



User Manual

JM-203B-230 - Digital Servo Amplifier

60865160

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Item no. 60865160
Revision 3.10
September 2017 / Printed in Germany

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This user manual is an integral part of the JetMove 203B-230:

Type: _____
Serial no.: _____
Year of manufacture: _____
Order no.: _____



To be entered by the customer:

Inventory no.: _____
Place of operation: _____

Significance of this user manual

This user manual is an integral part of the digital servo amplifier JetMove 203B-230 and

- must be kept in a way that it is always at hand until the digital servo amplifier JetMove 203B-230, will be disposed of.
- Pass this manual on, if the digital servo amplifier JetMove 203B-230 is sold, alienated or loaned.

In any case you encounter difficulties to clearly understand this user manual, please contact the manufacturer.

We would appreciate any suggestions and contributions on your part and would ask you to contact us. This will help us to produce manuals that are more user-friendly and to address your wishes and requirements.

Unavoidable residual hazards for persons and property may result from this digital servo amplifier JetMove 203B-230. For this reason, any person who has to deal with the transport, installation, operation, maintenance, and repair of the digital servo amplifier JetMove 203B-230 must have been familiarised with it and must be aware of these dangers.

Therefore, this person must carefully read, understand and observe this manual, and especially the safety instructions.

Missing or inadequate knowledge of the manual results in the loss of any claim of liability on part of Jetter AG. Therefore, the operating company is recommended to have the instruction of the persons concerned confirmed in writing.

History

| Revision | Remarks |
|----------|---|
| 2.00 | Original issue of the user manual |
| 3.00 | For revisions, please refer to Appendix A: "Recent revisions" of the user manual, revision 3.00 |
| 3.01 | Correction of style and orthography |
| 3.10 | For revisions, please refer to Appendix A: "Recent revisions" of the user manual, revision 3.10 |

Description of symbols



Warning

This sign is to indicate a possible impending danger of serious physical damage or death.



Caution

This sign is to indicate a possible impending danger of light physical damage. This sign is also to warn you of material damage.



This sign indicates hazard of life due to electric shock caused by a high operating voltage.



This sign is to indicate hazard of serious physical damage or death due to accidentally touching dangerous parts of the device.



Important

This sign is to indicate a possible impending situation which might bring damage to the product or to its surroundings. It also identifies requirements necessary to ensure faultless operation.



Note!

You will be informed of various possible applications and will receive further useful suggestions. It also gives you words of advice on how to efficiently use hardware and software in order to avoid unnecessary efforts.

· / -

Enumerations are marked by full stops, strokes or scores.



Operating instructions are marked by this arrow.



Automatically running processes or results to be achieved are marked by this arrow.



Reference to PC keyboard and HMI keys.



This symbol informs you of additional references (data sheets, literature, etc.) associated with the given subject, product, etc. It also helps you to find your way around this manual.

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1 Safety instructions

1.1 General safety instructions

The digital servo amplifier JetMove 203B-230 fulfills the accepted safety regulations and standards. Special emphasis was given to the safety of the users.

Further, the user should adhere to the following regulations:

- pertinent accident prevention regulations;
- accepted safety rules;
- EC guidelines and other country-specific regulations.

1.1.1 Intended conditions of use

Usage according to the intended conditions of use includes operation in accordance with these operating instructions.

The digital servo amplifier JetMove 203B-230 may only be operated in the closed control cabinet and within the range of the set values, see. Do not apply a voltage to the digital servo amplifier JetMove 203B-230 that is higher than the prescribed operating voltage.

The single phase or each of the three phases of the digital servo amplifier JetMove 203B-230 has got an operating voltage ranging between AC 195 V and AC 265 V. Thus, the digital servo amplifier comes under the EG Low Voltage Directive.

It is the explicit purpose of the digital servo amplifier JetMove 203B-230 to torque-, speed- and position-control, and to drive brushless synchronous servo motors. The winding insulation of the motors must be higher than, or at least equal to, the DC link voltage supplied by the servo amplifier.

The digital servo amplifier JetMove 203B-230 is used to drive machinery, such as conveyors, production machines, and handling machines.

1.1.2 Usage other than intended

The digital servo amplifier JetMove 203B-230 must not be used in technical systems which to a high degree have to be fail-save, e.g. ropeways and aeroplanes.

Do not apply the integrated brake control in safety-relevant systems.

The servo amplifier JetMove 203B-230 is not a safety-relevant device according to the machinery directive 2006/42/EG. Therefore, using this servo amplifier for safety-relevant applications as regards safety of persons is neither adequate nor permitted.

If the digital servo amplifier JetMove 203B-230 is to be run under operating conditions, which differ from the conditions mentioned in chapter 3 "Operating conditions", page 31, the manufacturer is to be contacted beforehand.

1.1.3 Qualified personnel

Depending on individual phases of the product life cycle, there are different demands on the personnel being involved. These demands have to be met, in order to grant safety in handling the JetMove 203B-230 at each phase of the product life cycle.

| Phase of the product life cycle | Minimum demands on the personnel |
|--|---|
| Transport/storage: | Only properly trained and instructed personnel with knowledge of correctly handling electrostatically sensitive components. |
| Mounting/installation: | Trained personnel specified in electrical automotive engineering, such as industrial electronics engineers. |
| Commissioning/programming: | Trained and instructed specialist personnel having got broad knowledge of, and experience in electrical engineering/motion systems, such as industrial electronics engineers of automation engineering. |
| Operation: | Only trained, instructed and authorized personnel with knowledge of correctly handling electrostatically sensitive devices. |
| Decommissioning: | Trained personnel specified in electrical engineering, such as industrial electronics engineers. |

1.1.4 Modifications and alterations to the device

For safety reasons, no modifications and alterations to the digital servo amplifier JetMove 203B-230 and its functions are permitted.

Any modifications to the servo amplifier JetMove 203B-230 not expressly authorised by the manufacturer will result in a loss of any liability claims to Jetter AG.

The original parts are specifically designed for the servo amplifier JetMove 203B-230. Parts and equipment from other manufacturers are not tested by Jetter AG, and are, therefore, not released by Jetter AG.

The installation of such parts may impair the safety and the proper functioning of the digital servo amplifier JetMove 203B-230.

Any liability on the part of Jetter AG for any damages resulting from the use of non-original parts and equipment is excluded.

1.1.5 Repair and maintenance

Repairs at the digital servo amplifier JetMove 203B-230 must not be carried out by the operator. The servo amplifier JetMove 203B-230 does not contain any parts to be repaired by the operator.

For being repaired, the servo amplifier JetMove 203B-230 must be sent to Jetter AG.

The digital servo amplifier JetMove203B-230 is maintenance-free. Therefore, absolutely no inspection or maintenance works are required for the operation of this device.

1.1.6 Disposal

When disposing of the digital servo amplifier, the local environmental regulations must be complied with.

You can disassemble the servo amplifier JetMove 203B-230 into its main components by unscrewing it (aluminum heat sink and side plate, steel casing cover, electronic boards).

1.2 Ensure your own safety



Warning

- Isolate the digital servo amplifier JetMove 203B-230 from the mains, if maintenance works have to be carried out. By doing so, you will prevent accidents resulting from electric voltage and moving parts. Follow the information given in chapter 1.3 "Residual dangers", page 17.
- Safety and protective devices, e.g. the barrier and cover of the terminal box or the thermal motor circuit-breaker must not in any case be shunted or by-passed.
- Dismantled protective equipment, such as guards and thermal motor circuit-breakers, must be reattached and checked for proper functioning prior to commissioning.
- Prior to commissioning, the machine manufacturer shall conduct a hazard analysis for the machine and take appropriate measures to prevent personal injury and damage to property resulting from accidental movements.


1.2.1 Malfunctions


- **In the case of malfunctions or other faults, please immediately separate the digital servo amplifier JetMove 203B-230 from the mains.** Follow the information given in chapter 1.3 "Residual dangers", page 17.
- Malfunctions or other damages have to be reported to a responsible person at once.
- Secure the servo amplifier JetMove 203B-230 against misuse or accidental use.


1.2.2 Information signs and labels

- Follow the instructions given on markings, information signs, and labels. Keep markings, signs and labels readable.
- Replace damaged or unreadable information signs and labels.

1.2.3 Earthing procedure

 Screw the enclosure of the digital servo amplifier JetMove 203B-230 onto a highly conducting, earthed panel.

 Do only use the servo amplifier JetMove 203B-230 at the three-phase, earthed industrial network (TN network, TT network with earthed neutral, 5,000 A max, symmetric rated current at 400/480 V + 10 %).
The servo amplifier must not be operated when connected to unearthed networks and to unsymmetrically earthed networks.
A one-phase connection to these mains can be established by means of a mains phase and a neutral wire.
The three-phase connection may only be established by means of an isolating or autotransformer (also refer to chapter "Power supply connection", page 37, and chapter 10 "Connection diagrams", page 77).

 **The leakage current of the digital servo amplifier JetMove 203B-230 is greater than 3.5 mA. Therefore, a second protective earth conductor is required in order to avoid electric shocks.**

For this, the following measures have to be taken:

- The protective earth conductor must be connected to the PE screw (1) located at the top side of the rack as well as to the PE terminal X1 (2); for this, please refer to fig. 1.
The cross-sectional areas of the two earthing conductors must be equal to the cross-sectional areas of the supply lines (1.5 mm² min.).
- A durable connection with the power supply of the digital servo amplifier JetMove 203B-230 has to be provided.
- Correct cabling of the PE bus according to the connection diagram must be carried out, chapter 10 "Connection diagrams", page 77.

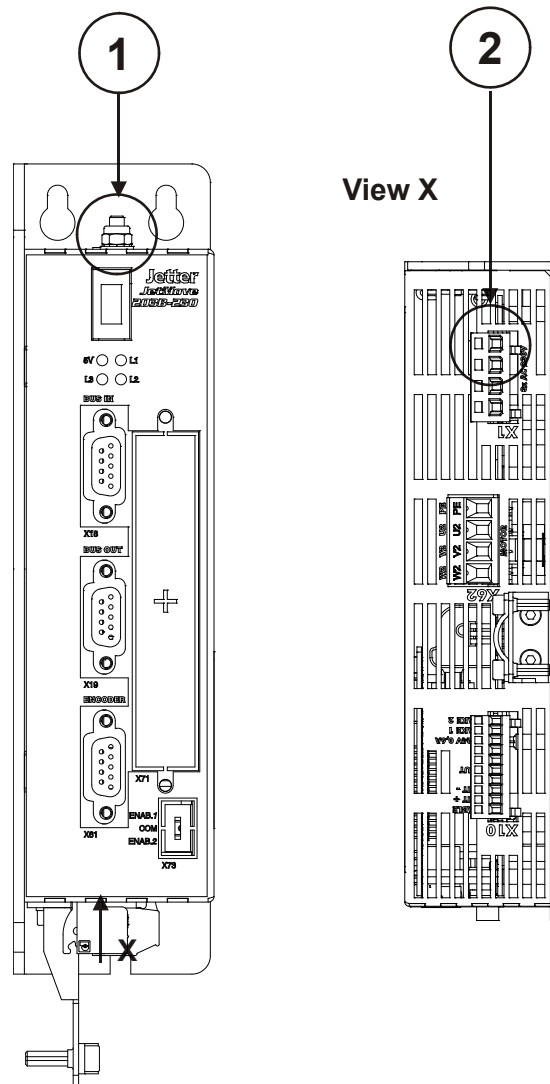


Fig.: 1: Double earthing



Important!



Do not install an earth-leakage current breaker in the mains power supply.

Using an earth-leakage current breaker (FI) within the mains power supply is not possible.

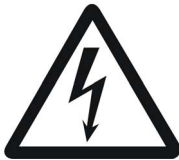
If, in spite of this, an earth-leakage current breaker is installed, it will switch off the digital servo amplifier JetMove 203B-230, although there is no fault.

When a leakage current screen needs to be installed in the JetMove 203B-230, an isolating transformer must be used.

1.3 Residual dangers

1.3.1 Hazards during operation

HAZARD caused by high operating voltage!



Warning

Extremely hazardous voltages of up to DC 480 V occur!

Such voltages may result in muscle cramps, burns, unconsciousness, respiratory standstill, or death.

- During operation, all coverings and control cabinet doors have to be kept closed.
- Do not remove the cover.
- Do not disconnect the electric connections of the servo amplifier JetMove 203B-230 when it is live.



Warning

- **Do not touch the screws of the terminals X1 and X62 during operation.**

The terminals have the following meaning:

- X1:** AC 230 V voltage supply
- X62:** DC motor voltage up to 480 V

Hot surface hazard!



Caution

During operation, the surfaces, respectively the heat sinks of the digital servo amplifier JetMove 203B-230 can heat up. The left sidewall can reach temperatures of up to 80 °C.

- Never touch the left sidewall of the servo amplifier JetMove D203 during operation and after switching off, while the device is still cooling down.
- Make sure that no temperature-sensitive parts have been connected or fastened to the servo amplifier JetMove 203B-230.



Warning

DANGER in a potentially explosive atmosphere!



Do not operate the digital servo amplifier JetMove 203B-230 in a potentially explosive atmosphere.



Caution

DANGER of injuries caused by mechanic force!

The digital servo amplifier JetMove 203B-230 drives a servo motor. This servo motor moves mechanic parts or sharp edges. Therefore, failure or malfunctioning of the digital servo amplifier JetMove 203B-230 can be dangerous for man or damage the manufacturing plant to an amount depending on the respective kind of plant. This should be prevented by installing additional safety devices.

- One safety precaution is to install a second set of limit switches to interrupt the power supply of the motor.
- Another safety precaution would be installing a guard.



Make sure that hazards to persons are precluded even when the drive is rotating unintentionally.



Do not remove any guards.



Do not wear gloves, lest they should get caught in the rotating drive shaft.



Never touch a rotating drive shaft.



Warning

1.3.2 Hazards after POWER is turned OFF

DANGER resulting from electric shock!



Warning

Capacitors installed in the servo amplifier can still have dangerous voltages present up to five minutes after switching off the operating voltage.

- **Always wait** at least five minutes after switching off the device, before separating it from the mains or loosening the connections.
- **Always wait** at least ten minutes after switching off, before taking the following actions:
 - Touching the screws of the terminals X1 and X62
 - Disconnecting the terminals and touching the contacts

1.4 Instructions on EMI

The digital servo amplifier JetMove 203B-230 is intended for use in industrial surroundings. It may cause radio interferences when used in residential areas. It is operated at the operator's own risk.

The noise immunity of a system is determined by the weakest component of the system. For this reason, correct wiring and shielding of cables is of paramount importance.



Important!

Measures for increasing immunity to interference:

- Ground the enclosure according to chapter 1.2.3 "Earthing procedure", page 15.
- Connect all grounding terminals of the JetMove 203B-230. A double grounding terminal is required!
 - Connect the protective earth terminal located on the enclosure.
 - Connect the protective earth (PE) to terminal X1.Please refer to fig. 1 on page 16.
- The distance between the optional line filters and the servo amplifier 203B-230 must be as short as possible.
- When of a motor cable with included brake lines is used, these brake lines have to be shielded separately.
- Follow the instructions given in Application Note 016 "EMC-Compatible Installation of the Electric Cabinet" published by Jetter AG.

The following instructions are excerpts from Application Note 016:

- Screw the enclosure of the digital servo amplifier JetMove 203B-230 onto a highly conducting, earthed panel.
- On principle, **physical separation** should be maintained between signal and voltage lines. We recommend spacings greater than 20 cm. Cables and lines should cross each other at an angle of 90°.
- For the following lines, shielded cables are to be used:
Analog lines, data lines, motor cables coming from inverter drives (servo output stage, frequency converter), lines between components and interference suppressor filter, if the suppressor filter has not been placed at the component directly.
- **Both ends of the cable** must be shielded.

- Unshielded wire ends of shielded cables should be as short as possible.
- The **entire shield** must be drawn behind the isolation, its **greatest possible surface area** being clamped under a strain relief which is extensively earthed.

When male connectors are used:

- The shield **must**, in its entire perimeter, be drawn behind the shielding clamp of the metallized connector housing, respectively of the EMC gland bushing, its greatest possible surface area being clamped under a strain relief.
- Only use metallized connectors, e.g. Sub-D with metallized housing. Make sure that the strain relief is directly connected with the housing here as well (see fig. 2).

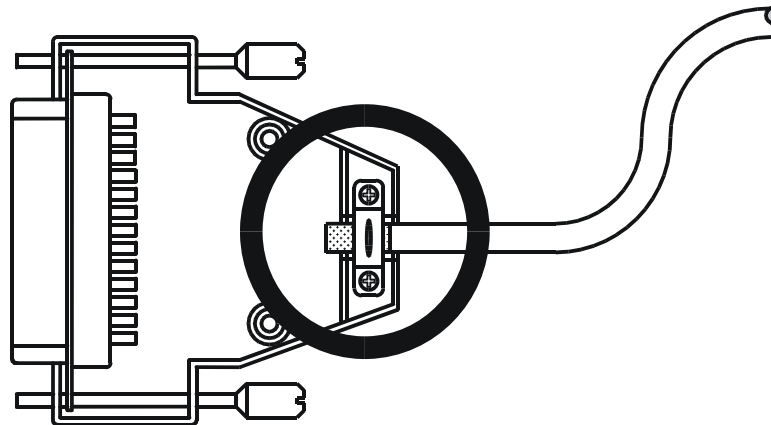


Fig.: 2: Shielding of Sub-D connectors in conformity with EMC standards

If the shield cannot be attached to the connector, for example, with a screw type terminal:

- It is important that shield and strain relief are highly conductive and directly connected to a grounded surface with the greatest possible surface area. When doing so, grounding must be implemented in a way that the unshielded portion of the cable is as short as possible (refer to fig. 3).

We recommend installing the enclosed ferrite core on the motor power supply cable as shown in figure 3.

For optimum results, increase the number of turns around the ferrite.

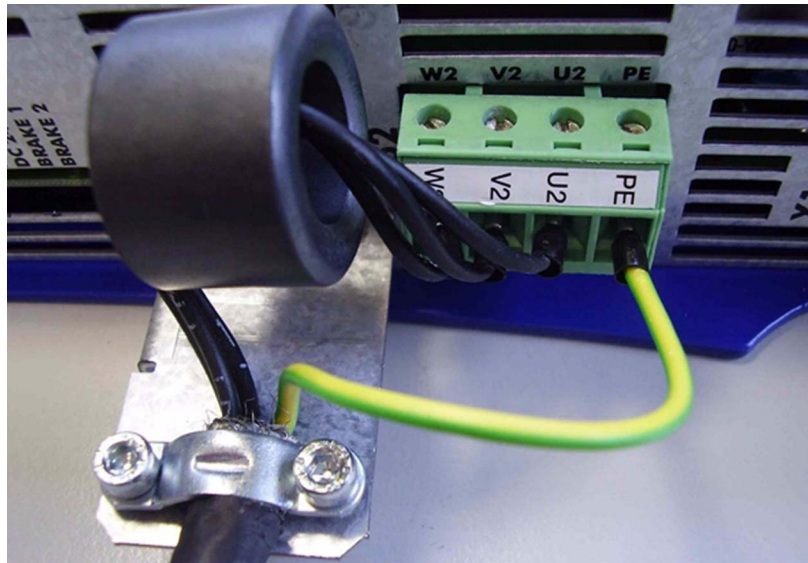


Fig.: 3: Shielding of screw terminals in conformity with the EMC standards

2 JetMove 203B-230 - Installation instructions

2.1 Scope of delivery

- Digital servo amplifier JetMove 203B-230
- The mating connector is plugged-on.
- Cable strap serving as strain relief and motor cable shield
- User manual

Installation accessories (not included in the scope of delivery)

(Please obtain an individual offer from the Jetter headquarters, the Jetter subsidiaries or the distributors.)











- System bus cable of cable assembly number 530 x.x m; length: 0.2 m to 5.0 m. See chapter 7.7 "Jetter system bus", page 66.
- Motor power cable, see chapter 7.2 "Motor connection", page 49.
- Resolver cable, see chapter 7.3 "Resolver connection", page 55.
- HIPERFACE cable, see chapter 7.4 "HIPERFACE connection", page 57.
- Synchronous servo motors, e. g. the Jetter motor types JL, JK, or JH
- Motor circuit breaker, see chapter 5 "Technical data", page 37.
- Circuit breaker, see chapter 5 "Technical data", page 37.
- Isolating transformer or autotransformer
- Mounting screws, 3 pcs.; refer to fig. 4, page 25.



Note!

If you are not sure which mounting accessories you will need, please contact Jetter AG.

2.2 Mechanical installation

-  Prior to installing the digital servo amplifier, check it for possible transport damages.
-  Check the shipment for completeness.
-  Fix the cable strap serving as strain relief and motor cable shield next to connector X62 (see fig. 3, page 22).
-  To ensure proper functioning of the JetMove 203B-230, check whether the mounting plate in the electric cabinet is unpainted.
-  The only possible mounting position is vertical - see fig. 4, page 25.
-  For sufficient air flow there has to be a clearance of 100 mm min. above and below the enclosure of the JetMove 203B-230.
-  Mark on the panel two positions for the fastening screw threads of the JetMove 203B-230 (see fig. 4, page 25).
-  Drill the holes and cut the respective threads into the panel.
-  Screw the corresponding fitting bolts into the thread by approximately half of their length.
-  By means of the oblong holes in the rear plate, hang up the JetMove 203B-230 by the fitting bolts; then screw them tightly.

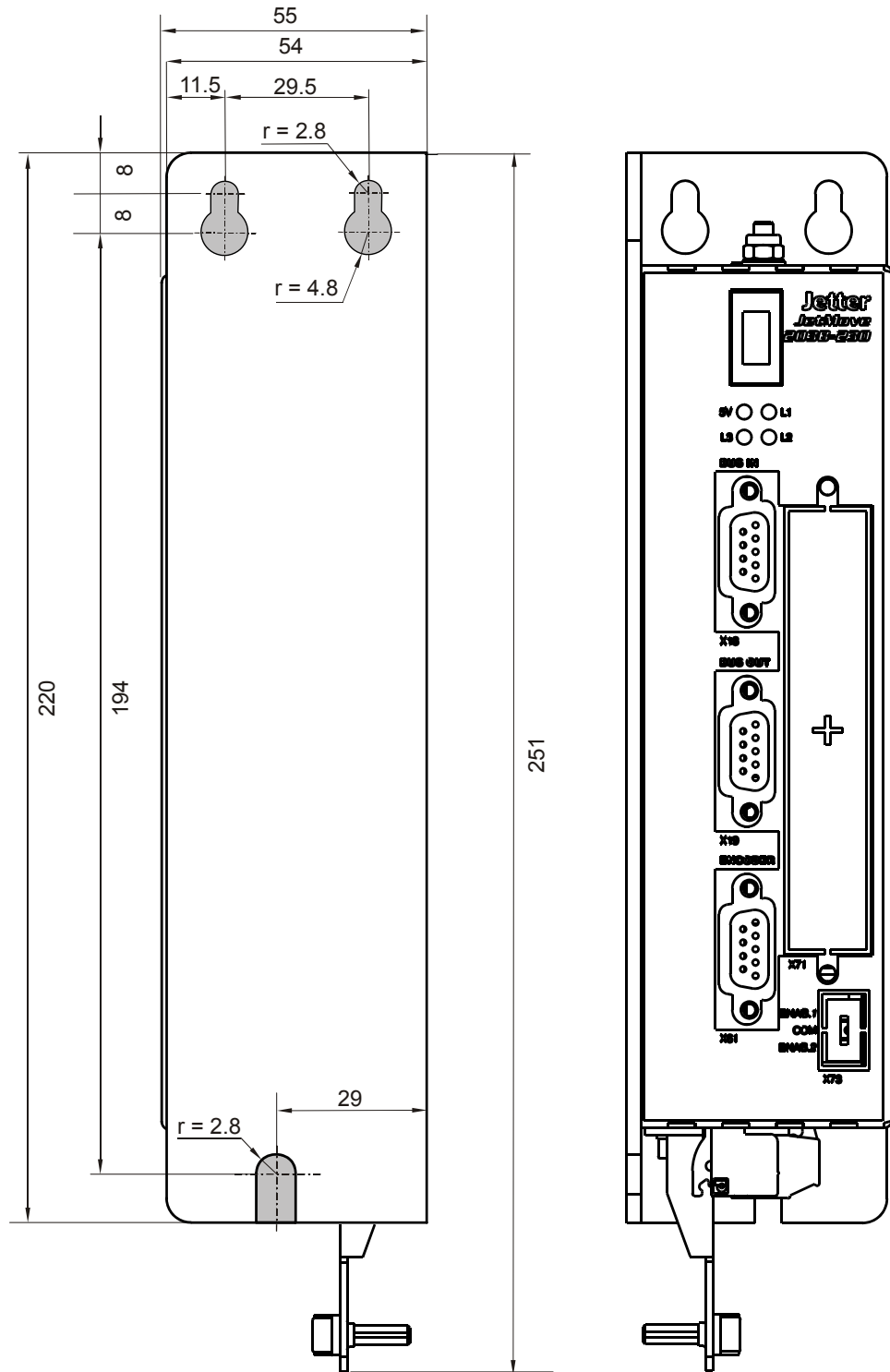


Fig.: 4: Rear and front view of the JetMove 203B-230 enclosure with mounting holes

2.3 Electrical installation



Check for correct motor and servo amplifier assignment.



Compare rated voltage and continuous rated current of servo amplifier and motor.

The motor must be isolated against voltages of DC 480 V min.; also refer to , .



Connect the JetMove 203B-230 according to the connection wiring diagram shown in chapter 10 "Connection diagrams", page 77.

Especially check the power lines for appropriate protection, see , . Protecting the motor cables is not advisable.



Select the cables according to standards.



Verify that all earthing cables are connected (double earthing).



To connect resolvers or power units you can use prefabricated cables available from Jetter or opt for self-made cables. Please refer to chapter 7 "Description of connections", page 47.



Please regard the following items regarding installation according to EMC:

- If possible, run control cables and power cables separately;
- Connect resolver;
- Use shielded terminals or EMC-compatible connectors;
- Connect holding brake, if available, and connect shields on both sides of the cables;
- Connect the motor lines according to fig. 3, page 22.

Please further note the chapter 1.4 "Instructions on EMI", page 20.

2.4 Checking the installation

- Check motor and servo amplifier wiring and connections by means of the connection diagrams used.
- Check the holding brake, if existing, for proper functioning.
- Check to see whether all necessary protection measures against accidental contact with live or moving parts have been taken.
- Carry out any other checks specific to, or required, for your system.

2.5 Notes on safety as regards the installation

HAZARD caused by high operating voltage!



Danger

Extremely hazardous voltages of up to DC 480 V may occur!

Please, observe the following precautions in order to avoid injuries such as muscle cramps, burns, unconsciousness, respiratory standstill or possibly death:

- Have installation and maintenance jobs carried out by qualified personnel only chapter 1.1.3 "Qualified personnel", page 12.
- Switch off the operating voltage.
- Please take into account the information on residual dangers given in chapter 1.3.2 "Hazards after POWER is turned OFF", page 19.
- Before carrying out installation and maintenance jobs, separate the servo amplifier JetMove 203B-230 and all connected devices from the mains (pull out the mains plug).

2.6 Notes on safety as regards commissioning

HAZARD caused by high operating voltage!



Danger

Extremely hazardous voltages of up to DC 480 V may occur!

Please, observe the following precautions in order to avoid injuries such as muscle cramps, burns, unconsciousness, respiratory standstill or possibly death:

- Have commissioning jobs carried out by qualified personnel only, see chapter 1.1.3 "Qualified personnel", page 12.

Before energizing the device make sure that the following requirements are complied with:

- Reattach dismantled protective equipment and check it for proper functioning.
This way, protection from moving parts of the machine will be achieved.
- Secure the servo amplifier JetMove 203B-230 against accidental contact with conductive parts and components.
- Only connect devices or electrical components to the signal lines of the digital servo amplifier JetMove 203B-230 (Enable, Limit+/-, REF, BRAKE 1 and BRAKE 2) that have been sufficiently isolated against the connected electric circuits. These signal lines may only be connected with units that have got the ground potential of the DC 24 V power supply.
- Only connect resolver, HIPERFACE and servo motor to the servo amplifier, if they have been sufficiently isolated from the connected electric circuits.
- The leakage current of the digital servo amplifier JetMove 203B-230 is greater than 3.5 mA. Therefore, a second protective earth conductor is required in order to avoid electric shocks.
For this, the measures listed in chapter 1.2.3 "Earthing procedure", page 15 have to be taken.
- Always carry out each commissioning, even a short functional test, with correctly connected PE bus.

2.7 Notes on decommissioning



Before returning the device, remove the cable strap serving as strain relief and motor cable shield.

3 Operating conditions

| Operating parameters | | |
|--|--|--------------|
| Ambient conditions | | Reference |
| Transport conditions (units within packing) | Temperature: -25 °C ... 70 °C Air humidity: 5 % ... 95 % Non-condensing | DIN EN 50178 |
| Storage conditions (units within packing) | Temperature: -25 °C ... 55 °C Change max. 20 K/h Air humidity: 5 % ... 95 % Non-condensing Max. storage time: 1 year | DIN EN 50178 |
| Ambient temperature | 0 ... 45 °C (45 °C ... 55 °C with derating of 2.5 %/K) Please be careful of sufficient cooling | DIN EN 50178 |
| Air humidity | 5 % ... 85 % Non-condensing | DIN EN 50178 |
| Pollution degree | 2 | DIN EN 50178 |
| Corrosion immunity / chemical resistance | No special protection against corrosion Ambient air has to be free from higher concentrations of acids, alkaline solutions, salts, metal vapours, or other corrosive or electroconductive contaminants. | DIN EN 50178 |
| Operating altitude | Up to 1,000 m above sea level 1,000 to 2,500 m above sea level with derating of 1.5 % per 100 m | DIN EN 50178 |
| | | |

| Operating parameters | | |
|-------------------------------------|---|--|
| Mechanical conditions | | Reference |
| Free falls withstanding test | Within original packing, the device withstands dropping over all of its edges. | DIN EN 50178 DIN EN 60068-2-31 |
| Vibration resistance | 10 Hz ... 57 Hz at an amplitude of 0.075 mm 57 Hz ... 150 Hz: 1.0 g constant acceleration 1 octave per minute, 10 frequency sweeps (sinusoidal), all three spatial axes | DIN EN 50178 DIN EN 60068-2-6 |
| Degree of protection | IP20 | DIN EN 60529 |
| Mounting position | Vertical (refer to Fig. 4 page 25) For sufficient air flow there has to be a clearance of 100 mm above and below the device. | |
| Electrical safety conditions | | Reference |
| Class of protection | I | DIN EN 61800-5-1 |
| Dielectric strength | Power to earth and power to logic 1.7 kVdc, 2 s | DIN EN 61800-5-1 DIN EN 60146-1-1 DIN EN 60204 |
| Isolation | Power to earth and power to logic > 1 MOhm at 500 V | |
| Protective connection | 12 V, 25 A, 0.1 Ohm | DIN EN 61800-5-1 |
| Overvoltage category | III | DIN EN 61800-5-1 DIN VDE 0110-1 |



Important!

Measures to avoid damages in transit and storage:



The packaging material and the storage place are to be chosen in a way that the values given in the above table "Operating parameters" on page 31 are kept to.

| EMC | | |
|-----------------------------|---|------------------|
| Emitted interference | | |
| Parameter | Value | Reference |
| Enclosure | <ul style="list-style-type: none"> • Frequency band 30 ... 230 MHz, limit 30 dB ($\mu\text{V}/\text{m}$) at 30 m • Frequency band 230 ... 1,000 MHz, limit 37 dB ($\mu\text{V}/\text{m}$) at 30 m (Class B) | DIN EN 61800-3 |
| Line AC | <ul style="list-style-type: none"> • Frequency band 0.15 ... 0.5 MHz, limit 79 dB (μV) • Frequency band 0.5 ... 30 MHz, limit 73 dB(μV) | DIN EN 61800-3 |



Important!



This is a product of restricted availability according to IEC/EN 61800-3. This module can cause radio interferences in residential areas. In this case, the user must take adequate measures to prevent this.

Additional line filters can be helpful here. See "Line filter" on page 38.

| EMC | | |
|---|--|------------------------------------|
| Interference immunity: Enclosure | | |
| Parameter | Value | Reference |
| RF field, amplitude-modulated | Frequency band 80 ... 1,000 MHz; test field strength 10 V/m AM 80 % at 1 kHz Criterion A | DIN EN 61000-4-3 DIN EN 61800-3 |
| ESD | Contact discharge: Test peak voltage 6 kV Criterion B | DIN EN 61800-3 DIN EN 61000-4-2 |

| EMC | | |
|--|--|------------------------------------|
| Interference immunity: Power connections and power interfaces | | |
| Parameter | Value | Reference |
| Conducted radio disturbances | Frequency 0.15 ... 80 MHz Test voltage 10 V AM 80 % at 1 kHz Criterion A | DIN EN 61800-3 DIN EN 61000-4-6 |
| Burst (fast transients) | Test voltage 2 kV tr/tn 5/50 ns Repetition frequency 5 kHz Criterion B | DIN EN 61800-3 DIN EN 61000-4-4 |
| Voltage surges | tr/th 1.2/50 μ s, 8/20 μ s 1 kV (phase to phase) 2 kV (phase to ground) Criterion B | DIN EN 61800-3 DIN EN 61000-4-5 |
| Interference immunity: Process, measuring and control lines | | |
| Parameter | Value | Reference |
| Conducted radio disturbances | Frequency 0.15 ... 80 MHz Test voltage 10 V AM 80 % at 1 kHz Criterion A | DIN EN 61800-3 DIN EN 61000-4-6 |
| Burst (fast transients) | Test voltage 2 kV tr/tn 5/50 ns Repetition frequency 5 kHz Criterion B | DIN EN 61800-3 DIN EN 61000-4-4 |
| Interference immunity: Signal interfaces | | |
| Parameter | Value | Reference |
| Conducted radio disturbances | Frequency 0.15 ... 80 MHz Test voltage 10 V AM 80 % at 1 kHz Criterion A | DIN EN 61800-3 DIN EN 61000-4-6 |
| Burst (fast transients) | Test voltage 1 kV tr/tn 5/50 ns Repetition frequency 5 kHz Criterion B | DIN EN 61800-3 DIN EN 61000-4-4 |

4 Physical dimensions

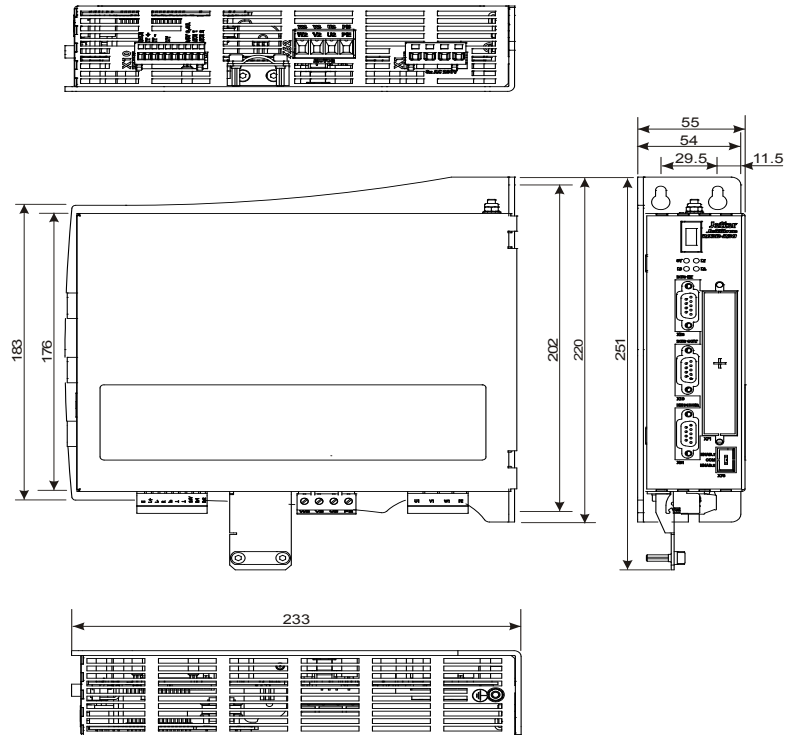


Fig.: 5: Physical dimensions of the JetMove 203B-230 (in mm)

For installation, please also refer to fig. 4 on page 25.

5 Technical data

5.1 Electrical specifications

| Electrical specifications | |
|---|--|
| Rated voltage supply | <ul style="list-style-type: none"> • Direct supply $U_{\text{eff}} = 230 \text{ V}$ Common mode voltage 2 % max. Power dissipation 3 ms max. • 48 ... 62 Hz Frequency change max. 2 %/s |
| Power supply connection | <ul style="list-style-type: none"> • 1-phase: direct ($U_{\text{eff}} = 230 \text{ V}$: L to N) • 3-phase: via autotransformer or isolating transformer e.g. Primary circuit: $U_{\text{eff}} = 3 \times 400 \text{ V}$. Secondary circuit: $U_{\text{eff}} = 3 \times 230 \text{ V}$ <p>See "Note 1!" on page 39.</p> |
| Power supply tolerance | $U_{\text{eff}} = 195 \text{ V} \dots 265 \text{ V} (-15 \% \dots + 15 \%)$ |
| Inrush current limitation | <p>< 45 A limited to 10 ms during the switch-on-sequence</p> <p>Refer to "Time between deactivating and activating the mains power supply" on page 40</p> |
| Overload protection | <p>For each phase an external overload protection is required, for example</p> <ul style="list-style-type: none"> – circuit breaker 10 A C – Fuse 10 A M (medium time lag) – Motor circuit breaker 10 A <p>For systems with UL approval, use overload protection devices that are UL listed (acc. to UL 508) (HKJH) and a self-protected combination motor controller (specification: 230 V, 10 A) for UL-certified systems. The JetMove 203B-230 is suitable for use on a circuit capable of delivering not more than 50,000 rms symmetrical Ampere, 600 V_{eff} max.</p> |
| Output voltage of the motor | Three-phase with 325 V typical (480 V max.) |
| Motor output current at an ambient temperature of 45 °C | <p>Nominal current: $I_{\text{eff}} = 3 \text{ A}$ Peak current for 30 seconds min.: $I_{\text{eff}} = 6 \text{ A}$ (The duration depends on the temperature of the heat sink)</p> <p>See "Note 2!" on page 39.</p> |

| Electrical specifications | |
|---|--|
| Continuous output | 0.5 kW |
| Short-circuit protection, motor side | Designed for <ul style="list-style-type: none"> • phase to phase • phase to earth |
| Motor overload protection | See "Motor protection" on page 41. |
| Motor cable Cable size Material Capacitance Temperature class Max. length of the motor cable | 4 * min. 0.75 mm ² (min. AWG 18) Copper < 150 pF/m > 60 °C 50 m max. (for greater lengths please contact Jetter AG) |
| Line filter | Line filter ensuring EMC in a residential environment to DIN EN 61800-3 with no limitations. The following filters can be applied with input circuits: <ul style="list-style-type: none"> – FMAC-931-0810 8 A – FMAC-932-1610 16 A – FMAC-932-2510 25 A – FMAC-934-3610 36 A <p>See "Note 3!" on page 39.</p> |
| Voltage supply of processor logics (demands on the power supply module) | <ul style="list-style-type: none"> • DC 24 V (20 ... 30 V) • ≤ 0.6 A • The voltage output of the power supply unit must comply with the SELV or PELV type. |
| Internal ballast resistor | <ul style="list-style-type: none"> • Resistor: 175 Ω (PTC) • Continuous output: 70 W • Maximum capacity internally limited to 1 kW at 0.6 s (warning and error message) |
| Residual voltage | To avoid hazard of electrical shock wait at least 5 minutes after switching off the digital servo amplifier before attempting to pull out the plug or remove this unit (refer to page 19). |
| Leakage current | > 3.5 mA See "DANGER resulting from electric shock!" on page 40. |

| Electrical specifications | |
|--|---|
| Digital inputs – Enable (E) – Reference switch (R) – Limit switch right (L+) – Limit switch left (L-) – Input (Inp) | DC 20 V ... 30 V related to the ground potential of voltage supply of processor logics, with an input current of 7.5 mA max. each. See "Digital inputs, logic power supply" on page 64. |
| Braking relay (contacts: Br1 and Br2) | $V_{\max} = \text{DC } 30 \text{ V}$ $I_{\max} = \text{DC } 2 \text{ A}$ Contact: N/O connected to BR1 and BR2 on X10 The lines may only be connected to devices that are related to the same potential as the power supply of the controller logic. Can be switched by the control program of the PLC or by the operating system of JetMove 203B-230 together with the software enable command. |
| Power dissipation P_v | Output stage: 25 W max. Logic circuit: 18 W max. |

**Note 1!****When a transformer is used:**

The neutral point on the secondary side of the circuit must be grounded.

**Note 2!****Cooling:**

- The overtemperature protection is activated at 80 °C.
- The overtemperature alarm is activated at 75 °C.
- The duration of the peak current is measured at a starting temperature of 45 °C at the heat sink.

**Note 3!**

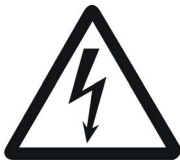
A line filter can supply several digital servo amplifiers JetMove 203B-230, as soon as I_f (the current of the line filter) is greater than the total current of the connected servo amplifiers.



Important

Time between deactivating and activating the mains power supply

If the drive system has been run by motor power (speed and torque at the moment) and the mains power supply is deactivated, the inrush current limitation unit must cool down for 2 to 3 minutes. If this is not considered, the inrush current limitation unit can be destroyed.



Warning

DANGER resulting from electric shock!

➤ In order to prevent electric shocks, ground the digital servo amplifier JetMove 203B-230 **by all means** via two positions; for this, refer to chapter 1.2.3 "Earthing procedure", page 15.

| Compatible synchronous servo motors | |
|--|--|
| Motor types | Jetter motor types JL, JK and JH Please refer to "Jetter Motor Catalog" or contact the sales department of Jetter AG. |



Note!

In case you intend to use motors other than the above mentioned types, please contact Jetter AG.

5.2 Motor protection

There are three ways of motor protection:

5.2.1 Thermal sensor integrated in the motor

The servo amplifier JetMove 203B-230 can read out and process three different motor temperature sensors:

| Sensor type | Type of sensor signal evaluation |
|--------------------|---|
| KTY83-110 | Temperature is measured in °C The warning threshold can be set Error detection at maximum motor temperature |
| PTC | Go-no-go decision Error detection at maximum motor temperature |
| Temperature switch | Go-no-go decision Error detection at maximum motor temperature |

5.2.2 I²t calculation

The digital servo amplifier JetMove 203B-230 calculates the model of motor power loss by an I²t calculation. The calculated value is a measure of the average power dissipation of the motor. It is calculated in percent of the maximum motor power dissipation.

For this calculation it is important, that the parameters are entered correctly:

- Continuous rated current (either continuous rated motor current or continuous rated amplifier current, taking the lower value of the two)
- Overload factor
- and time constant of the motor

The I²t calculation has to be activated by JetSym or by the PLC program.

It is possible to parameterize the warning level. The error level (error 30) is set to 100 %.

The I²t value is readable in a variable of JetMove 203B-230 through JetSym or the PLC.

The digital servo amplifier JetMove 203B-230 calculates the percentage of motor power loss according to the following formula:

$$x(t) = 100\% \times \left(\frac{\text{average motor current}}{\text{rated current}} \right)^2 \times \left(1 - e^{-\frac{t}{T}} \right)$$

$x(t)$ = displayed value of motor power dissipation in %
 t = Time since start of motor running it with the average current (in seconds)
 T = Motor time constant (in seconds)

The formula shows that the 100 % value will never be reached as long as the average motor current is lower than the continuous rated current of the motor. Further, calculating always starts by 0 (at $t = 0$, the result of the equation is 0). After some time that is by far longer than the motor time constant, the result does virtually not change any more.

The time till error stop ($x = 100\%$) is a result of the following formula:

$$t = -T \times \ln \left[1 - \left(\frac{\text{rated current}}{\text{average motor current}} \right)^2 \right]$$

After reset, the values of the important parameters are:

| | |
|----------------------|------------------|
| Rated current: | 3 A |
| Overload factor: | 2 |
| Motor time constant: | 1,800 s (30 min) |

With these parameters the 100 % error level will be reached if, for example the motor is run by a current of 6 A for about 8 minutes and 30 seconds.



Important

Because of the fact that after reset the I^2t calculation always starts with zero, the motor overload calculation is wrong if the motor is already hot when the digital servo amplifier JetMove 203B-230 is switched on (i. e. at the time of parameters of I^2t calculation are written after switching on 24 V logic power supply).

5.2.3 Motor overload protection according to UL

The UL standard prescribes a motor overload detection for a servo amplifier according to the following criteria:

The "trip current" is defined to be 1.15 times the user-set continuous rated current.

- If the average motor current corresponds to the trip current, the overload protection has to switch off the motor after a limited time.
- If the average motor current is 2 times higher than the trip current the overload protection has to switch off the motor after at least 8 minutes.
- If the average motor current is 6 times higher than the trip current the overload protection must switch of the motor after at least 20 seconds.

This protection (error message 31 is activated) can be parameterized only through the rated current value.

The motor overload protection is always active and cannot be deactivated.

**Important**

Because of the fact that after reset the motor overload calculation always starts with zero, the result is wrong if the motor is already hot when the digital servo amplifier JetMove 203B-230 is switched on (i. e. at the time of connecting the 24 V logic power supply).

6 Drive controller structure

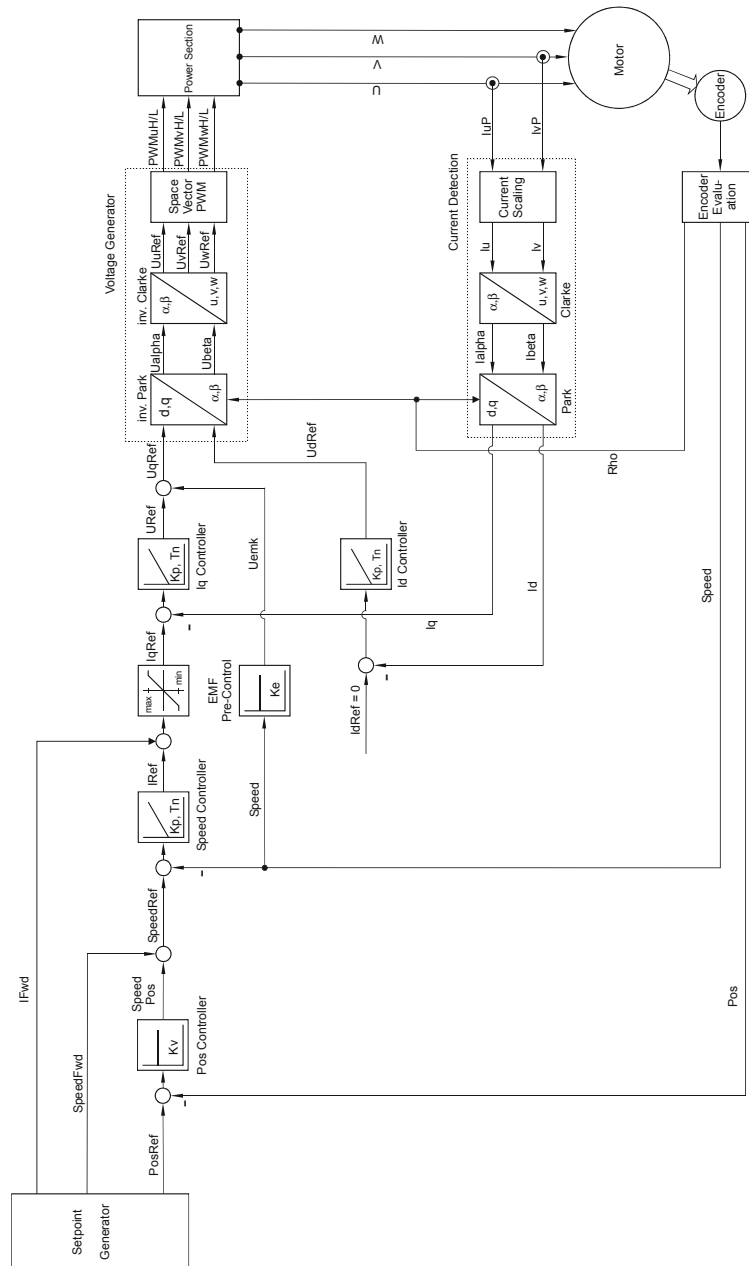


Fig.: 6: Block diagram of drive controller structure

Drive controller specification

All drive controllers can be parameterized through the control program.

| Operating principle | Remarks |
|--|---|
| Motor control (commutation) | Space vector modulation |
| PWM frequency | 16 kHz |
| Current controller – Cycle time | 62.5 μ s |
| Speed controller – Cycle time – Current pre-control | 125 μ s adjustable |
| Position controller – Cycle time – Speed pre-control | 250 μ s adjustable |
| Position setpoint generator – Sine-square and linear acceleration and deceleration ramps – Setpoint output cycle (position feedback controller interpolation) | can be parameterized individually 2 ms |
| Position sensing Resolver: – Resolution – Scan time Absolute encoder (Multiturn and Single-Turn): – Interface – Resolution of absolute position – Resolution of velocity pickup – Scan time | 12 bits per revolution 62.5 μ s HIPERFACE 15 bits per revolution 20 bits per revolution 62.5 μ s |

7 Description of connections

7.1 Power supply connection

Specification of terminal X1

- 4-pin spring tension terminal (type ZEC 1.5/ 4-ST-7.5 C2 R1,4; for printed circuit boards)
- Allowed conductor size: 0.25 ... 1.5 mm² (AWG 24 ... AWG 16)
- Bladed screw-driver: 0.6 x 3.5 x 100 mm²

Connecting cable specifications

- Cable size: 4 * 0.75 mm² (AWG 18(4))
- Material: Copper
- Temperature class: 60 °C
- Stripping length of cores: 6 mm
- Bootlace ferrules are not required.

Cable shielding

- Not needed

| Power supply 3-phase connection | | |
|------------------------------------|--------------|------------------------------------|
| Terminals X1 on the amplifier side | Signal | Specification |
| U1 | L1 | • AC 230 V between the power lines |
| V1 | L2 | |
| W1 | L3 | |
| PE | PE conductor | |

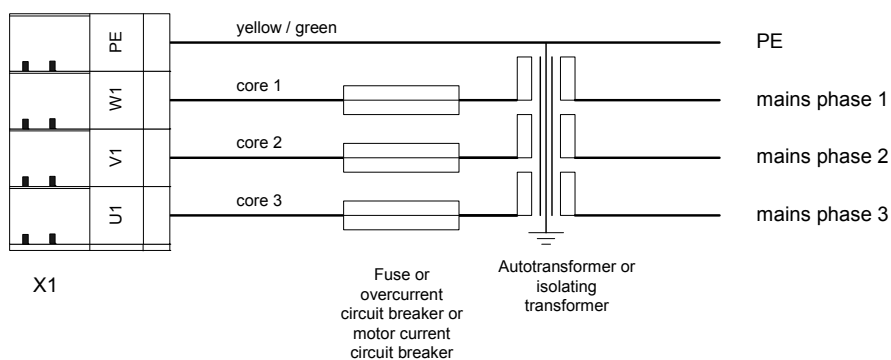


Fig.: 7: Connection of the 3-phase supply line

| Power supply 1-phase connection | | |
|------------------------------------|--------------|--|
| Terminals X1 on the amplifier side | Signal | Specification |
| U1 | L | • AC 230 V between mains phase and neutral conductor |
| V1 | N | |
| W1 | | |
| PE | PE conductor | |

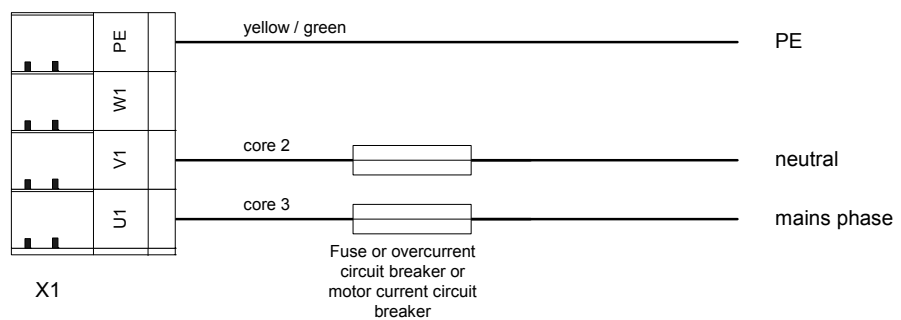


Fig.: 8: Connection of the 1-phase supply line

7.2 Motor connection

7.2.1 General remarks



Important!

Measures to avoid malfunctions of the control system and the motor:



Always connect brake lines to a separate power supply unit DC 24 V if brake and motor lines are run together in one bunch of cables, and are not separately shielded.



Important!

Measures to avoid oscillation and blocking of the motor:



Avoid mixing-up of phase cables, resp. be sure to connect the phase cables according to pin assignment.

7.2.2 Assignment and specifications

Specification of the connector for terminal X62

- 4-pin connector (type PC 4/ 4-ST-7.62)
- Allowed conductor size: 0.25 ... 4.0 mm² (AWG 24 ... AWG 12)
- Bladed screw-driver: 0.6 x 3.5 x 100 mm²
- Stud torque for the screw clamping terminal:
0.5 Nm (4.4 ... 5.3 lbf-inch)

Specification of the motor cable

- Cable size: 4 * 0.75 mm² (AWG 18(4))
- Material: Copper
- Temperature class: 60 °C
- Stripping length of cores: 6 mm
- Bootlace ferrules are recommended.

Cable shielding

- Braided copper shield of 80 % coverage

Connection of the motor to the digital servo amplifier JetMove 203B-230 has to be done following the wiring diagram below. Connection of the brake is optional.

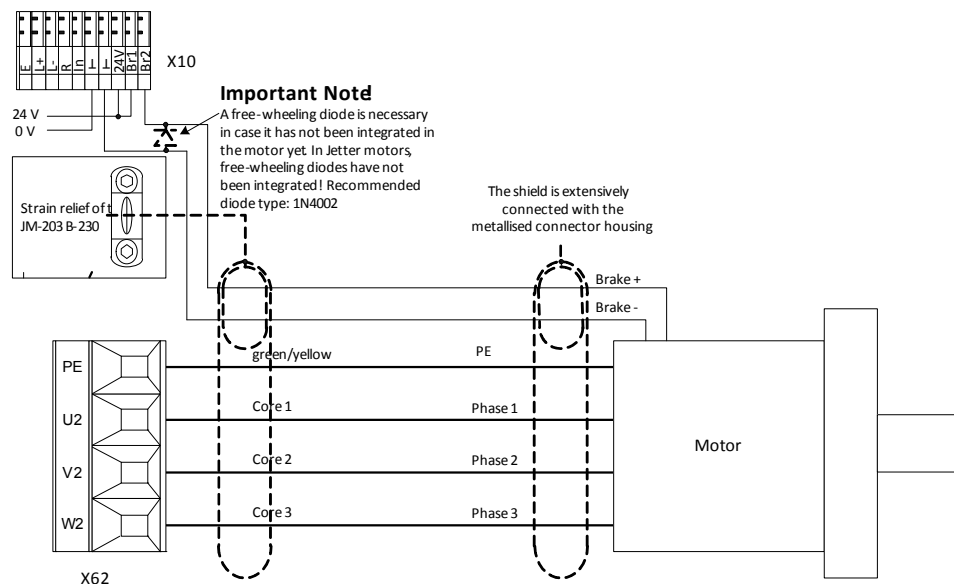


Fig.: 9: Connection of motor lines

7.2.3 Motor power cable with mating connector SC



Note!

The suitable mating connector SC (female connector) can be ordered from JetterAG by supplying the following particulars:

- Item no. 15100070 Motor mating connector for the Jetter motor types JH2, JH3, JH4, JH5, JL2, JL3, JL4, JK4, JK5, JK6 without brake
- Item no. 15100105 Motor mating connector for the Jetter motor types JH2, JH3, JH4, JH5, JL2, JL3, JL4, JK4, JK5, JK6 with brake



Note!

Motor power cable with mating connector SC (female connector) suitable for the Jetter motor types JL2, JL3, JL4, JK4, JK5, JK6 can be ordered from Jetter AG. It is confectioned with the matching motor mating connector and can be ordered by the following cable assy numbers:

Without brake:

Cable assy no. 26.1

With brake:

Cable assy no. 24.1

Mating connector of the motor (solder side)

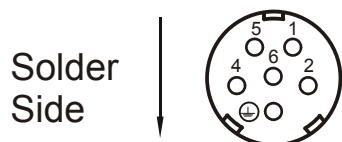
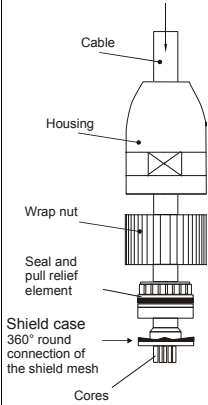
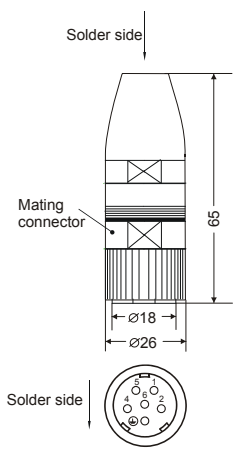
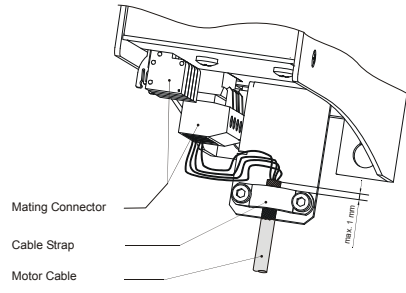



Fig.: 10: View on the SC series mating connector of the motor (internal thread M23)

Specification of the motor power cable with mating connector SC for JetMove 203B-230

For connection without motor holding brake

| Motor power cable, cable assy no. 26.1 | | | |
|--|---|---|---|
| Field wiring terminals of the JM-203B-230 | Shielding | | Motor mating connector (female, solder side) |
| <p>(4 x 1.5 mm² (2 x 1.5 mm²)) (AWG 16(6))</p> <p>The wires are equipped with wire end ferrules.</p> | <p>Highly flexible 6-wire cable with PE (GND) (separately shielded brake lines and all-over shielding)</p> |  |  |
|  | <p>Connect both sides of the shield with the greatest possible surface area! Use metallized housing only!</p> | | |
| Pin | Wire number | Signal | Pin |
| X62.U2 | U1 | Phase 1 | 1 |
| X62.V2 | V2 | Phase 2 | 5 |
| X62.W2 | W3 | Phase 3 | 2 |
| X62.PE | yellow-green | PE conductor |  |
| X10.BRAKE2 | BR1 | Brake + | 6 |
| X10.GND | BR2 | Brake - | 4 |


Dimensions of the motor mating connector are specified in millimeters.

For connection with motor holding brake

| Motor power cable, cable assy no. 24.1 | | | |
|--|--|---|--|
| Field wiring terminals of the JM-203B-230 | Shielding | | Mating connector of the motor (female, solder side) |
| <p>(4 x 1.5 mm² (2 x 1.5 mm²)) (AWG 16(6))</p> <p>The wires are equipped with wire end ferrules.</p> | <p>Highly flexible 6-wire cable with PE (GND) (separately shielded brake lines and all-over shielding)</p> | | |
| | | | |
| | | <p>Connect both sides of the shield with the greatest possible surface area! Use metallized housing only!</p> | |
| Pin | Wire number | Signal | Pin |
| X62.U2 | U1 | Phase 1 | 1 |
| X62.V2 | V2 | Phase 2 | 5 |
| X62.W2 | W3 | Phase 3 | 2 |
| X62.PE | yellow-green | PE conductor | |
| X10.BRAKE2 | BR1 | Brake + | 6 |
| X10.GND | BR2 | Brake - | 4 |

Dimensions of the motor mating connector are specified in millimeters.

7.2.4 Connection assignment of terminal box

| Connection assignment of terminal box ^{*)} | | |
|---|--|--|
| Field wiring terminals of the amplifier | Motor terminal box - terminal assignment | |
| X62.U2 | Pin 1 | Phase 1 |
| X62.V2 | Pin 2 | Phase 2 |
| X62.W2 | Pin 3 | Phase 3 |
| X62.PE | Pin 4 |  Protective earth |
| X10.BRAKE2 | Pin 7 | Brake + |
| X10.GND | Pin 8 | Brake - |

^{*)} alternative to motor connectors

7.3 Resolver connection

7.3.1 Specification

Specification of the connector for terminal X61 (ENCODER)

- 9-pin male Sub-D connector
- Metallized enclosure

Specification of the resolver cable

- Cable size: 4 * 2 * 0.14 mm² (AWG 26(8)) min.
- Cores have to be shielded and twisted in pairs and have to be included in an overall shielding.
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Maximum cable length: 50 m

7.3.2 Resolver cable with mating connector



Note!

The resolver respectively HIPERFACE mating connector of the Jetter motor types JL, JK and JH can be ordered from Jetter AG by supplying the following particulars:

Item no. 15100069 Resolver/HIPERFACE

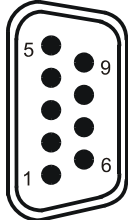
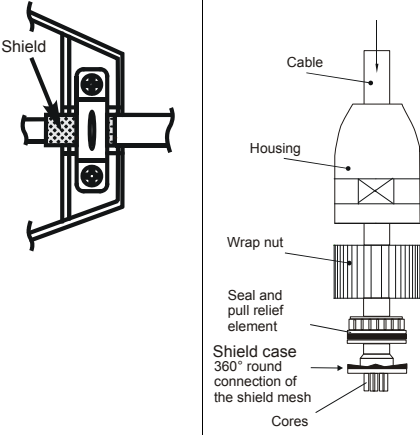
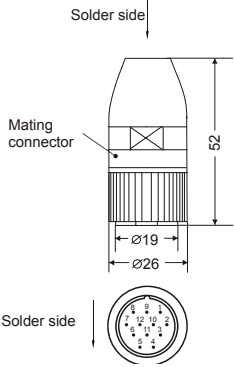
The complete resolver cable between the servo amplifier series JetMove 2xx and the Jetter motor types JL, JK and JH can be obtained from Jetter AG. It can be ordered by supplying the following cable assy number:

Cable assy no. 23 For the servo amplifier series JetMove 2xx

Mating connector of the resolver (solder side)



Fig.: 11: RC series mating connector of the resolver (internal thread M23)

| Resolver cable of cable assy no. 23 | | | |
|--|--|---|---|
| JetMove 2xx (Sub-D male connector X61) | Shielding | | Motor (resolver) (female, solder side) |
|  <p>Attaching screws must have a metric thread!</p> |  |  | |
| <p>Connect shield with the greatest possible surface area! Use metallized housing only!</p> | | | |
| Pin | Signal | Core color | Pin |
| 8 | Cosine + | red | 1 |
| 3 | Cosine - | blue | 2 |
| 2 | Sine - | amber | 3 |
| 7 | Sine + | green | 4 |
| 1 | R1R (exciter winding +) | pink | 5 |
| 6 | R2L (exciter winding -) | gray | 6 |
| 9 | Th1 (Thermal sensor) | white | 7 |
| 4 | Th2 (Thermal sensor) | brown | 8 |
| - | Unassigned | - | 9 - 12 |

Dimensions of the resolver mating connector are specified in millimeters.

7.4 HIPERFACE connection

7.4.1 Specification

Specification of the connector for terminal X61 (ENCODER)

- 9-pin male Sub-D connector
- Metallized enclosure

HIPERFACE cable specification

- Cable size:
4 * 2 * 0.14 mm² + 2 * 0.5 mm² (AWG 26(8) + AWG 20(2)) min.
2 * 0.5 mm² (AWG 20(2)) must be used for the power supply unit and for GND.
- Twisted-pair cables shielded with the all-over shield must be used; the signal lines must also be twisted in pairs:
Sine + and reference sine
Cosine + and reference cosine
DATA - and DATA +
0 V and power supply
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Maximum cable length: 50 m

7.4.2 HIPERFACE cable with mating connector



Note!

The resolver respectively HIPERFACE mating connector of the Jetter motor types JL, JK and JH can be ordered from Jetter AG by supplying the following particulars:

Item no. 15100069 Resolver/HIPERFACE

The complete HIPERFACE cable connecting the servo amplifier series JetMove 2xx and the Jetter motor types JL, JK and JH can be obtained from Jetter AG. It can be ordered by submitting the following cable specifications and the respective cable length in cm:

KAY_0723-xxxx For the servo amplifier series JetMove 2xx

HIPERFACE mating connector (solder side)

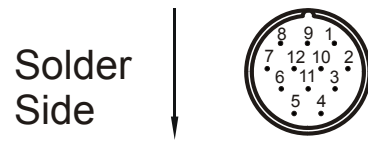
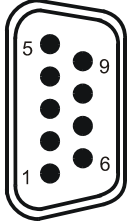
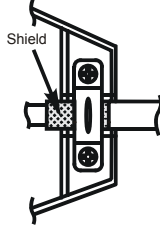
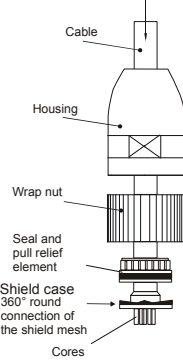
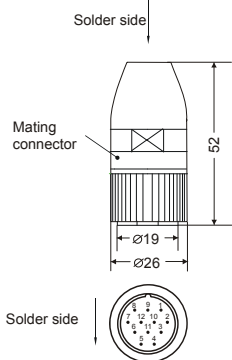


Fig.: 12: RC series HIPERFACE mating connector (internal thread M23)

| HIPERFACE cable of KAY_0723-xxxx | | | |
|--|---|---|---|
| JetMove 2xx (Sub-D male connector X61) | Shielding | | Motor (HIPERFACE) (female, solder side) |
|  <p>Attaching screws must have a metric thread!</p> |  |  |  |
| | <p>Connect shield with the greatest possible surface area! Use metallized housing only!</p> | | |
| Pin | Signal | Core color | Pin |
| - | Unassigned | - | 1 |
| - | Unassigned | - | 2 |
| 7 | Sine + | white | 3 |
| 2 | Reference sine | brown | 4 |
| 8 | Cosine + | green | 5 |
| 3 | Reference cosine | amber | 6 |
| 6 | DATA - (RS-485) | gray | 7 |
| 1 | DATA + (RS-485) | pink | 8 |
| 4 | 0 V | blue | 9 *) |
| 5 | Power supply (7 through 12 volts) | red | 10 |
| 9 | Thermal sensor | black | 11 |
| | Thermal sensor | - | 12 *) |

*) Pin 9 and pin 12 are short-circuited.

Dimensions of the HIPERFACE mating connector are specified in millimeters.

7.5 Sin-cos encoder connection

7.5.1 Adapter

An adapter is needed for connecting a sin-cos encoder. This adapter can be obtained from Jetter AG by the following specification:

JM-200-ENC-ADAP (item no. 10000430)

Another 9-pin SUB-D connector of the encoder cable can be connected to this adapter. Further, this adapter allows for connecting an individual temperature sensor of the motor, as normally these signals are not conducted via the encoder cable, if a sin-cos encoder is used.

7.5.2 Specification

Specifications of the mating connector for X61 (ENCODER)

- 9-pin male Sub-D connector
- Metallized enclosure

Sin-cos encoder cable specifications

- Cable size: $2 * 2 * 0.14 \text{ mm}^2 + 2 * 0.5 \text{ mm}^2$ (AWG 26(4) + AWG 20(2)), if there is no index signal.
- Cable size: $3 * 2 * 0.14 \text{ mm}^2 + 2 * 0.5 \text{ mm}^2$ (AWG 26(6) + AWG 20(2)), if there is an index signal.
- $2 * 0.5 \text{ mm}^2$ (AWG 20(2)) must be used for the power supply unit and for GND.
- Cores have to be twisted in pairs and have to be included in an overall shielding.
- The following signal lines have to be twisted in pairs:
 - Sine + and reference sine
 - Cosine + and reference cosine
 - Index + and reference index
 - 0 V and power supply
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Max. cable length: 100 m

7.5.3 Connection diagram

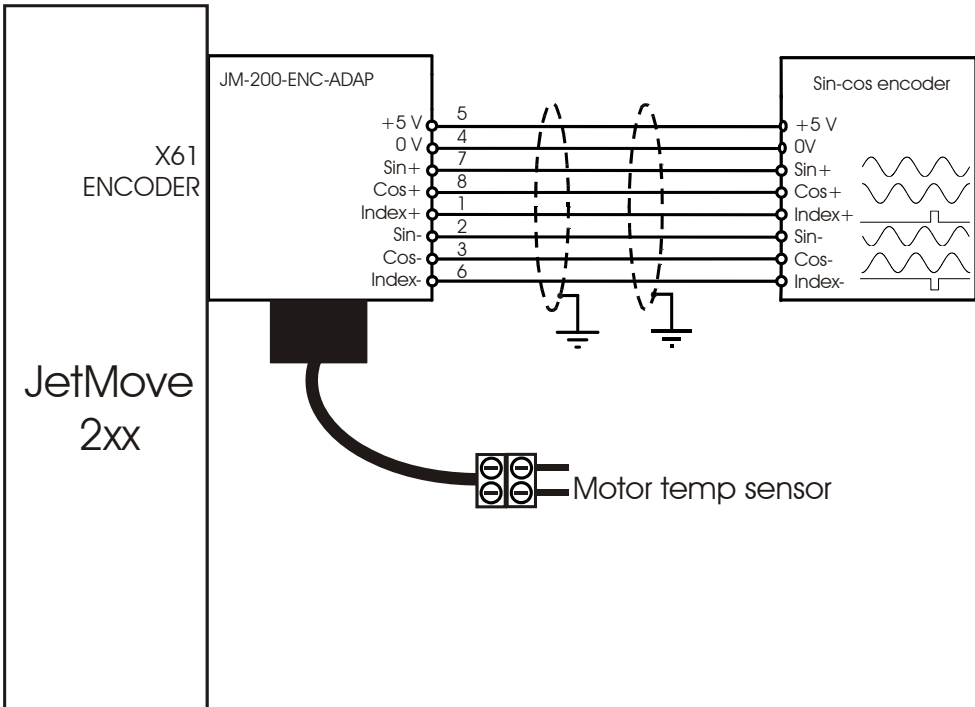
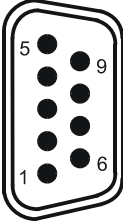
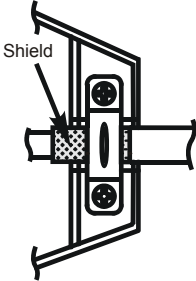


Fig.: 13: Sin-cos encoder connection with adapter

| Sin-cos encoder cable | |
|---|--|
| JetMove 2xx (Sub-D connector X61) with adapter JM-200-ENC-ADAP | Shielding |
|  |  |
| Attaching screws must have a metric thread! | Connect shield with the greatest possible surface area! Use metallized housing only! |
| Pin | Signal |
| 7 | Sine + |
| 2 | Reference sine |
| 8 | Cosine + |
| 3 | Reference cosine |
| 1 | Index + |
| 6 | Reference index |
| 4 | 0 V |
| 5 | Power supply (5 V - 100 mA max.) |
| 9 | Unassigned |



Important!

To be considered before connecting sin-cos encoders:

- If a sin-cos encoder is to be used, after applying the logic power supply to the JetMove 2xx and before the first enable, commutation finding **always** has to be carried out. If this is not considered, the motor might move uncontrollably.
- The counting direction of the position in the JetMove 2xx is reversed in the following cases:
Case 1: The signal sine+ is exchanged with the signal cosine+, and the signal reference-sine is exchanged with the signal reference cosine.
Case 2: The signal sine is exchanged with the signal reference sine
Case 3: The signal cosine is exchanged with the signal reference cosine
- Due to conduction loss, a voltage smaller than 5 V might reach the encoder. If necessary, the encoder supply cords have to have a greater diameter.
- If a motor temperature sensor is not used, the inputs have to be short-circuited at the adapter, so the JetMove 2xx will not give an error message.

7.6 Digital inputs, logic power supply

Specification of terminal X10

- 10-pin spring tension terminal (type ZEC 1.0/10-ST-3.5)
- Diameter of the cable apt for connecting: 0.2 ... 1 mm² (AWG 24 ... AWG 16)
with bootlace ferrules in a plastic sleeve: 0.25 - 0.75 mm² (AWG 24 - AWG 18)
- Bladed screw-driver: 0.4 x 2.5 mm

| Digital inputs, logic power supply | | | |
|------------------------------------|---|---|---|
| Designation of terminals | Signal | Operating principle | Specification |
| ENABLE | Hardware enable for the power supply of the motor (Input) | <ul style="list-style-type: none"> • At this input, a high signal is necessary for power supply of the motor (This signal must have been applied before carrying out the software enable). • A low signal de-energizes the motor immediately. | <ul style="list-style-type: none"> • DC 24 V • 7.5 mA max. • Operating point: < 6 V low, > 15 V high |
| REF | Reference switch (Input) | <ul style="list-style-type: none"> • Depending on the parameter setting, this input is used for reference run. | <ul style="list-style-type: none"> • DC 24 V • 7.5 mA max. • Operating point: < 6 V low, > 15 V high <p>NC or NO contact</p> |
| LIMIT + | Positive limit switch (input) | <ul style="list-style-type: none"> • Depending on the parameter setting, this input is used as a positive limit switch. | <ul style="list-style-type: none"> • DC 24 V • 7.5 mA max. • Operating point: < 6 V low, > 15 V high <p>NC or NO contact</p> |
| LIMIT - | Negative limit switch (input) | <ul style="list-style-type: none"> • Depending on the parameter setting, this input is used as a negative limit switch. | <ul style="list-style-type: none"> • DC 24 V • 7.5 mA max. • Operating point: < 6 V low, > 15 V high <p>NC or NO contact</p> |

| | | | |
|---------|------------------------------------|--|---|
| INPUT | Digital input | <ul style="list-style-type: none"> Depending on the parameter setting, this input can be used for quick stop, position capture or referencing without stop. | <ul style="list-style-type: none"> DC 24 V 7.5 mA max. Operating point: < 6 V low, > 15 V high |
| ⊥ | Common ground | | GND ^{*)} for all inputs and supply of the logic |
| ⊥ | Common ground | | GND ^{*)} for all inputs and supply of the logic |
| DC 24 V | Voltage supply of processor logics | | DC 20 ... 30 V (I < 0.6 A) |
| BRAKE 1 | Braking relay contact Br1 | Relay contact for motor holding brake | V _{max} = DC 30 V I _{max} = DC 2 A |
| BRAKE 2 | Braking relay contact Br2 | <p>The relay can be operated either by the control program or by the firmware of the JetMove 203B-230 at release of the motor current.</p> <p>Important note! A free-wheeling diode is necessary in case it has not been integrated in the motor yet. In Jetter motors, free-wheeling diodes have not been integrated! Recommended diode type: 1N4002</p> | <p>N/O</p> <p>These connections are only for devices having got the same reference to ground as the power supply of the logic.</p> |

^{*)} is connected to the ground of the control system.

7.7 Jetter system bus

By means of the Jetter system bus, the JetMove 203B-230 is interlinked with the controller, additional JetMove amplifiers, or Jetter peripheral modules. The system bus input BUS-IN is a 9-pin Sub-D male connector, and the system bus output BUS-OUT is a 9-pin Sub-D female connector.

7.7.1 Specifications of the Jetter system bus cable

Specification of connectors

On the BUS-OUT (X19) side

- 9-pin male Sub-D connector
- Metallized enclosure

On the BUS-IN (X18) side

- 9-pin female Sub-D connector
- Metallized enclosure

System bus cable specification

The following minimum requirements apply to the manufacture of the system bus cable:

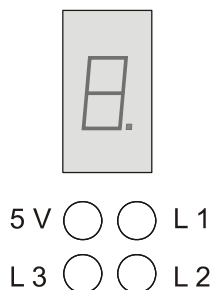
| System bus cable - technical data | |
|-----------------------------------|---|
| Operating principle | Description |
| Cable size | 1 MBaud: 0.25 - 0.34 mm ² |
| | 500 kBaud: 0.34 - 0.50 mm ² |
| | 250 kBaud: 0.34 - 0.60 mm ² |
| | 125 kBaud: 0.50 - 0.60 mm ² |
| Cable capacitance | 60 pF/m max. |
| Resistivity | 1 MBaud: 70 max. Ω /km |
| | 500 kBaud: 60 max. Ω /km |
| | 250 kBaud: 60 max. Ω /km |
| | 125 kBaud: 60 max. Ω /km |
| Number of cores | 5 |
| Shielding | Complete shielding, no paired shielding |
| Twisting | Core pairs CL and CH must be twisted. |

| Allowed cable lengths | | | |
|-----------------------|-------------------|----------------------|------------------------------|
| Baud rate | Max. cable length | Max. tap line length | Max. overall tap line length |
| 1 MBaud | 30 m | 0.3 m | 3 m |
| 500 kBaud | 100 m | 1 m | 39 m |
| 250 kBaud | 200 m | 3 m | 78 m |
| 125 kBaud | 200 m | - | - |

| System bus cable of cable assy no. 530 | | |
|--|---|---------------|
| Shielding | | |
| | | |
| BUS-OUT | Connect shield with the greatest possible surface area! Use metallized housing only! | BUS-IN |
| Pin | Signal | Pin |
| 1 | CMODE0 | 1 |
| 2 | CL | 2 |
| 3 | GND | 3 |
| 4 | CMODE1 | 4 |
| 5 | TERM | 5 |
| 6 | Unassigned | 6 |
| 7 | CH | 7 |
| 8 | Unassigned | 8 |
| 9 | Do not connect | 9 |

8 Status monitoring

The output stage LEDs indicate the operating status of the digital servo amplifier.



| JetMove 203B-230 - LEDs | | | |
|-------------------------|-------|--------|--|
| LED | Color | State | Meaning |
| 5 V | green | is lit | Logic module voltage is OK. |
| L1 | amber | is lit | Axis is standing still (speed = 0) |
| L2 | amber | is lit | A voltage of 24 V is applied to the input of the positive limit switch (LIMIT+). |
| L3 | amber | is lit | A voltage of 24 V is applied to the input of the negative limit switch (LIMIT-). |

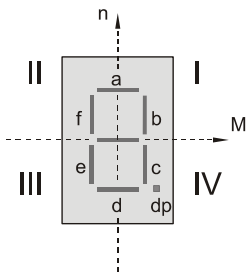


Note!

The seven-segment display of the output stage indicates the operating and fault conditions of the digital servo amplifier JetMove 203B-230. The various display modes are set by the Motion Setup. Mode 0 (default) is used for normal operation and mode 1 for commissioning.

| JetMove 203B-230 - Seven-segment display Mode 0: Normal operation | | |
|--|-----------------------------|---|
| Display | State | Meaning |
| 0 | NOT READY TO BE SWITCHED ON | Initialization of amplifier functions |
| 1 | SWITCH-ON INHIBIT | Initialization completed. Safe state. Is achieved after initialising and after acknowledging errors. The drive controller can be switched on. |
| 2 | READY TO BE SWITCHED ON | Drive controller has been disabled by software command. The drive controller can be switched on. |
| 3 | SWITCHED ON | DC link monitoring is activated. |
| 4 | OPERATION_ENABLED | The drive controller has been enabled. |

| JetMove 203B-230 - Seven-segment display Mode 0: Normal operation | | |
|--|-----------------------------|---|
| 7 | QUICK STOP ACTIVATED | A quick stop has been activated. The drive is being decelerated to $n = 0$ and then locked. |
| E | ERROR REACTION IS ACTIVATED | An error was recognized. An adjustable error reaction may be active. |
| F | MALFUNCTION | The drive controller is locked, error can be acknowledged. |
| F X. X. | ERROR NUMBER | Error with number X. X. has occurred. |
| . | Flashing dot | Warning activated |
| 0. | Flashing "ZERO" | Boot sector activated |
| C. | Flashing "C" | OS flash is cleared. |
| E. | Flashing "E" | OS flash is cleared. |
| L. | Flashing "L" | OS loader gets loaded. |
| P. | Flashing "P" | OS is transferred to the flash memory. |
| U. | Flashing "U" | The boot sector waits for OS update. |



| JetMove 203B-230 - Seven-segment display Mode 1: Commissioning | | |
|---|--|-------------------------------|
| Display | Meaning | Meaning |
| g | n_{as-is} value $< 0.5 \% n_{max}$. | -- |
| b | $M > 0, n > 0$ --> Quadrant I | Mode of operation - Motor |
| c | $M < 0, n > 0$ --> Quadrant II | Mode of operation - Generator |
| e | $M < 0, n < 0$ --> Quadrant III | Mode of operation - Motor |
| f | $M > 0, n < 0$ --> Quadrant IV | Mode of operation - Generator |
| a | Positive current limit has been reached. | -- |
| d | Negative current limit has been reached. | -- |

9 Diagnostics

9.1 Error messages



Note!

In case of an error message, the letter "F" and two successive numbers appear on the seven-segment display every second.

Error message table JetMove 203B-230

| Error number | Type of error | Description | Error response | Troubleshooting |
|--------------|--|--|---------------------------------|--|
| F 00 | Hardware error | Internal hardware defect | – Immediate motor power disable | – Separate the drive controller from the power lines. – Return the amplifier for repair. |
| F 01 | Internal voltage supply error | One or more power supply voltages are beyond their limits. | – Immediate motor power disable | – Separate the drive controller from the power lines. – Return the amplifier for repair. |
| F 02 | Mains phase error (is only active in case of a 3-phase connection) | Failure of one of the mains phases. | – Immediate motor power disable | – Check fuses and wiring. – Acknowledge failure. |
| F 03 | Motor cable breakage | The motor cable is broken. Please be careful: The motor cable is tested when the drive controller is enabled for the first time. | – Immediate motor power disable | – Check the motor cable connections. – Acknowledge failure. |
| F 04 | Overvoltage in the DC link | A DC link voltage of > 480 V has been detected. | – Immediate motor power disable | – Check input voltage supply. – If the motor is used as generator, reduce the regenerating power. – Acknowledge failure. |

Error message table JetMove 203B-230

| Error number | Type of error | Description | Error response | Troubleshooting |
|---------------------|---------------------------|--|---------------------------------|---|
| F 05 | Over-current | The output current has been greater than 2.5 x the rated current. | – Immediate motor power disable | <ul style="list-style-type: none"> – Check cable and motor for a short circuit. – Check current control parameters. If necessary, correct parameters. – Acknowledge failure. |
| F 06 | Ballast resistor overload | The ballast resistor has been overloaded. | – Immediate motor power disable | <ul style="list-style-type: none"> – Let the amplifier cool down. – After cooling down, acknowledge failure. – Reduce regeneration power. |
| F 07 | Amplifier overtemperature | The amplifier has reached the maximum temperature. | – Immediate motor power disable | <ul style="list-style-type: none"> – Let the amplifier cool down. – After cooling down, acknowledge failure. – Reduce power of the motion system. |
| F 08 | Motor overtemperature | The motor has reached the maximum temperature. | – Immediate motor power disable | <ul style="list-style-type: none"> – Let the motor cool down. – After cooling down, acknowledge failure. – Reduce the power of the drive. |
| F 09 | Encoder failure | Encoder breakage or initialization error | – Immediate motor power disable | <ul style="list-style-type: none"> – For extended diagnostics purposes use Motion Setup. – Check the encoder line and all plug-in connections. – Acknowledge failure. |
| F 10 | Overspeed | The actual shaft speed has exceeded a value of 1.25 x maximum speed. | – Immediate motor power disable | <ul style="list-style-type: none"> – Check motor and encoder connections. – Check speed controller parameters. If necessary, modify parameters. – Acknowledge failure. |
| F 11 | Current overrange | A current temporarily too high has been detected. | – Immediate motor power disable | <ul style="list-style-type: none"> – Reduce K_p of the current controller by 10 to 20 %. – Acknowledge failure. |

| Error message table JetMove 203B-230 | | | | |
|---|-------------------------------------|--|---|--|
| Error number | Type of error | Description | Error response | Troubleshooting |
| F 12 | Ground fault | One or several phases of the motor cable or inside the motor have been short-circuited to earth. | <ul style="list-style-type: none"> – Immediate motor power disable | <ul style="list-style-type: none"> – Check the motor cable and the motor. – Acknowledge failure. |
| F 13 (combined with F00) | Internal checksum error | An internal checksum error has occurred. | <ul style="list-style-type: none"> – Immediate motor power disable | <ul style="list-style-type: none"> – Switch the 24 V supply off and on again. – If the error occurs repeatedly, return the amplifier for repair. |
| F 14 (combined with F 00) | Internal communication error | An internal communication error has occurred. | <ul style="list-style-type: none"> – Immediate motor power disable | <ul style="list-style-type: none"> – Switch the 24 V supply off and on again. – If the error occurs repeatedly, return the amplifier for repair. |
| F 15 | The hardware enable is missing. | The software enable is given without a hardware enable. | <ul style="list-style-type: none"> – Immediate motor power disable | <ul style="list-style-type: none"> – Disable the drive by means of the software. – Acknowledge failure. |
| F 16 | Power input overcurrent | The current at the power input is too high. | <ul style="list-style-type: none"> – Immediate motor power disable | <ul style="list-style-type: none"> – Check input voltage. – Reduce mechanical power of the motor. – Acknowledge failure. |
| F 17 | Software limit switch is activated. | Actual position is outside the programmed range, and a software limit switch has tripped. | <ul style="list-style-type: none"> – Stop at max. current (max. torque). | <ul style="list-style-type: none"> – Check target position. – Check reference position. – Acknowledge failure. – Return the axis to a position within the software travel limits (monitoring of software limit switches is re-enabled automatically at entering this range). |

Error message table JetMove 203B-230

| Error number | Type of error | Description | Error response | Troubleshooting |
|----------------------------------|--------------------------------------|---|--|---|
| F 18 | The hardware limit switch is active. | A hardware limit switch is active. | <ul style="list-style-type: none"> – Stop at max. current (max. torque). | <ul style="list-style-type: none"> – Check target position. – Check reference position. – Acknowledge failure. – Return the axis to a position within the machine travel limits (monitoring of hardware limit switches is re-enabled automatically at entering this range). |
| F 20 | Undervoltage in the DC link | The DC link voltage is less than the set minimum value. | <ul style="list-style-type: none"> – Stop with emergency deceleration ramp. | <ul style="list-style-type: none"> – Check the supply voltage. – Check the parameter "U_{ZK} min. trip". – Acknowledge failure. |
| F 21 | Overvoltage of the DC link voltage | The DC link voltage has exceeded the set maximum value. | <ul style="list-style-type: none"> – Stop with emergency deceleration ramp. | <ul style="list-style-type: none"> – Check the supply voltage. – In generator operation, reduce braking power. – Acknowledge failure. |
| F 22 | The drive is blocked. | The drive could not overcome the n = 0 threshold within the time limit specified by the parameter "blocking-tripping time". | <ul style="list-style-type: none"> – Immediate motor power disable | <ul style="list-style-type: none"> – Eliminate the cause of blocking. – Acknowledge failure. |
| F 23 | Tracking error | The tracking error has exceeded the limit defined in the parameter "tracking error limit" for the time specified in "tracking window time". | <ul style="list-style-type: none"> – Stop with emergency deceleration ramp. | <ul style="list-style-type: none"> – Check the drive mechanism. – Check steepness of acceleration/ deceleration ramps and amplifier parameters in relation to the parameters "tracking error limit" and "tracking error window time". – Acknowledge failure. |
| F 24 (combined with F 01) | Error in 24 V supply voltage | The external 24 V supply was lower than 18 V. | <ul style="list-style-type: none"> – Immediate motor power disable | <ul style="list-style-type: none"> – Check external power supply. – Acknowledge failure. |

| Error message table JetMove 203B-230 | | | | |
|---|---|---|---------------------------------|---|
| Error number | Type of error | Description | Error response | Troubleshooting |
| F 25 - F 27 (combined with F 01) | Internal power supply error | One or more internal supply voltages have fallen below their limits. | – Immediate motor power disable | – Note the fault number. – Return the amplifier for repair. |
| F 29 | The mains power is too high. | The average mains power of the 230 V supply was too high. | – Immediate motor power disable | – Acknowledge failure. – Reduce the average load of the motor. |
| F 30 | I ² t error | The average power loss of the motor has been greater than the max. value configured by nominal motor current, overload factor and motor time constant. See "I ² t calculation" on page 41. | – Immediate motor power disable | – Let the motor cool down. – Acknowledge failure. – Check the configuration of nominal motor current, overload factor and motor time constant. – Reduce the average load of the motor. |
| F 31 | Motor overload measuring to UL | The average motor power loss was higher than has been defined according to UL. See chapter 5.2.3 "Motor overload protection according to UL", page 42. | – Immediate motor power disable | – Let the motor cool down. – Acknowledge failure. – Reduce the average load of the motor. |
| F 38 | Asymmetric encoder signal | The amplitudes of the analog sine-cosine signals are not identical. | – Immediate motor power disable | – Check wiring or encoder signals. – Acknowledge failure. |
| F 39 | Error at commutation finding | Measuring the commutation offset could not be completed with results being guaranteed. | – Immediate motor power disable | – Check parametering. – Check wiring or encoder signal. – Acknowledge failure. |
| F 42 | Malfunctioning of encoder 2 (only for the option CNT) | Encoder breakage or initialization error | – Immediate motor power disable | – Check the encoder line and all plug-in connections. – Acknowledge failure. |

9.2 WARNINGS

If the dot in the seven-segment display is flashing, one or several warnings have been recognized. Check in the Motion Setup or by issuing the motion instructions in the controller program which warning is active.

10 Connection diagrams

see page 64

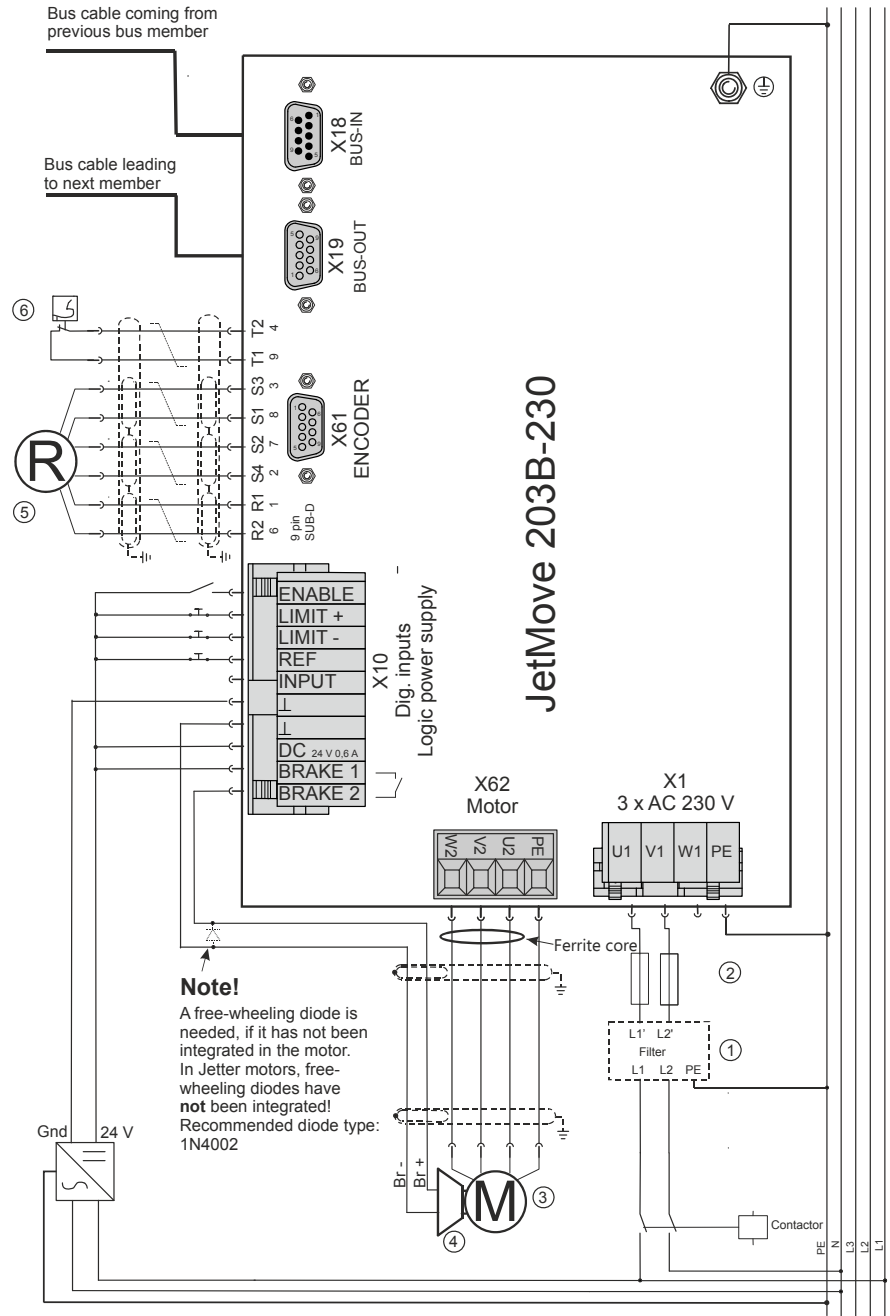


Fig.: 14: Connection diagram JetMove 203B-230, 1-phase connection, type of position transducer: Resolver

See also chapter 7 "Description of connections", page 47.

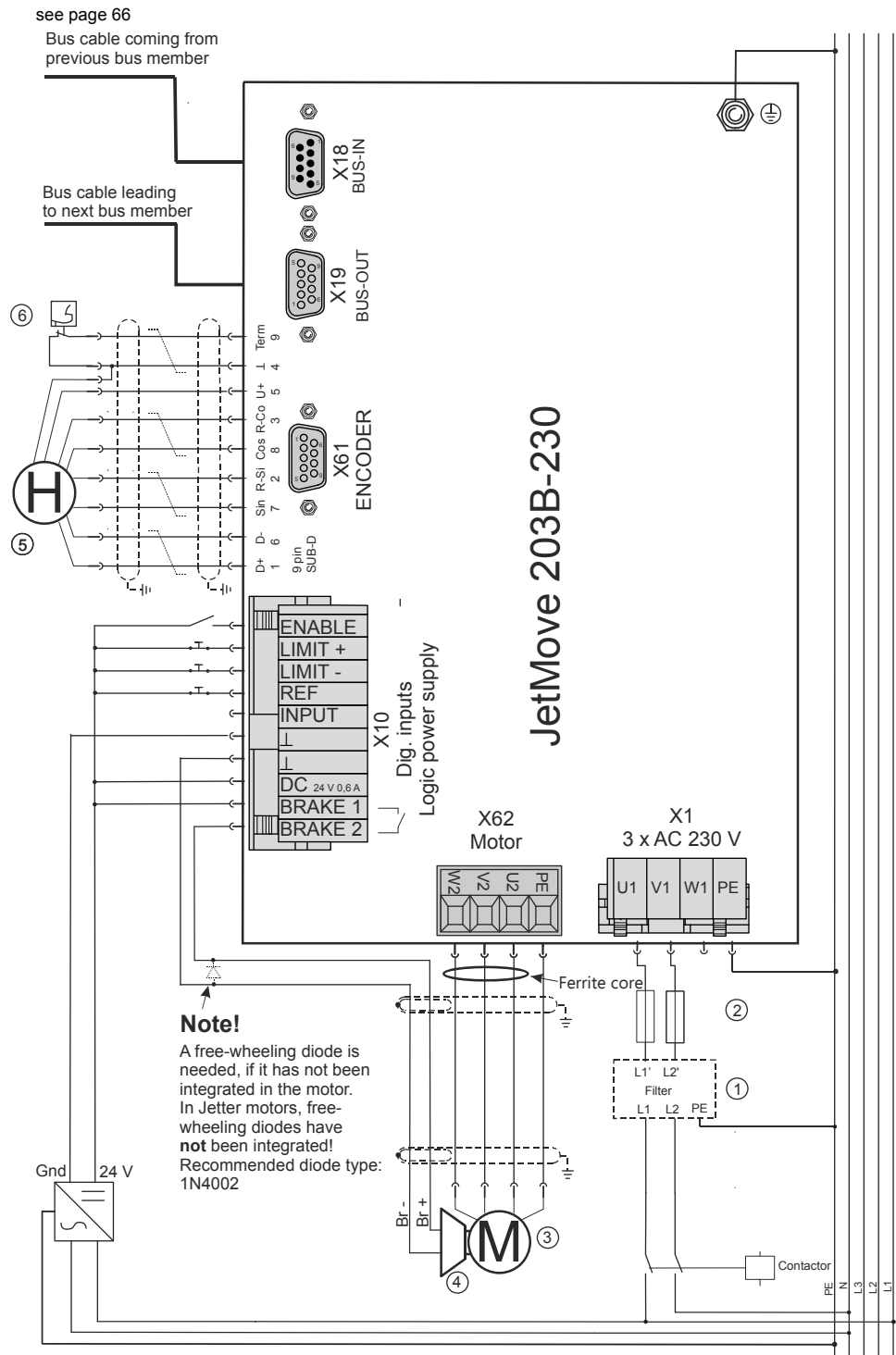


Fig.: 15: Connection diagram JetMove 203B-230, 1-phase connection, type of position transducer: HIPERFACE

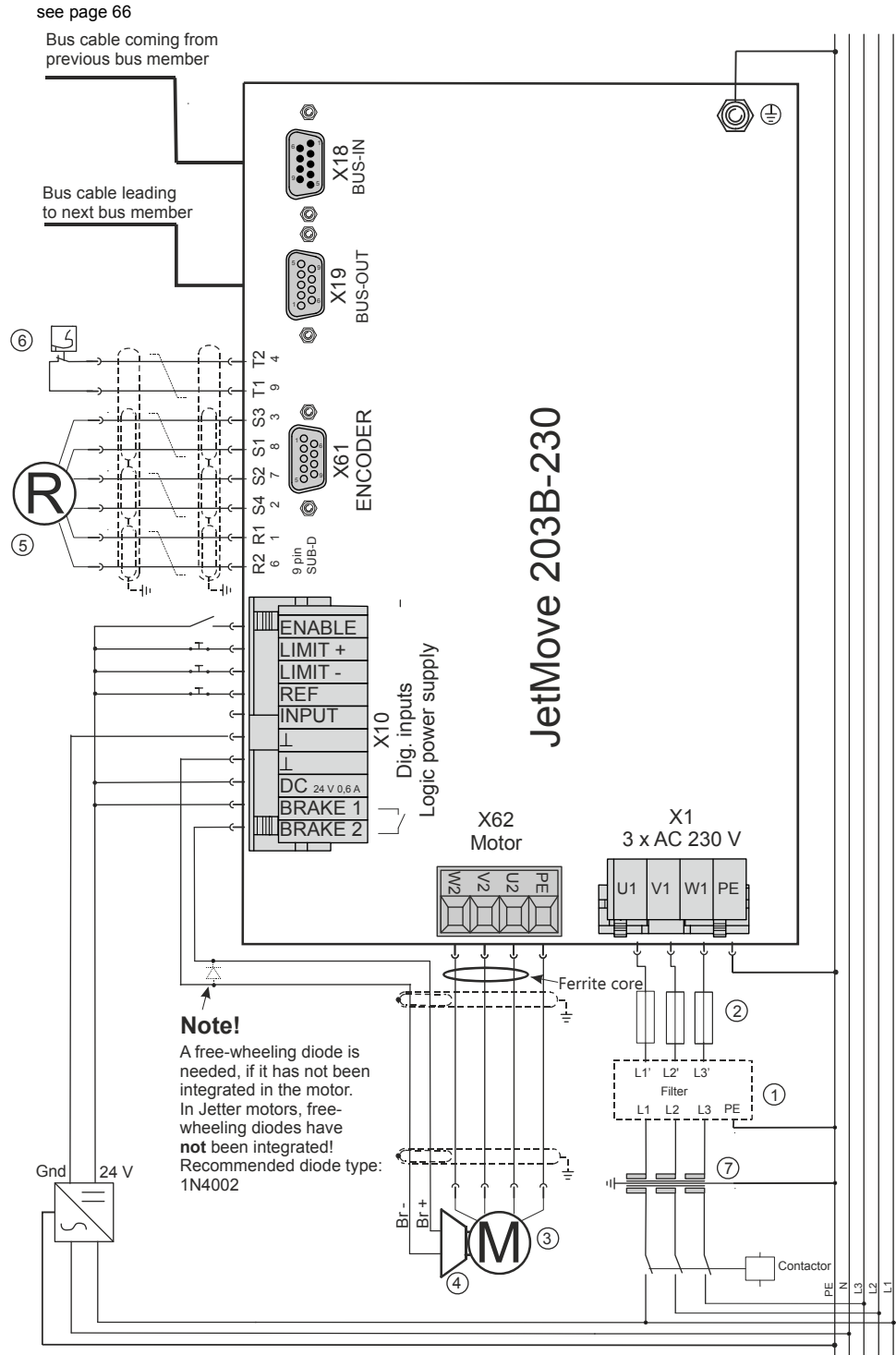


Fig.: 16: Connection diagram JetMove 203B-230, 3-phase connection, type of position transducer: Resolver

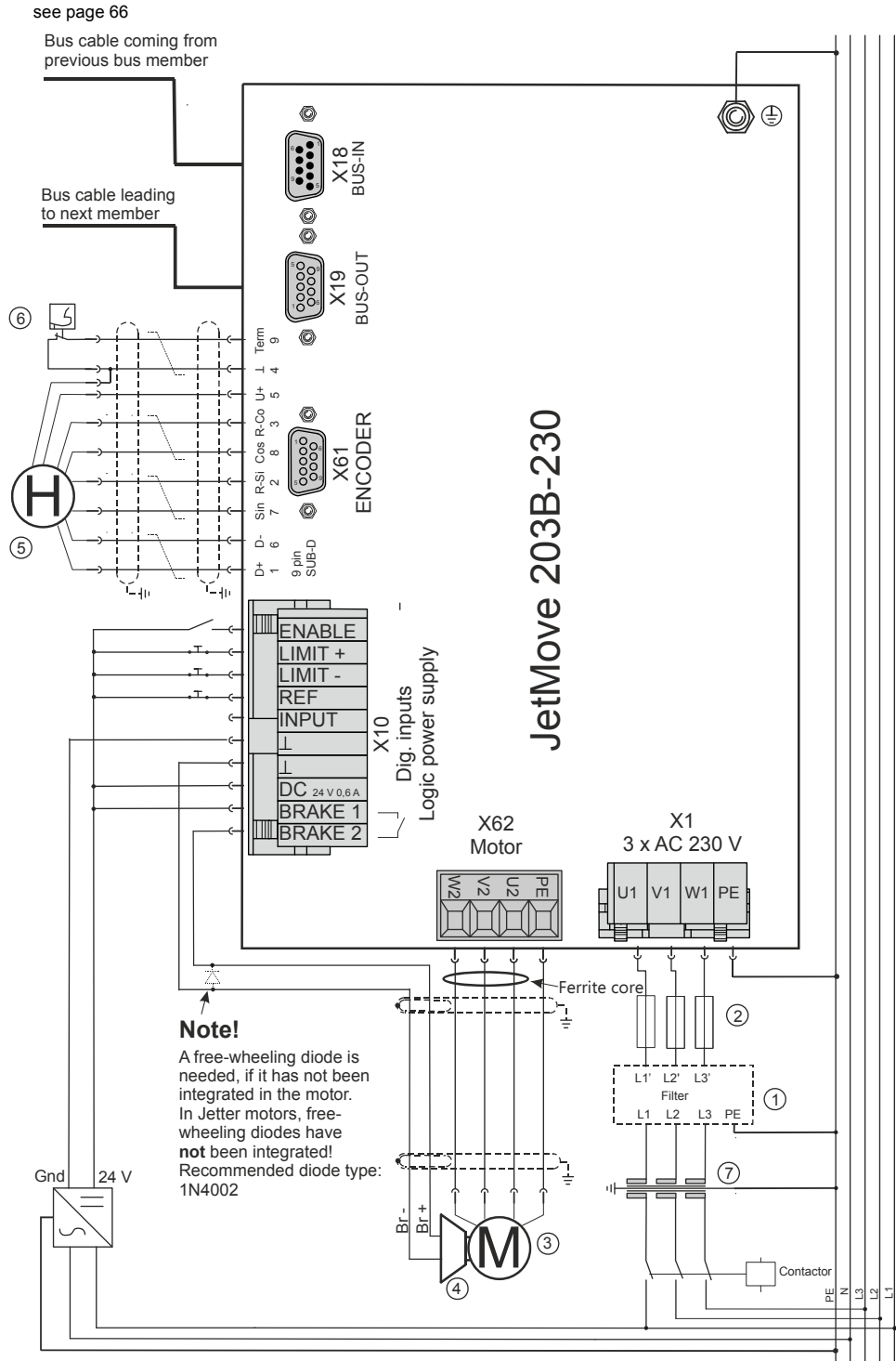


Fig.: 17: Connection diagram JetMove 203B-230, 3-phase connection, type of position transducer: HIPERFACE

Key to the wiring diagrams:

- 1 Line filter (optional) (refer to "Line filter" on page 38)
- 2 Mains protection (refer to "Overload protection" on page 37)
- 3 Motor
- 4 Motor holding brake (option)
- 5 Position transducer (resolver or HIPERFACE encoder)
- 6 Motor overtemperature protection
- 7 Isolating transformer or autotransformer

11 Analog input (option)

11.1 Operating principle

For the digital servo amplifier JetMove 203B-230, an optional integrated analog input card can be ordered (article designation of the device: JM-203B-230...-IA1). This card supplies an analog input of a 12-bit resolution. The converted value of the measured voltage can be read by a register of the JetMove in the PLC program or processed by the firmware of the JetMove in an additional controller. This way it is possible for example, to realize a pressure control loop in which the motor controlled by the JetMove generates the pressure. A pressure sensor in the machine is connected to the analog input of the JetMove to deliver the actual pressure value for the control loop.

11.2 Technical data

| Technical data of the analog input | |
|--------------------------------------|--|
| Connection | Sub-D connector (male) at the device |
| Voltage range | 0 ... 10 V |
| Input current | 1.4 mA max. |
| Resolution | 12 bits |
| Value range | 0 ... 32767 (resolution in steps of 8) |
| Electrical isolation | None |
| Accuracy Zero error Gain error | max. ± 5 LSB (± 40 values) corresponds to ± 12.2 mV max. ± 20 LSB (± 160 values) corresponds to ± 48.8 mV |

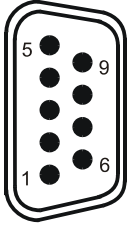
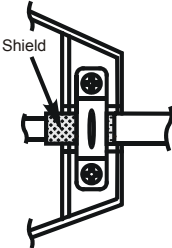
11.3 Description of connections

Specification of the mating connector for X72

- 9-pin female Sub-D connector
- Metallized housing

Specification of the cable leading to the analog input

- Cable size: 2 * 0.14 mm² min. (AWG 26(2))
- Cores have to be twisted and entirely shielded.
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C

| Pin assignment of the analog input | |
|---|---|
| | Shielding |
|  |  |
| X72 | Connect shield with the greatest possible surface area! Use metallized housing only! |
| Pin | Signal |
| 1 | Analog signal (0 - 10 V to pin 6) |
| 6 - 9 | Analog GND (connected to earth in the device) |
| 2 - 5 | Do not use |

12 Ethernet interface (option)

12.1 Operating principle

For the digital servo amplifier JetMove 203B-230, an optional integrated Ethernet interface can be ordered (article designation of the device: JM-203B-230...-OEM). This allows for the JetMove 203B-230 to be addressed by the controller via Ethernet instead of the Jetter system bus.

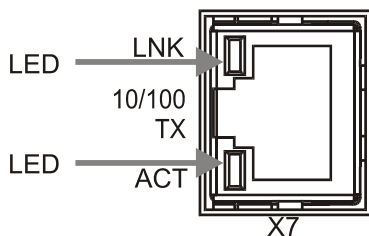
| Functional equipment | |
|---|-------------------|
| 1 Ethernet interface | 10/100 MBit/s, TX |
| 10-pin DIP switch for the lower 8 bits of the IP address and of various operating modes | RUN / STOP / LOAD |
| LED for status indication | RUN / ERR |

12.2 Description of connections

The digital servo amplifier JetMove 203B-230...-OEM is connected with the Ethernet by a RJ45 socket (X71).

There are two types of interconnecting cables used for 10/100 MBit/s twisted pair Ethernet.

- Straight-through twisted pair cable
- Crossover cables (transmitting and receiving lines are crossed)



| The LEDs of the JetMove 203B-230...-OEM Ethernet | |
|--|--|
| Designation | Operating principle |
| ACT | Activity: The JetMove 203B-230...-OEM transmits or receives data via the Ethernet. |
| LNK | Linkage: The JetMove 203B-230...-OEM is linked with the Ethernet. |

12.2.1 Connection between the JetMove 203B-230...-OEM and a PC or JetControl

Direct connection between a PC or JetControl and a JetMove 203B-230...-OEM is established by means of a crossover cable.

12.2.2 Connection between the JetMove 203B-230...-OEM and a PC or JetControl through a switch

If connection between PC or JetControl and a JetMove 203B-230...-OEM is established through a switch, straight-through cables have to be used.



Note!

Terminals have to be interconnected by means of crossover cables:

- PC to PC
- JetControl to PC
- JetControl to JetMove...-OEM
- etc.

Terminals with infrastructure components (e.g. switch) have to be interconnected via straight-through cables:

- PC to switch
- JetControl to switch
- JetMove...-OEM to switch
- etc.



Note!

If the proper cable is not available, the uplink port of a switch/hub can be used. The pin assignment of an uplink port allows connection of terminals or can be switched over.

Some devices are provided with an automatic crossover function which ensures automatic adjustment to the cable and distant station.

12.3 Logic circuit LEDs, switches

12.3.1 LEDs

| Logic circuit LEDs | |
|--------------------|--|
| ERR (red) | Flashes shortly at initializing. It remains lit in case of an initialization error at the Ethernet interface. |
| RUN (green) | Flashes regularly at correct functioning of the Ethernet interface. |

The as-is state of the LED can be scanned in register 10182.

| LED error messages | |
|---|--|
| Following power-up the red LED (ERR) and the green LED (RUN) are flashing. | The selector is in LOAD position. The boot loader is running. The OS of the Ethernet interface is neither checked nor launched. |
| Following power-up the red LED (ERR) flashes three times, then both LEDs (red = ERR, green = RUN) are flashing. | The selector is in RUN or STOP position. The boot loader is running. There is no valid operating system of the Ethernet interface available. |
| The red LED (ERR) and the green LED (RUN) are flashing alternately with intermittent breaks during runtime. | Fatal operating system error of the Ethernet interface |

12.3.2 The DIP switches

The switches are evaluated at switching on the JetMove 203B-230...-OEM. Switches 1 through 8 influence the IP address; switches 9 through 10 influence starting the operating system.

Start-up process

| Switches 9 and 10 | |
|--------------------------------------|---|
| Position | Meaning |
| 9 = OFF, 10 = OFF (NORMAL OPERATION) | Normal function of the Ethernet interface |
| 9 = OFF, 10 = ON (LOAD) | The booting proceeds as far as to the initial program loader of the Ethernet interface. |
| 9 = ON | Reserved |

After booting, the switch has no influence on the interface functions. The current position of the mode selector can be scanned in register 10181.

12.4 Setting the IP address

There are four ways of assigning an IP address to a JetMove 203B-230...-OEM. The actually used IP address can be scanned in register 2931.

12.4.1 Default IP address

If, at activating the controller, DIP switches 1 through 8 are in "OFF" position, the JetMove 203B-230...-OEM has got IP address 192.168.10.15.

In case of any uncertainties with regard to the IP address used, you can use this "loophole" to set the JetControl to a defined state.

12.4.2 IP address out of the configuration memory

If, at activating the JetMove 203B-230...-OEM, the DIP switches 1 through 8 are in "ON" position, the JetControl has got the IP address saved in the configuration memory.

The configuration memory can be accessed by means of the "/System/cfgvar.ini" file or registers 10131 through 10145.

Configuration file

In order to gain access to the configuration file "/System/cfgvar.ini", the user having got the administrator rights must have been connected.

This file has the same structure as a Windows *.INI file:

```
[CFGVAR]
Version      = 4
IP_Address   = 192.128. 10. 97
IP_SubNetMask = 255.255.255. 0
IP_DefGateway = 192.128. 10. 1
BasePort     = 50000
IP_DNS       = 192.118.210.209
```



Important!

In no case change the version number.

Registers

Alternative access to the configuration memory is possible via registers 10131 through 10145.

In order to make a change via registers, first password register 10159 with password value 2002149714 (0x77566152) has to be loaded. Then, registers 10132 through 10145 are modified. Finally, the changes to the configuration memory have to be saved by entering an arbitrary value into register 10100.

| Registers | Meaning | Value used in the example |
|-----------|---------------------------------|---------------------------|
| 10100 | Saving the configuration values | |
| 10131 | Version number | 4 |
| 10132 | IP address MSB | 192 |
| 10133 | IP address 3SB | 128 |
| 10134 | IP address 2SB | 10 |
| 10135 | IP address LSB | 97 |
| 10136 | Subnet mask MSB | 255 |
| 10137 | Subnet mask 3SB | 255 |
| 10138 | Subnet mask 2SB | 255 |
| 10139 | Subnet mask LSB | 0 |

| Registers | Meaning | Value used in the example |
|-----------|---------------------------------|---------------------------------|
| 10140 | Default gateway MSB | 192 |
| 10141 | Default gateway 3SB | 128 |
| 10142 | Default gateway 2SB | 10 |
| 10143 | Default gateway LSB | 1 |
| 10144 | Port number of the JetIP server | 50000 |
| 10145 | IP address of the DNS server | 0xC076D2D1 (192.118.210.209) |
| 10159 | Password | 2002149714 (0x77566152) |



Important!

Do not change the version number contained in register 10131.

12.4.3 IP address taken from the switch position

In all other switch positions, the IP-address is taken out of the configuration memory; the lowest-order byte (fourth octet) is substituted by the position of DIP switches 1 through 8.

To make up the IP address, the position of DIP switches 1 through 8 is read in once during the start-up procedure.

The actual settings of DIP switches 1 through 8 can be scanned from register 10180.

13 Safe Standstill (option)

For the digital servo amplifier JetMove 203B-230 an optional integrated card for the "Safe Standstill" and "Safe Restart Inhibit" function can be ordered (designation of the device: JM-203B-230...-S1).

13.1 Introduction

The option "Safe Standstill" serves for safe de-energizing the motor, if personal or material damage caused by a moving or inadvertently started motor is to be reliably prevented. This safe standstill feature corresponds to stop category 0 as specified in EN 60204. Additionally, this feature implements a safe restart inhibit. As long as at the "Enable" inputs no signal is present, any restart of the drive is blocked.

For controlling these functions, there exist the terminals Enable1, COM, and Enable2. In order to make dual-channel switch-off possible, two independent Enable inputs and one ground reference are available. The ground reference of enable inputs (COM) is potentially isolated from the ground reference of the servo amplifier (see "Common ground" on page 65). The ground reference of enable inputs can differ by up to +/-100 V from the ground of the control system.

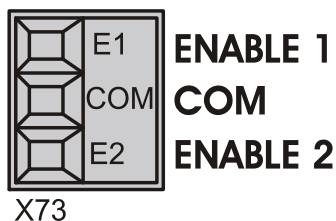


Fig.: 18: Connection X73 for "Safe Standstill"



Note!

Even if the device has been equipped with the option -S1, the function of the ENABLE input at the terminal array X10 is still active. This means that the motion system can only produce a certain torque, if this input has been connected to 24 V (against \perp reference ground).

13.2 Motion system JM-203B-230-S1

The following figure is to demonstrate the basic setting of a motion system using a digital servo amplifier JetMove 203B-230-S1 equipped with the "Safe Standstill" function.

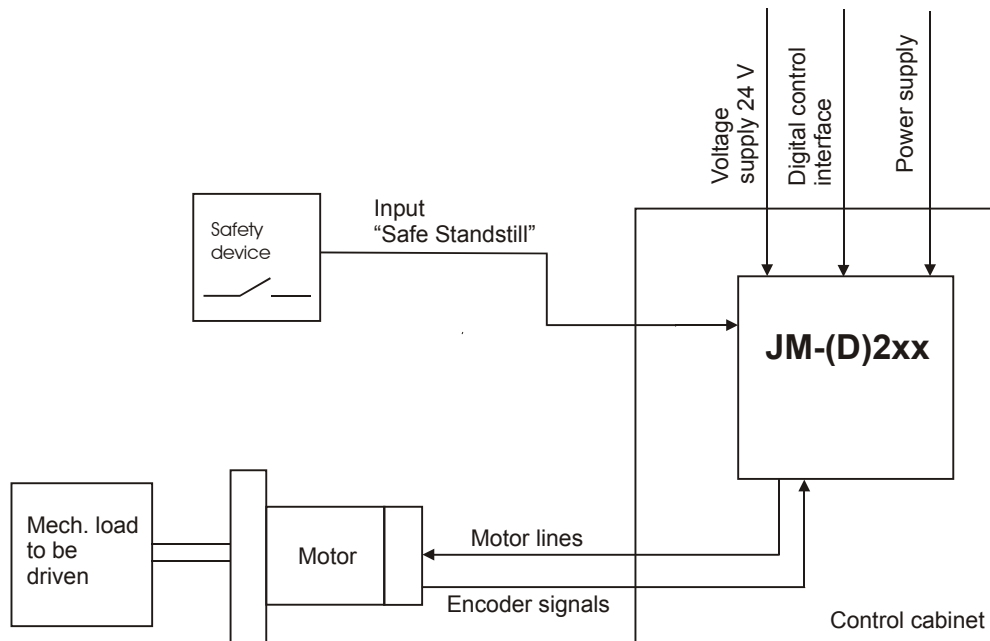


Fig.: 19: Motion system using a servo amplifier JM-(D)2xx

The digital servo amplifier JetMove 203B-230 has been designed for being installed in a control cabinet. The energy for driving a motor is supplied by a three-phase mains system. Further, a safe extra-low voltage (SELV) of 24 V supplies the control electronics. Via various inputs and outputs of a digital signal interface, communication with higher-level control elements is established; these control elements issue the motion commands for the motor, receive status reports and forward them, if necessary. Usually, the motor has been mounted at or within a machine outside the control cabinet. It is connected via a cable to the JetMove 203B-230. For reporting the position, it has got an actual position encoder. The mechanic load to be driven has been mounted to the motor shaft.

A safety-relevant device accesses the electronic control system of the JetMove via controller inputs "ENABLE1" and "ENABLE2". If "Safe Standstill" has been required, the motor is de-energized in a way that the torque will be safely deactivated. Yet, this does not mean that there is a safe electric isolation. If a safe electric isolation is necessary, an additional isolating device for interrupting the power supply (e.g. mains switch) must be supplied according to EN 60204.

13.3 Safety instructions



The "Safe Standstill" feature has got the sole purpose to safely switch off a drive or to prevent it from starting up inadvertently. In order to gain personal safety, the safety circuit must meet the safety requirements to EN 60204, EN 92, and EN ISO 13849-1.

13.4 Functional test



At the initial commissioning, after each intervention into the safety chain of the plant, or after replacing one or more than one components, the "Safe Standstill" function must be checked:

1. Disable all motion systems, mechanically secure pendant loads.
2. Close the safety chain.
3. Enable an axis (ENABLE, ENABLE1, ENABLE2 and software enable). If the torque cannot be checked, drive the axis.
4. Interrupt the circuit of the Enable1 input at encoder terminal X73; the axis must be de-energized (no torque), respectively stop rotating, immediately.
5. Re-activate the Enable1 input at terminal X73; clear faults within the servo amplifier.
6. Re-enable the same axis. If the torque cannot be checked, drive the axis.
7. Interrupt the circuit of the Enable2 input at encoder terminal X73; the axis must be de-energized (no torque), respectively stop rotating, immediately.
8. Re-activate the Enable2 input at terminal X73; clear faults within the servo amplifier.

13.5 Requirements placed on the safety system

This paragraph is to describe the safety requirements that can be met by the system. They are based on the standards EN 954-1, EN ISO 13849-1 and IEC 61508.

The following safety functions can be applied:

- Safe Standstill according to EN 954-1, category 3, and IEC 61508 SIL2
- Safe Standstill according to EN 954-1, category 4, and IEC 61508 SIL3
- Safe Standstill to PL "e" according to EN ISO 13849-1
- Restart inhibit to EN 954-1, category 3, and IEC 61508 SIL2
- Restart inhibit to EN 954-1, category 4, and IEC 61508 SIL3
- Safe Restart Inhibit to PL "e" according to EN ISO 13849-1

"Safe Standstill" is to be implemented according to Stop Category 0 or Stop Category 1 to EN 60204:

- Stop Category 0
When the safety function is activated, the motor is de-energized unconditionally and immediately.
According to IEC 61800 Part 5.2, Stop Category 0 is also called STO (Save Torque Off).
- Stop Category 1
When the safety function is activated, the motor is stopped in a controlled manner, and, after a set delay time, is de-energized unconditionally and immediately.
According to IEC 61800 Part 5.2, SLA (Safety-Limited Acceleration) is not kept in case of switching off via time-relay.

JM-2xx-S1 - Performance level classification to EN ISO 13849-1

Performance level "e" is based on the following data:

| | |
|---------------------|--|
| Structure: | Cat 3 |
| MTTF _d : | high (> 100 years) |
| DC: | medium (DC _{avg} = 0.96) |
| PFH _d : | 0 (all failures will result in a safe condition) |

CCF portion

Within the framework of this classification, the CCF ("Common Cause Failure") referred to in the standard mainly applies to the related application. Here we proceed from the assumption that the measures taken by R&D and application departments will ensure that the required score is achieved.

Basically, the following measures make sure that servo amplifiers of the JetMove 2xx avoid Common Cause Failures.

- Electrical isolation (optocoupler) from power supply units
- Compliance with clearances and creepage distances (layout and wiring)
- Overrating of components and derating

13.5.1 Control variants for "Safe Standstill"

- Controlling via safety relays
- OSSD control
OSSD: **O**utput **S**ignal **S**witching **D**evice
Controlling the inputs "Safe Standstill" with test pulses for recognizing short circuits, shorts between contacts, or shunts of the control cable. The test pulses have a duration of 1 ms and a repetition frequency of 100 Hz. If a control logic with OSSD signals is used, errors (e.g. short circuits or shorts between contacts) are detected by the logic itself, which will lead to switching off both signal paths.

The following signal waveforms are accepted by the OSSD signals without triggering a fault message:

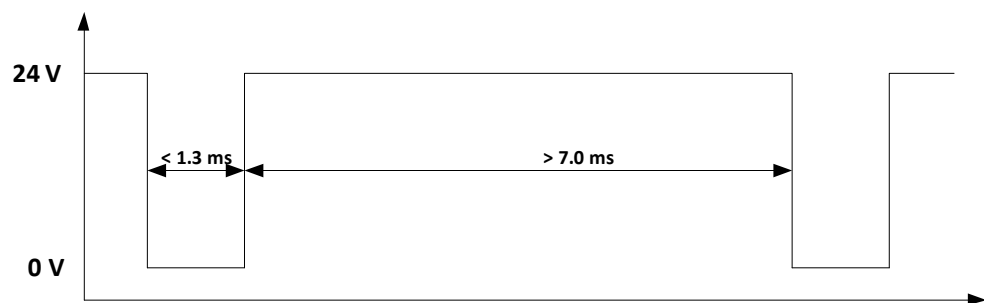


Fig.: 20: Example: OSSD signal waveform, single pulse

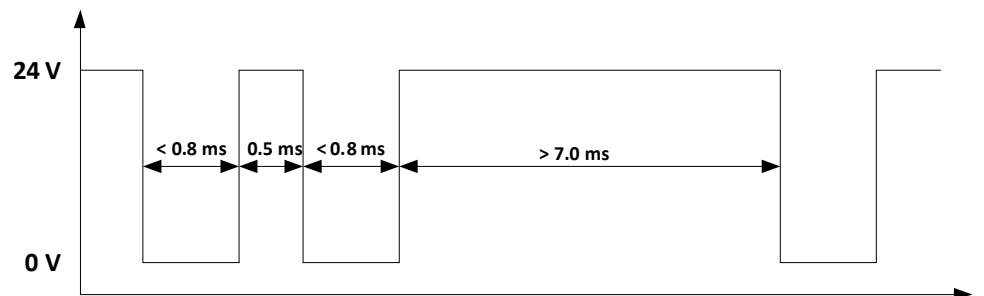


Fig.: 21: Example: OSSD signal waveform, dual pulse

The following figures show the basic illustrations of the respective applications.

13.5.2 Application 1

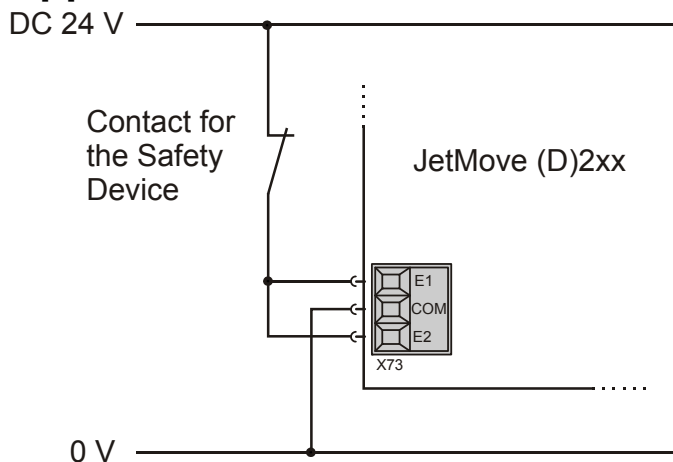


Fig.: 22: Application 1

The safety switching device applies a +24 Volt signal for activating the servo amplifier to the two parallel inputs Enable1 and Enable 2. When the safety function is actuated, the contact opens and thus interrupts the enabling signal. The digital servo amplifier safely switches off the motor power supply. By opening the contact, the safety function can be tested. When the voltage at the Enable input is interrupted, the motor is immediately de-energized (Stop Category 0).

Give heed that the external safety switching devices (e.g. emergency stop device) are of the corresponding safety category.

Following this example, "Safe Standstill" (according to EN 954-1 Category 1) with Stop Category 0 (according to EN 60204) can be implemented, if all safety switching devices involved meet the requirements of Category 1.

13.5.3 Application 2

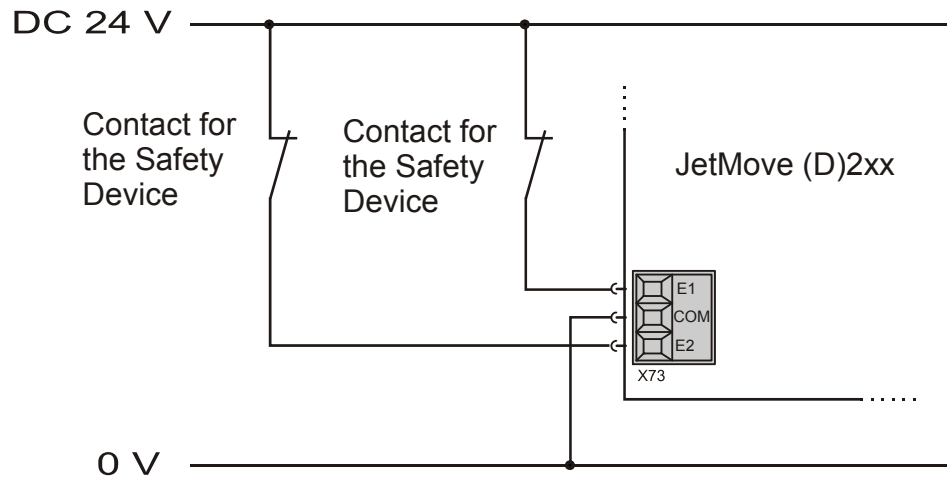


Fig.: 23: Application 2

The safety switching device(s) applies/apply a +24 Volt signal for activating the servo amplifier to either of the two inputs Enable1 and Enable 2. When the safety function is actuated, the contact opens and thus interrupts the enabling signal. In case of an error, it is sufficient that at least one of those two contacts opens, in order to switch off the motor safely (dual-channel switch-off). Deactivating the inputs leads to immediate switching off the motor (Stop Category 0). By means of the wiring technology, a short, both between the contacts of the emergency stop device, and between the two lines, can be precluded.

As this application is not self-testing, proper function of the system must be tested regularly. These tests are to prove freedom from faults of the entire system. Following this example, "Safe Standstill" (according to EN 954-1 Category 2) with Stop Category 0 (according to EN 60204) can be implemented, if all safety switching devices involved meet the requirements of Category 2.

13.5.4 Application 3

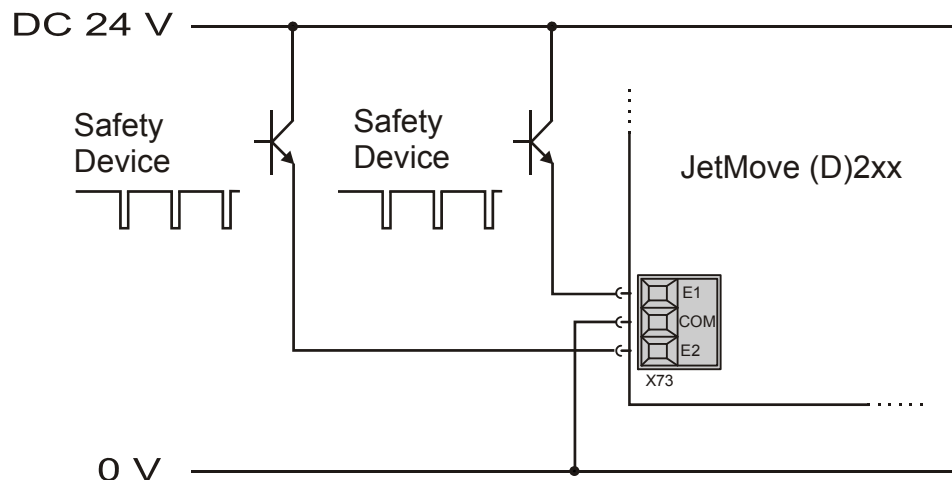


Fig.: 24: Application 3

The safety switching device(s) applies/apply a +24 Volt signal for activating the servo amplifier to either of the two inputs Enable1 and Enable 2. There are alternating interruptions of 1 ms max. with each signal, which serve for checking the signals for shorts between contacts, short circuits or interference voltages.

(OSSD signals). This interruption of 1 ms max. does not lead to deactivating the servo amplifier, though. When the safety function is actuated, the contact opens and thus interrupts the enabling signals. In case of an error, it is sufficient that at least one of those two signals ceases to apply, in order to switch off the motor safely (dual-channel switch-off). Deactivating the inputs leads to immediate switching off the motor (Stop Category 0). Possible errors (such as short circuits, shorts between contacts, or a quadrature-axis component of voltage) can be recognized and safely controlled.

Following this example, "Safe Standstill" (according to EN 954-1 Category 3) with Stop Category 0 (according to EN 60204) can be implemented, if all safety switching devices involved meet the requirements of Category 3.

13.5.5 Application 4

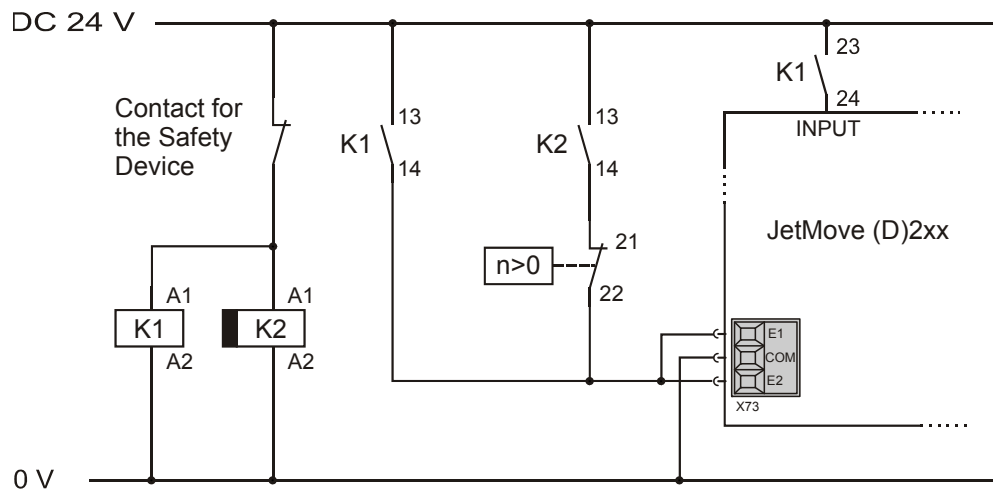


Fig.: 25: Application 4

The safety device activates relay K1, which activates the digital servo amplifier via NOC 13-14 and the controller input "INPUT" via another NOC 23-24. The input has to be configured either by the application program or via the motion setup in a way that at 0 V the emergency stop function of the servo amplifier is activated. Simultaneously with relay K1, a dropout-delayed safety relay K2 is activated. Its NOC is series-connected to a contact safely monitoring the motor speed. The contact of the speed monitoring is closed, while the motor is running; it opens at zero speed. When the Safety function is called up, relays K1 and K2 are deactivated. By opening, the NOC 23-24 of K1 triggers a controlled braking process. The servo amplifier still remains active, until relay K2 also drops out due to the drop-out delay, or until the motor has come to a standstill due to the braking process that has been triggered. Deactivating the Enable1- and Enable2- inputs leads to switching off the motor immediately after a pre-defined delay time, respectively, after the motor has come to a standstill (Stop Category 1). In case de-energizing or braking fails, the time relay K2 limits the maximum runtime, in order to always ensure safe de-energizing when the set time has elapsed. The option of stopping via the emergency stop function as shown in the diagram needs not necessarily be provided. The motor can also be brought to standstill by a control command or by a mechanical brake. Please make sure that the timing element (time relay) grants safe switching off. Following this example, "Safe Standstill" (according to EN 954-1 Category 1) with Stop Category 1 (according to EN 60204) can be implemented, if all safety switching devices involved meet the requirements of Category 1. Yet, the Safely-Limited Acceleration (SLA) is not met.

13.6 Block diagram of the JM-203B-230 with the "Safe Standstill" function

In the following figure, the most important components of the digital servo amplifier JetMove 203B-230 with the option -S1 ("Safe Standstill") are illustrated:

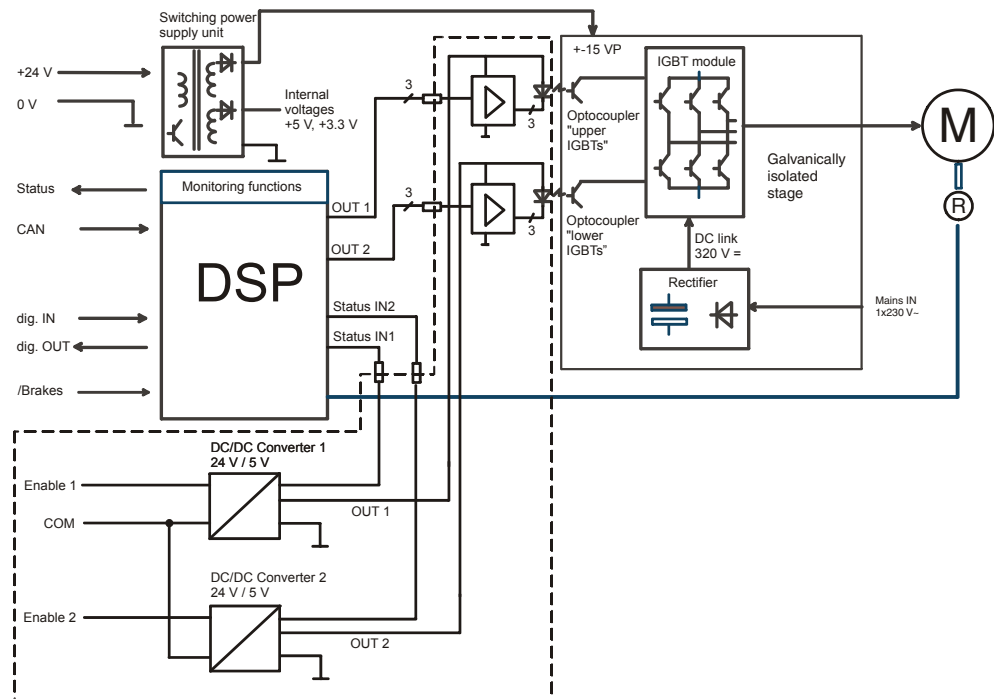


Fig.: 26: Block diagram JetMove 203B-230 with the "Safe Standstill" function

Description:

The electrical arrangement of the servo controller JetMove 203B-230 can be roughly categorized in three parts. The area up left contains a DSP as a central component. It processes data traffic with the higher-level controller, acquires input signals and sets digital outputs. Out of the information total, it creates the pulse pattern for running the motor. Signals are transmitted into the power circuit via optocoupler. On top of this, there is a switching power supply unit for the control electrics. On the right hand side, there is the power section, which, by means of semiconductor switches (IGBTs), amplifies the created pulse pattern and drives the motor. Bottom left, the "Safe Standstill" function is shown. It consists of two mainly identical, yet independent signal paths 1 and 2. Each path consists of a DC/DC converter, which creates an output voltage of 5 Volt out of the connected input voltage. Further, each converter is equipped with a status output which is connected to the DSP. This way, the DSP recognizes immediately, whether the corresponding input is enabled or disabled, and it activates, respectively deactivates the pulse outputs. The output voltage OUT1 leads to a driver stage, at which it takes up the pulse patterns for the "upper" IGBTs and transmits them to the optocouplers. The same way, the optocouplers themselves have been supplied with this voltage. By analogy, the output voltage OUT2 supplies the drivers of various levels and the opto isolators of the "lower" IGBTs.

This means that for running the motor, both inputs Enable1 and Enable2 must be supplied with voltage. Activating the "Safe Standstill" function must de-energize the inputs. As a result, the driver stages and optocouplers are de-energized. The same way, the DSP will recognize this by means of the status outputs. Finally, the motor is safely de-energized.

In a fault condition it is sufficient to deactivate only one path, as the motor stops rotating even if only the "upper" or only the "lower" IGBTs have been switched off. To decouple the control signals of the DSP, especially for excluding a faulty supply of the driver stages/optocouplers by the control signals of the DSP, all signals have been equipped with resistors of apt design and values at their interface.

The dashed line marks the border between the safety-relevant assemblies.



Note!

In spite of these safety precautions, the motor can jerk due to defective IGBTs. The possible rotation angle depends on the pole pair number of the motion system in use.

| Pole pair number of the motor | Possible rotation angle |
|-------------------------------|-------------------------|
| 1 | 180° |
| 2 | 90° |
| 3 | 60° |
| 5 | 36° |

Fig.: 27: Possible rotation angle in case of defective IGBTs

In the risk analysis, this behavior must be taken into consideration. If this can lead to a hazard, the given equipment is not apt for use in this case.

The possibility that the above mentioned case occurs is very low, though. If the unit for the failure rate of an IGBT is 100 fit (10E-7 per hour), the possibility of two IGBTs failing at the same time is 10E-14 per hour (several million years). Out of these, only 6 out of 15 cases lead to jerking. This means that practically, there is no possibility of this to happen. Moreover, the IGBTs are continually being checked at each commutation.

14 Counting input (option)

14.1 Operating principle

For the digital servo amplifier JetMove 203B-230, an optional integrated analog counting card can be ordered (article designation of the device: JM-203B-230...-CNT). It supplies a counting input equipped with the following interface:

- EnDat 2.2 by Heidenhain
- Synchronous Serial Interface (SSI)
- Incremental counter

The received or counted value of an actual position can be read via a JetMove register by the controller program or processed by the firmware of the JetMove in the controllers.

Yet, the actual position of an SSI encoder cannot be used for position control. It only indicates the position of the leading axis.

14.2 EnDat 2.2

14.2.1 Technical data

| Technical data of the input EnDat 2.2 | |
|---------------------------------------|---|
| Encoder types | Absolute encoders (single, multiturn or linear) |
| Scanning | 62.5 μ s |
| Transfer rate | 8 MHz |
| Maximum cable length | 100 m |
| Type of signal | 5 V differential signals |
| Input impedance | 22 k Ω |
| Bus termination | 120 Ω Integrated resistance |
| Electrical isolation | None |

14.2.2 Description of connections

Specification of the mating connector for X72

- 9-pin male Sub-D connector
- Metallized enclosure

EnDat cable specification

- Cable size: $2 * 2 * 0.14 \text{ mm}^2 + 2 * 0.25 \text{ mm}^2$ (AWG 26(4) + AWG 23(2))
2 * 0.25 mm² must be used for the power supply unit and for GND.
- The cables have to be twisted in pairs and included in an overall shielding
- The following signal lines have to be twisted in pairs:
DATA - and DATA +
Clock - and Clock +
0 V and power supply
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Maximum cable length: 100 m

14.2.3 EnDat cable with mating connector



Note!

The resolver, HIPERFACE, respectively mating connector of the Jetter motor types JL, JK and JH and can be ordered from Jetter AG by supplying the following particulars:

Item no. 15100069 Resolver/HIPERFACE

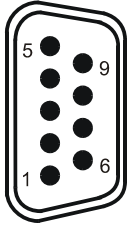
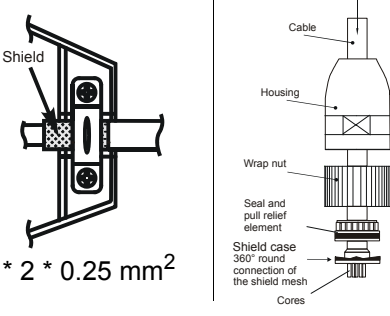
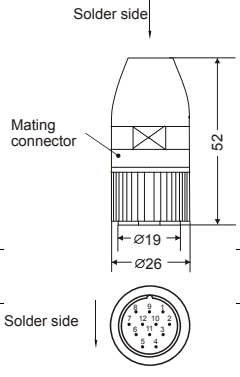
The complete HIPERFACE cable between the servo amplifier types JetMove 2xx and the Jetter motor types JL, JK, and JH can be ordered from Jetter AG. It can be ordered by submitting the following cable specifications and the respective cable length in cm:

KAY_0723-xxxx For the servo amplifier series JetMove 2xx

HIPERFACE mating connector (solder side)



Fig.: 28: View on RC series mating connector of the EnDat (internal thread M23)

| HIPERFACE-, EnDat Cable with KAY_0723-xxxx | | | |
|--|---|------------|--|
| JetMove 2xx (Sub-D male connector X72) | Shielding | | Motor (EnDat) (female, solder side) |
|  <p>Attaching screws must have a metric thread!</p> |  <p>5 * 2 * 0.25 mm²</p> <p>Connect shield with the greatest possible surface area! Use metallized housing only!</p> | |  <p>Solder side</p> |
| Pin | Signal | Core color | Pin |
| - | Unassigned | - | 1 |
| - | Unassigned | - | 2 |
| 7 | DATA - (RS-485) | white | 3 |
| 2 | DATA + (RS-485) | brown | 4 |
| 8 | Unassigned | green | 5 |
| 3 | Unassigned | amber | 6 |
| 6 | Clock - (RS-485) | gray | 7 |
| 1 | Clock + (RS-485) | pink | 8 |
| 4 | 0 V | blue | 9 ^{*)} |
| 5 | 5 V power supply 200 mA max. | red | 10 |
| 9 | Unassigned | black | 11 |
| | Unassigned | - | 12 ^{*)} |

^{*)} Pin 9 and pin 12 are short-circuited (thermal sensor HIPERFACE)
The measurements of the EnDat mating connector are specified in millimeters.

14.2.4 Power supply of the encoder

The optional counter card supplies a voltage of 5 V +/- 5 %.

The EnDat encoders by Heidenhain have been specified to 3.6 through 5.25 V of 0.2 A max. This results in a maximum voltage drop of $\Delta U = 1.15$ V on the EnDat cable. The voltage drop can generally be calculated as follows:

$$\Delta U = \frac{2 \cdot I_n \cdot l}{\gamma \cdot A}$$

This results in the maximum cable length or in a minimum cable cross section:

$$l = \frac{\Delta U \cdot \gamma \cdot A}{2 \cdot I_n} = 161 \cdot \frac{\text{m}}{\text{mm}^2} \cdot A$$

$$A = \frac{2 \cdot I_n}{\Delta U \cdot \gamma} = \frac{\text{mm}^2}{161 \cdot \text{m}} \cdot l$$

| | | |
|-------|--------------|---|
| Given | ΔU : | Voltage drop in V |
| | I_n : | Current consumption by the measuring device in A |
| | A: | Cross section of the supply cable in mm^2 |
| | l: | Cable length |
| | γ : | Electric conductivity (for copper: $56 \frac{\text{m}}{\Omega \text{mm}^2}$) |

Example:

At a cable cross section of 0.34 mm^2 , there results a maximum cable length of $l = 54.74 \text{ m}$ or - at a cable length of 80 m - the following cross section is needed: $A = 0.5 \text{ mm}^2$.

By a double wiring arrangement, the cable length can be doubled.

14.3 Synchronous Serial Interface (SSI)

14.3.1 Technical data

| Technical data of the SSI input | |
|---------------------------------|------------------------------------|
| Encoder types | Multiturn absolute encoder |
| Scanning | up to 2 ms |
| Transmission rate | 100 kHz ... 1 MHz |
| Maximum cable length | 50 ... 100 m |
| Type of signal | 5 V differential signals |
| Input impedance | 22 k Ω |
| Bus termination | 120 Ω integrated resistance |
| Electrical isolation | None |

14.3.2 Description of connections

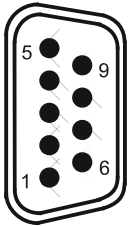
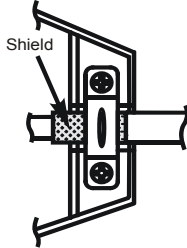
Specification of the mating connector for X72

- 9-pin male Sub-D connector
- Metallized enclosure

Specification of the SSI cable

- Cable size: 2 * 2 * 0.14 mm² + 2 * 0.25 mm² (AWG 26(4) + AWG 23(2))
2 * 0.25 mm² must be used for the power supply unit and for GND.
- The cables have to be twisted in pairs and included in an overall shielding.
- The following signal lines have to be twisted in pairs:
Clock - and Clock +
DATA - and DATA +
0 V and power supply
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Maximum cable length: 100 m
Dependent on the encoder type, the transmission frequency has to be reduced due to the signal runtimes in long cables.

14.3.3 SSI cable

| SSI cable | | |
|--|--|--|
| JetMove 2xx (Sub-D male connector X72) | Shielding | Specification of the cable |
|  <p>Attaching screws must have a metric thread!</p> |  <p>Connect shield with the greatest possible surface area! Use metallized housing only!</p> | <p>Encoder signal: 5 V differential signal Maximum cable length: 100 m</p> |
| Pin | Signal | |
| 1 | Clock + | |
| 2 | DATA + | |
| 3 | do not use | |
| 4 | 0 V | |
| 5 | Power supply 5 V, 200 mA max. | |
| 6 | Clock - | |
| 7 | DATA - | |
| 8 | do not use | |
| 9 | do not use | |

14.4 Incremental encoder

14.4.1 Technical data

| Technical data of the incremental encoder input | |
|---|------------------------------------|
| Encoder types | Rotatory or linear encoders |
| Scanning | 62.5 μ s |
| Maximum counting rate | 20 MHz |
| Maximum cable length | 100 m |
| Type of signal | 5 V differential signals |
| Input impedance | 22 k Ω |
| Bus termination | 120 Ω integrated resistance |
| Electrical isolation | None |

14.4.2 Description of connections

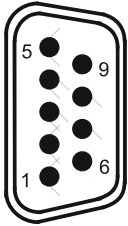
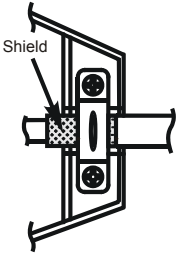
Specification of the mating connector for X72

- 9-pin male Sub-D connector
- Metallized enclosure

Specification of the incremental encoder cable

- Cable size: 3 * 2 * 0.14 mm² + 2 * 0.25 mm² (AWG 26(6) + AWG 23(2))
2 * 0.25 mm² must be used for the power supply unit and for GND.
- The cables have to be twisted in pairs and included in an overall shielding.
- The following signal lines have to be twisted in pairs:
 - K0 - and K0 +
 - K1 - and K1 +
 - K2 - and K2 +
 - 0 V and power supply
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Maximum cable length: 100 m

14.4.3 Incremental encoder cable

| Incremental encoder cable | | |
|--|--|---|
| JetMove 2xx (Sub-D male connector X72) | Shielding | Specification of the cable |
|  <p>Attaching screws must have a metric thread!</p> |  <p>Connect shield with the greatest possible surface area! Use metallized housing only!</p> | <p>Encoder signal: 5 V differential signal</p> <p>Maximum cable length: 100 m</p> |
| Pin | Signal | |
| 1 | K0 + | |
| 2 | K1 + | |
| 3 | K2 + | |
| 4 | 0 V | |
| 5 | Power supply 5 V, 200 mA max. | |
| 6 | K0 - | |
| 7 | K1 - | |
| 8 | K2 - | |
| 9 | do not use | |

15 Ordering information

15.1 List of documentation

The documents listed below have been supplied on the website of Jetter AG at <http://www.jetter.de/Support> for download.

Programming

jetmove_2xx_D203_at_the_jetcontrol_bi_xxxx_user_information.pdf



User information on configuration and operation of the JetMove2xx series at the JetControl 24x
Item no. 60874950

jetmove_2xx_at_nano_bi_xxxx_user_information.pdf



User information on configuration and operation of the JetMove 2xx series at the NANO-B/C/D
Item no. 60866113

15.2 Options

| Designation | Ethernet interface (page 85) | Analog input (page 83) | Counter input (page 103) | Safe Standstill (page 91) |
|--------------------|---------------------------------|---------------------------|-----------------------------|------------------------------|
| JM-203B-230 | | | | |
| JM-203B-230-OEM | ✓ | | | |
| JM-203B-230-IA1 | | ✓ | | |
| JM-203B-230-CNT | | | ✓ | |
| JM-203B-230-S1 | | | | ✓ |
| JM-203B-230-OEM-S1 | ✓ | | | ✓ |
| JM-203B-230-IA1-S1 | | ✓ | | ✓ |
| JM-203B-230-CNT-S1 | | | ✓ | ✓ |

Appendices

Appendix A: Recent revisions

| Chapter | Remarks | Revised | Added | Deleted |
|-------------|--|---------|-------|---------|
| | Title page | ✓ | | |
| 1.2 | Signal word: "Danger" instead of "Warning" | ✓ | | |
| 1.4 | Recommendation of installing a ferrite core | | ✓ | |
| 1.4 | New figure 3: Photo showing the ferrite core | ✓ | | |
| 2.2 | Mechanical installation | ✓ | | |
| 2.5 and 2.6 | Signal word: "Danger" instead of "Warning" | ✓ | | |
| 2.7 | Note on decommissioning | | ✓ | |
| 10 | Ferrite core shown in connection diagrams | ✓ | | |
| 11.2 | Technical data of analog input | ✓ | | |
| 13.5.1 | OSSD: Output Signal Switching Device | ✓ | | |
| 14.1 | Counting input - Function | ✓ | | |
| | Addresses | ✓ | | |

Appendix B: Differences between JetMove 203-230 and 203B-230

The JetMove 203-230 servo amplifier has been developed further to become the servo amplifier JetMove 203B-230.

The objectives of this further development have been the following:

- To save components, in order to achieve greater dependability
- To decrease the amount of various models

In the development process, special attention was paid to providing a large scope of interchangeability.

For technical reasons, there will still remain certain differences which must be considered in individual cases.

Automatic encoder recognition

The JetMove 203B-230 is not equipped with two varieties for different position transducers any more. (Up to now, the customer had to decide whether to order the JetMove 203-230-RE servo amplifier for the resolver input circuit or the servo amplifier JetMove 203-230-HI for the HIPERFACE input circuit.)

The JetMove 203B-230 servo amplifier can automatically recognize which encoder has been connected to it and configure its input circuit respectively.

Consequences for the user:

- Even with both encoder types being applied, double stock-keeping can be avoided.
- Irrespective of the encoder type used, the order number is the same.

UL certification

On the development of the servo amplifier JetMove 203B-230 special attention was given to UL certification.

Consequences for the user:

- In future, the servo amplifier JetMove 203B-230 will also be available with UL certification.

Power factor correction

Using a 1-phase power supply the servo amplifier JetMove 203-230 was operated with a power factor correction circuit. In the JetMove 203B-230 amplifier, this is not applied any more.

Consequences for the user:

- In case of a 1-phase connection, the DC link voltage in motor mode (no feedback by braking) is 325 V instead of 380 V. This means that the maximum possible speed by which a motor can be run is decreased by about 15 %. Moreover, the DC link voltage now is directly proportional to the input voltage and no longer independent of it.
- Operating from a 1-phase power supply, the RMS value of the input current is approximately 2.3 times higher at the same motor output level. For this reason, at an average motor power of 500 W, the crucial fusing value (and accordingly the cable size of the power line) has to be increased from 4 A to 10 A.

Operating from a 3-phase power supply, there will be no differences.

"Safe Standstill" option

The servo amplifier JetMove 203B-230 can optionally be ordered with "Safe Standstill" (-S1). The function "Safe Standstill" can be applied up to SIL3 to IEC61508 inclusively and, considering the application regulations of the respective user manual up to Cat. 4 to EN 954-1, respectively to PL "e" to ISO 13849-1.



Important

The servo amplifier JM-203B-230 can only be operated with OS version 2.11.0.0 or higher. When older versions are used, the servo amplifier will issue an error message.

Appendix C: Glossary

| | |
|--------------------------------------|---|
| AC | Alternating Current: Alternating current |
| CE | Communautés Européenes European Union |
| DC | Direct Current: Direct current |
| DIN | Deutsches Institut für Normung e.V. = German Industry Standard |
| EU | Europäische Gemeinschaft = European Union |
| EC Low Voltage Directive | To be considered when using electric devices of a rated voltage between 50 and 1,000 V AC and between 75 and 1,500 V DC. |
| Electro-Magnetic Compatibility (EMC) | Definition according to the EMC regulations: "EMC is the ability of a device to function in a satisfactory way in an electro-magnetic environment without causing electromagnetic disturbances itself, which would be unbearable for other devices in this environment." |
| EN | Europäische Norm = European Standard |
| ESD | Electrostatic Discharge |
| Hazard analysis | Excerpt from the Machinery Directive: The manufacturer is under an obligation to assess the hazards in order to identify all of those which apply to his machine; he must then design and construct it taking account of his assessment. |
| HIPERFACE | High Performance Interface HIPERFACE designates a sensor-transducer system by Sick / Stegmann. The SinCos motor feedback system with the standardised HIPERFACE interface is often used in digital drive technology. Unlike the resolver, the SinCos motor feedback system with HIPERFACE interface contains electronic components. Over several motor rotations, a HIPERFACE will report the absolute position values; this cannot be performed by a resolver. A HIPERFACE is far more precise than a resolver, but also more expensive. |
| IEC | International Electrotechnical Commission |
| IP | International Protection |
| JetMove | JetMove is the type designation of a digital servo amplifier series produced by Jetter AG. The extension 203B-230, for example, marks the following features: <ul style="list-style-type: none"> – 203 identifies a rated current of 3 A. – 230 identifies the operating voltage of the rated power supply. |

| | |
|-----------------------|--|
| Jetter system bus | The Jetter system bus is a system-bus system of a cable length of 200 m max. and of fast data transmission rates of 1 MBit/s max. In addition to this, the Jetter system bus is highly immune to interferences. Therefore, the Jetter system bus is suited to realise field bus applications in a limited space. |
| JetWeb | Control technology comprising control systems, motion systems, user interfaces, visualization devices, remote I/Os and industrial PCs. Programming by means of multitasking and a modern sequence-oriented language. Communication by means of Ethernet TCP/IP and making use of the Web technologies. |
| Motor circuit-breaker | A circuit-breaker with monitoring functions of phases and temperature of a motor. |
| NN | Normal Null = Sea Level |
| PE | Protective Earth : "Protective Earth", respectively "Protective Earth Conductor" |
| Resolver | Feedback unit at a servo motor for determining the absolute position within one revolution. Other than a HIPERFACE, the resolver will not provide any information on how many revolutions the motor has performed so far. A resolver could be envisaged as a transformer; the couplings of its secondary windings (sine and cosine) change in relation to the position of the motor shaft. Basically, a resolver consists of a rotor with one coil and a stator with two coils. The stator windings are displaced by 90° (sine and cosine). The resolver itself does not contain any electronic components. |
| SELV | Safe Extra Low Voltage : Voltage, which, under all operating conditions will not exceed a peak or DC voltage of 42.4 V. This voltage is either measured between two conductors or between one conductor and earth. The circuit, in which this voltage occurs, must be separated from the mains power supply by a safety isolating transformer or some equivalent. |
| Sub-D | Type name of a plug-in connector |
| t_r/t_h | time rise / time hold : "Rise time of a pulse / total hold time of a pulse" |
| t_r/t_n | time rise / time normal : "Rise time of a pulse / total duration of a pulse" |
| TN network | Supply network which is solidly earthed in the neutral point and which is equipped with a protective earth conductor. |

| | |
|-----------------|---|
| TT network | Supply network which is solidly earthed in the neutral point, yet, which is not equipped with a protective earth conductor. Earthing is carried out by means of a local protective earth. |
| UL | Underwriters Laboratories Inc. |
| VDE | Verband deutscher Elektrotechniker e.V. = Association of German Electrical Engineers |
| DC link voltage | DC circuit within a servo drive on the basis of which the motor currents are generated. |

Units:

| | |
|----|---|
| A | Ampere |
| mA | Milliampere (1 mA = 10 ⁻³ A) |
| dB | Decibel |
| g | Gram |
| h | Hour |
| Hz | Hertz |
| K | Kelvin |
| m | Meter |
| cm | Centimeter (1 cm = 10 ⁻² m) |
| mm | Millimeter (1 mm = 10 ⁻³ m) |
| s | Second |
| V | Volt |
| μV | Microvolt (1 μV = 10 ⁻⁶ V) |
| W | Watt |
| Ω | Ohm |
| °C | Degrees centigrade (temperature unit) |
| ° | Degrees (angular dimension) |

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