

Supply Module for AC Drives

Error Messages, Diagnostics and Fault Clearance

DOK-POWER*-GENEREL****-WAR1-EN-P

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| <i>The purpose of this documentation</i> | <p>This documentation is meant for use by trained maintenance personnel:</p> <ul style="list-style-type: none"> • to assist in the quick location of diagnostics displays and RESET keys • to assist in the rapid identification and clearance of faults • to assist in contacting INDRAMAT Customer Service |

Change sequence

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1. Safety Guidelines

This manual is meant to assist trained maintenance personnel in quickly locating the causes of drive problems.

The diagnostics displays of the supply modules represent the starting point. These displays already limit possible causes of problems.

Additional metrological tests on the switched-on machines are sometimes necessary, nonetheless, to precisely locate the fault.

Please note the following safety guidelines in this case.



Source of danger:

High electrical voltages of up to 700 V!

Possible effects:

Danger of life and limb and property damage! Remaining within the area of live parts is dangerous. This applies to all supply module connections, their chokes, capacitors and fuses as well as the drive modules, motors and all motor connections.

Avoidance:

All work on electrical components must be performed by an electrician.

The machine must be switched off before any work is performed within its vicinity. The master switch must also be secured against all unintentional or unauthorized switching back on.

Before starting work, use appropriate metrological equipment to determine whether any parts on the machine are still conductive (e.g., capacitors and similar parts). Wait for the DC bus to discharge. This takes approximately five minutes!

Use only that metrological and testing equipment that is appropriate to and has been accepted for that particular use.

Do not run motors! Motor rotations mean that the motor connections are live. Secure hanging axes against any and all movement once the machine has been switched off.

Place safety caps on cables or accessible plugs or connections when replacing drive components.



Source of danger:

Unintentional axis movements!

Possible affects:

Danger to life and limb and property damage! Problems with the machine or fault finding situations are especially dangerous and represent an increased risk.

Avoid:

Personnel must not remain within the danger zone of the machine.

Make sure that all protective measures such as safety fences, covers and light barriers are being used and are working.

The E-stop switch must be accessible at all times.

Testing and Repairing

In the event tests or repairs must be made on the drive, then:

- tests may only be conducted by INDRAMAT customer service personnel or properly trained personnel,
- maintain and adhere to all safety regulations when running tests on the machine and,
- as repairs to drive components on the machine can be very time consuming, it is advisable to completely replace defective components.

Replacing Equipment

The following is needed for replacing equipment:

- a lifting device (which is dependent upon the weight of the component)
- and a replacement unit of exactly the same type.

Please adhere to the following steps:

1. Switch power to machine off and secure it against being unintentionally switched back on.
2. Using the appropriate device, check whether the machine is not conductive. If necessary, wait for parts to discharge. Motors must be standing still. Hanging axes must be secured against all movement.
3. Using the rating plate, check whether both units are of the same type or not. Make sure that the replacement unit is identical to the one replaced.
4. Release all the connections of the defective unit.
5. Release the fixing bolts and remove the unit from the control enclosure. Use the appropriate lifting device, e.g., a crane, if necessary.



Source of danger:

Electrostatic discharges!

Possible affects:

Electrostatic discharges can damage electronic components and units.

Avoid:

Prior to replacing plug-in modules, touch a grounded object, e.g., the door of the control enclosure. This will discharge the human body.

6. Hang the replacement unit onto the fixing bolts. Use the lifting device. Tighten the bolts.
7. Now re-connect the unit **as per the terminal diagram of the manufacturer.**
8. If hanging axes were secured prior to replacement, remove the safety devices at this point.

The replacement procedure is now completed. The machine can be started up again.

2. KDV 2.3

LEDs are used by the unit to signal operating states or errors.

Details on each display are listed in the section "Definition of the Displays", and include

- a definition,
- the possible causes of a warning or an error, and, if necessary,
- recovery procedures.



An incorrect diagnosis is possible!

Fault diagnosis pre-requisite: a faultless control voltage of +24 V or ± 15 V. Control voltages can be checked at terminal X10.

If the control voltages are faulty, then it is possible that the displays could signal incorrect states.

It is, therefore, important to first eliminate faults in the control voltage supply.

Clearing a Fault

Once a fault has been cleared, it is necessary to clear or cancel the error messages. Otherwise, the machine remains not ready to operate.

Faults are cleared by

- pressing the "RESET" key on the front of the device or
- switching the power to the electronics sequentially off and on once.

Contacting INDRAMAT Customer Service

If the user is unable to clear a fault, then it becomes necessary to contact INDRAMAT Customer Service.

In the interests of a quick and decisive processing of the problem, we would appreciate having the following information handy at the time of contact, viz.,

- the type data and serial numbers of units and motors,
- the fault status and
- the diagnostics and fault displays information.

Telephone numbers

INDRAMAT Customer Service can be reached from Mondays through Fridays between 7:00 a.m. and 5:00 p.m. at the following numbers:

09352/40-4894 (AC Drive Systems)

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09352/40-4808 (CLM; DLC; non-cutting machining)

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Sundays and holidays: 9:00 a.m. to 7:00 p.m.

2.1. Position of the Diagnostics Display and RESET Key

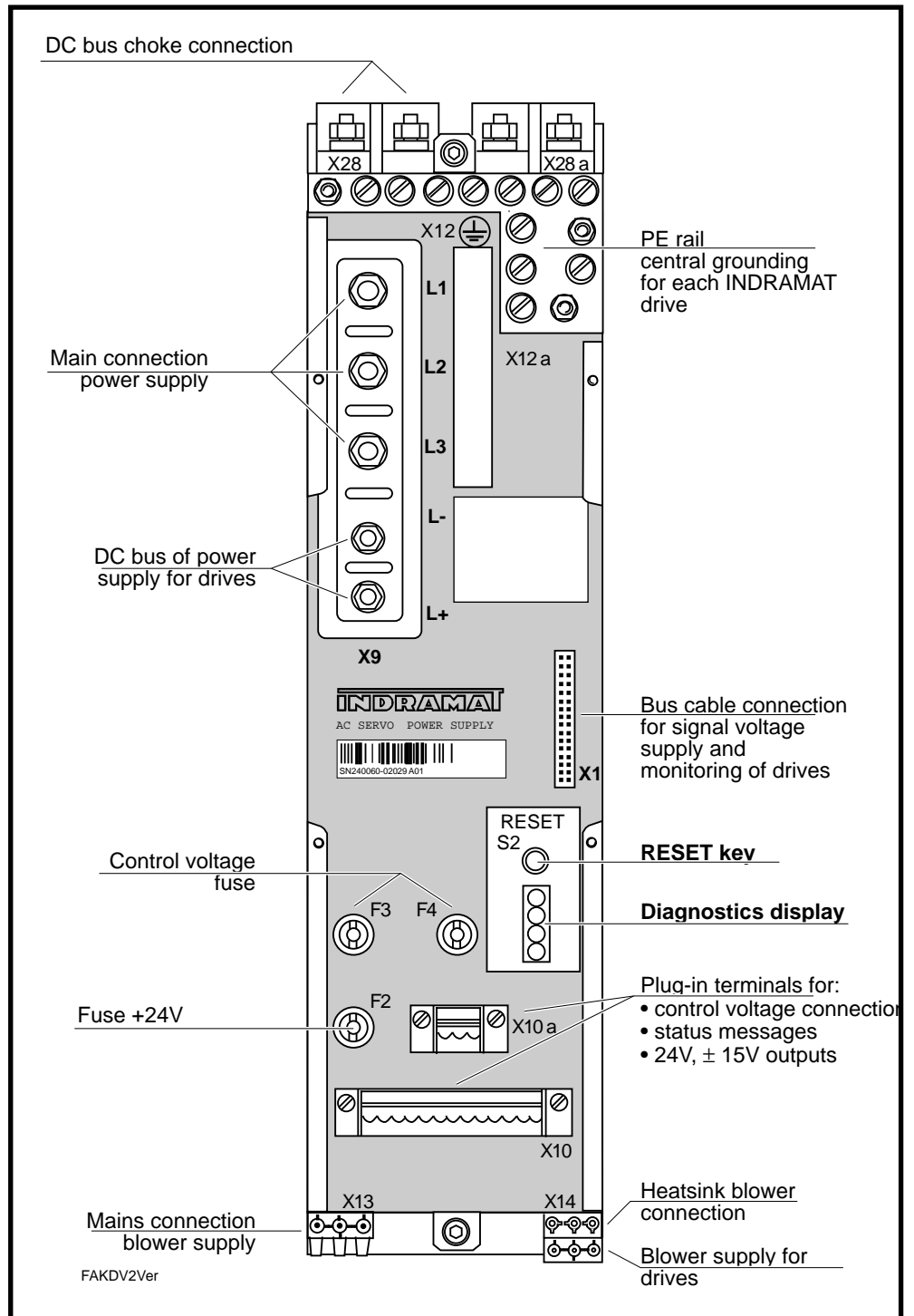
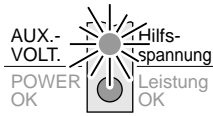
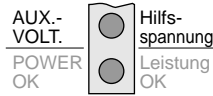


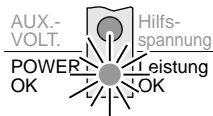
Fig 2.1 Position of display and RESET key on the KDV 2.3

**AUX.-VOLT.****Display green:**

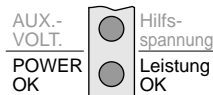
Electronics supply in working order.

(Operating state)**AUX.-VOLT.****Display dark:**

Electronics supply not in working order.

(Fault - not stored)*Cause 1: Fuse F3 or F4 defective**Recovery***Check fuses and replace, if necessary.***Cause 2: Voltage supply interrupted**Recovery***Check voltage at X10a (rated value: 230 V_{AC} ±10%). If no voltage, then check mains fuse in control enclosure and supply lead, replace if necessary.****POWER OK****Display green:**

Power source in working order.

(Operating state)**POWER OK****Display dark:**

Power not on or faulty; fault in DC bus.

(Fault - not stored)*Cause 1: No power at X9 or insufficient level**Recovery***Check power supply at X9 (rated value: 3 x 230 V_{AC} ±10%).***Cause 2: DC bus voltage less than 200 V_{DC}**Recovery***Remove conductor rails to the drive modules and measure DC bus voltage at X9 (L-, L+). Check DC bus for short circuit.**

2.3. Fault Without Display

Bb1 contact will not close (Fault)

Cause 1: Drive module fault

Recovery **Check drive module diagnostics display.**

Cause 2: Connection to signal voltage bus faulty

Recovery **Make sure that the bus cable at X1 and the end plug of the bus connection are properly in place.**

+24 V and/or ± 15 V control voltage faulty (Fault)

Cause 1: Fuse F2, F3 or F4 defective

Recovery **Check fuses and replace, if necessary.**

Cause 2: Maximum signal voltage load exceeded

Recovery **1. Release bus connection (X1) to the drive modules and check signal voltage at X10.
2. Release external taps of the signal voltages and check for short-circuit (+24 V: max. 2 A; ± 15 V: each a maximum of 100 mA).**

Cause 3: Control voltage at X10a faulty

Recovery **Check mains fuses in control enclosure.**

3. KDV 4.1

Operating states, warnings and faults are signalled by the unit via LEDs.

Details on each display are listed in the section "Definition of the Displays", and include

- a definition,
- the possible causes of a warning or error, and, if necessary,
- recovery procedures.



Incorrect diagnoses are possible!

A steady green light of the display "+24 V/±15 V" is a prerequisite for fault diagnostics.

If this display is not lit up, then there is a control voltage problem. This means that the other displays could signal incorrect states.

Faults in the control voltage source should, therefore, be eliminated first.

Clearing a Fault

Once a fault has been cleared, it is necessary to clear or cancel the error messages. Otherwise, the machine will not operate.

Faults are cleared by

- pressing the "RESET" key on the front of the device or
- switching the power to the electronics sequentially off and on once.

Contacting INDRAMAT Customer Service

If the user is unable to clear a fault, then it is necessary to contact INDRAMAT Customer Service.

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- the diagnostics and fault displays information.

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3.1. Position of the Diagnostics Display and RESET Key

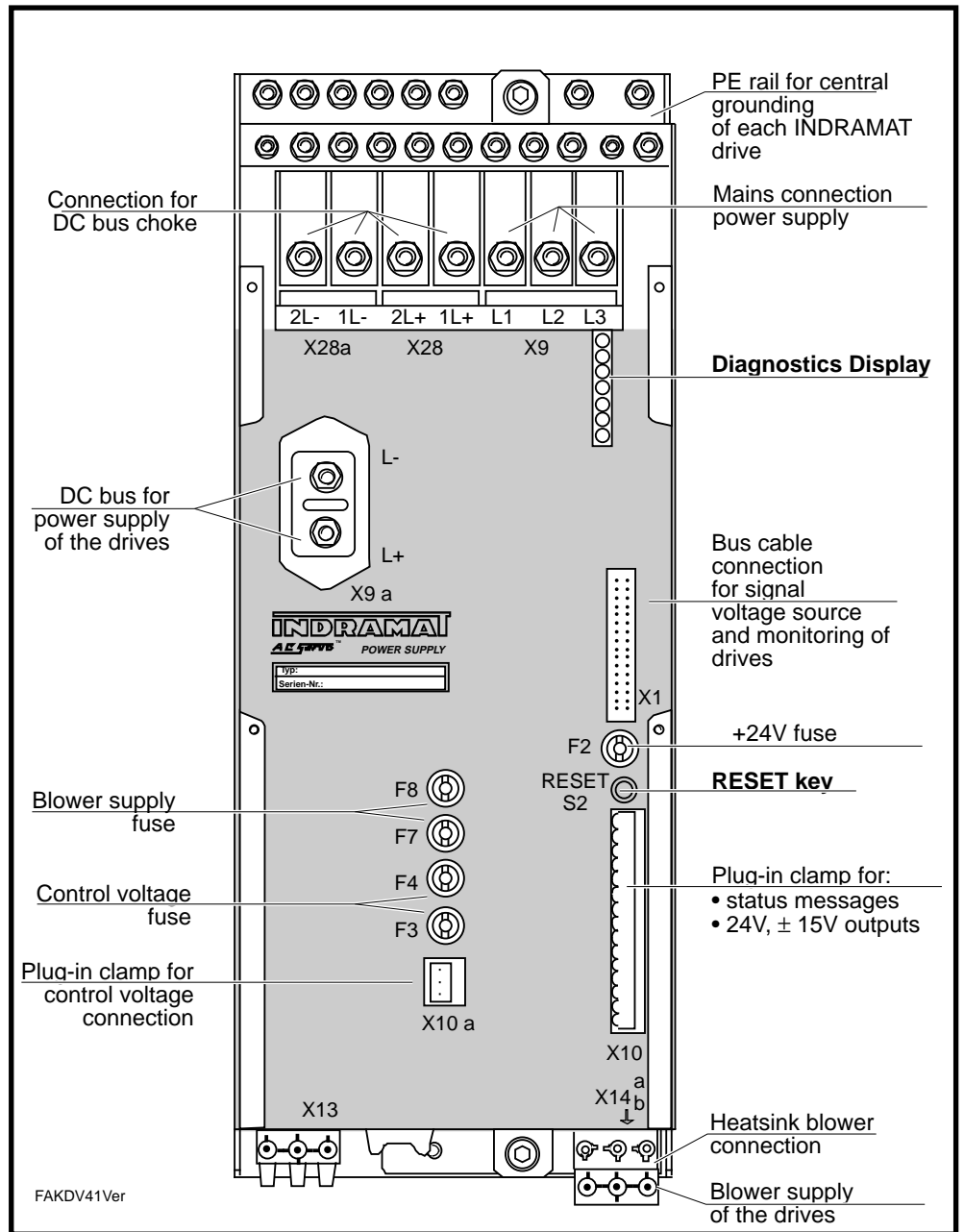


Fig. 3.1 Position of the display and RESET key on the KDV 4.1

3.2. Definitions of the Displays

| | | | |
|----|---|-------------------------------|-------------|
| H1 | ● | AUX. Volt. Hilfsspannung | |
| H2 | ● | +24V / ±15V | |
| H3 | ● | MAINS FAULT Netzüberwachg. | ● LED green |
| H4 | ● | POWER OK Leistung | |
| H5 | ● | BLEEDER OVERL. Überl. | |
| H6 | ● | TEMP. FAULT KK-Übertemp | ● LED red |
| H7 | ● | OVERCURRENT Überstrom | |
| H8 | ● | EARTH CON. Erdschluß | |

DAKDV4.1

Fig. 3.2 Diagnostic displays on the KDV 4.1



AUX.-VOLT.

Display green:

(Operating state)

Power supply to the electronics in working order.



AUX.-VOLT.

Display dark:

(Fault - not stored)

Power supply to the electronics not in working order.

Cause 1: Fuse F3 or F4 defective

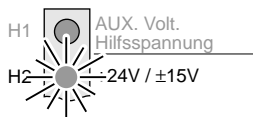
Recovery

Check fuses and replace, if necessary.

Cause 2: Problem in voltage supply lead

Recovery

Check voltage at X10a (rated value: 230 V_{AC} ±10%). If there is no voltage, check mains fuse in control enclosure and supply lead, replace if necessary.

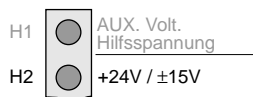


+24 V/±15 V

Display green:

(Operating state)

Signal voltages in working order.



+24 V/±15 V

Display dark:

(Fault - not stored)

Signal voltages not in working order.

Cause 1: Fuse F3 or F4 defective

Recovery

Check fuses and replace, if necessary.

Cause 2: Maximum load of signal voltages exceeded

Recovery

1. Release bus connection (X1) to drive modules and check signal voltages at X10.

2. Release external taps of the signal voltages and check for short-circuits (+24 V: max. 1 A; ±15 V: maximum each of 100 mA).

**MAINS FAULT****Display green:**

Power supply in working order.

(Operating state)**MAINS FAULT****Display dark:**

Power supply not in working order.

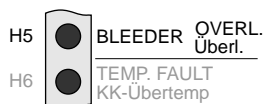
(Fault - not stored)*Cause 1: No phase at X9***Check mains feed at X9 (rated value: 3 x 380...460 V_{AC} ±10%).***Cause 2: No clockwise rotational field at X9**Recovery***Check rotational field at X9 (command state: clockwise rotations).****POWER OK****Display green:**

Power supply in working order.

(Operating state)**POWER OK****Display dark:**

Power not on or not working, fault in DC bus.

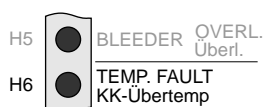
(Fault - not stored)*Cause 1: No phase at X9.**Recovery***Check mains feed at X9 (rated value: 3 x 380...460 V_{AC} ±10%).***Cause 2: No clockwise rotational field at X9**Recovery***Check rotational field at X9 (command status: clockwise rotations).***Cause 3: DC bus voltage below 200 V_{DC}**Recovery***Remove conductor rail to the drive modules and measure DC bus voltage at X9a. Check DC bus for short-circuit.***Cause 4: DC bus smoothing choke not connected**Recovery***Check to make sure that the DC bus smoothing choke has been properly connected.**

**BLEEDER OVERLOAD****Display dark:****(Operating state)**

Braking energy of drives within permissible range.

**BLEEDER OVERLOAD****Display red:****(Fault - stored)**

Shutdown has been triggered due to bleeder overload.

*Cause 1: Braking energy of drive too high.**Recovery***Check energy content of drives. Reduce drive speed. Delay powering down with OFF or E-Stop.***Cause 2: Bleeder defective or internal fault in unit.**Recovery***Replace unit.****TEMP. FAULT****Display dark:****(Operating state)**

Heatsink temperature within permissible range.

**TEMP. FAULT****Display red:****(Fault - stored)**

Shutdown has been triggered as heatsink temperature is too high.

*Cause 1: No blower connected or it is defective; fuses F6, F7 or F8 are defective**Recovery***Check blower including F6 (on blower), F7 and F8 (on front of unit) and replace, if necessary.***Cause 2: Heatsink is dirty**Recovery***Clean heatsink.***Cause 3: Unit is overloaded or ambient temperature is too high.**Recovery***Check load/ambient temperature. Check temperature pre-warning contact (TVW contact) of the unit.**

**OVERCURRENT****Display dark:****(Operating state)**

Current in power section within permissible range.

**OVERCURRENT****Display red:****(Fault - stored)**

Shutdown was triggered due to overcurrent in power section.

Cause 1: Drive module defective, motor power cable damaged or interturn fault of the motor.

Recovery

Remove conductor rails to the drive modules. Check drive module, motor power cable and motor, replace if necessary.

Cause 2: Mains inductance too high

Recovery

Check input to network (mains transformer).

**EARTH CON.****Display dark:****(Operating state)**

No ground fault in system.

**EARTH CON.****Display red:****(Fault - stored)**

System shutdown due to ground fault in system.

Cause: Drive module defective, motor power cable damaged or interturn fault of the motor.

Recovery

Remove conductor rails to the drive modules; check drive module, motor power cable and motors, replace if necessary.

3.3. Fault Without Display

Bb1 contact will not close**(Fault)**

Cause 1: Drive module fault

Recovery

Check diagnostics display of drive module.

Cause 2: Signal voltage bus connection faulty.

Recovery

Check bus cable at X1 and end connector of the bus connection to make sure that it is properly in place.

4. KVR 1.3 and TVR 2.2

The unit signals operating states, warnings or faults via LEDs and a two-place seven-segment display.

Details on each display are listed in the section "Definition of the Displays", and include

- a definition,
- the possible causes of a warning or error, and, if necessary,
- recovery procedures.



Incorrect diagnoses are possible!

A steady green light of the display "+24 V/±15 V" is a prerequisite for fault diagnostics.

If this display is not lit up, then there is a control voltage problem. This means that the other displays could signal incorrect states.

Faults in the control voltage source should, therefore, be eliminated first.

Clearing a Fault

Once a fault has been cleared, it is necessary to clear or cancel the error messages. Otherwise, the machine remains unready to operate.

Faults are cleared by

- pressing the "RESET" key on the front of the device or
- switching the power to the electronics sequentially off and on once.

Contacting INDRAMAT Customer Service

If the user is unable to clear a fault, then it becomes necessary to contact INDRAMAT Customer Service.

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4.1. Position of the Diagnostics Displays and RESET Key

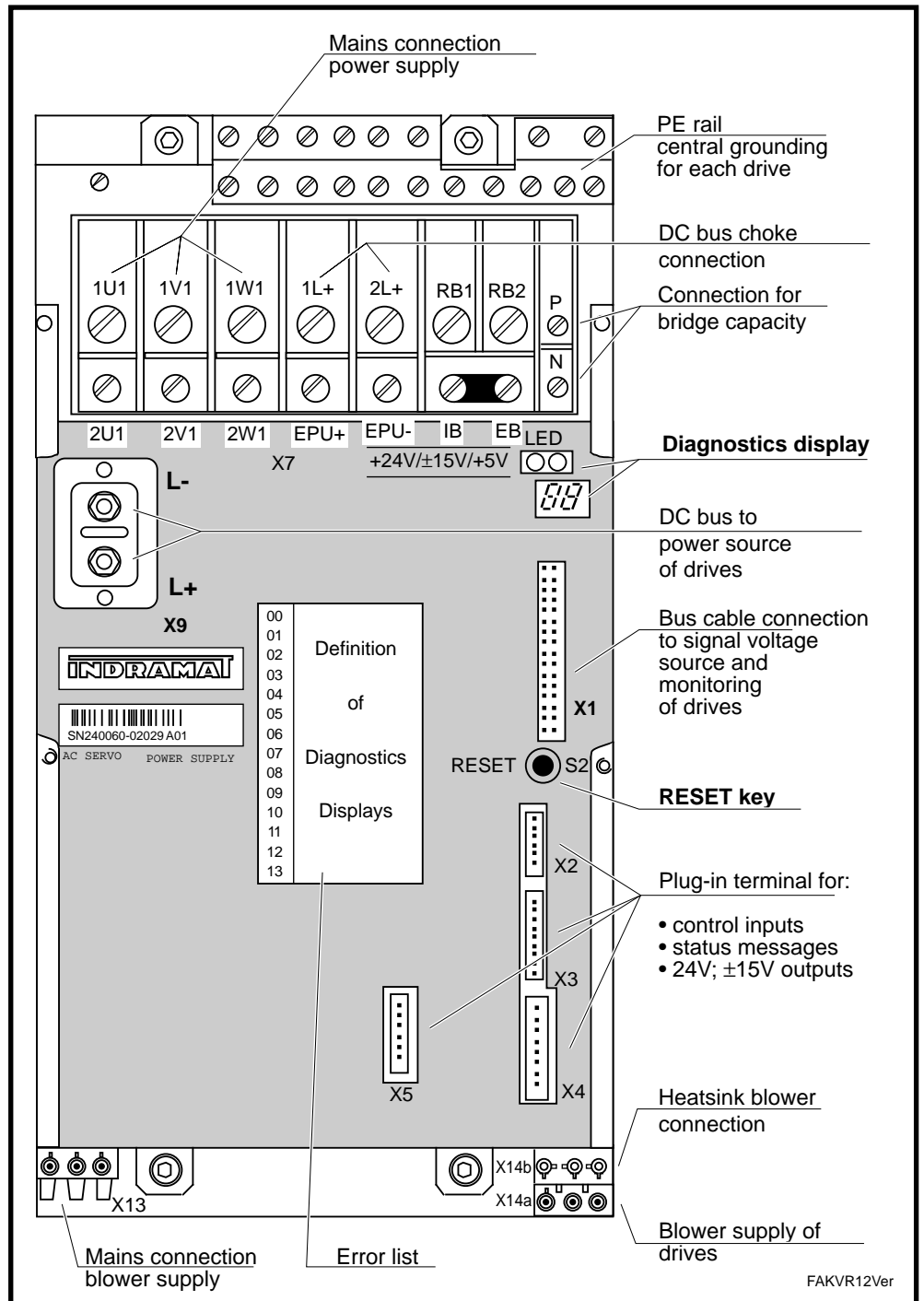


Fig 4.1 Position of the display and RESET key on the KVR 1.3 / TVR 2.2

4.2. Definition of the Displays

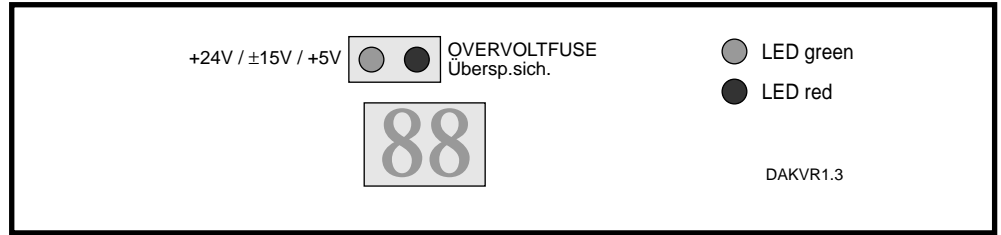


Fig. 4.2 Diagnostics displays on the KVR 1.3 / TVR 2.2



+24 V / ±15 V / +5 V

Display green:

(Operating state)

Signal voltages in working order.



+24 V / ±15 V / +5 V

Display dark:

(Fault - stored)

Signal voltages not in working order.

Cause 1: Mains connection of electronics supply is faulty.

Recovery

Check mains fuse in control enclosure.

Cause 2: Maximum load of signal voltage exceeded.

Recovery

1. Release bus connection (X1) to drive modules and check signal voltages at X3.

2. Release external taps of the signal voltages and check for short (+24 V: max. 2 A; ±15 V: maximum each of 100 mA).



OVERVOLT FUSE

Display dark:

(Operating state)

Voltage in power section within permissible range.



OVERVOLT FUSE

Display red:

(Fault - stored)

Shutdown was actuated as voltage in power section exceeded the maximum permissible value.

Cause 1: Unit defective due to excessive mains voltage.

Recovery

Check input voltage (max. 480 V_{AC} +10 %). Replace unit.

Cause 2: Fault in unit

Recovery

Replace unit.

00 **POWER (Leistung)** **(Operating state)**
DC bus voltage within permissible range. Unit is ready to output power.

01 **POWER OFF (Leistung aus)** **(Operating state)**
Power contactor has fallen off.

Cause 1: OFF or E-stop button has been pressed.

Recovery **Switch power back on.**

Cause 2: Controller faulty (if power cannot be switched on).

Recovery **Check controller circuits. Turn-on pulse between X2/5 and X2/6 equals a minimum of 1.2 seconds.**

02 **POWER OFF WITH ZKS (Leistung aus mit ZKS)** **(Operating state)**
Power contactor has fallen off; DC bus dynamic brake has been triggered.

Cause: The plant controller has triggered a DC bus dynamic braking.

Recovery **Check the entire E-stop sequence of the plant.**

03 **+24 V/±15 V** **(Fault - stored)**
Signal voltages not in working order.

Cause 1: Mains connection of the electronics supply is faulty.

Recovery **Check mains fuse in control enclosure and replace, if necessary.**

Cause 2: Maximum load of signal voltage exceeded.

Recovery **1. Release bus connection (X1) to the drive modules and check signal voltages at X3.
2. Release external taps of signal voltages and check for short circuit (+24 V: max. 2 A; ±15 V: maximum each of 100 mA).**

Cause 3: Unit defective.

Recovery **Replace unit.**

Cause 4: If the DC bus is buffered after a power failure, then the DC bus capacity is too low.

Recovery **Increase DC bus capacity.**

04 **MAINS FAULT (Netz-Fehler)** **(Fault - stored)**
Mains voltage is faulty.

Cause: Mains fuse has triggered, no mains phase at X7 or mains voltage too low.

Recovery **Check input connection (rated value: 3 x 380...480 V_{AC} ; ±10 %).**

05

UD FAULT (UD Fehler)

(Fault - not stored)

DC bus voltage exceeds permissible value.

Cause 1: Mains voltage too high or too low

Recovery

Check input connection (rated value: 3 x 380...480 V_{AC} ; ±10 %).

Cause 2: DC bus smoothing choke not or incorrectly connected

Recovery

Check DC bus smoothing choke connection (between X7/1L+ and X7/2L+).

Cause 3: Fault in unit

Recovery

Replace unit.

06

HEAT SINK TEMP. FAULT (Kühlkörper Übertemp.)

(Fault - stored)

Cause 1: Blower not connected or defective; Fuse F6 defective

Recovery

Check blower including F6 (on the blower). Check blower supply at X13, X14a and X14b.

Cause 2: Unit overloaded or ambient temperature too high

Recovery

Check load/ambient temperature. Check temperature pre-warning contact (TVW contact) of the unit.

Cause 3: Unit defective.

Recovery

Replace unit.

07

BLEEDER OVERLOAD (Bleeder Überlast)

(Fault - stored)

Cause 1: Braking energy with power off is too high.

Recovery

Check energy content of drives. Reduce drive speed. Delay shut-down with OFF or E-stop.

Cause 2: Bleeder defective or internal fault in unit

Recovery

Replace unit.

08

EPU FAULT (EPU Fehler)

(Fault - not stored)

Capacitor between X7/EPU+ and X7/EPU- has shorted or is incorrectly polarized.

Cause 1: Capacitor incorrectly polarized or wiring is faulty.

Recovery

Clamp off capacitor. Check wiring.

Cause 2: Capacitor defective

Recovery

Replace capacitor.

Cause 3: Internal fault in unit

Recovery

Replace unit.

09

SOFTSTART FAULT (Softstart-Fehler)

(Fault - stored)

DC bus cannot be loaded.

Cause 1: Additional capacitance connected to DC bus is too big

Recovery

Reduce additional capacitance.

Cause 2: DC bus smoothing choke not or incorrectly connected

Recovery

Check DC bus smoothing choke connection (between X7/1L+ and X7/2L+).

Cause 3: Bridge or DC bus capacitors incorrectly polarized, shorted or wiring is faulty.

Recovery

Check wiring.

Cause 4: Short in a drive module

Recovery

Check diagnostics display of drive modules.

Cause 5: Short in unit

Recovery

Replace unit.

Cause 6: Power on while DC bus dynamic brake thyristor still conducting current

Recovery

Delay power on after OFF until DC bus has discharged.

10

OVERCURRENT (Überstrom)

(Fault - stored)

Cause 1: Defective drive module, damaged motor power cable or interturn fault of motor

Recovery

Remove conductor rails to drive modules. Check drive module, motor power cable and motors, replace if necessary.

Cause 2: Short in unit

Recovery

Replace unit.

11

CONTROLLER ERROR (Prozessorstörung)

(Fault - stored)

Cause 1: Program sequence in unit disrupted

Recovery

Switch power off and on again.

Cause 2: Microprocessor in unit defective

Recovery

Replace unit.

12

DRIVE FAULT (Antriebs-Fehler)

(Fault - not stored)

Cause: Defect in drive module, motor power cable or motor

Recovery

Check diagnostics display of drive; remove bus connection (X1) to drives step by step.

13

DEVICE DAMAGED (Gerät defekt)

(Fault - stored)

Overvoltage fuse in unit has been actuated.

Cause 1: Mains voltage too high

Recovery

Check mains voltage (max. 480 V_{AC} +10 %). Replace unit.

Cause 2: Fault in unit

Recovery

Replace unit.

14

BRIDGE FAULT (Brücken-Fehler)

(Fault - not stored)

Bridge voltage cannot be built up.



Caution

Source of danger:

Switch unit on several times with fault "Bridge Fault"!

Possible affects:

Unit can be damaged by repeatedly switching it on and off!

Avoid:

Check all the following items (causes 1 through 3), before switching the unit back on.

Cause 1: Mains voltage too low

Recovery

Check mains voltage at X7 (3 x 380 V...480 V_{AC} ±10 %).

Cause 2: Mains fuse has been actuated

Recovery

Check mains fuse. Check wiring for short.

Cause 3: Bridge capacitor faulty, incorrectly polarized or short between X7/P and X7/N

Recovery

Check bridge capacitor for correct connection.

15

MISWIRING (Anschluß-Fehler)

(Fault - not stored)

Cause 1: Electronic supply connections (as relate to power supply connections) has been improperly polarized

Recovery

Check voltages at X7. Clamps 1U1 and 2U1, 1V1 and 2V1, 1W1 and 2W1 may not conduct voltage to each other.

16

CHECKSUM ERROR (Prüfsummen-Fehler)

(Fault - not stored)

Cause 1: EPROM in unit defective

Recovery

Replace unit.

4.3. Fault Without Display

Bb1 contact will not close

(Fault)

Cause 1: Fault of a drive module

Recovery

Check diagnostics display of drive modules.

Cause 2: Signal voltage bus connection faulty

Recovery

Check bus cable at X1 and end connector of the bus connection to make sure that they are properly in place.

5. TVD 1.2

Operating states, warnings and faults are signalled by the unit via LEDs.

Details on each display are listed in the section "Definition of the Displays", and include

- a definition,
- the possible causes of a warning or error, and, if necessary,
- recovery procedures.



Incorrect diagnoses are possible!

A steady green light of the display "+24 V/±15 V" is a prerequisite for fault diagnostics.

If this display is not lit up, then there is a control voltage problem. This means that the other displays could signal incorrect states.

Faults in the control voltage source should, therefore, be eliminated first.

Clearing a Fault

Once a fault has been cleared, it is necessary to clear or cancel the error messages. Otherwise, the machine remains unready to operate.

Faults are cleared by

- pressing the "RESET" key on the front of the device or
- switching the power to the electronics sequentially off and on once.

Contacting INDRAMAT Customer Service

If the user is unable to clear a fault, then it becomes necessary to contact INDRAMAT Customer Service.

In the interests of a quick and decisive processing of the problem, we would appreciate having the following information handy at the time of contact, viz.,

- the type data and serial numbers of units and motors,
- the fault status and
- the diagnostics and fault displays information.

Telephone numbers

INDRAMAT Customer Service can be reached from Monday through Friday between 7:00 a.m. and 5:00 p.m. at the following numbers:

09352/40-4894 (AC Drive Systems)

09352/40-4922 (AC Drive Systems)

09352/40-4592 (MT-CNC Applications)

09352/40-4808 (CLM; DLC; non-cutting machining)

Service-Hotline

The Service-Hotline can be reached at **0172/6600406** or **0171/3338826** during the following hours.

Mondays through Fridays: 5:00 p.m. to 11:00 p.m.

Saturdays: 8:00 a.m. to 8:00 p.m.

Sundays and holidays: 9:00 a.m. to 7:00 p.m.

5.1. Position of the Diagnostics Displays and RESET Key

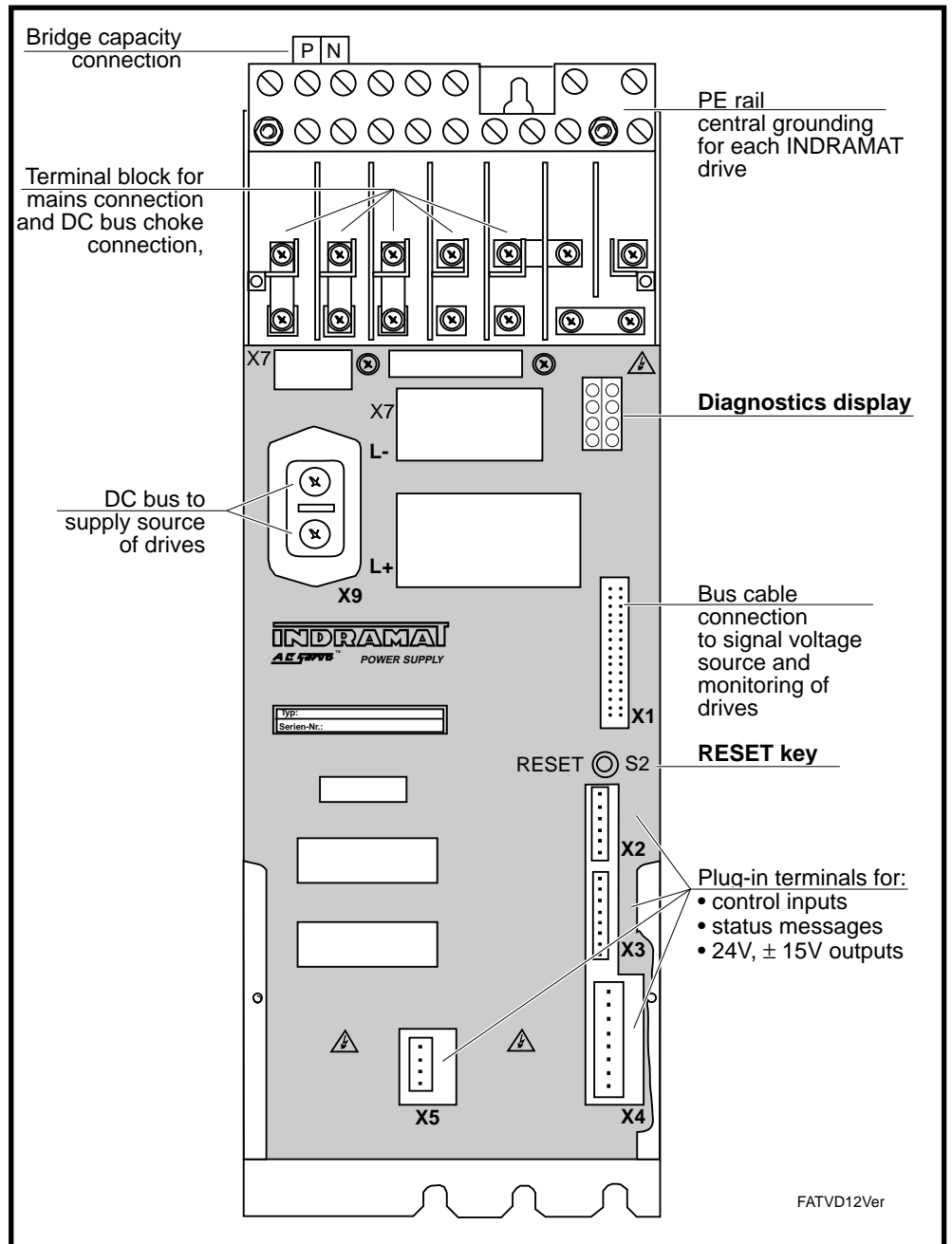


Fig 5.1 Position of display and RESET key on the TVD 1.2

5.2. Definitions of the Displays

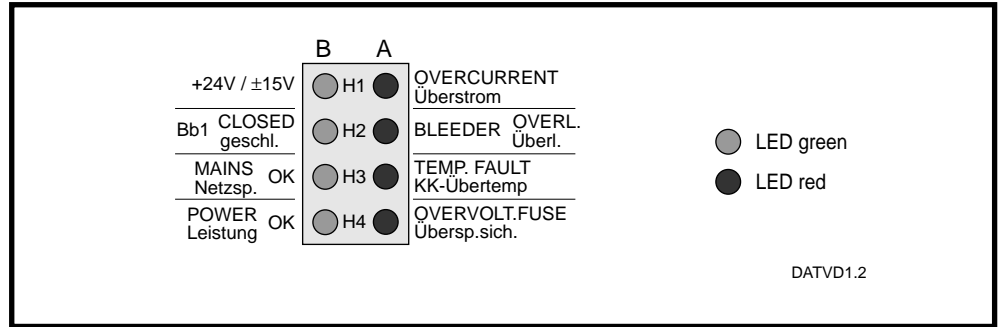
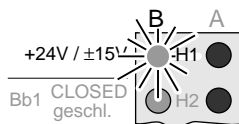


Fig 5.2 Diagnostics displays on the TVD 1.2

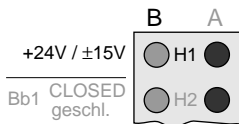


+24 V/±15 V

Display green:

(Operating state)

Signal voltages in working order.



+24 V/±15 V

Display dark:

(Fault - not stored)

Signal voltages not in working order.

Cause 1: Electronics supply input connection is faulty

Recovery

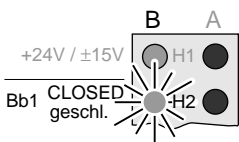
Check mains fuse in control enclosure.

Cause 2: Maximum load of signal voltage exceeded

Recovery

1. Release bus connections (X1) to drives and check signal voltage at X3.

2. Release external taps of signal voltages and check for short (+24 V: max. 2 A; ±15 V: maximum each of 100 mA).

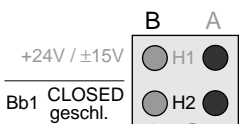


Bb1 CLOSED

Display green:

(Operating state)

Supply module and drives without fault.



Bb1 CLOSED

Display dark:

(Fault - stored)

Fault in supply module or drives.

Cause 1: Fault in supply module

Recovery

Check remaining diagnostics displays of the supply module.

Cause 2: Drive module fault

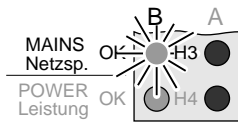
Recovery

Check diagnostics display of drive modules.

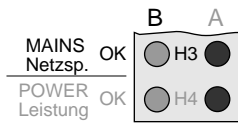
Cause 3: Signal voltage bus connection faulty

Recovery

Check bus cable at X1 and end connector of bus connection to make that they are properly in place.

**MAINS OK****Display green:****(Operating state)**

Power supply in working order.

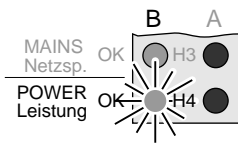
**MAINS OK****Display dark:****(Fault - not stored)**

Power supply not in working order.

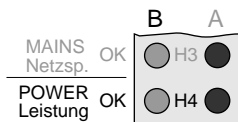
Cause: Mains fuse has been actuated, mains phase at X7 missing or mains voltage too low.

Recovery

Check input connection (rated value: 3 x 380...460 V_{AC} ±10%).

**POWER OK****Display green:****(Operating state)**

Internal mains contactor on; DC bus voltage in working order.

**POWER OK****Display dark:****(Fault - not stored)**

Mains contactor not on; fault in DC bus.

Cause 1: Mains contactor not on

Recovery

Check controller at X2/6 (+24 V_L to 0 V_L).

Cause 2: DC bus smoothing choke not or incorrectly connected

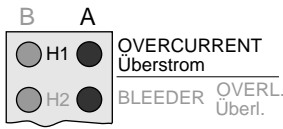
Recovery

Check DC bus smoothing choke connection (between X7/1L+ and X7/2L+).

Cause 3: Rectifier faulty

Recovery

Replace unit.

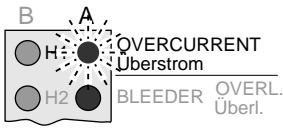


OVERCURRENT

Display dark:

(Operating state)

Current in power section within permissible range.

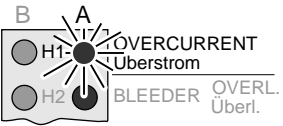


OVERCURRENT

Display is flashing:

(Fault - not stored)

Power has been switched on even with a short in unit, in drive module, in cable or in motor.



OVERCURRENT

Display red:

(Fault - stored)

Shutdown was actuated due to overcurrent in power section.

Cause 1: Defective drive module, damaged motor power cable or interturn fault in motor

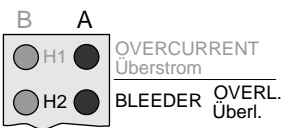
Recovery

Remove conductor rails to drive modules; check, drive module, motor power cable and motors, replace if necessary.

Cause 2: Short in unit.

Recovery

Replace unit.

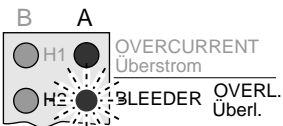


BLEEDER OVERLOAD

Display dark:

(Operating state)

Braking energy of drives within permissible range.

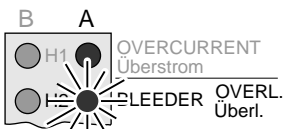


BLEEDER OVERLOAD

Display is flashing:

(Warning)

Bleeder is fully loaded. Braking energy of drive may not be permitted to climb further.



BLEEDER OVERLOAD

Display red:

(Fault - stored)

Shutdown actuated due to bleeder overload.

Cause 1: Braking energy of drives too high

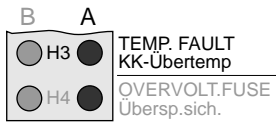
Recovery

- 1. Check energy level of drives. Reduce drive speed or increase load cycle time.**
- 2. Check bleeder pre-warning contact (BVW contact) .**

Cause 2: Bleeder defective or internal fault in unit

Recovery

Replace unit.

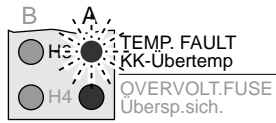


TEMP. FAULT

Display dark:

(Operating state)

Heatsink temperature within permissible range.

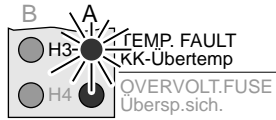


TEMP. FAULT

Display is flashing:

(Warning)

Heatsink temperature too high. Power will shutdown within next 30 seconds.



TEMP. FAULT

Display red:

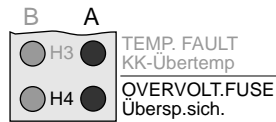
(Fault - stored)

Shutdown has been actuated as heatsink temperature is too high.

Cause: Unit overloaded or ambient temperature too high

Recovery

Check load/ambient temperature. Check temperature pre-warning contact (TVW contact) of the unit.

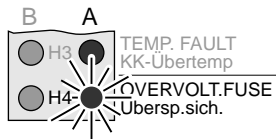


OVERVOLT.FUSE

Display dark:

(Operating state)

DC bus voltage exceeding permissible range.



OVERVOLT.FUSE

Display red:

(Fault - stored)

Shutdown has been actuated as DC bus voltage is exceeding maximum permissible value.

Cause 1: Mains voltage too high

Recovery

Check mains voltage (rated value: 3 x 380...460 V_{AC} ±10%). Replace unit.

Cause 2: Fault in unit

Recovery

Replace unit.

6. TVD 1.3

Operating states, warnings and faults are signalled by the unit via LEDs.

Details on each display are listed in the section "Definition of the Displays", and include

- a definition,
- the possible causes of a warning or error, and, if necessary,
- recovery procedures.



Incorrect diagnoses are possible!

A steady green light of the display "+24 V/±15 V" is a prerequisite for fault diagnostics.

If this display is not lit up, then there is a control voltage problem. This means that the other displays could signal incorrect states.

Faults in the control voltage source should, therefore, be eliminated first.

Clearing a Fault

Once a fault has been cleared, it is necessary to clear or cancel the error messages. Otherwise, the machine will not operate.

Faults are cleared by

- pressing the "RESET" key on the front of the device or
- switching the power to the electronics sequentially off and on once.

Contacting INDRAMAT Customer Service

If the user is unable to clear a fault, then it becomes necessary to contact INDRAMAT Customer Service.

In the interests of a quick and decisive processing of the problem, we would appreciate having the following information handy at the time of contact, viz.,

- the type data and serial numbers of units and motors,
- the fault status and
- the diagnostics and fault displays information.

Telephone numbers

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09352/40-4894 (AC Drive Systems)

09352/40-4922 (AC Drive Systems)

09352/40-4592 (MT-CNC Applications)

09352/40-4808 (CLM; DLC; non-cutting machining)

Service-Hotline

The Service-Hotline can be reached at **0172/6600406** or **0171/3338826** during the following hours.

Mondays through Fridays: 5:00 p.m. to 11:00 p.m.

Saturdays: 8:00 a.m. to 8:00 p.m.

Sundays and holidays: 9:00 a.m. to 7:00 p.m.

6.1. Position of the Diagnostics Display and RESET Key

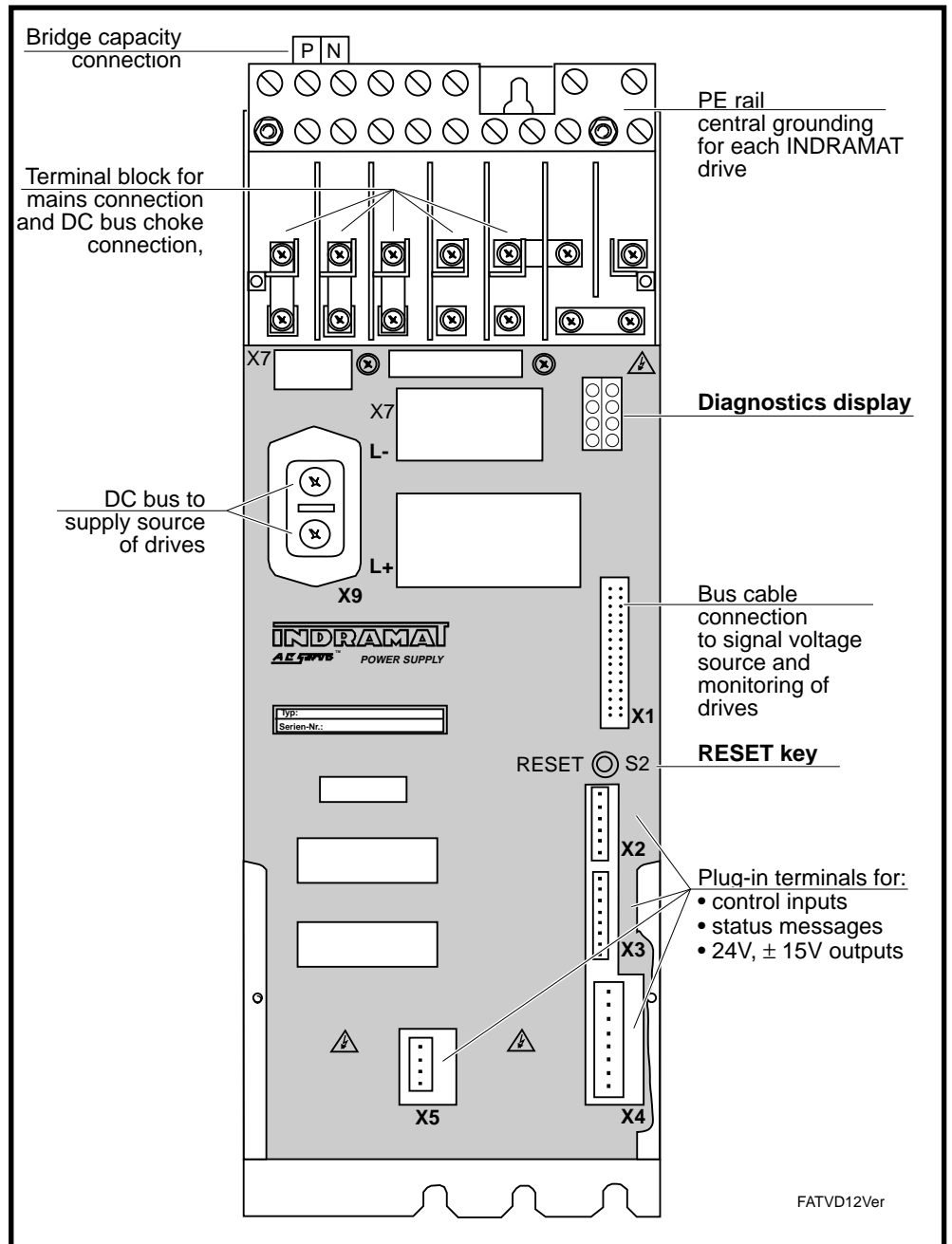


Fig 6.1 Position of the diagnostic display and RESET key on the TVD 1.3

6.2. Definitions of the Displays

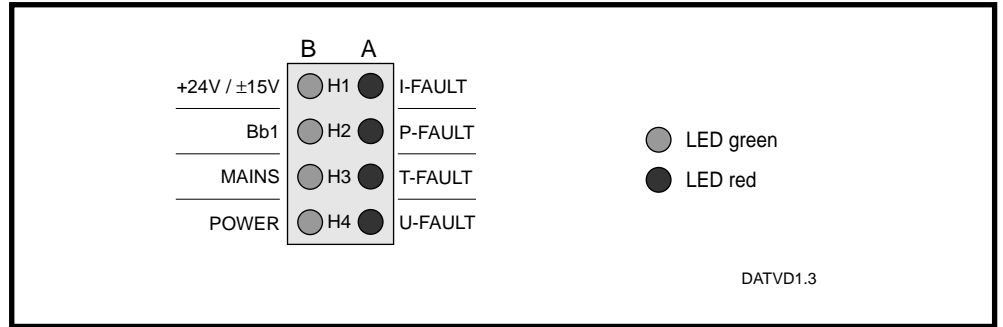
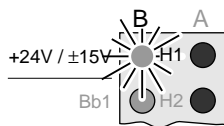


Fig 6.2 Diagnostics display on the TVD 1.3

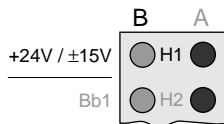


+24 V/±15 V

Display green:

Signal voltages in working order.

(Operating state)



+24 V/±15 V

Display dark:

Signal voltages not in working order.

(Fault - not stored)

Cause 1: Electronics supply input connection is faulty

Recovery

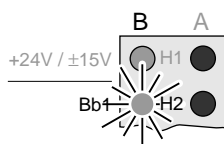
Check mains fuse in control enclosure.

Cause 2: Maximum load of signal voltage exceeded

Recovery

1. Release bus connection (X1) to drive modules and check signal voltages at X3.

2. Release external taps of signal voltages and check for short (+24 V: max. 2 A; ±15 V: maximum each of 100 mA).

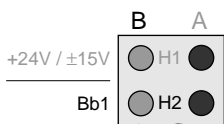


Bb1

Display green:

Supply module and drives without fault.

(Operating state)



Bb1

Display dark:

Fault in supply module or drives.

(Fault - stored)

Cause 1: Fault in supply module

Recovery

Check other diagnostic displays of the supply module.

Cause 2: Drive module fault

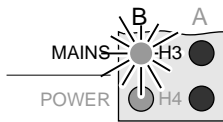
Recovery

Check diagnostics display of drive modules.

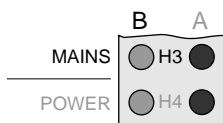
Cause 3: Signal voltage bus connection faulty

Recovery

Check bus cable at X1 and end connector of bus connection to make that they are properly in place.

**MAINS****Display green:**

Power supply in working order.

(Operating state)**MAINS****Display dark:**

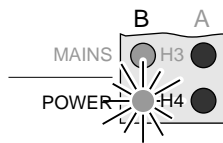
Power supply not in working order.

(Fault - not stored)

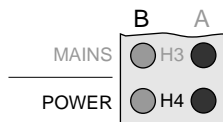
Cause: Mains fuse has been actuated, mains phase at X7 missing or mains voltage too low.

Recovery

Check mains connection (rated value: 3 x 380...480 V_{AC} ±10%).

**POWER****Display green:**

Internal mains contactor on, DC bus voltage in working order.

(Operating state)**POWER****Display dark:**

Mains contactor not on; fault in DC bus.

(Fault - not stored)

Cause 1: Mains contactor not on

Recovery

Check controller at X2/6 (+24 V_L to 0 V_L).

Cause 2: DC bus smoothing choke not or incorrectly connected

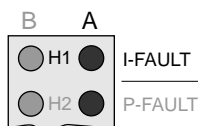
Recovery

Check DC bus smoothing choke connection (between X7/1L+ and X7/2L+).

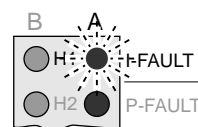
Cause 3: Rectifier faulty

Recovery

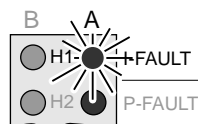
Replace unit.

**I-FAULT****Display dark:****(Operating state)**

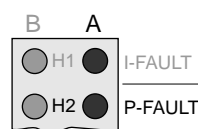
Current in power section within permissible range.

**I-FAULT****Display is flashing:****(Fault - not stored)**

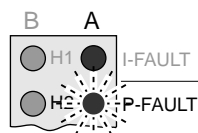
Power has been switched on even though there is a short in the unit, drive module, cable or in the motor.

**I-FAULT****Display red:****(Fault - stored)**

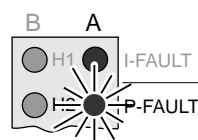
Shutdown has been actuated due to overcurrent in power section.

*Cause 1: Defective drive module, damaged motor power cable, interturn fault of the motor or DC bus choke.**Recovery***Remove conductor rails to drive modules; check drive module, motor power cable, motors and DC bus choke and replace, if necessary.***Cause 2: Short in unit**Recovery***Replace unit.****P-FAULT****Display dark:****(Operating state)**

Braking energy of drives within permissible range.

**P-FAULT****Display is flashing:****(Warning)**

Bleeder is fully loaded. Braking energy of drive may not be permitted to climb further.

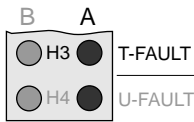
**P-FAULT****Display red:****(Fault - stored)**

Shutdown actuated due to bleeder overload.

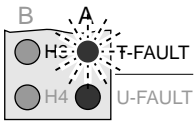
*Cause 1: Braking energy of drives too high**Recovery*

- 1. Check energy level of drives. Reduce drive speed or increase load cycle time.**
- 2. Check bleeder pre-warning contact (BVW contact) .**

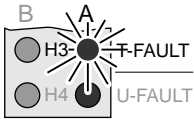
*Cause 2: Bleeder defective or internal fault in unit**Recovery***Replace unit.**

**T-FAULT****Display dark:****(Operating state)**

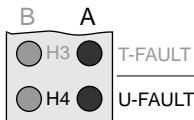
Heatsink temperature within permissible range.

**T-FAULT****Display is flashing:****(Warning)**

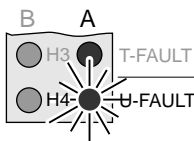
Heatsink temperature too high. Power will shutdown within next 30 seconds.

**T-FAULT****Display red:****(Fault - stored)**

Shutdown has been actuated as heatsink temperature is too high.

*Cause: Unit overloaded or ambient temperature too high**Recovery***Check load/ambient temperature. Check temperature pre-warning contact (TVW contact) of the unit.****U-FAULT****Display dark:****(Operating state)**

DC bus voltage exceeding permissible range.

**U-FAULT****Display red:****(Fault - stored)**

Shutdown has been actuated as DC bus voltage is exceeding maximum permissible value.

*Cause 1: Mains voltage too high**Recovery***Check mains voltage (rated value: 3 x 380...480 V_{AC} ±10%). Replace unit.***Cause 2: Fault in unit**Recovery***Replace unit.**

7. TVM 2.4

Operating states, warnings and faults are signalled by the unit via LEDs.

Details on each display are listed in the section "Definition of the Displays", and include

- a definition,
- the possible causes of a warning or error, and, if necessary,
- recovery procedures.



Incorrect diagnoses are possible!

A steady green light of the display "+24 V/±15 V" is a prerequisite for fault diagnostics. Control voltages can be checked at terminal X10.

If this display is not lit up, then there is a control voltage problem. This means that the other displays could signal incorrect states.

Faults in the control voltage source should, therefore, be eliminated first.

Clearing a Fault

Once a fault has been cleared, it is necessary to clear or cancel the error messages. Otherwise, the machine remains unready to operate.

Faults are cleared by

- pressing the "RESET" key on the front of the device or
- switching the power to the electronics sequentially off and on once.

Contacting INDRAMAT Customer Service

If the user is unable to clear a fault, then it becomes necessary to contact INDRAMAT Customer Service.

In the interests of a quick and decisive processing of the problem, we would appreciate having the following information handy at the time of contact, viz.,

- the type data and serial numbers of units and motors,
- the fault status and
- the diagnostics and fault displays information.

Telephone numbers

INDRAMAT Customer Service can be reached from Monday through Friday between 7:00 a.m. and 5:00 p.m. at the following numbers:

09352/40-4894 (AC Drive Systems)

09352/40-4922 (AC Drive Systems)

09352/40-4592 (MT-CNC Applications)

09352/40-4808 (CLM; DLC; non-cutting machining)

Service-Hotline

The Service-Hotline can be reached at **0172/6600406** or **0171/3338826** during the following hours.

Mondays through Fridays: 5:00 p.m. to 11:00 p.m.

Saturdays: 8:00 a.m. to 8:00 p.m.

Sundays and holidays: 9:00 a.m. to 7:00 p.m.

7.1. Position of the Diagnostic Display and RESET Key

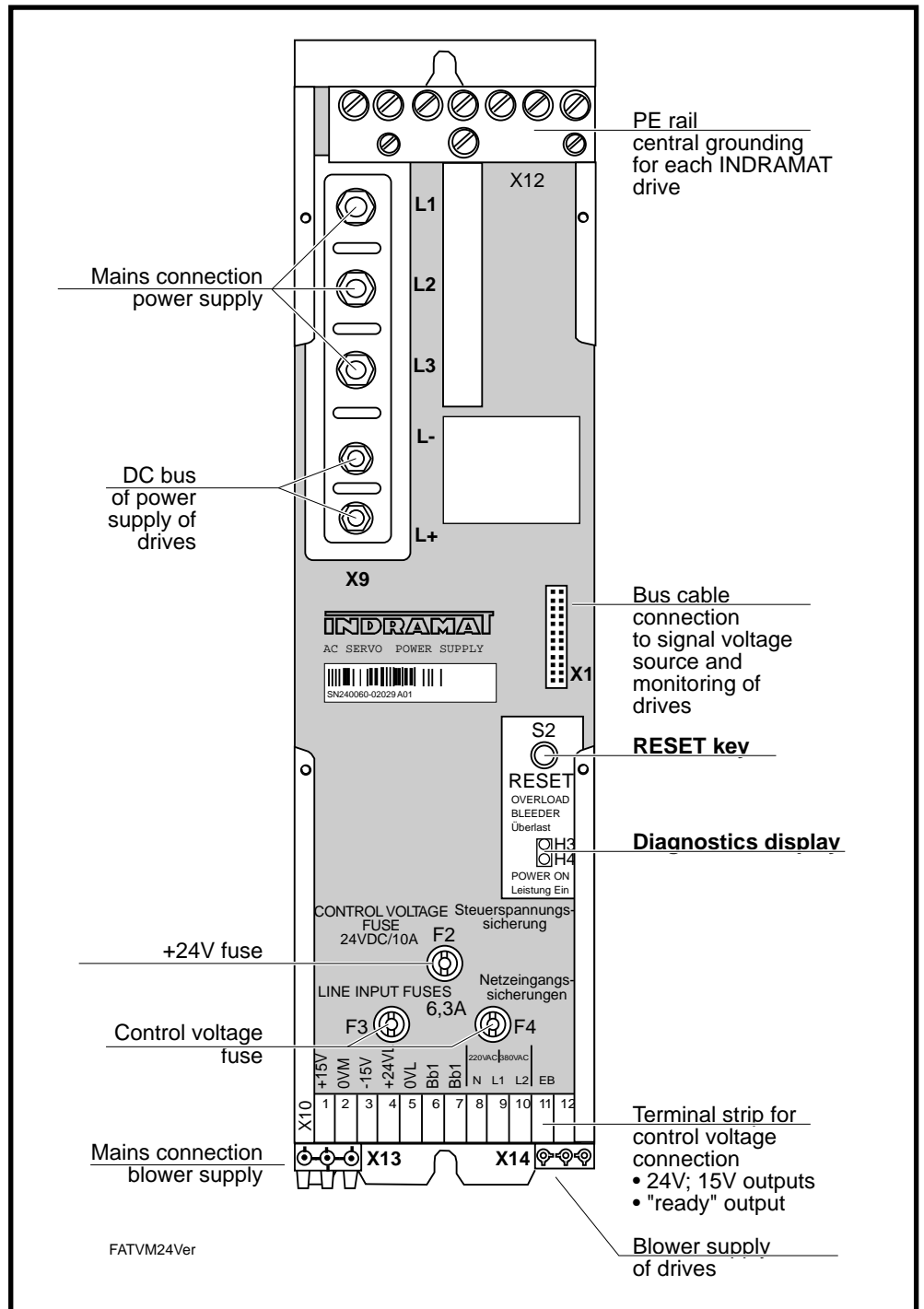


Fig 7.1 Position of the display and RESET key on the TVM 2.4

7.2. Definitions of the Displays

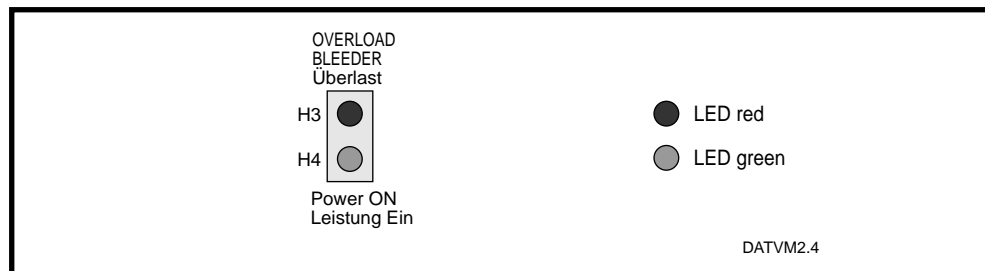
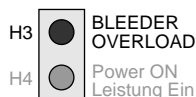


Fig 7.2 Diagnostics display on the TVM 2.4



BLEEDER OVERLOAD

Display dark:

(Operating state)

Braking energy of drives within permissible range.



BLEEDER OVERLOAD

Display red:

(Fault - stored)

Shutdown has been actuated as bleeder overloaded.

Cause 1: Braking energy of drives too high

Recovery

Increase load cycle time or reduce drive speed.

Cause 2: Bleeder defective or internal fault in unit

Recovery

Replace unit.

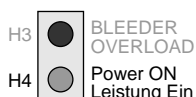


POWER ON

Display green:

(Operating state)

Power supply in working order.



POWER ON

Display dark:

(Fault - not stored)

Power not on or not working.

Cause 1: Mains fuse switched off.

Recovery

Check mains fuse.

Cause 2: Mains fuse not on.

Recovery

Check mains fuse controller.

Cause 3: Mains voltage too low or mains phase missing.

Recovery

Check input to network at X9 (rated value: 3 x 230 V_{AC} ±10%).

7.3. Fault Without Display

Bb1 Contact Will Not Close

(Fault)

Cause 1: Drive module fault

Recovery **Check diagnostics display of drive modules.**

Cause 2: Signal voltage bus connection faulty

Recovery **Check bus cable at X1 and end connector of bus connection to make sure that they are properly in place.**

+24 V and/or ±15V control voltage faulty

(Fault)

Cause 1: Fuse F2, F3 or F4 defective

Recovery **Check fuses and replace, if necessary.**

Cause 2: Maximum load of signal voltage exceeded

Recovery **1. Release bus connections (X1) to drives and check signal voltage at X10.**
2. Release external taps of signal voltages and check for short (+24 V: max. 2 A; ±15 V: maximum each of 100 mA).

Cause 3: Control voltage connection at X10 faulty

Recovery **Check mains fuse in control enclosure.**

8. TVR 3.1

Operating states, warnings and faults are signalled by the unit via LEDs and a two-place seven-segment display.

Details on each display are listed in the section "Definition of the Displays", and include

- a definition,
- the possible causes of a warning or error, and, if necessary,
- recovery procedures.



Incorrect diagnoses are possible!

A steady green light of the display "+24 V/±15 V" is a prerequisite for fault diagnostics.

If this display is not lit up, then there is a control voltage problem. This means that the other displays could signal incorrect states.

Faults in the control voltage source should, therefore, be eliminated first.

Clearing a Fault

Once a fault has been cleared, it is necessary to clear or cancel the error messages. Otherwise, the machine remains unready to operate.

Faults are cleared by

- pressing the "RESET" key on the front of the device or
- switching the power to the electronics sequentially off and on once.

Contacting INDRAMAT Customer Service

If the user is unable to clear a fault, then it becomes necessary to contact INDRAMAT Customer Service.

In the interests of a quick and decisive processing of the problem, we would appreciate having the following information handy at the time of contact, viz.,

- the type data and serial numbers of units and motors,
- the fault status and
- the diagnostics and fault displays information.

Telephone numbers

INDRAMAT Customer Service can be reached from Monday through Friday between 7:00 a.m. and 5:00 p.m. at the following numbers:

09352/40-4894 (AC Drive Systems)

09352/40-4922 (AC Drive Systems)

09352/40-4592 (MT-CNC Applications)

09352/40-4808 (CLM; DLC; non-cutting machining)

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Saturdays: 8:00 a.m. to 8:00 p.m.

Sundays and holidays: 9:00 a.m. to 7:00 p.m.

8.1. Position the Diagnostic Display and RESET Key

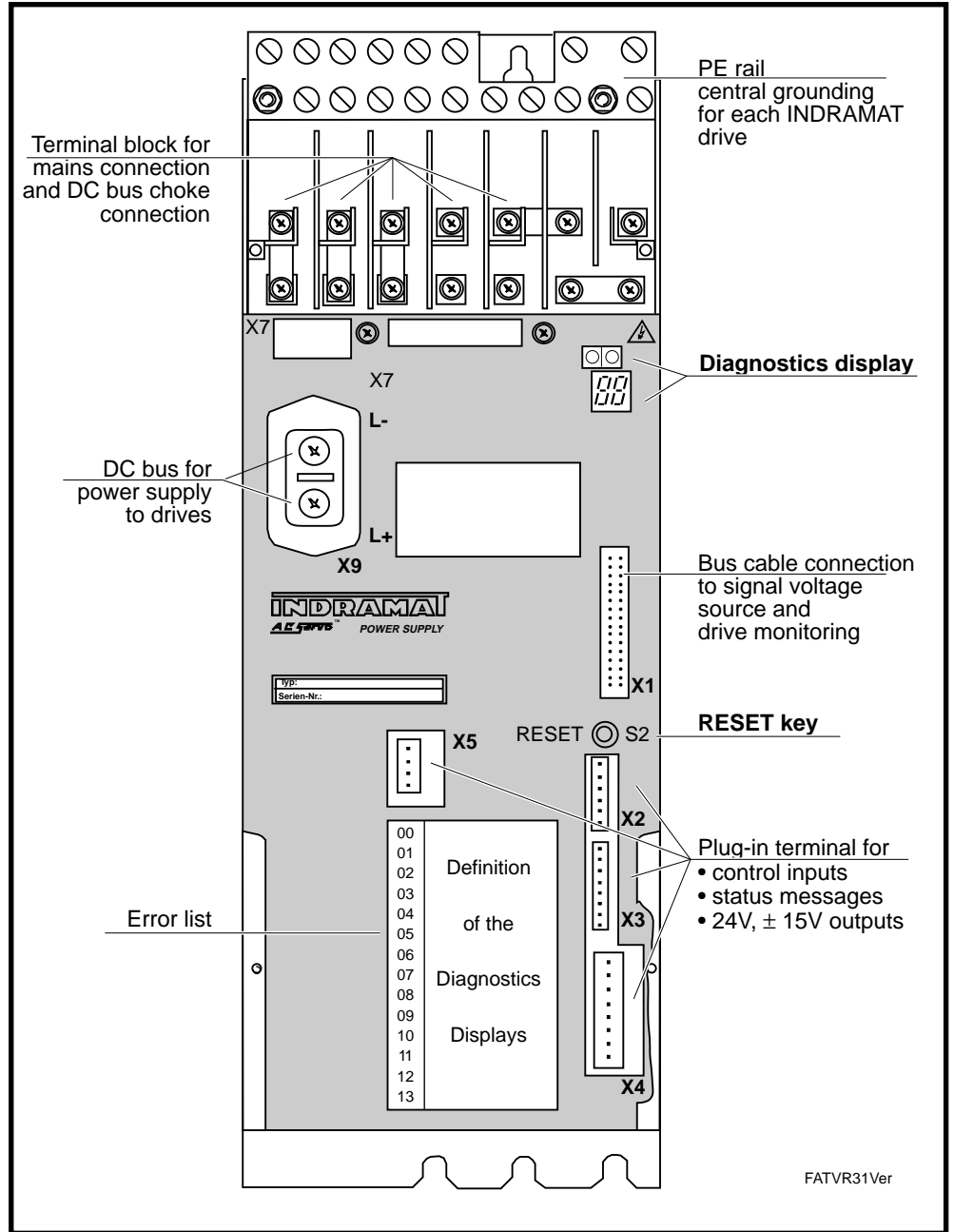


Fig 8.1 Position of the display and RESET key on the TVR 3.1

8.2. Definitions of the Displays

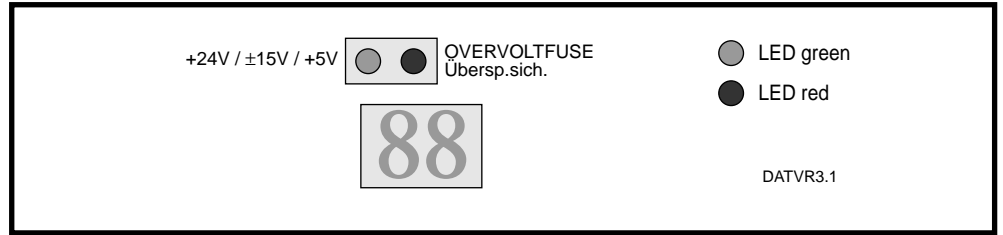


Fig. 8.2 Diagnostic displays on the TVR 3.1



+24 V/±15 V/+5 V

Display green:

(Operating state)

Signal voltages in working order.



+24 V/±15 V/+5 V

Display dark:

(Fault - stored)

Signal voltages not in working order.

Cause 1: Electronics supply mains connection is faulty

Recovery

Check mains fuse in control enclosure

Cause 2: Maximum load of signal voltage exceeded

Recovery

1. Release bus connections (X1) to drives and check signal voltage at X3.

2. Release external taps of signal voltages and check for short (+24 V: max. 2 A; ±15 V: maximum each of 100 mA).

Cause 3: Unit defective.

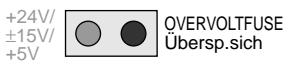
Recovery

Replace unit.

Cause 4: If the DC bus has a back up after a power failure, then the DC bus capacity is too small.

Recovery

Increase DC bus capacity.



OVERVOLT FUSE

Display dark:

(Operating state)

Voltage in power section within permissible limit.



OVERVOLT FUSE

Display red:

(Fault - stored)

Shutdown has been actuated as voltage in power section exceeds permissible limit.

Cause 1: Mains voltage too high

Recovery

Check mains voltage (max. 480 V_{AC} +10 %). Replace unit.

Cause 2: Fault in unit

Recovery

Replace unit.

00 **POWER (Leistung)** **(Operating state)**
DC bus voltage within permissible range; unit ready to output power.

01 **POWER OFF (Leistung aus)** **(Operating state)**
Power contactor has fallen off.

Cause 1: OFF or E-stop button has been pressed.

Recovery **Power up.**

Cause 2: Controller faulty (if power can not basically be switched on)

Recovery **Check control circuits. Turnon pulse between X2/5 and X2/6: min. 300 ms.**

02 **POWER OFF WITH ZKS (Leistung aus mit ZKS)** **(Operating state)**
Power contactor has fallen off; DC bus short has been actuated.

Cause: The plant controller has actuated a DC bus dynamic brake.

Recovery **Check the entire E-stop sequence.**

03 **+24 V/±15 V** **(Fault - stored)**
Signal voltages not in working order.

Cause 1: Electronics supply mains connection is faulty

Recovery **Check mains fuse in control enclosure**

Cause 2: Maximum load of signal voltage exceeded

Recovery **1. Release bus connection (X1) to drive modules and check signal voltage at X3**
2. Release external taps of signal voltages and check for short (+24 V: max. 2 A; ±15 V: maximum each of 100 mA).

Cause 3: Unit defective.

Recovery **Replace unit.**

Cause 4: If DC bus is buffered after a power failure, then the DC capacitor is too small.

Recovery **Increase DC bus capacitor.**

04 **MAINS FAULT (Netz-Fehler)** **(Fault - stored)**
Mains voltage is faulty.

Cause: Mains fuse has been actuated, mains phase at X7 missing or mains voltage too low

Recovery **Check mains connection (rated value: 3 x 380...480 V_{AC} ; ±10 %).**

05

UD FAULT (UD Fehler)

(Fault - not stored)

DC bus voltage exceeds permissible value.

Cause 1: Mains voltage too high or too low

Recovery

Check mains connection (rated value: 3 x 380...480 V_{AC} ; ±10 %).

Cause 2: DC bus smoothing choke not or incorrectly connected

Recovery

Check DC bus smoothing choke connection (between X7/1L+ and X7/2L+).

Cause 3: Fault in unit

Recovery

Replace unit.

06

HEAT SINK TEMP. FAULT (Kühlkörper Übertemp.)

(Fault - stored)

Cause: Unit overloaded or ambient temperature too high

Recovery

Check load/ambient temperature. Check temperature pre-warning contact (TVW contact) of the unit.

07

BLEEDER OVERLOAD (Bleeder Überlast)

(Fault - stored)

Cause 1: Braking energy of drives with power shutdown is too high.

Recovery

Check energy content of drives. Reduce drive speed. Delay power down with OFF or E-Stop.

Cause 2: Bleeder defective or internal fault in unit

Recovery

Replace unit.

08

EPU FAULT (EPU Fehler)

(Fault - not stored)

Capacitor between X7/EPU+ and X7/EPU- has short circuited or been incorrectly polarized.

Cause 1: Capacitor incorrectly polarized or wiring faulty

Recovery

Clamp off capacitor. Check wiring.

Cause 2: Capacitor defective

Recovery

Replace capacitor.

Cause 3: Internal fault in unit

Recovery

Replace unit.

09

SOFTSTART FAULT (Softstart-Fehler)

(Fault - stored)

DC bus cannot be loaded.

Cause 1: Additional capacitance connected to DC bus is too big.

Recovery **Reduce additional capacitance.**

Cause 2: DC bus smoothing choke not or incorrectly connected

Recovery **Check DC bus smoothing choke connection (between X7/1L+ and X7/2L+).**

Cause 3: Bridge or DC bus capacitor incorrectly polarized, short-circuited or wiring is faulty

Recovery **Check wiring.**

Cause 4: Short in a drive module

Recovery **Check diagnostics display of drive modules.**

Cause 5: Short in unit.

Recovery **Replace unit.**

Cause 6: Power on while DC bus dynamic brake thyristor still conducting current

Recovery **Delay powering up after OFF until DC bus has discharged.**

10

OVERCURRENT (Überstrom)

(Fault - stored)

Cause 1: Defective drive module, damaged motor power cable or interturn fault in motor

Recovery **Remove conductor rails to drive modules; check, drive module, motor power cable and motors, replace if necessary.**

Cause 2: DC bus choke defective or wrong type has been installed.

Recovery **Check DC bus choke.**

Cause 3: Short in unit.

Recovery **Replace unit.**

11

CONTROLLER ERROR (Prozessorstörung)

(Fault - stored)

Cause 1: Program sequence in unit disrupted.

Recovery **Switch power off and on again.**

Cause 2: Microprocessor in unit defective.

Recovery **Replace unit.**

12 **DRIVE FAULT (AntriebsFehler)** **(Fault - not stored)**

Cause 1: Defect in drive module, motor power cable or motor

Recovery **Check diagnostics display of drive module; step by step, release bus connection (X1) to the drive modules.**

13 **DEVICE DAMAGED (Gerät defekt)** **(Fault - stored)**

Overvoltage fuse in unit has actuated.

Cause 1: Mains voltage too high

Recovery **Check mains voltage (max. 480 V_{AC} +10 %). Replace unit.**

Cause 2: Fault in unit

Recovery **Replace unit.**

14 **BRIDGE FAULT (Brücken-Fehler)** **(Fault - not stored)**

Bridge voltage cannot be built up.



Caution

Source of danger:

Switch unit on several times with fault "Bridge Fault"!

Possible affects:

Unit can be damaged by repeatedly switching it on and off!

Avoid:

Check all the following items (causes 1 and 2), before switching the unit back on.

Cause 1: Mains voltage too low

Recovery **Check mains voltage at X7 (3 x 380 V...480 V_{AC} ±10 %)**

Cause 2: Mains fuse has actuated

Recovery **Check mains fuse. Check wiring for short.**

15 **MISWIRING (Anschluß-Fehler)** **(Fault - not stored)**

Cause: Electronic supply connections incorrectly polarized (in terms of the power supply connections).

Recovery **Check voltages at X7. Clamps 1U1 and 2U1, 1V1 and 2V1, 1W1 and 2W1 may not be permitted to conduct voltage to each other.**

16 **CHECKSUM ERROR (Prüfsummen-Fehler)** **(Fault - not stored)**

Cause: EPROM in unit defective

Recovery **Replace unit.**

8.3. Fault Without Display

Bb1 contact will not close

(Fault)

Cause 1: Drive module fault

Recovery

Check diagnostics display of drive modules.

Cause 2: Signal voltage bus connection faulty

Recovery

Check bus cable at X1 and end connector of bus connection to make sure that they are properly in place.

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