. The installer/operator of a machine and/or item of plant must provide proof of compliance with the protection targets stipulated in the standard.
 - The essential EMC measures are already implemented in the design of the devices through optimized enclosure shielding, PCB layout, filtering measures and selection of suitable connector plugs with screen plate. In addition to the internal measures, the following installation steps must be heeded:
- *Cable type*
 - Use only screened mains, motor and signal cables with double copper braiding that is overlapping by 60 to 70 %.
- *Routing of cables*
 - If possible, signal cables should only enter from one side into the control cabinet.
 - Lines of the same electric circuit must be twisted.
 - Avoid unnecessary cable lengths and loops.

NOTE:

When using third-party connection cables, these must be at least equivalent. However, Jetter AG cannot guarantee stable and safe operation when such cables are used.

- *Earthing measures*
 - The devices must be attached to a conductive, earthed panel. Earthing measures are described in section "3.4 Protective conductor connection".
- *External components*
 - Place larger consumers near the supply.
 - Contactors, relays, solenoid valves (switched inductors) must be wired with fuses. The wiring must be directly connected to the respective coil.
 - Any switched inductors should be at least 0.2 m distant from the process controlled assemblies.
- *Screening measures*
 - Strip the cable shields to the required length and use the shield lugs on the respective plug-in connectors for establishing contact at the components (see Fig. 3.1). Lay the other part of the cable shield with the greatest possible surface area on the PE rail (main earth) or the panel.

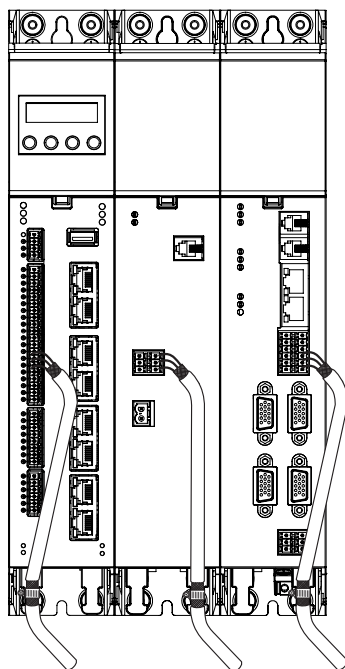


Fig. 3.1 Example shield connection control connections

Additional information can be found in the corresponding connection description. For further detailed information on installation, please consult the Jetter hotline (see "Hotline, support & service" on page 56).

3.3 Overview of connections

The respective position of the connectors and terminals for the JM-3000 supply unit is shown on the following layout. For improved clarity, an abbreviation has been added to the designations of connectors and terminals.

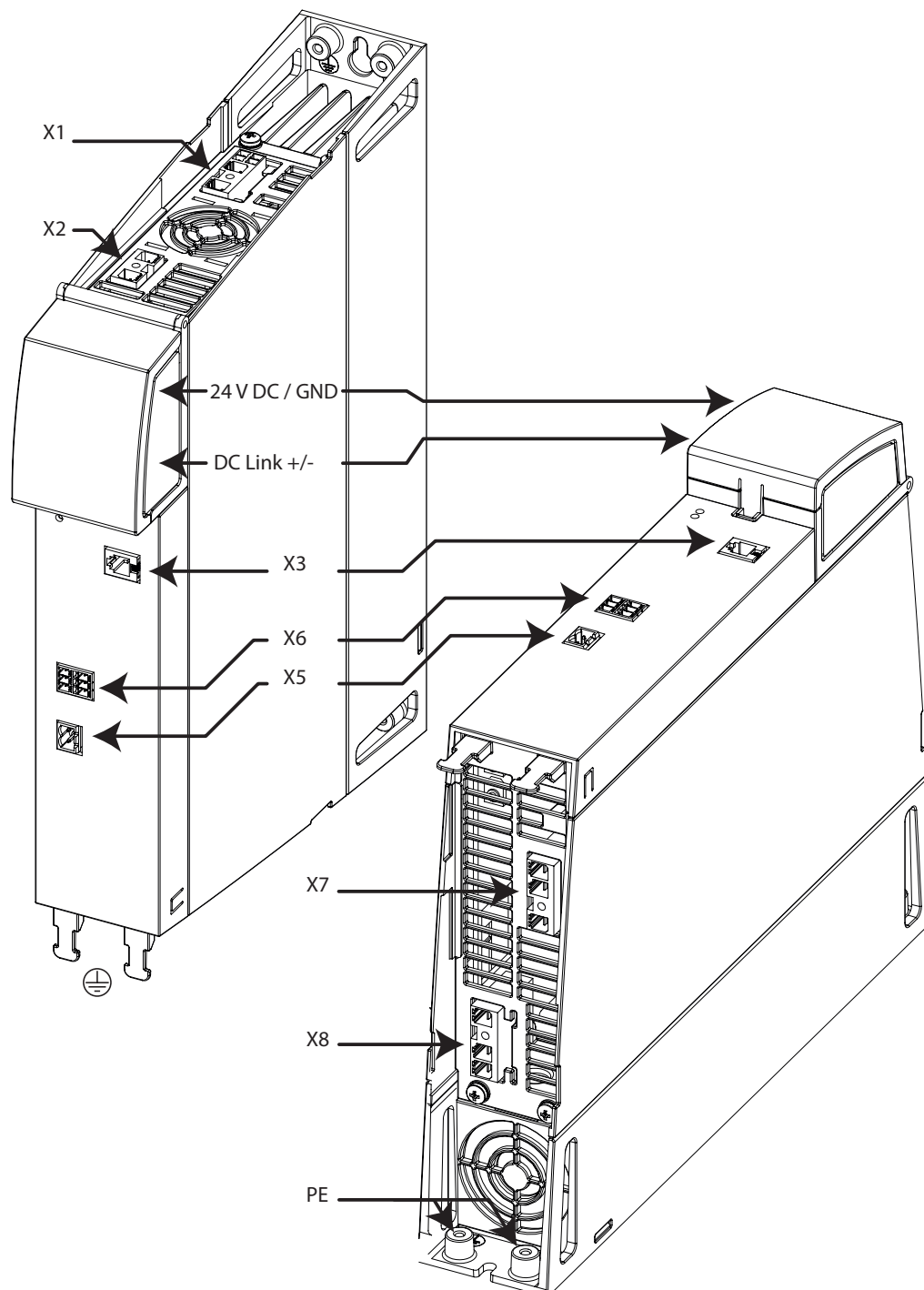


Fig. 3.2 Layout JM-3000 supply unit

Abbreviation	Designation	Details
24 V DC / GND	Output 24 V control supply via busbar	See section 3.10
DC Link +/-	Output DC link supply via busbar	See section 3.10
X1	Connection braking resistor	See section 3.8
X2	Output 24 V control supply via terminals	See section 3.9
X3	Output cross-communication (XC out)	See section 3.11
X5	Relay contact (RO02), programmable	See section 3.11
X6	Relay contact (RO01) Digital outputs (TPO1, TPO2)	See section 3.11
X7	Power input switching power supply (L1, L2 / 2 x 400 V AC)	See section 3.7
X8	Power input DC link supply (L1, L2, L3 / 3 x 230/400/480 V AC)	See section 3.6
PE	Protective conductor connection	See section 3.4
	Screen connection control wire	

Table 3.1 Key connection JM-3000 supply unit

3.4 Protective conductor connection

Step	Action	PE mains connection in accordance with DIN EN 61800-5-1
1.	Every device in the axis group must be earthed! Interconnect the PE connections of the supply unit, the servo amplifiers and the control system in a row. Establish a connection from one of the devices to the PE rail (main earth) in the control cabinet (see "Fig. 3.3 Protective conductor connection of the JM-3000 system").	As leakage current is > 3.5 mA, the following applies to the PE connection: - Use protective conductors with the same cross-section as the mains power cables. - If the cross-section of the power cable is < 10 mm², the PE connections must be doubled (see Fig. 3.7), or a copper cable with a minimum cross section of 10 mm² must be laid.
2.	Connect the protective conductor connections of all other components, such as line filter*), line reactor*) etc., in a star configuration to the PE rail (main Earth) in the control cabinet.	*) Components are only required for the JM-3000 power supply unit.

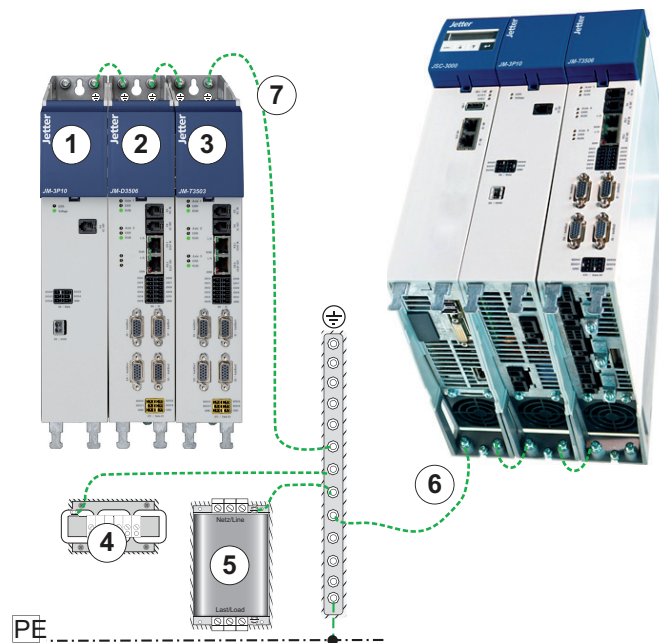


Fig. 3.3 Protective conductor connection of the JM-3000 system

- 1) Supply unit
- 2) Servo amplifier
- 3) Servo amplifier
- 4) Line reactor
- 5) Line filter
- 6) Earthing in a row from below
- 7) Alternatively, earth connection from above

NOTE:

Also comply with local and country-specific regulations and conditions at all times.

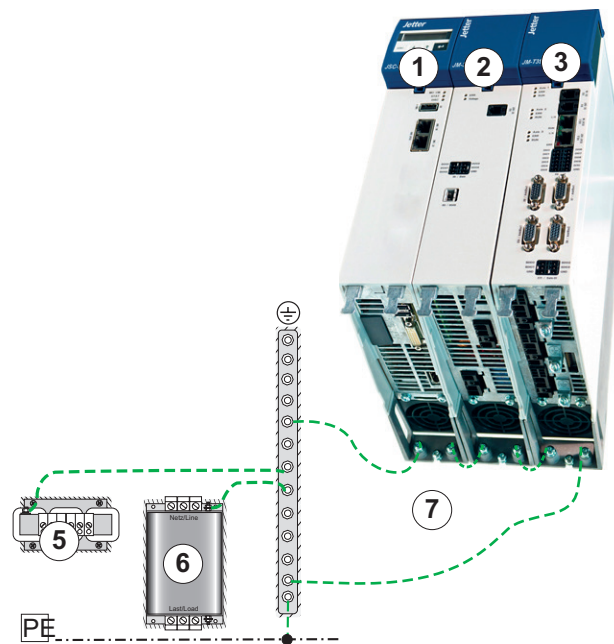


Fig. 3.4 Connection of the JM-3000 system with double PE cables

- 1) JSC-3000 safety control (optional)
- 2) Supply unit
- 3) Servo amplifier
- 5) Line reactor
- 6) Line filter
- 7) Earth connection double



CAUTION!

The protective conductor connection is a safety feature. For this reason, ensure that good contact is established for all connections and that they are so tight that they cannot become loose by themselves.

A wiring diagram of the supply unit and servo amplifiers, which also provides details of the protective conductor connections, is provided in section 3.12.

3.5 Electrical isolation concept

All control connections are designed as protective extra-low voltage circuits (PELV) and must only be operated with such PELV voltages in accordance with the respective specification. This means reliable protection against electric shock at the control side.

The X1, X5, X7, X8 connections are at mains potential (low voltage).

The adjoining overview shows the potential supplies for the individual connections in detail.

This concept also results in a higher operational safety of the servo amplifier.

Connections supply unit (11)	Description	Potential	Abbreviation
X1 /BR	Connection external braking resistor (connected with DC link)	Low voltage ¹⁾	ZK
X1/9	Connection motor temperature monitoring braking resistor (Klixon)	Basic insulation ²⁾	BI
X2/ 24 V DC	Output 24 V switching power supply	Protective extra low voltage circuit ³⁾	PELV
X3	Cross-communication	Protective extra low voltage circuit ³⁾	PELV
X5	Relay contact programmable	Reinforced insulation ⁴⁾	VI
X6 /TP	Two test pulse outputs	Protective extra low voltage circuit ³⁾	PELV
X6/ RO01	Relay contact changer programmable	Protective extra low voltage circuit ³⁾	PELV
X7	Mains supply DC link	Low voltage ¹⁾	Network
X8	Mains supply switching power supply	Low voltage ¹⁾	Network
Busbar 24 V	Output 24 V switching power supply	Protective extra low voltage circuit ³⁾	PELV
Busbar DC link	DC link	Low voltage ¹⁾	ZK

1) Low voltage = AC: $U \leq 1000 \text{ V}$

2) Simple separation to low-voltage grid and PELV network

3) PELV = protective extra low voltage AC: $U \leq 50 \text{ V}$
A connection of the extra low voltage is earthed.

4) Secure separation to low-voltage grid and PELV network

Table 3.2 Key to "electrical isolation concept" overview

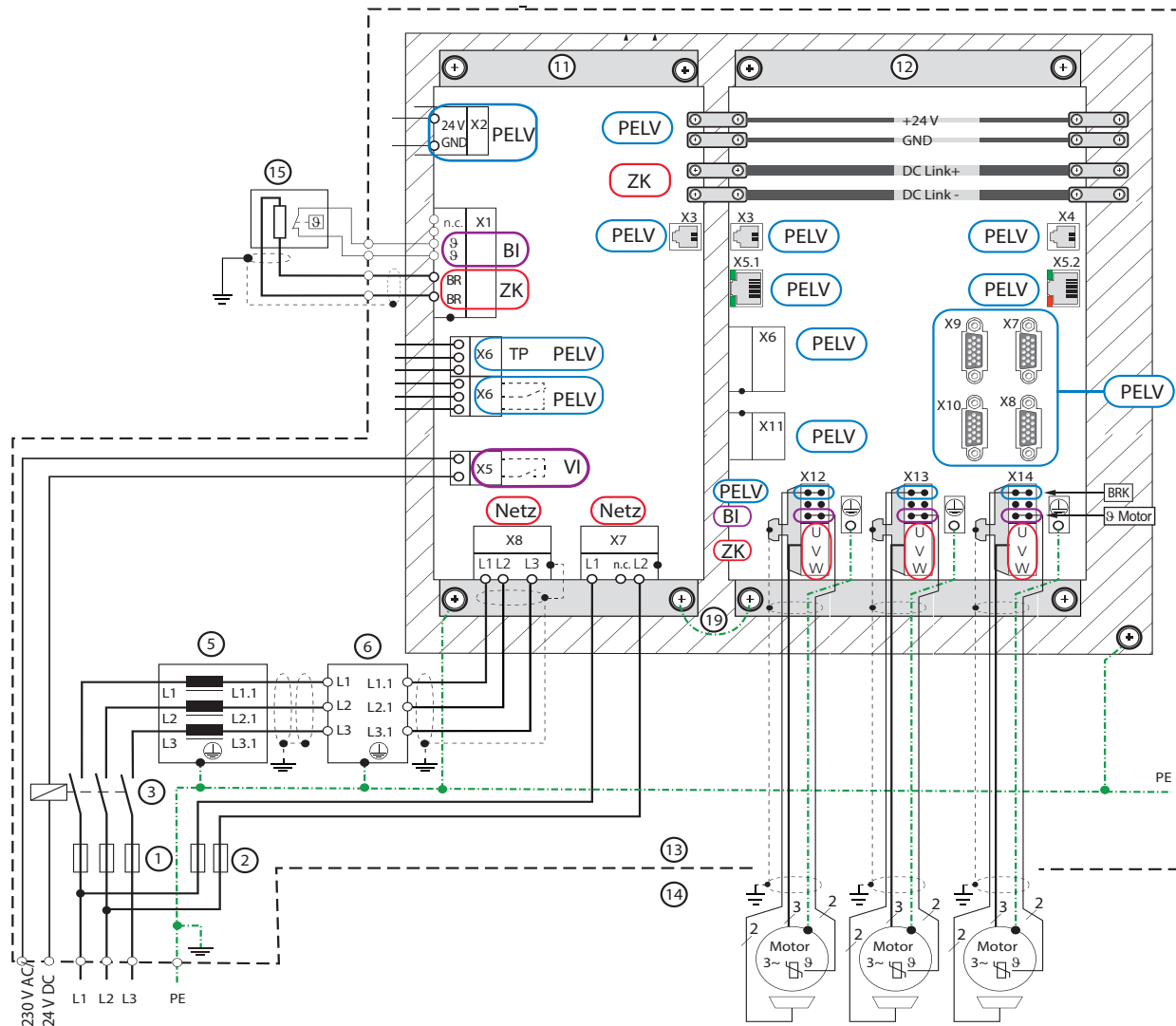


Fig. 3.5 Electrical isolation concept with key

- 4) Mains fuse for DC link supply
- 5) Mains fuse for switching power supply
- 6) Mains contactor (optional)
- 5) Line reactor (accessory)
- 6) Line filter (accessory)
- 11) Supply unit
- 12) Servo amplifier
- 13) Control cabinet
- 14) Field
- 15) Braking resistor with temperature monitoring (external)
- 19) Protective conductor connection to next device in a row

NOTE:

The electrical isolation concept complies with the EN 61800-5-1 product standard.

3.6 AC mains connection (power supply)

3.6.1 Layout bottom X7 and X8

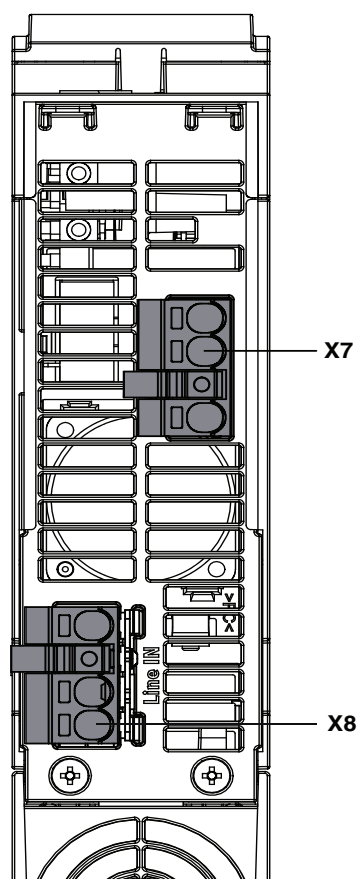


Fig. 3.6 Layout BG1 (bottom)

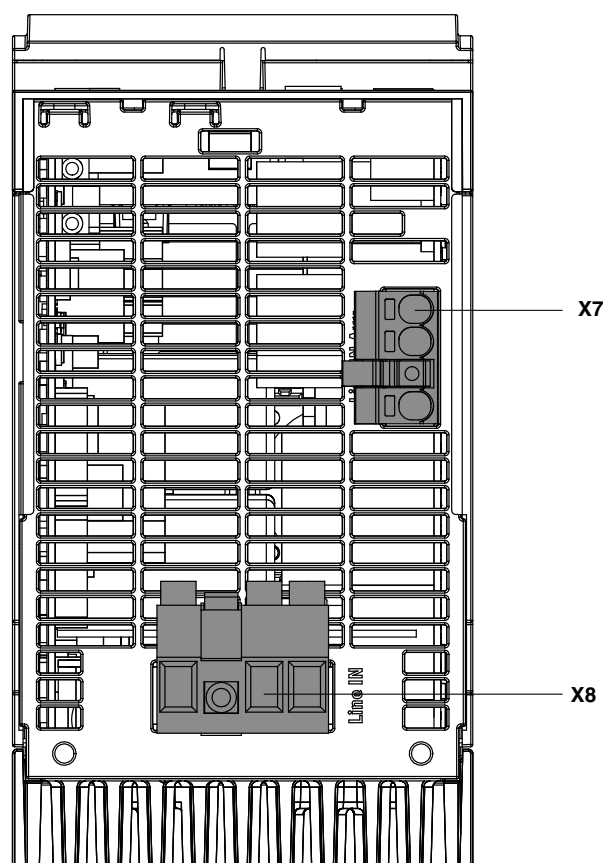


Fig. 3.7 Layout BG2 (bottom)

Power supply mains connection X8

The mains connecting cable must always be laid screened. The screen connection at the device side is established via the shield lug at the X8 (Line IN) connector.

Typically, a suitable line filter for the entire control cabinet is used for the disturbance suppression of the conducted high-frequency interferences.

For the separate disturbance suppression of the JM-3000 system, provision can be made for an optimized filter by Jetter AG at the X8 (Line IN) connection of the supply unit. The supply voltage as well as the sum of the motor cable lengths determine the dimensioning. For details, see chapter "A.6 Line filter".

When connecting the line filter, the screen of the connection cable must be attached on both sides. At the device side, the shield lug of the X8 (Line IN) connector is used for this purpose.

A good screening of the connection at the line filter is established by installing the line filter on a metallic, conductive and well earthed base plate and by connecting the cable shield with the panel as closely as possible to the "Load" connection of the line filter.

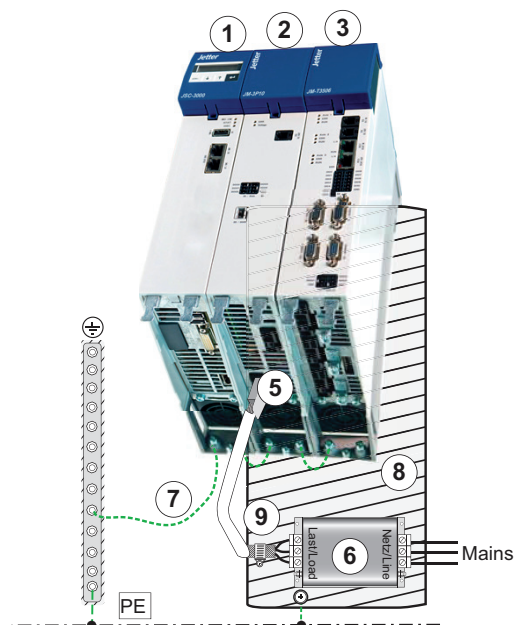


Fig. 3.8 Connection line filter (preliminary)

- 1) JSC-3000 safety control (optional)
- 2) Supply unit
- 3) Servo amplifier
- (5) Screen connection on the screen plate of the X8 connector (Line IN)
- 6) Line filter (optional)
- 7) Protective conductor connection in a row
- 8) Earthed panel
- 9) Screen connection filter side

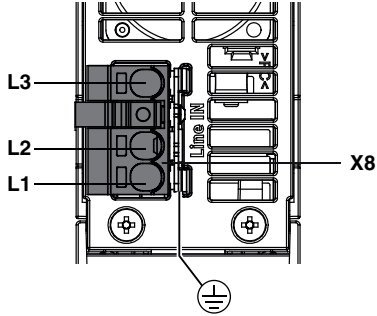
Ref.	Terminal	Specification	Connection BG1
X8 Line IN	L3	• 3 x 400-480 V AC • Approx. 3 x 25 A current consumption • Terminal cross section: 6 mm² maximum	
	L2		
	L1		
		• Connection shield lug at connector for cable shield ¹⁾	

Table 3.3 Specification AC mains connection X8 BG1

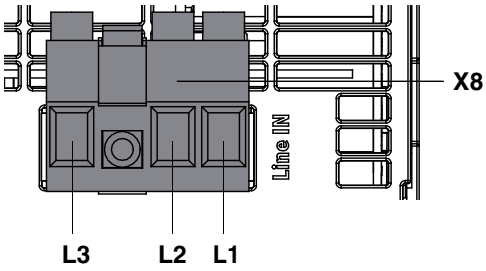
Ref.	Terminal	Specification	Connection BG2
X8 Line IN	L3	• 3 x 400-480 V AC • Approx. 3 x 50 A current consumption • Terminal cross section: 16 mm² maximum	
	L2		
	L1		
		• Connection shield lug at connector for cable shield ¹⁾	

Table 3.4 Specification AC mains connection X8 BG2

NOTE:

The operational provisions of the site as well as the national and regional regulations for line protection must be observed!

If local regulations require the installation of an earth-leakage current breaker, the following applies

NOTE:

In case of a fault, the servo amplifiers in the axis group can generate DC leak currents without zero crossing. The multi-axis system must therefore only be operated with residual current devices (RCDs) type B for AC fault currents, pulsating or smooth DC fault currents, which are suitable for drive control system operation, see IEC 60755!

In addition, residual current monitors (RCMs), which are suitable for drive control systems, can be used for monitoring purposes.

For compliance with equipment safety requirements in accordance with EN61800-5-1, use mains fuses with duty class gG to isolate the device from the mains in case of a fault.

Terminal	Designation	Fuse
X8/L1, L2, L3	JM-3P10 (BG1)	3 x 35 A (gG)
X8/L1, L2, L3	JM-3P22 (BG2)	3 x 63 A (gG)

Table 3.5 Mains fuse JM-3000 supply unit

3.6.2 Operation in special networks

TN and TT network

**CAUTION! Operation is only permitted when**

- In the case of single-phase devices for 1 x 230 V AC the supply system conforms to the maximum installation category III as per EN 61800-5-1.
- In the case of three-phase devices with phase voltages 3 x 400 V, 3 x 480 V
 - the neutral point of the supply system is earthed and
 - The supply system conforms to the maximum installation category III as per EN 61800-5-1 at a system voltage (external conductor → neutral point) of maximum 277 V.
 - In the case of phase voltages 3 x 400 V, 3 x 480 V
 - the neutral point of the supply system is earthed
 - The supply system conforms to the maximum installation category III in accordance with EN 61800-5-1 at a system voltage (external conductor → neutral point) of maximum 277 V.

IT network

**CAUTION! Operation is not permitted!**

In the event of a ground fault the electrical voltage is approx. twice as high. Clearances and creepage distances in accordance with EN 61800-5-1 are no longer maintained. This can lead to the destruction of the device.

3.7 AC mains connection 24 V switching power supply

The mains connection at X7 supplies the integrated 24 V switching power supply.

These 24 V DC are used for the control supply of the entire axis group via busbars.

For compliance with equipment safety requirements in accordance with EN61800-5-1, use mains fuses with duty class gG to isolate the device from the mains in case of a fault.

Terminal	Designation	Fuse
X7/L1, L2	JM-3P10 (BG1)	2 x 6 A (gG)
X7/L1, L2	JM-3P22 (BG2)	2 x 6 A (gG)

Table 3.6 Mains fuse JM-3000 supply unit

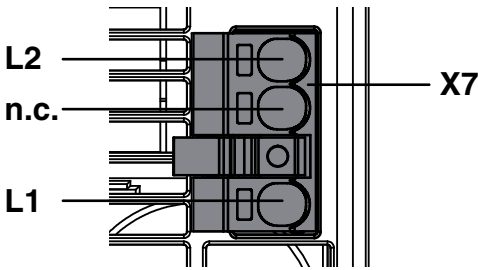
Ref.	Terminal	Specification	Connection
X7 Line IN AUX	L2	• 2 x 400-480 V AC • Approx. 2 A current consumption • Terminal cross section: 6 mm² maximum	
	n.c.		
	L1		

Table 3.7 Specification AC mains connection X7

NOTE:

The same switching power supply is installed in supply unit BG1 and BG2. The technical data are therefore identical.

NOTE:

The supply unit in the order variant JM-3Pxx is supplied without a switching power supply. For further details see section 5.3.

3.7.1 Layout top X1 and X2

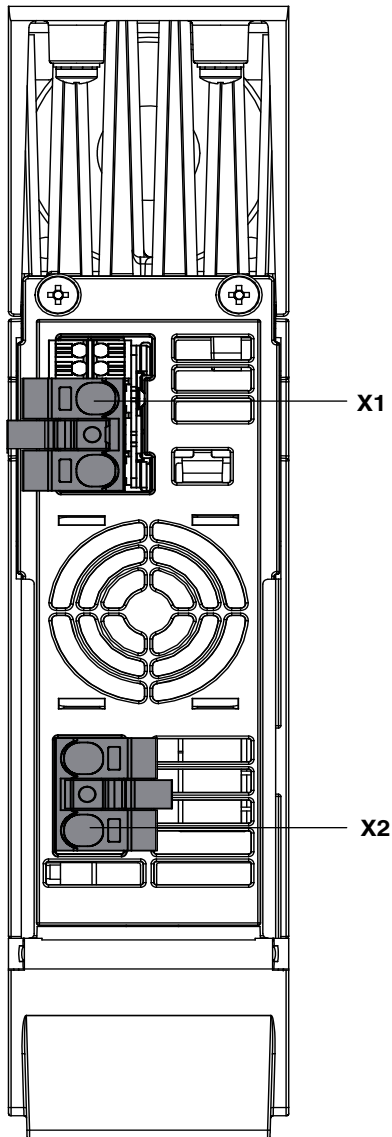


Fig. 3.9 Layout BG1 (top)

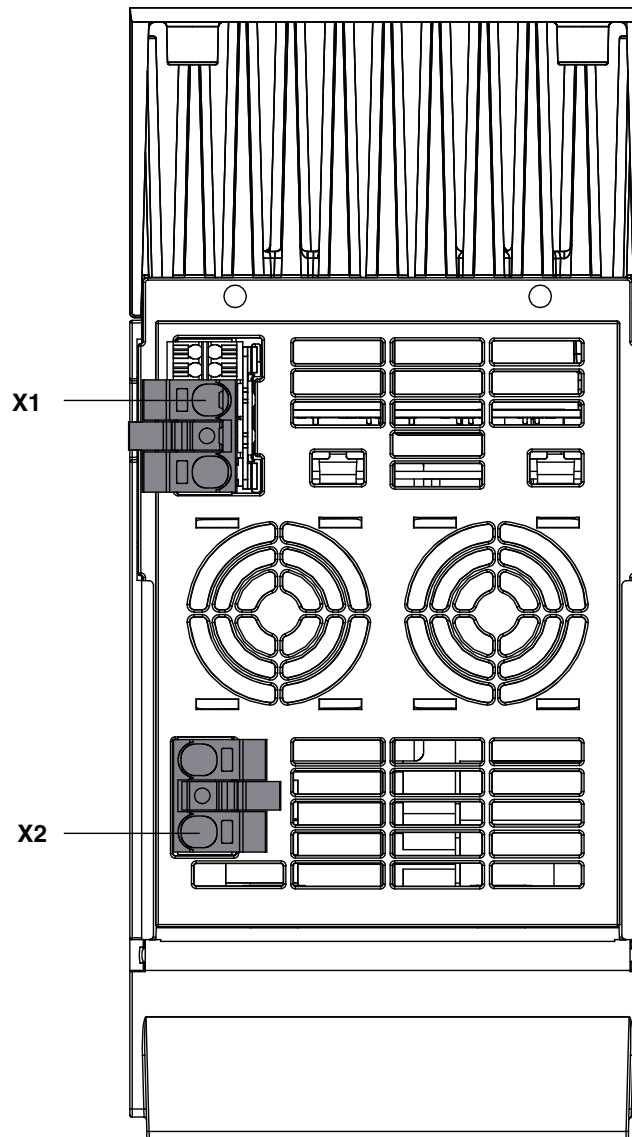


Fig. 3.10 Layout BG2 (top)

3.8 Brake chopper connection

In regenerative operation, e.g. when braking the drive, the motor feeds energy back to the servo amplifier. This increases the voltage in the DC link. If the voltage exceeds a threshold value, the internal braking transistor in the supply unit is activated and the regenerated power is converted into heat by means of a braking resistor.

The JM-3000 supply unit always requires a braking resistor. There is a choice between an ext. braking resistor or the variant "Supply unit with integrated braking resistor", see the order number code.

3.8.1 Connection of an external braking resistor

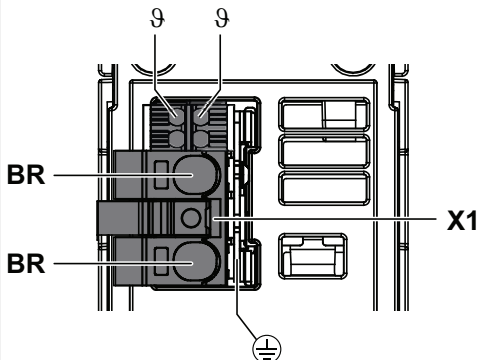
Ref.	Terminal	Specification	Connection
X1	BR	- Connection braking resistor - Terminal cross section: 6 mm² maximum - Technical data see Table A.2 on page 62 and Table A.4 on page 64 - The connection must be screened	
	9	Connection temperature monitoring (Klixon) braking resistor ¹⁾	
		Connection shield lug at connector for cable shield	
Layout see Fig. 3.9 and Fig. 3.10 1) If temperature monitoring is not connected, the X1-9 terminals must be bridged!			

Table 3.8 Connection braking resistor with temperature monitoring at X1 BG1 and BG2



DANGER DUE TO HIGH VOLTAGE!

The BR connection is permanently switched to DC link potential (> 300 V DC). Never wire or disconnect electrical connections while they are live! Always disconnect the device from the mains before working on it. **Dangerously high voltages of ≥ 50 V may still be present 3 minutes after the power is cut (capacitor charge).**

For temperature monitoring, the external braking resistor must have a temperature monitor (Klixon), which must be connected to X1-9. In the event of overheating, the temperature evaluation of the supply unit reacts and sends a stop command to all servo amplifiers. The motion systems then coast to a stop.

See chapter Appendix for technical data on the design of braking resistors. The cable cross-section depends on the performance of the braking resistor.

NOTE:

The Klaxon in the braking resistor must have at least basic insulation in accordance with EN 61800-5-1 to the resistor that carries mains voltage.

**CAUTION**

During operation, the braking resistor emits intensive thermal radiation ($>300\text{ }^{\circ}\text{C}$). For this reason, maintain sufficient distance to neighboring assemblies or install the braking resistor outside the control cabinet. If the braking resistor is installed outside the control cabinet, ensure that suitable touch protection is present, which provides reliable protection from hot surfaces.

3.8.2 Connection example with external braking resistor

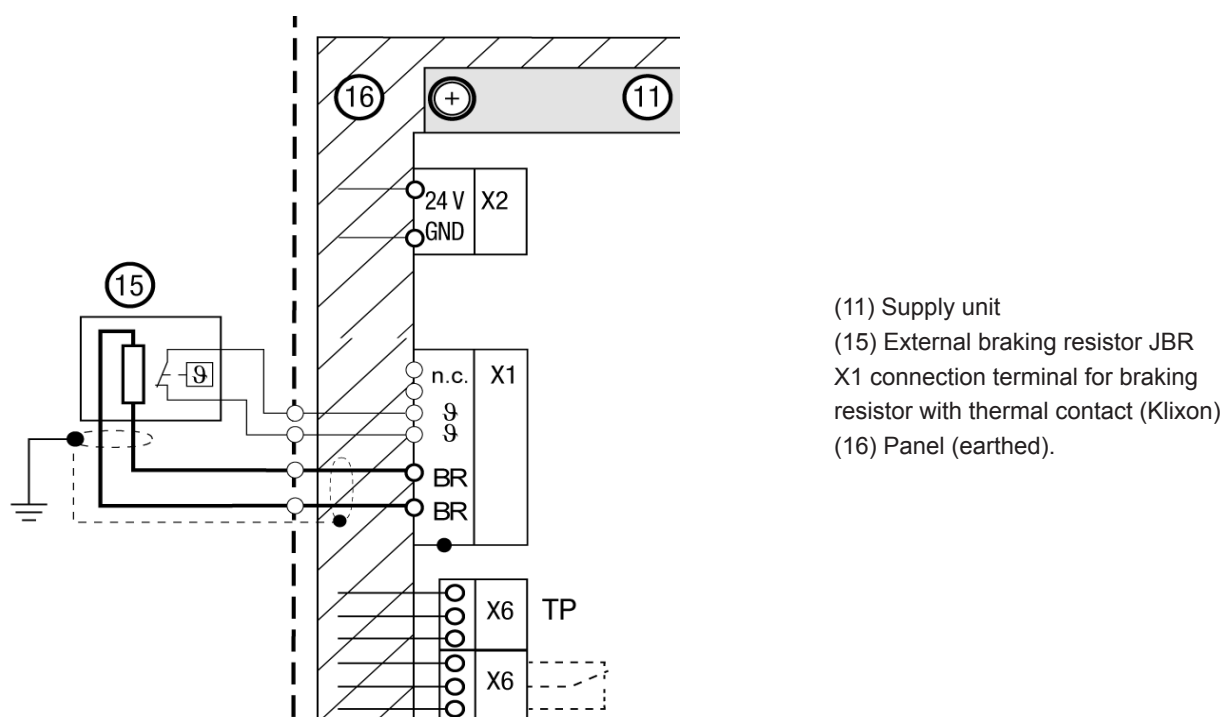
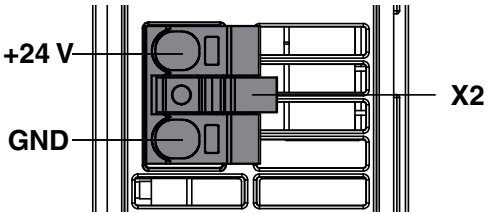


Fig. 3.11 Connection braking resistor with thermal contact (X1)

3.9 24 V DC output (X2 top)

Ref.	Terminal	Specification	Connection
X2 24 V DC OUT	+24 V	24 V DC - The sum of the power requirement via the busbar and the X2 DC output may not exceed 470 W - Terminal cross section: 6 mm² maximum	
	GND		

Layout see Fig. 3.9 and Fig. 3.10

Table 3.9 Specification 24 V DC output X2 BG1 and BG2

NOTE:

The same switching power supply is installed in supply unit BG1 and BG2. The technical data are therefore identical.

3.10 Busbar connection of supply voltages

The supply unit provides the power supply for the servo amplifiers, separately for the control unit and the DC link. The 24 V supply of the control unit is supplied via the upper busbar (+24 V DC and GND, see Fig. 3.12) from the switching power supply of the supply unit. The DC link supply is provided from an unregulated DC voltage DC link supply and is connected to the servo amplifiers via the lower busbar (DC Link +/-).

Step	Action	Comment
 1.	First, ensure that the JM-3000 supply unit is arranged in a row with the JM-3000 servo amplifiers and that they are butt mounted.	See installation instructions
 2.	Use the busbar elements supplied for the control supply of the servo amplifiers. Connect all 24 V connections with each other and all GND connections with each other.	The length of the busbar elements supplied is equivalent to the width of the corresponding device.
 3.	Use the busbar elements supplied for the DC link supply of the servo amplifiers. Connect all (DC Link+) connections with each other and all (DC Link-) connections with each other.	The length of the busbar elements supplied is equivalent to the width of the corresponding device.



CAUTION!

The connection elements (busbars) supplied must be used for the electrical connection of the devices. Ensure that good contact is established for all connections and that the tightening torque (2.1 Nm) is achieved, so that they cannot become loose by themselves. Jetter AG cannot guarantee stable and safe operation when connection elements are used that do not meet the specifications.

3.10.1 24 V control supply

Fig.		Specification
JM-3000 supply unit	JM-3000 servo amplifier	• $U_{st} = +24 \text{ V DC} \pm 20\%$ stabilized and filtered • Output power of switching power supply (SNT) max. 470 W • Internal polarity reversal protection • The power supply unit used must have a safe separation to the mains as per EN 61131-2 • Torque for rail screw connection 2.1 Nm

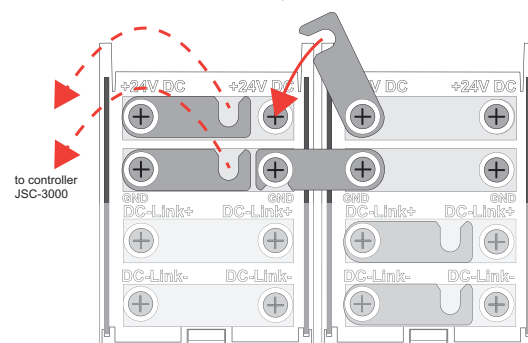


Fig. 3.12 Busbar 24 V V control supply

3.10.2 DC link supply

Fig.		Specification
JM-3000 supply unit	JM-3000 servo amplifier	• JM-3000 supply unit • DC link voltage 565/ 678 V DC • Depending on mains voltage (400 V / 480 V) • Torque 2.1 Nm

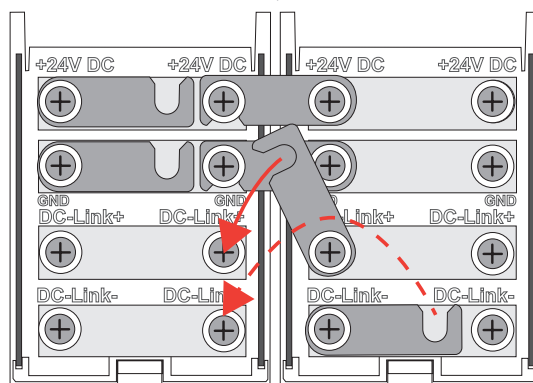


Fig. 3.13 Busbar DC link supply

3.10.3 Overview busbar configuration in the group

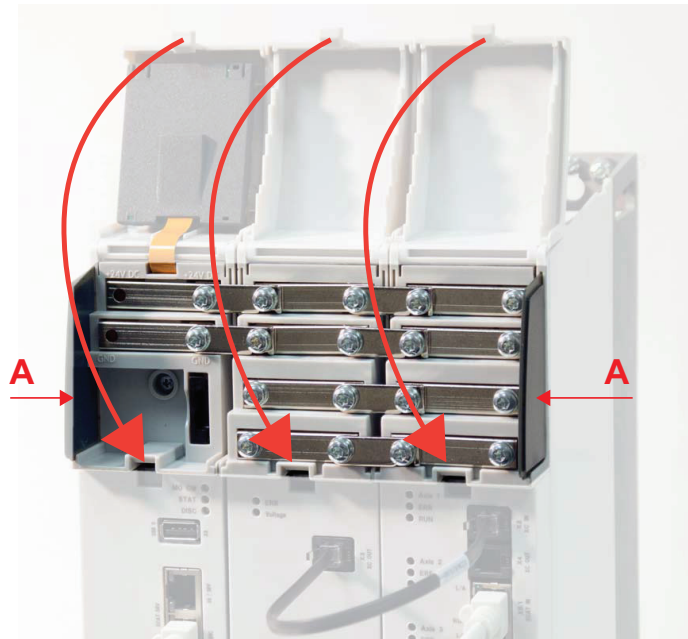


Fig. 3.14 Busbar covers



DANGER DUE TO HIGH VOLTAGE!

The multi-axis system must only be operated when the rail covers are closed! Here, it is also important that the side covers (A) are inserted. Both constitute touch protection against bare and live parts. Death or serious physical injury can occur if this precaution is not taken.

3.11 Control connections (front)

Step	Action	Comment
1.	Establish a connection between the X3 connection of the supply unit with the X3 connection of the first servo amplifier (cross-communication).	For this, use the supplied cable type: XCOM See Appendix
2.	Wire the programmable relay contacts X5 and X6 and the test pulse outputs TP01 and TP02, as required.	
3.	Check all connections again!	

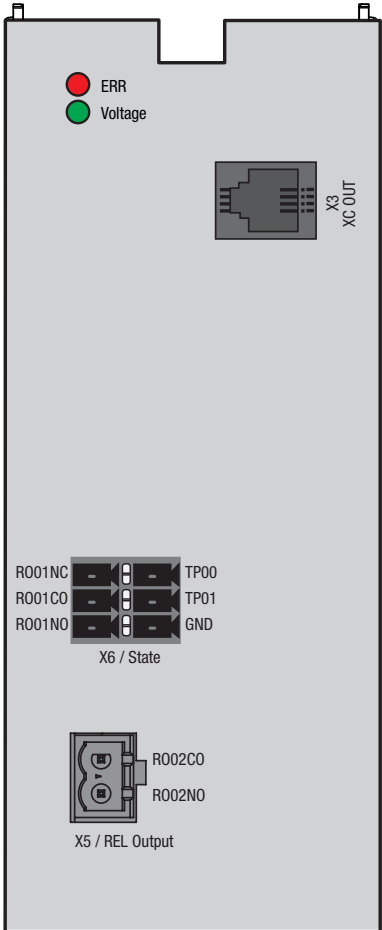
Fig.	Abbreviation	Designation	Details
 The diagram shows the front panel of the supply unit. At the top left, there are two LEDs: a red one labeled 'ERR' and a green one labeled 'Voltage'. To their right is a connector labeled 'X3 XC OUT'. Below these, there is a terminal block labeled 'X6 / State' with terminals for 'R001NC', 'R001CO', 'R001NO', 'TP00', 'TP01', and 'GND'. At the bottom, there is another terminal block labeled 'X5 / REL Output' with terminals for 'R002CO' and 'R002NO'.	LED red (ERR)	Error status supply unit (blink code)	See chapter 4
	LED green (voltage)	Status mains supply	See chapter 4
	X3 / XC OUT	Cross-communication	See chapter 3.11.1
	X5 / REL Output	Relay contact (R002)	See chapter 3.11.2
	X6 /State	Relay contact (R001) Digital outputs (TPO1, TPO2)	See chapter 3.11.3

Table 3.10 Layout supply unit front

3.11.1 Specification of cross-communication (X3)

Ref.	Terminal	Specification	Details
X3	XC OUT	Cross-communication output (RJ10 plug), internal RS485 network for communication with servo amplifiers	See JM-3000 User Manual Item no. 60880296

NOTE:

X3 connections are exclusively used for internal communication between the supply unit and the servo amplifiers.

3.11.2 Specification relay contact REL Output (X5)

Ref.	Terminal	Specification	Details
X5	R002N0 = NO contact	R002C0  R002N0 	Relay contact: 230 V AC, 0.5 A max. (resistive load), contact user-programmable Factory setting = control for main contactor

3.11.3 Specification connection "state" (X6)

Ref.	Terminal	Specification	Details
X6	RO01= NC contact RO01= CO contact RO01NO = NO contact	R001NC  R001CO  R001NO 	Relay contact: ≤ 50 V AC, 0.5 A max. (resistive load) contact user-programmable Factory setting = active on fault
X6	TP00 = Test pulse signal 00 TP01 = Test pulse signal 01 GND = Ground reference	Signal driver outputs for internal use for testing of short circuits and shorts between contacts of the wiring to the safe inputs of the servo amplifiers	See S1 JM-3000 User Manual Item no. 60880300

3.12 Commissioning

Commissioning is described in chapter 4 of the JM-3000 servo amplifier user manual.

3.12.1 Connection example supply unit/ servo amplifier

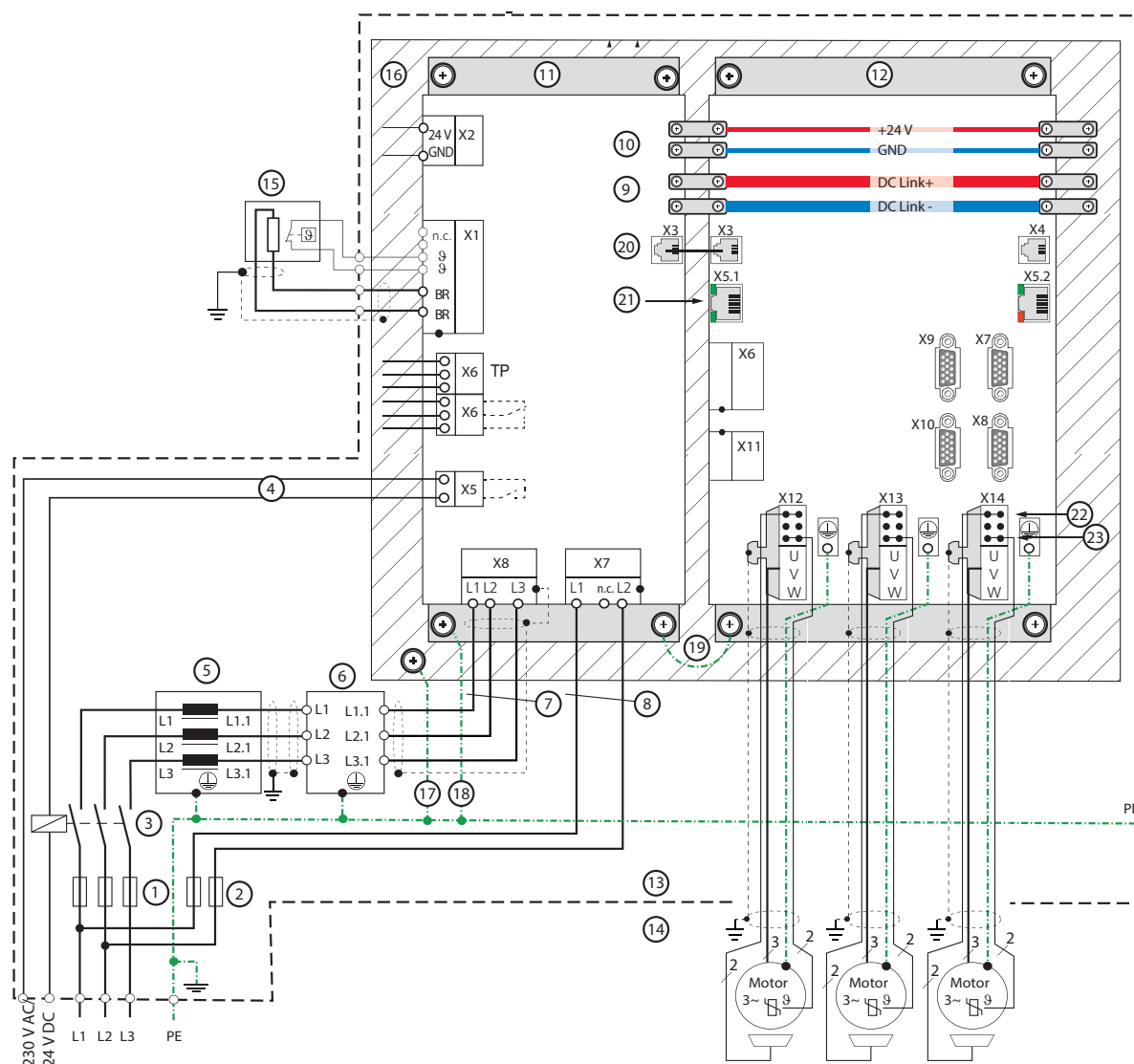


Fig. 3.15 Connection example (schematic diagram)

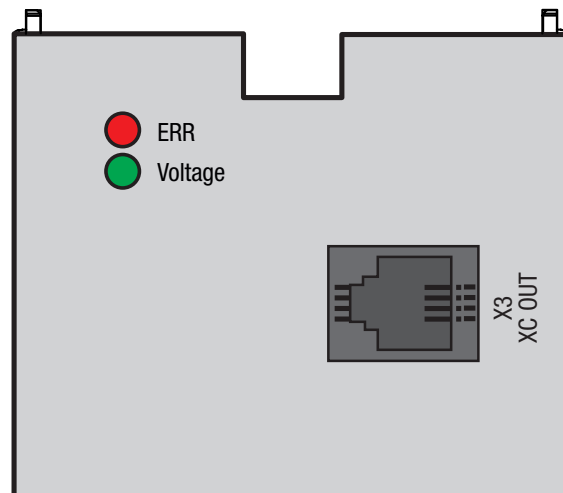
Key for connection example

	Designation
(1)	Mains fuses for DC link supply
(2)	Mains fuse for switching power supply
(3)	Mains contactor with suppressor circuit
(4)	Switching contact programmable as mains contactor
(5)	Line reactor (optional)
(6)	Line filter (optional)
(7)	AC mains connection (power supply)
(8)	AC mains connection (24 V switching power supply)
(9)	DC link
(10)	24 V DC (PELV)
(11)	Supply unit
(12)	Servo amplifier
(13)	Control cabinet
(14)	Field
(15)	External braking resistor with temperature monitoring
(16)	Panel
(17)	Earthing of panel
(18)	PE- protective conductor connection
(19)	Protective conductor connection to next device in a row
(20)	Cross-communication
(21)	EtherCAT® connections
(22)	Connection motor holding brake
(23)	Connection motor temperature monitoring

Table 3.11 Key connection example

4 Diagnostics

4.1 LEDs axis status



LED red (ERR)

Error status supply module (blink code)

LED green (voltage)

Mains supply present

Fig. 4.1 Meaning of status LEDs

NOTE:

You will find details on the LED messages in the online help for JetSym.

4.2 Hotline, support & service

Our hotline can provide you with fast, specific assistance if you have any technical queries relating to project planning or commissioning of the supply unit. Please collect the following information prior to making contact:

1. Type designation, serial number and software version of the device (see software nameplate)
2. JetSym version used (Menu ► Help ► About JetSym...)
3. Error code displayed (on 7-segment display or in JetSym)
4. Description of the error symptoms, how it occurred and relevant circumstances
5. Save device settings to file in JetSym
6. Name of company and contact, telephone number and e-mail address

The hotline is available Monday to Friday from 8 a.m. to 5 p.m. (CET), and can be accessed by telephone, e-mail or over the Internet:

Phone: +49 7141 2550-444
E-Mail: hotline@jetter.de
Internet: www.jetter.de ► Support

NOTE:

If you need more detailed assistance and advice, you will find all the services we offer in the Industrial Automation catalog. You can download the Industrial Automation catalog from the “Quicklinks” section of our website at <http://www.jetter.de>.

5 Configuration variants

5.1 24 V support during line loss

Applies to JM-3Pxx-P2

5.1.1 Purpose of the function

The “24 V support during a line loss” function is used to bring the moving masses of a mechanical system (e.g. robot arm) to a standstill in a controlled fashion in case of a line loss. For this purpose, the DC Link of the 24 V switching power supply is coupled with the DC links of the servo amplifiers (DC Link +/-). By braking a drive axis, regenerative energy is created, which recharges the DC links of the servo amplifiers. The 24 V control supply can be maintained for a longer period using this additional energy.

5.1.2 Functional description

As a rule, the system does not react to a line loss, but to the accompanying low voltage in the DC link of the servo amplifiers or the DC link of the switching power supply. If the pre-charge relay is open, the function is activated.

5.2 Configuration with integrated braking resistor

Applies to JM-3Pxx-R1

5.2.1 Purpose of configuration variant

In regenerative operation, e.g. when braking the drive, the motor feeds energy back to the servo amplifier. This increases the voltage in the DC link. If the voltage exceeds a threshold value, the internal braking transistor in the supply unit is activated and the regenerated power is converted into heat by means of a braking resistor.

The configuration variant described here is a cost effective option that makes it possible to brake motion systems with small masses without additional effort.

In addition, the integrated braking resistor has the major advantage that no additional space is required, as would be the case for an external brake resistor.

However, the braking power is limited due to thermal reasons. The technical data for BG1 are provided in section A.1.1 and for BG2 in section A.2.1.

5.3 Configuration without 24 V switching power supply

Applies to JM-3Pxx

5.3.1 Purpose of the variant

This configuration variant provides you with the option to supply the control unit of the JM-3000 system with an already existing external switching power supply.

The external switching power supply must meet the following minimum requirements:

- $U_v = +24 \text{ V DC } \pm 10\%$, stabilized and filtered (operating voltage)
- $P_v = 470 \text{ W}$ minimum (power drawn)
- Internal polarity reversal protection
- The power supply unit used must have a safe separation to the mains in accordance with EN 50178 or EN 61800-5-1.
- The start-up current for the control voltage can be 2-3 times that of the operating current for a brief time.
- If other devices are also supplied by this switching power supply, the performance value must be correspondingly higher.



CAUTION!

The 24 V/GND connection at the supply unit is at earth potential (see PELV). Other consumers can be damaged by connecting items such as control wire screens. Check connections beforehand.

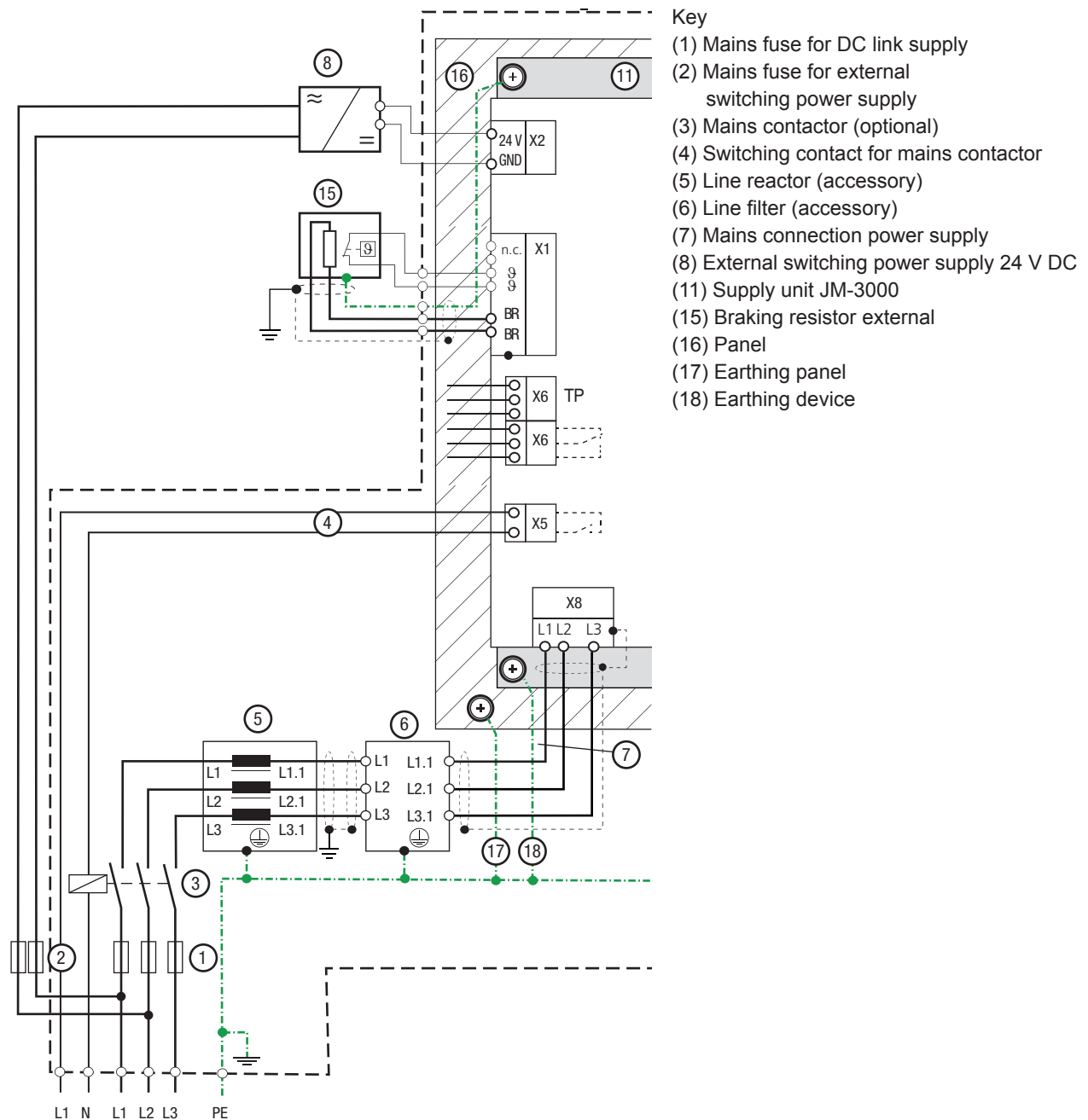


Fig. 5.1 Connection example for JM-3Pxx

A Appendix

A.1 Technical data power supply unit BG1

Device	JM-3P10 / JM-3P10-C1		
Input, mains side			
Power supply voltage $U_N \pm 10\%$, 3 times	230 V AC	400 V AC	480 V AC
Continuous current [$A_{AC\ eff}$]		21.4 A_{eff}	18 A_{eff}
Peak current [A_{AC}]		43 A_{eff}	36 A_{eff}
Continuous output		Typically 14 kVA depending on the mains impedance	
Power dissipation rectifier			
Asymmetry of mains voltage		50 W	
Frequency	±3 % maximum		
Maximum cable cross-section X12	50 ... 60 Hz ±10 %		
Output DC link			
DC link voltage	325 V DC	565 V DC	678 V DC
Continuous current	18 A DC	18 A DC	15 A DC
Peak current 2 x I_N for 1 s, line reactor not required	36 A DC	36 A DC	30 A DC
Continuous output P_N	5.75 kW	10 kW	10 kW
Peak output 2 x P_N for 1 s	11.5 kW	20 kW	20 kW
DC link capacitance only JM-3Pxx		330 µF	
Maximum permissible DC link capacitance JM-3000 + JM-3Pxx ¹⁾	2,000 µF (1,670 + 330) maximum		
Power dissipation P_N in interior		85 W	

Table A.1 Technical data JM-3000 supply unity unit BG1



¹⁾ **CAUTION!**

The maximum overall capacity of the multi-axis system DC link must not exceed the specified value. This could lead to the destruction of the devices.

A.1.1 Technical data brake chopper BG1

Device	JM-3P10 / JM-3P10-C1		
Power supply voltage	230 V AC	400 V AC	480 V AC
Brake chopper power electronics			
Brake chopper operating point	411 V	652 V	765 V
Transient protection	446 V	687 V	800 V
Continuous braking power [kW]	3 kW	3 kW	3 kW
Peak braking power for max. 0.5 s *)	13 kW	13 kW	16 kW
Maximum ohmic resistance of an externally connected braking resistor	90 Ω	90 Ω	90 Ω
Minimum ohmic resistance of an externally connected braking resistor	33 Ω	33 Ω	38 Ω
Supply unit with integrated braking resistor: Configuration JM-3P10-R1			
Continuous braking power	75 W		
Peak braking power for max. 0.5 s *)	3 kW		
Ohmic resistance of the integrated braking resistor	56 Ω		

*) After this time shut-down occurs after I^2t

Table A.2 Technical data brake chopper BG1



CAUTION!

Please note that the connection of an additional, external braking resistor to a device with an integrated braking resistor is not permitted. This would lead to the destruction of the device.

The stated braking power of the brake chopper electronics can only be achieved with externally connected brake resistors.

A.2 Technical data power supply unit BG2

Device	JM-3P22 / JM-3P22-C1		
Input, mains side			
Power supply voltage $U_N \pm 10\%$, 3 times	230 V AC	400 V AC	480 V AC
Continuous current [$A_{AC\ eff}$]			
Peak current [A_{AC}]			
Continuous output		Typically 28 kVA depending on the mains impedance	
Power dissipation rectifier		110 W	
Asymmetry of mains voltage		$\pm 3\%$ maximum	
Frequency		50 ... 60 Hz $\pm 10\%$	
Maximum cable cross-section of the terminals X 12		1.5 ... 16 mm ² (flexible conductor cable with/without ferrule)	
Output DC link			
DC link voltage	325 V DC	565 V DC	678 V DC
Continuous current		35 A DC	
Peak current 2 x I_N for 1 s, line reactor not required		70 A DC	
Continuous output P_N		22 kW	
Peak output 2 x P_N for 1 s		44 kW	
DC link capacitance only JM-3Pxx	840 μ F		
Maximum permissible DC link capacitance JM-3000 + JM-3Pxx ¹⁾	4,000 μ F (3,160 + 840) maximum		
Power dissipation P_N in interior		85 W	

Table A.3 Technical data JM-3000 power supply unit BG2



¹⁾ CAUTION!

The maximum overall capacity of the multi-axis system DC link must not exceed the specified value. This could lead to the destruction of the devices.

A.2.1 Technical data brake chopper BG2

Device	JM-3P22 / JM-3P22-C1		
Power supply voltage	230 V AC	400 V AC	480 V AC
Brake chopper power electronics			
Brake chopper operating point	411 V	652 V	765 V
Transient protection	446 V	687 V	800 V
Continuous braking power [kW]	6 kW		
Peak braking power for max. 0.5 s *)	32 kW		
Maximum ohmic resistance of an externally connected braking resistor	90 Ω		
Minimum ohmic resistance of an externally connected braking resistor	15 Ω		
Supply unit with integrated braking resistor: Configuration JM-3P22-R1			
Continuous braking power	200 W		
Peak braking power for max. 0.5 s *)	6 kW		
Ohmic resistance of the integrated braking resistor	28 Ω		

*) After this time shut-down occurs after I^2t

Table A.4 Technical data brake chopper BG2



CAUTION!

Please note that the connection of an additional, external braking resistor to a device with an integrated braking resistor is not permitted. This would lead to the destruction of the device.

The stated braking power of the brake chopper electronics can only be achieved with externally connected brake resistors.

A.3 Ambient conditions

Ambient conditions	JM-3000 supply unit
Degree of protection	Device: IP20 - except terminals: IP10 - (touch protection back of hand)
Accident prevention regulations	In accordance with local regulations (in Germany e.g. BGV A3)
Installation altitude	Up to 1000 m above NSL, above 1000 m NSL with power reduction (1% per 100 m, max. 2000 m above NSL)
Pollution degree	2
Type of installation	Open-chassis unit, only for vertical installation in a control cabinet with min. degree of protection of IP4x, on using safety function STO min. IP54

Table A.5 Ambient conditions JM-3000 supply unit

Ambient conditions	JM-3000 supply unit
During transport	In accordance with EN 61800-2, IEC 60721-3-2 class 2K3 ¹⁾
	Temperature -25 °C to +70 °C
	Relative air humidity 95 % at max. +40 °C
During storage	In accordance with EN 61800-2, IEC 60721-3-1 classes 1K3 and 1K4 ²⁾
	Temperature -25 °C to +55 °C
	Relative air humidity 5 to 95%
During operation	In accordance with EN 61800-2, IEC 60721-3-3 class 3K3 ³⁾
	Temperature 5 °C to +40 °C (4, 8, 16 kHz) up to 50 °C with power reduction (5 %/°C)
	Relative air humidity 5 to 85% without condensation

1) The absolute humidity is limited to max. 60 g/m³. This means that, at 70 °C for example, the relative humidity may only be max. 40 %.

2) The absolute humidity is limited to max. 29 g/m³. This means that the peak values for temperature and relative humidity stipulated in the table must not occur simultaneously.

3) The absolute humidity is limited to max. 25 g/m³. This means that the peak values for temperature and relative humidity stipulated in the table must not occur simultaneously.

Table A.6 Ambient conditions JM-3000 supply unit

NOTE:

The ambient conditions apply to the device. They must therefore also be adhered to in the control cabinet.

Mechanical conditions		JM-3000 supply unit	
Vibration limit in transit	In accordance with EN 61800-2, IEC 60721-3-2 class 2M1		
	Frequency [Hz]	Amplitude [mm]	Acceleration [m/s²]
	2 ≤ f < 9	3.5	Not applicable
	9 ≤ f < 200	Not applicable	10
	200 ≤ f < 500	Not applicable	15
Shock limit in transit	In accordance with EN 61800-2, IEC 60721-2-2 class 2M1		
	Free falls height of packed device: maximum 0.25 m		
Vibration limit of the plant ¹⁾	In accordance with EN 61800-2, IEC 60721-3-3 class 3M1		
	Frequency [Hz]	Amplitude [mm]	Acceleration [m/s²]
	2 ≤ f < 9	0.3	Not applicable
	9 ≤ f < 200	Not applicable	1

1) Note: The devices are only designed for stationary use.

Table A.7 Mechanical conditions supply unit JM-3000

NOTE:

- In accordance with EN ISO 13849-2, the control cabinet must have a degree of protection of IP54 or higher when the STO (Safe Torque OFF) safety function is used.



CAUTION!

The ambient conditions apply to the device. They must therefore also be adhered to in the control cabinet.

A.4 Certification

A.4.1 CE certification

The JM-3000 supply unit meets the requirements of the Low Voltage Directive 2006/95/EC and of the product standard EN 61800-5-1.

The JM-3000 supply unit therefore meets the requirements for installation in a machine or plant within the meaning of the Machine Directive 2006/42/EC.

The supply unit is CE marked accordingly.

The CE mark on the nameplate indicates conformity with the above mentioned guidelines.

A.4.2 UL certification

The UL certification for the JM-3000 supply unit is in preparation.

A.4.3 Reactive system load through harmonics

(note to
EN 61000-3-2:2006)

The devices of the JM-3000 system are “professional devices” in the sense of EN 61000, so that they are within the scope of the standard at a nominal rated load of ≤ 1 kW (or ≤ 16 A per supply phase).

When the supply unit is connected directly ≤ 1 kW to the public low-voltage grid, measures must either be taken to comply with the standard, or the relevant power supply company must issue connection approval. If you use our drive units as a component in your machine/plant, the scope of the standard must be tested for the complete machine/plant.

A.5 Accessories

The JM-3000 system has been complemented with extensive accessories. Important components include, for example:

- Synchronous servo motors
- Pre-fabricated motor cable
- Pre-fabricated sensor cable
- Data cables - for Fieldbus and cross-communication
- Connector sets
- PC user software - e.g. JetSym
- Line filter - reduces the conducted high-frequency interferences of the drive control system (for use on the JM-3000 supply unit)
- Line reactor - reduces the voltage distortions (THD) in the network and increases the service life of the servo amplifier (for use on the JM-3000 supply unit).
- Braking resistor - converts excess regenerative energy into heat, allowing an even more dynamic process (for use on the JM-3000 power supply unit).

A.5.1 Connecting cables for communication

 Type: XCOM  Type: ECAT	Jetter item no. 60879945_00 Communication cable set JM-3000 1 pc each: • RJ-10 cross-communication, 0.25m • RJ-45 patch cable SF/UTP, Cat 5e, 0.25m
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A.6 Line filter

Compliance with the EMC standard

Commissioning (i.e. start-up of intended operation) is only permitted in compliance with the EMC Directive (2004/108/EC). The installer/operator of a machine and/or item of plant must provide proof of compliance with the protection targets stipulated in the standard.

External line filters are available to reduce the conducted emitted interference to the permissible level. The use of these line filters makes it possible to comply with the EMC Directive 2004/108/EG under certain conditions:

- Public low-voltage grid "First environment" (residential C2)
- Industrial low-voltage grid "Second environment" (industrial C3)

A.6.1 Selection guide for line filters

The following tables provide an initial estimation of which line filter is likely to meet the EMC requirements under the conditions specified. This must be checked by the installer/operator. Under certain conditions, it may be possible to change to a smaller filter or necessary to change to a larger filter.

Step	Action	Comment
 1.	Select the table that corresponds to the continuous rated current of your application at the mains side.	
 2.	Add the motor cable lengths of your application and go to the corresponding or next larger column.	
 3.	Select the environment applicable (residential C2 or industrial C3).	
 4.	Select the maximum clock frequency of the motor end stages that occur in your application.	
 5.	Read out the order designation of the line filter.	
 6.	Use measurements to prove that the EMC requirements are being met.	

Example

The system in which interference is to be eliminated consists of six axes with 4 m motor cable length each, and is also operated in residential areas with an automatically switched clock frequency of max. 8 kHz. The continuous rated mains current is 18 A.

- Based on this continuous rated current, the table "Power input current $I_{IN} \leq 25 \text{ A}$ " must be selected.
- The sum of the motor cable lengths is $6 \times 4 \text{ m} = 24 \text{ m}$, column "30" must be selected.
- Residential environment = category C2
- Maximum clock rate = 8 kHz
- The recommended line filter is JEMC25.240-UR

See next page for table.

Power input current **$I_{IN} \leq 25 \text{ A}$**

Max. motor cable length [m]				20	30	40	50	60	70	80	90	
Category	C2	Clock frequency [kHz]	4	JEMC25.120-UR	JEMC25.240-UR					JEMC25.600-UR		
			8	JEMC25.120-UR	JEMC25.240-UR			JEMC25.600-UR				
			16	JEMC25.240-UR				N/A				
	C3		4	JEMC25.120-UR								
			8	JEMC25.120-UR								
			16	JEMC25.120-UR								

Max. motor cable length [m]				100	120	140	240	300	600	
Category	C2	Clock frequency [kHz]	4	N/A						
			8	N/A						
			16							
	C3		4	JEMC25.240-UR				JEMC25.600-UR		
			8	JEMC25.240-UR				JEMC25.600-UR		
			16	N/A						

Jetter order designation	Jetter item no.
JEMC25.120-UR	60880637_00
JEMC25.240-UR	60880639_00
JEMC25.600-UR	60880641_00

Power input current **$I_{IN} \leq 53 \text{ A}$**

Max. motor cable length [m]			20	30	40	50	60	70	80	90	
Category	C2	Clock frequency [kHz]	4	JEMC53.120-UR	JEMC53.240-UR	JEMC53.600-UR		N/A			
			8	JEMC53.240-UR	JEMC53.600-UR		N/A				
			16	JEMC53.240-UR	JEMC53.600-UR	N/A					
	C3		4	JEMC53.120-UR							
			8	JEMC53.120-UR							
			16	JEMC53.120-UR							

Max. motor cable length [m]				100	120	140	240	300	600	
Category	C2	Clock frequency [kHz]	4	N/A						
			8	N/A						
			16	N/A						
	C3		4	JEMC53.120-UR		JEMC53.240-UR		JEMC53.600-UR		
			8	JEMC53.120-UR		JEMC25.240-UR		JEMC53.600-UR		
			16	JEMC53.240-UR				N/A		

Jetter order designation	Jetter item no.
JEMC53.120-UR	60880638_00
JEMC53.240-UR	60880640_00
JEMC53.600-UR	60880642_00

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