

VM350

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2008-09

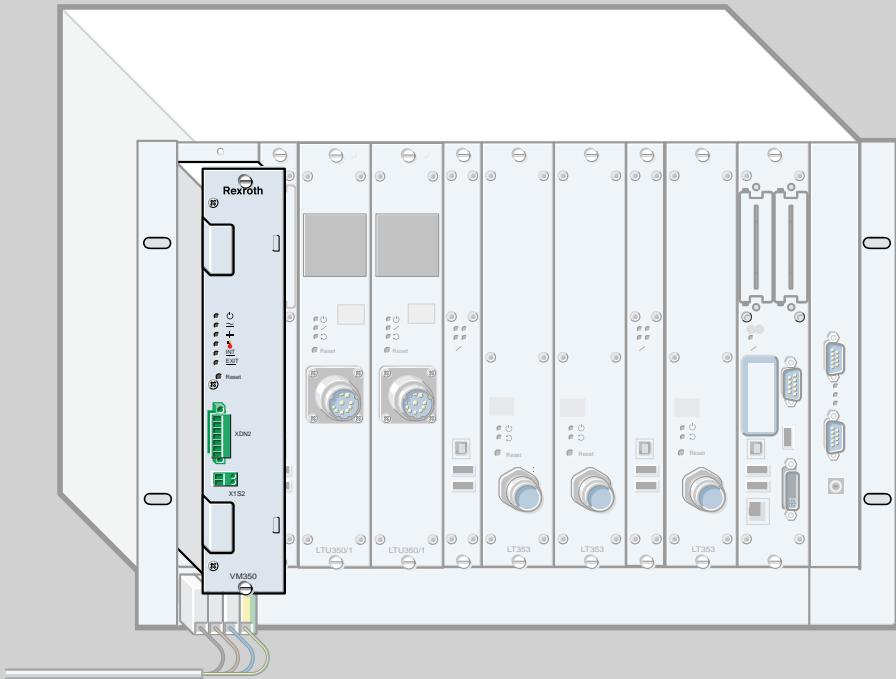


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The data specified above only serves to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

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This document was written in German.

1 About this document

This manual contains important information on the safe and appropriate assembly, transport, commissioning, operation, maintenance, disassembly, and simple troubleshooting of the VM350 power supply module.

Read these instructions completely, especially chapter “2 General safety instructions” on page 22, before working with the VM350 power supply module.

Related documents

The VM350 power supply module is a system component.

Also observe the instructions for the other system components.

Also observe the generally applicable, legal or otherwise binding regulations of European or national legislation and the rules for the prevention of accidents and for environmental protection applicable in your country.

2 General safety instructions

The VM350 power supply module has been manufactured according to the accepted rules of current technology. There is, however, still a danger of personal injury or damage to equipment if the following general safety instructions and the warnings before the steps contained in these instructions are not complied with.

- Read these instructions completely and thoroughly before working with the VM350 power supply module.
- Keep these instructions in a location where they are accessible to all users at all times.

- Always include the operating instructions when you pass the VM350 power supply module on to third parties.

Intended use

The VM350 power supply module is a component in terms of the machine directive 98/37/EC and is not a ready-for-use machine. The product is exclusively intended for being integrated in a machine or system or for being assembled with other components to form a machine or system. The product may be commissioned only if it is integrated in the machine/system for which it is designed and the machine/system fully complies with the EC machine directive. Observe the operating conditions and performance limits specified in the technical data.

The VM350 power supply module is a work appliance and not designed for private use.

Intended use includes having read and understood these instructions, especially the chapter “2 General safety instructions”.

The VM350 power supply module is intended for installation in the BT356 card rack or SB35x system box. The power supply module provides the power supply for all the cards in the BT356 card rack or SB35x system box.

Improper use

Any use of the VM350 power supply module other than as described in chapter “Intended use” is considered as improper.

Personnel qualifications

Assembly, commissioning and operation, disassembly, service (including maintenance and repair) require basic electrical and mechanical knowledge, as well as knowledge of the appropriate technical terms. In order to ensure operating safety, these activities may therefore only be carried

out by qualified technical personnel or an instructed person under the direction and supervision of qualified personnel.

Qualified personnel are those who can recognize possible hazards and institute the appropriate safety measures due to their professional training, knowledge, and experience as well as their understanding of the relevant conditions pertaining to the work to be done. Qualified personnel must observe the rules relevant to the subject area.


Safety instructions in this document


In this manual, there are safety instructions before the steps whenever there is a danger of personal injury or damage to the equipment. The measures described to avoid these hazards must be observed.

Safety instructions are set out as follows:

	 SIGNAL WORD
	Type of RISK!
	Consequences Precautions


- **Safety sign (warning triangle):** draws attention to the risk
- **Signal word:** identifies the degree of hazard
- **Type of risk:** identifies the type or source of the hazard
- **Consequences:** describes what occurs when the safety instructions are not complied with
- **Precautions:** states how the hazard can be avoided


	This warning symbol cautions against dangers to your health. Observe all the safety instructions that follow this symbol to avoid possible injuries or death.
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	This warning symbol cautions against dangers to your health caused by electrical voltage or currents. Observe all the safety instructions that follow this symbol to avoid possible injuries or death.
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The signal words have the following meaning:

	 DANGER
	Type of RISK!
	Consequences Precautions

 CAUTION
CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to equipment.

 NOTE!
If this information is disregarded, the operating procedure may be impaired.

Adhere to the following instructions

General instructions

Only accessories and add-on units that have been approved for use in Rexroth tightening systems may be used therein. Non-approved components may neither be added nor connected to the system. The same applies to cables and lines which belong to the Rexroth tightening system. Otherwise, functional and system safety is jeopardized.

Observe the regulations for accident prevention and environmental protection for the country where the product is used and at the workplace.

Exclusively use Rexroth products in good technical order and condition.

Check the product for visible defects, for example damage to the circuit board, components, housing, and plug connectors or missing screws.

Only use the product within the performance range provided in the technical data.

Persons who assemble, operate, disassemble or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to respond.

The warranty only applies to the delivered configuration.

The warranty will not apply if the product is incorrectly assembled or handled or not used as intended.

Do not expose the product to any mechanical loads under any circumstances. Never use the product as a handle or step. Do not place any objects on it.

During assembly

Make sure the relevant system component is not under pressure or voltage before assembling the product or when connecting and disconnecting plugs. Protect the system against being switched on.

Lay cables and lines so that they cannot be damaged, are in accordance with the bending radiuses, and no one can trip over them.

Before commissioning, make sure that all the connection gaskets and plugs are installed correctly to ensure that they are leakproof and fluids and foreign bodies are prevented from penetrating the product.

During commissioning

Let the product acclimate itself for several hours before commissioning, otherwise water may condense in the housing.

Make sure that all electrical connections are either used or covered. Commission the product only if it is installed completely.

During cleaning

Cover all openings with the appropriate protective equipment in order to prevent detergents from penetrating the system.

Never use solvents or aggressive detergents. Only clean the product using a slightly damp, lint-free cloth. Only use water to do this and, if necessary, a mild detergent.

Disposal

Dispose of the product in accordance with the currently applicable national regulations in your country.

3 Delivery contents

The delivery contents include:

- 1 VM350 power supply module
- 1 operating instructions for the VM350 power supply module

4 Product description

Performance description

The VM350 power supply module supplies the intermediate circuit voltage or intermediate circuit power for the power packs of the 350 tightening system and provides the power supply to all the cards within the 350 tightening system.

Device description

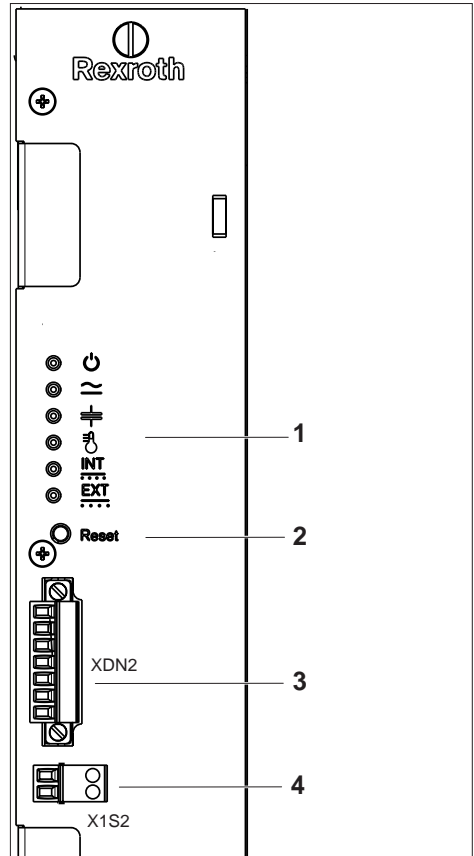


Fig. 1: Front view section of VM350

- 1 LED
- 2 Reset button
- 3 XDN2 user interface
- 4 24 V power supply: X1S2 interface

Displays and operating elements

Temperature and voltage errors can only be reset by switching the whole system off and on again, or by pressing the Reset button on the front panel.

NOTE!

Pressing the reset button only resets the VM350.

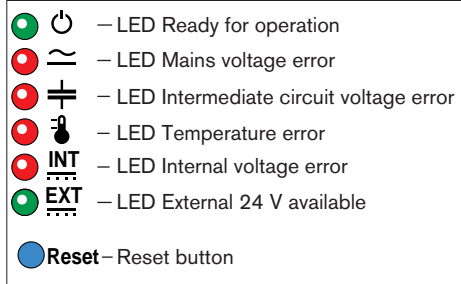


Fig. 2: Displays and operating elements on the VM350

The following displays and operating elements are integrated into the VM350 (Fig. 2):

During operation, the following displays/diagnoses are output (Table 1):

Table 1 Displays/diagnoses during operation

LED	Display/diagnosis	Error range/limit values	
Ready for operation	steady green when ready for operation	–	
	Off when not ready for operation	–	
230 V mains voltage error ^a	Red flashing if exceeded	> 265 V	
	Steady red if too low	< 170 V	
Intermediate circuit voltage error	Red flashing if limit value is infringed	> 420 V _{DC}	
Temperature error	Red flashing if exceeded	T _{heat sink} > T _{admissible}	
Internal voltage error	– VEE	Red flashing if exceeded	> 30 V _{DC}
		Steady red if too low	< 18 V _{DC}
– VDD	Red flashing if exceeded	> – 18 V _{DC}	
	Steady red if too low	< – 30 V _{DC}	
– VCC	Red flashing if exceeded	> 5.4 V _{DC}	
	Steady red if too low	< 4.8 V _{DC}	
External 24 V available (supply to X1S1; short circuit at XDN2 (VEE) is not displayed)	Steady green if 24 V is within admissible range	–	
	Flashing green if voltage is too high	> 27 V _{DC}	
	Off if voltage is too low	< 21 V _{DC}	
All LEDs except BTB LED and “External 24 V available” LED	Flashing red if emergency OFF error	–	

- a The connected mains voltage is measured when the VM350 is switched on, then the corresponding limits for overvoltage and undervoltage are automatically set.

X1S1 user interface for external 24 V power supply

The X1S2 interface enables the external 24 V power supply. This ensures the power supply e.g. to interfaces after triggering the emergency OFF (i.e. after disconnecting the mains lead).

Table 2 X1S2

Pin	Signal	Description/ function	Voltage/ current
1	VEE_ Extern	External (customer's) 24 V power supply for the 350 tightening system	24 V +/- 5 %; 10 A
2	GND	Reference potential for all voltages	PE potential

The power pack must be protected against short circuit and overload.

Recommendation:

Rexroth VAP 01.1H-W23-024-010-NN

MNR: R911 17 10 65

i NOTE!

The insulation stripping length must be at least 10 mm for reliable contacting to X1S1.

The maximum torque at the bolted connections of the terminals at X1S1 must not exceed 0.5 Nm.

XDN2 user interface

The XDN2 interface is located on the front panel. This serves to:

- ensure the 24 V power supply for external consumers
- provide the emergency OFF connection, referred to in this document as NH.

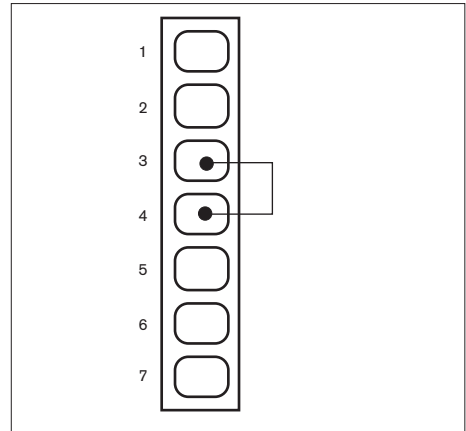


Fig. 3: Terminal strip, 7-pin, with jumper

Pin 3 and pin 4 are fitted with a jumper at the factory in order to ensure the operational readiness of the tightening system. This jumper must be removed for connection of an emergency OFF circuit.

i NOTE!

The 24 V supply voltage (VEE) is not galvanically isolated from the internal supply.

⚠ CAUTION**Risk of damage to persons and property!**

The voltage circuits on terminal XDN2 are safely isolated from the mains circuit (safe isolation in accordance with EN50178, PELV).

- The requirements for safe isolation of electric circuits must be observed if using the connection options on this terminal.

i NOTE!

The maximum torque at the bolted connections of the terminals at XDN2 must not exceed 0.3 Nm.

The motor contactors integrated in the servo amplifiers are operated centrally by switching the emergency OFF.

Table 3 XDN2

Pin	Signal	Description/function	Voltage/current
1	VEE	24 V supply voltage	24 V= / 1 A ^a
2	VEE	24 V supply voltage	24 V= / 1 A ^a
3	VEE_NH	24 V supply voltage for emergency OFF circuit	24 V= / 0.3 A ^b
4	ES	emergency OFF joint feed for motor contactors	24 V / 30 mA
5	GND	Reference potential for all voltages	PE potential
6	GND	Reference potential for all voltages	PE potential
7	GND	Reference potential for all voltages	PE potential



a The total current that can be drawn at pin 1 and pin 2 is max. 1 A (current limiting).



b Current limited to 1 A

⚠ DANGER**Insufficient emergency OFF equipment!**

Danger to life through electrical or mechanical forces

- The user is responsible for determining the necessity of an emergency OFF, its implementation, and the risk analysis! Make sure the emergency OFF equipment is accessible and effective. Release of the emergency OFF equipment may not result in an uncontrolled system restart!
- Check the function of the emergency OFF equipment before switching the system on. If using the voltage circuits at the emergency OFF terminal, observe the requirements for the safe isolation of electric circuits.

 CAUTION	
	Risk of damage to persons and property!
	▶ The user is obliged to maintain the system-specific requirements for an emergency OFF system.
	▶ When using external mains contactors in superior emergency OFF circuits, observe the restarting time of 10 seconds for single switching and 30 seconds for repeated switching.
	▶ Check that the emergency OFF circuit is functioning correctly before commissioning the tightening system.
	▶ Observe the local, system-specific regulations and requirements; proper use of tools, lifting, and transport equipment; as well as the relevant standards, provisions, and accident prevention regulations.

 CAUTION	
	Risk of damage to persons and property!
	Dangerous shock currents due to insufficient PE wire connections!
	▶ Protective conductor connections may not be affected by mechanical, chemical, or electrochemical influences. The connection must be permanent.

Examples of emergency OFF in the 350 tightening system (in BT356 and SB356)

Stationary tightening spindles (shutdown via VM350):

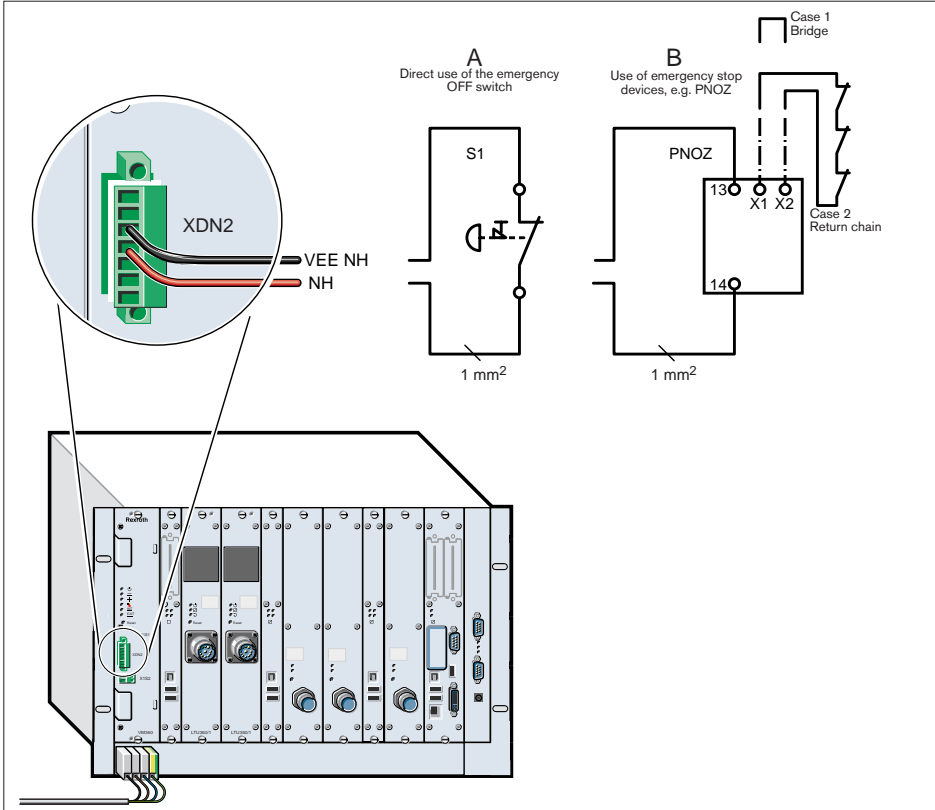


Fig. 4:

Stationary tightening spindles (shutdown via mains lead)

An additional external 24 V power pack can be connected via the X1S2 interface. If the mains power supply is switched off, this supplies the electronics in the 350 tightening system (external field buses such as e.g. ProfiBus remain ready for operation).

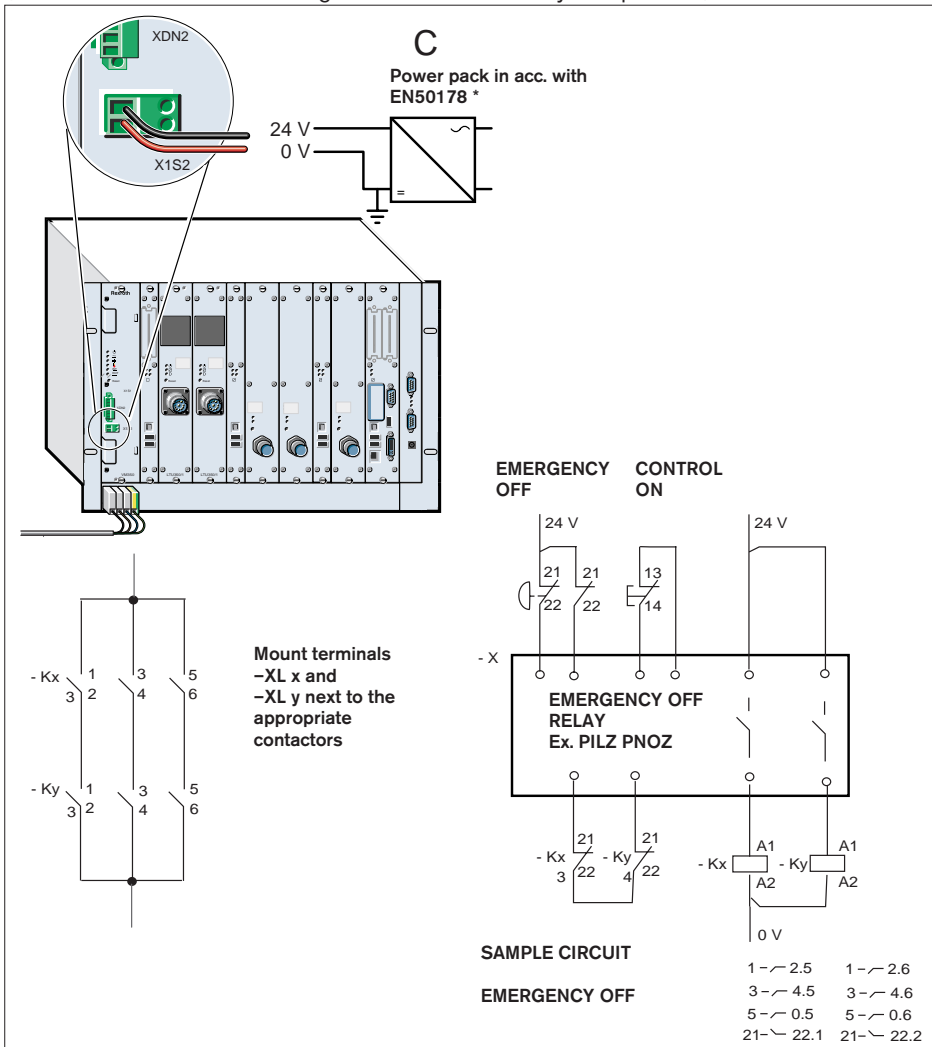


Fig. 5:

* The external power pack at this interface is connected in parallel to the internal 24 V power supply. The internal isolating diode ensures that with equally high supply voltages (internal = external), the internal power supply bears the load. The power pack must be stabilized and protected against short circuit and overload. Maximum ripple voltage 240 mV_{pp}, 150 mV_{RMS}, minimum and maximum power see page 27.

ENGLISH

Boundary conditions:

- 24 V supply from an internal power pack
- emergency OFF operating device according to ISO 60947-5-1.
- The maximum line length for the emergency OFF circuit is 30 m.
- The emergency OFF must be designed as a system emergency OFF in accordance with DIN EN ISO 13849.
- The emergency OFF operating devices and emergency OFF switchgears (e.g. PNOZ) must be switched and inspected regularly according to the device description.
- Safety-relevant cables that are moveable must be short-circuit and cross-fault proof.
- The internal supply for the emergency OFF function is designed as an PELV.
- The cables and lines (visual inspection), as well as the function of the emergency OFF circuit, must be checked at regular intervals.

Case A:

Emergency OFF switch directly connected to the contacts for the emergency OFF:

- The tightening spindles are stopped by the servo amplifiers and the internal automatic cutouts for the individual servo amplifiers are opened when the S1 emergency OFF switch is activated. This tightening job abort leads to an error message in the controller. Restarting is possible after closing switch S1 and acknowledging the error message.

Case B:

Use of an emergency OFF switch device, e.g. PNOZ:

- The cut-out of the emergency OFF circuit in the emergency OFF switch device results in the same function as described under A. Restoring the free contacts from the internal automatic cutouts to X1, X2 is not necessary.
- Variant 1: These contacts are bridged if the emergency OFF switch device is used exclusively for the tightening system.
- Variant 2: If further movements must be queried, e.g. feed slides, etc., they will be returned as usual via X1, X2.

Case C:

The following boundary conditions apply in this operating mode:

- When an emergency OFF is triggered (mains supply interrupted), the external 24 V supply must not be switched off as otherwise data may be lost.
- The external 24 V supply may not be generally switched in order to avoid high starting currents (on the secondary side).
- When an emergency OFF is triggered (mains supply interrupted), no CW/CCW should be set, as this can lead to system errors.
- The maximum line length between power pack and VM350 must not exceed 5 m.
- Triggering the emergency OFF (mains switching) is subject to the same time intervals as the switching on the mains. After the return of the mains power supply, wait approx. 10 s before setting CW/CCW.

Hand-held tightening spindles:

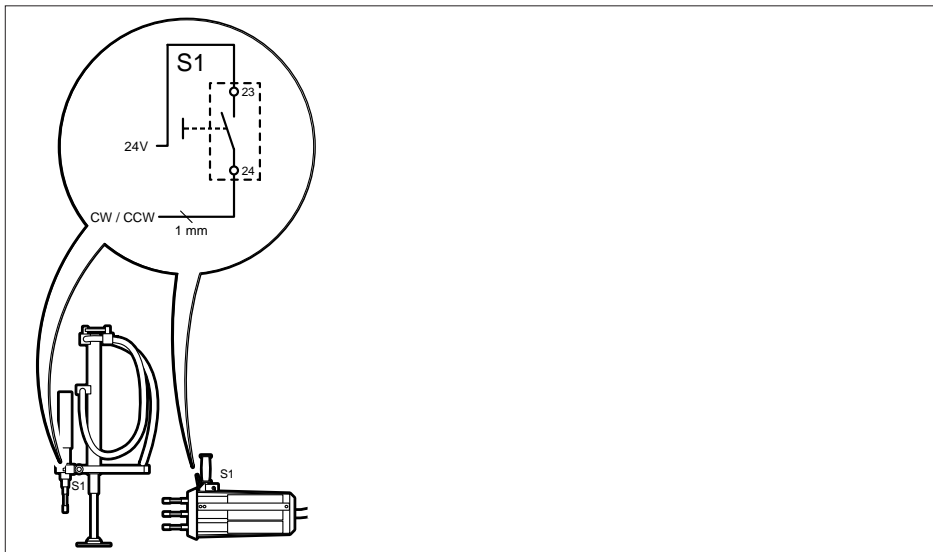


Fig. 6:

Switch S1:

We recommend the use of a position switch, e.g. Telemecanique ZCK-M8. Connect the signal “CW” to the digital input CW (clockwise tightening) of the SE352 or to one of the digital inputs FOxCW (Fastening Operation No. x clockwise) of the KE350 communication unit. Inspect the S1 switch at regular intervals according to the device description. Safety-relevant cables that are moveable must be short-circuit and cross-fault proof.

The servo amplifier contactor is directly integrated into the system’s emergency OFF circuit. The connection to the VM350 is interrupted if the emergency OFF switch is activated. System errors of error classes 3 and 4 may then occur. However, this disruption is intentional, as the emergency OFF switch is only activated in case of actual danger.

The PLC or the switch on the hand-held nutrunner sends a Cw/Ccw signal. In this case, the Cw/Ccw signals can also be sent via a bus system.

The solution with separated emergency OFF wiring is always preferred. It is required for nutrunners without a measurement transducer. If stricter safety measures must be followed due to circumstances caused by the system (e.g. special machinery directives), the emergency OFF concept must be taken into consideration separately, in conjunction with the nutrunners.

5 Transport and storage

For storing and transporting the product, always observe the ambient conditions specified in the technical data (see “Technical data” on page 37).



6 Assembly



When installing the product, always observe the ambient conditions specified in the technical data (see “Technical data” on page 37).

Required tools

- Screwdrivers
for the front panel: 0.8 x 4.5 mm
for X1S1: 0.6 x 3.5 mm
for XDN2: 0.4 x 2.5 mm



Assembling VM350 power supply module

	 CAUTION
	<p>Risk of damage to persons and property!</p> <p>Assembly of the VM350 power supply module requires basic mechanical and electrical knowledge.</p> <ul style="list-style-type: none"> ▶ Only qualified personnel (see “Personnel qualifications” on page 22) are authorised to assemble the VM350 power supply module. ▶ Measures to prevent electrostatic discharge (ESD protection) must be undertaken to protect the module and system components during all assembly work.

	 CAUTION
	<p>Risk of injuries when assembling under voltage!</p> <p>If you do not switch off the power supply to the system components before the start of assembly, you may become injured or the VM350 power supply module or system components may be damaged.</p> <ul style="list-style-type: none"> ▶ Isolate the relevant system components before assembling the VM350 power supply module.

1. Switch off the power supply for the BT356 card rack or SB35x system box and allow for a discharging time of 10 seconds.
2. Completely insert the VM350 power supply module into the slot furthest to the left in the BT356 card rack or into the SB35x system box.
3. Tighten the knurled bolts on the front. Make sure that the front panel is flush to the BT356 card rack or SB35x system box by tightening the knurled bolts.

7 Commissioning

	 CAUTION
	<p>Risk of damage to persons and property!</p> <p>Commissioning of the VM350 power supply module requires basic mechanical and electrical knowledge.</p> <ul style="list-style-type: none"> ▶ Only qualified personnel (see "Personnel qualifications" on page 22) are authorized to commission the system. ▶ Once the device has been switched off, it cannot be switched back on again until at least 30 seconds have elapsed.



Before commissioning, check that all plug-in connections are correctly fitted.

8 Operation

Operation is not necessary while the system is running.

9 Maintenance and repair

Cleaning and care

	 CAUTION
	<p>Any dirt or liquids penetrating the device lead to malfunctions!</p> <p>Safe function of the VM350 power supply module is no longer ensured.</p> <ul style="list-style-type: none"> ▶ Pay particular attention to the utmost cleanliness when working with the VM350 power supply module.

Maintenance

The VM350 power supply module is maintenance-free if used as intended.

Spare parts

Please refer to the address directory under www.boschrexroth.com and in chapter "16 Service and sales" on page 38 for the addresses of our foreign subsidiaries.

10 Decommissioning



For details on how to disassemble or replace your VM350 power supply module, please refer to chapter "11 Disassembly and replacement" on page 36.

11 Disassembly and replacement

Required tools

- Screwdriver
for X1S1: 0.6 x 3.5 mm
for XDN2: 0.4 x 2.5 mm

Disassembling

	 CAUTION
	<p>Remove the VM350 power supply module while live.</p> <p>Damage to the VM350 power supply module!</p> <ul style="list-style-type: none"> ▶ Isolate the relevant system components before disassembling the VM350 power supply module. ▶ For reasons of safety, the VM350 power supply module may only be inserted or removed at the earliest 10 seconds after the power supply to the BT356 card rack or SB35x system box has been switched off.

Proceed as follows to disassemble the VM350 power supply module:

1. Switch off the power supply for the BT356 card rack or SB35x system box and allow for a discharging time of 10 seconds.
2. Disconnect the cables from XDN2 and X1S2.
3. Loosen the knurled screws on the front panel and pull out the VM350 power supply module.

12 Disposal

Environmental protection

Careless disposal of the VM350 power supply module could lead to pollution of the environment.

Therefore, dispose of the device in accordance with the currently applicable regulations in your country.

You can also send the device to Bosch Rexroth for disposal.

13 Extension and conversion

Do not convert the VM350 power supply module.

14 Troubleshooting

Malfunctions and information on errors are displayed by the LEDs on the front panel (see section "Displays and operating elements" on page 26) and in the tightening system, e.g. in the BS350.

Should you be unable to remedy an occurring defect, please contact one of the addresses found under www.boschrexroth.com or in the address directory in chapter "16 Service and sales" on page 38.

15 Technical data

Table 4

General data	VM350
Order number	0 608 750 110
Input	
Input voltage	200 - 265 V, single or three-phase, 50 - 60 Hz
Input current	Depending on the voltage and type of connection, e.g. 3-phase 230 V: $3 \times 7.5 A_{\text{nom}}$ $3 \times 30 A_{\text{peak}}$ for 5 s
Output	
Intermediate circuit output voltage	$200 V_{\text{DC}} \dots 325 V_{\text{DCnom}} \dots 370 V_{\text{DC}}$
Max. intermediate circuit output voltage	$420 V_{\text{DC Max}}$
Nominal power	3000 VA (at 230 V) 3-phase 1500 VA (at 230 V) single-phase 1000 VA (at 110 V) single-phase
Peak power	10000 VA (at 230 V) for 5 s
Internal supply voltage	
VEE	24 V 10 A ($\pm 8\%$)
VCC	5.1 V 7 A ($\pm 3\%$)
VDD	-24 V 0.8 A (+20% / -10%)
24 V _{ext} external supply voltage (V_{EE} at XDN2)	24 V 1 A ($\pm 8\%$)
Interference suppression	EN 55011 class A
Interference immunity	DIN EN 61000-4 part 2 to part 5 severity class 4
Permissible ambient temperature	0 to 60 °C with fan
Admissible relative humidity during operation	20 - 90 %, non-condensing
Max. permissible altitude for use	2000 m above sea level (for altitudes more than 2000 m above sea level, we recommend the use of an isolating transformer)
Operation at altitudes greater than 1000 m above mean sea level	At more than 1000 m above mean sea level, a reduc- tion in the nominal power of approx. 1% per 100 m of altitude may occur due to the reduced air pres- sure.
Admissible storage temperature	-20 °C to 70 °C
Admissible relative storage humidity	20 - 95 %
Protection class	Protection class I
Protection type	IP20 (protection against accidental contacts) when installed
Dimensions (W x H x D)	53 mm x 271 mm x 285 mm
Weight	2.8 kg
Switching cycles of emergency OFF circuit	approx. 1 million