



**Handling Components
SERVOLINE**

QUICK START

Version I/O

BA-100038

Edition 02/06

Change index

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1. General

1.1 Introduction

This manual sets out the fundamental approach to be taken when setting up a servo axis by providing a practical example.

The equipment consists of a programmable logic controller (PLC), a servo amplifier with I/O card, and a servo axis.

All stages which are necessary for commissioning are described step by step. Programming of the PLC is to be undertaken by the customer.

1.2 Documents

This manual forms part of the complete documentation of the SERVOLINE® products. The complete documentation consists of the following documents:

Item no. Description

BA-100038 Quick Start (version I/O)

This manual explains the minimum tasks necessary to operate a servo axis. It contains cross references to the respective operating manual.

BA-100040 Setup software (version I/O)

The **Manual Montech Setup Software** is hereinafter referred to as MMSS. It contains detailed information for setting the servo amplifier.

BA-100039 Servo amplifier (version I/O)

The **Manual Montech Servo Amplifier** is hereinafter referred to as MMSA. It contains detailed information for installation and cabling of the servo amplifier.

Miscellaneous

Mechanical design of the SERVOLINE® products

The **Manual Montech Mechanical Part** is hereinafter referred to as MMMP. It contains detailed information for installation and cabling of the servo axis.

The documentation is available in the German language.

1.3 Dangers and safety notes



Please read this documentation before commencing with setup. Failure to use manufacturers instructions or incorrect handling of the equipment may lead to personal injury or material damage and will render the warranty null and void. It is imperative to observe the technical data and information on connection requirements.

Only properly qualified personnel are permitted to perform activities such as installation, setup and maintenance. Properly qualified persons are those who are familiar with the assembly, installation, setup and operation of the product, and who have the appropriate qualifications for their job. The qualified personnel must know and observe the following standards or guidelines:

IEC 364 and CENELEC HD 384 or DIN VDE 0100
IEC report 664 or DIN VDE 0110
National accident prevention regulations or VBG4

See also MMSS chapter 1.1, MMSA chapter 1.3 to 1.5 and MMMP chapter "Dangers"

1.4 “Use as directed”

The setup software is intended to be used for altering or storing the operational parameters of the servo amplifier of the SERVOLINE® products. The servo amplifier that is connected is commissioned by means of the software - whereby the drive can be directly controlled by the setup and service functions. Due to the characteristic nature of a PC, these functions do not provide operational safety without further measures. A PC program might unexpectedly be disturbed or stopped, so that in the event of a malfunction, any movements that have already been initiated can no longer be stopped from the PC.

The equipment manufacturer is obliged to prepare a hazard analysis of the equipment, and is also responsible for functional, mechanical and personal safety aspects in relation to the machine. This applies especially to the initiation of movements by way of functions in the setup software.



Sets of data that are stored on data media are not safe from unintended alteration by third parties. **After a set of data has been loaded, all parameters must always be checked** before the servo amplifier is enabled.

Servo amplifiers are components that are built into electrical equipment or machinery; they must only be operated as integral components of such equipment.

The BTB contact must be wired into the safety loop of the system. The safety loop as well as the stop and emergency stop functions must comply with the requirements of EN60204, EN292 and VDI2853.

Before operating the servo axes, all work is to be carried out as specified in the operator manuals of the servo amplifier and the Servoline axes. Strictly observe all safety regulations.



Assembly, installation, wiring and **final check have been carried out according to the operator manual for the servo amplifier.**

Assembly, installation and **final check have been carried out according to the user manual for the servo axes.**

See also MMSA chapter 1.6 to 1.8, and MMMP chapter EU conformity declaration.

1.5 Software description

The servo amplifier has to be adapted to the conditions of the application (target position, acceleration, speed etc.). Such parameterisation is not carried out on the amplifier itself but on a PC by means of the setup software. The PC is connected (in series) to the servo amplifier via a null-modem cable. The setup software establishes communication between the PC and the servo amplifier.

With very little effort, you can alter parameters and instantly see the effect on the drive, since there is a permanent (online) connection to the amplifier. Simultaneously, important actual values are read out from the amplifier and displayed on screen.

You can store (archive) sets of data on a data carrier and load them again. The data set currently in use can be printed.

1.6 Prerequisites

The servo axis has been safely installed according to the "Operating instructions, mechanical part", chapter "Important information and installation".

The servo amplifier has been safely installed according to MMSA chapters 1 and 3. The servo amplifier is equipped with an **I/O extension card**. The I/O extension card is equipped with two 12-pin mini Combicom connectors.

A PC with loaded Montech AG software 2.0 is available.

A PLC is available. For this application, 5 digital outputs and 3 digital inputs are required.

If the PLC does not provide an auxiliary voltage of 24V DC, then an additional 24V DC voltage supply must be provided.

The voltage supply systems (24V DC, 240V AC and 400V AC) are switched OFF.

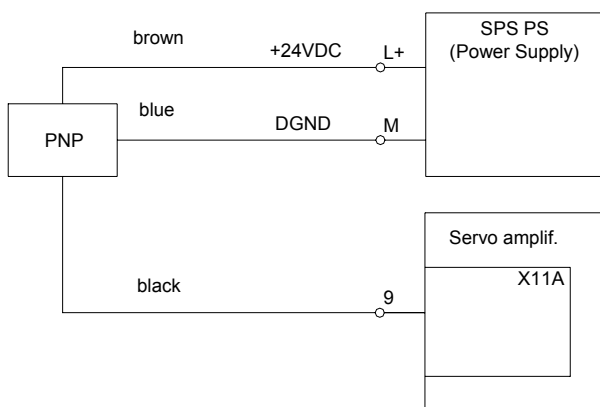
2. Wiring

Wiring of the PLC, the servo amplifier and the servo axis.

2.1 Connecting the reference switch (zero point of the servo axis) to the servo amplifier

Wiring the proximity switch is according to the following diagram.

See also MMSA chapter 4.2 and MMMP chapter "Installation", paragraph "Connecting the inductive proximity switch".

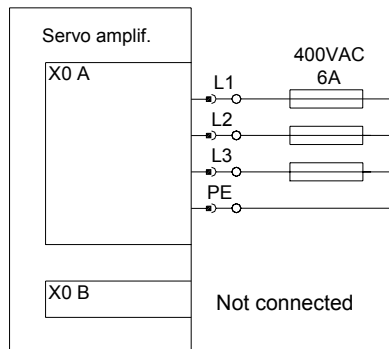


2.2 Mains connection (X0)

Directly on the earthed 3-phase mains, 400V, 50Hz, filter class A integrated.
Fuses 6AT, e.g. fusible cut-outs.

Terminal X0/B is not occupied. It is used to transmit voltage supply to additional servo amplifiers.

See also MMSA chapter 4.3.1



2.3 Resolver connection (X2)

The resolver cable transmits the signals of the two-pin hollow shaft resolver and the thermal protection contact.

Use the connection cable supplied; it is shielded and suitable for use as trailing cable. Connect the resolver (which is integrated in the motor of the servo axis) to terminal X2 at the amplifier.

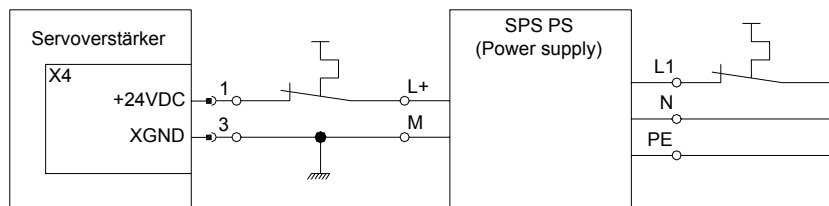
See also MMSA chapter 4.5 and MMMP chapter "Installation", paragraph "Connecting the motor and resolver cables".

2.4 Connection 24V auxiliary voltage (X4)

The power supply module PS takes its power from the PLC. Connection is according to the following diagram.

Connect the power supply module to the 2-phase mains, 230V, 50Hz.

See also MMSA chapter 4.3.2



2.5 DC-link circuit (X7)

Function: parallel connection of the ballast power to all connected amplifiers. Since no ballast resistor and only one amplifier is used in our application, this terminal is not used. The terminal is not occupied.

2.6 External ballast resistor (X8)

Since in this application no external ballast resistor is used, check that there is a plug-in bridge on connectors X8/-RB and X8/Int. If this is not the case, a plug-in bridge will have to be installed.

2.7 Motor connection (X9)

Use the connection cable supplied; it is shielded and capable of following. Connect the motor of the servo axis with the amplifier, terminal X9.

See also MMSA chapter 4.4 and MMMP chapter "Installation", paragraph "Connecting the motor and resolver cables".

2.8 Encoder (X1)

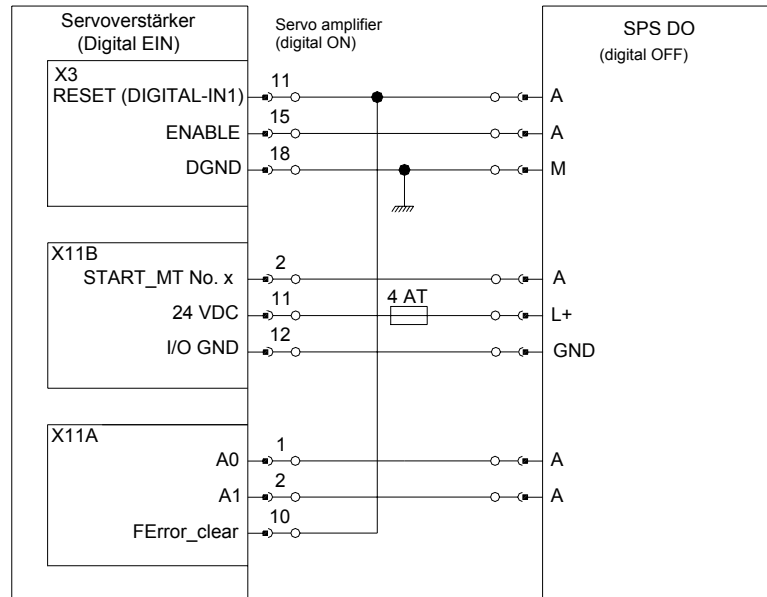
This connection is not used. The connection/terminal is not occupied.

See also MMSA chapter 4.5.2

2.9 Digital control inputs of the amplifier (X3; X11B and X11A)

Connect the cables as shown in the diagram below. Specifications of the cable up to 50 m: 0.5 mm², not shielded.

See also MMSA chapters 4.6.1 and 4.6.2



2.9.1 Description of the digital input functions

Reset (DIGITAL_IN1) Software reset of the servo amplifier in the event of a fault. All the functions and displays are set to the initial status. Parameters that are not stored in the EEPROM are deleted; the parameter set which is stored in the EEPROM is loaded. If any of the error messages F01, F02, F03, F05, F08, F13, F16 or F19 (chapter 6.3) are present, then no software reset will be carried out, instead only the error message will be deleted. This means that, for example, the encoder output signals are stable and can continue to be evaluated by the control system.

See also MMSS chapter 2.7.1.1

Enable Releases the output stage of the servo amplifier (high= active). In the disabled state (low signal) the connected motor is without torque.

See also MMSA chapter 4.6.1.1

Start_MT No.x Start of a motion task that is stored in the servo amplifier, with definition of the motion task number which is present in bit-coded form on inputs A0 to A7. Motion task number "0" starts the reference traverse (homing). A rising edge starts the motion task; a falling edge cancels the motion task.

See also MMSS chapter 2.6.1.1

A0 or A1 Motion block 1 or motion block 2

See also MMSS chapter 2.6.1.1

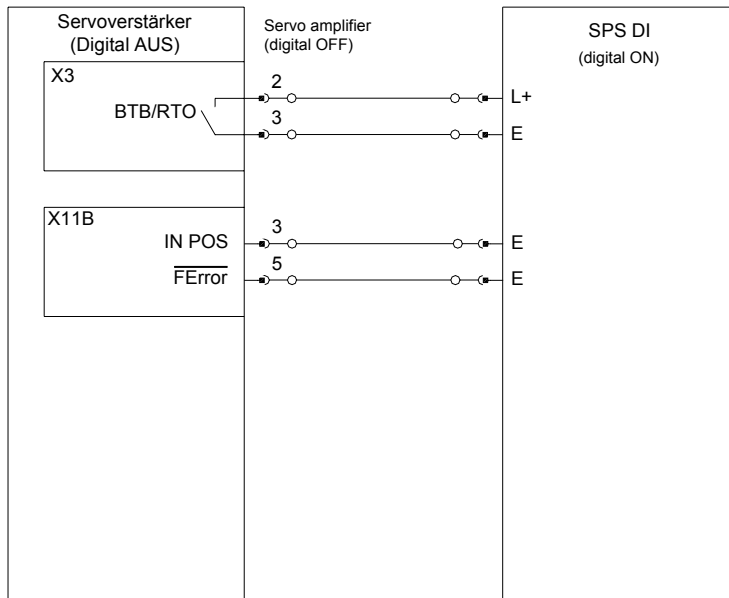
FError_clear A rising edge at the digital input clears any warning that may be present (following error / response monitoring).

See also MMSS chapter 2.6.1.1

2.10 Digital control outputs of the amplifier (X3; X11B)

Connect the cables as shown in the diagram below. Specifications of the cable up to 50 m: 0.5 mm², not shielded.

See also MMSA chapter 4.6.3 and 4.6.4



2.10.1 Description of the digital output functions

BTB/ RTO

Operational readiness is signalled via a potential-free relay contact.. The contact is closed if the servo amplifier is ready for operation. The message is **not** affected by the enable signal, the I²t limit or the regen threshold.

All errors result in the BTB contact dropping out and the output stage switching off. See chapter 6.3 for a list of error messages.

See also MMSA chapter 4.6.3.1

InPos

When the target position (InPosition window) for a motion task has been reached, this is signalled by the output of a High signal. If a number of motion tasks are automatically executed in sequence, the message is issued that the final position of the motion task sequence (target position of the last motion task) has been reached.

See also MMSS chapter 2.6.1.2

FError

If the position moves outside the preset following-error window, this is signalled by a Low signal.

See also MMSS chapter 2.6.1.2

2.11 Encoder emulation (X6)

This connection is not used. The connection/ terminal is not occupied.

See also MMSA chapter 4.7

2.12 PC connection, RS-232 interface (X6)

With the supply voltages switched off, connect the PC interface (X6) of the **servo amplifier** via the null-modem cable to a serial interface of the PC (**do not use a null-modem link cable**).



Connect or disconnect the interface cable only if the supply voltages (amplifier and PC) have been switched off.

The interface is galvanically separated via an optocoupler and is on the same potential as the CANopen interface.

See also MMSA chapter 4.8

3. Setting the amplifier

This chapter describes how to set the inputs of the amplifier and the parameters of motion tasks.

Switch the PC and the servo amplifier (24 VDC; 400 VAC) on.

3.1 Setting the inputs

You reach the screen page <<Desktop>> from the PC.

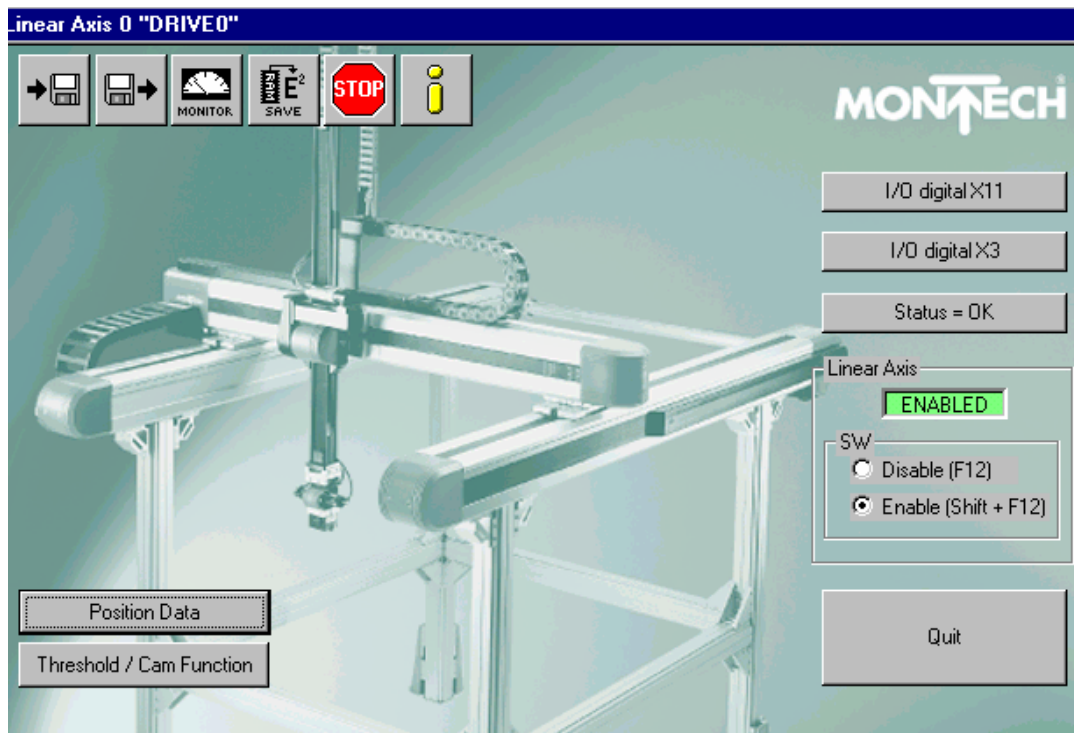
Doubleclick on the Servoline icon. (If there is no such icon, you will need to load the firmware anew). See MMSS chapter 1.6.

You reach the <<Communication>> screen page. See also MMSS chapter 1.9.



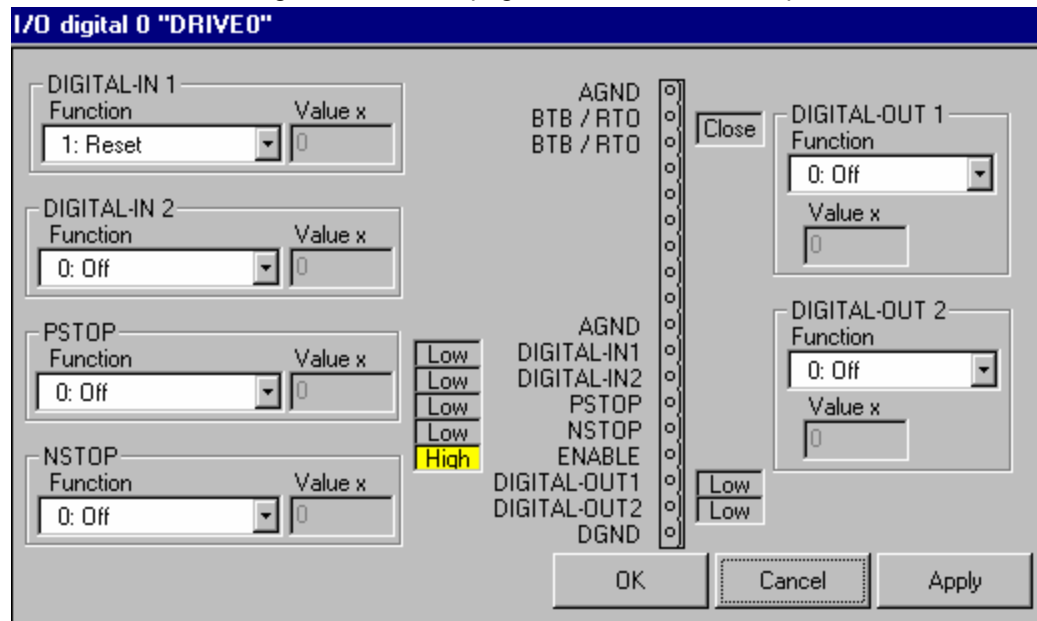
Click on the appropriate interface or on COM1 or COM2, depending on the connection of the null-modem cable.

You reach the <<Linear axis>> screen page with the MONTECH logo top right. See also MMSS chapter 2.3.



Click on <<I/O digital X3>>.

You reach the <<I/O digital 1>> screen page. See also MMSS chapter 2.7.



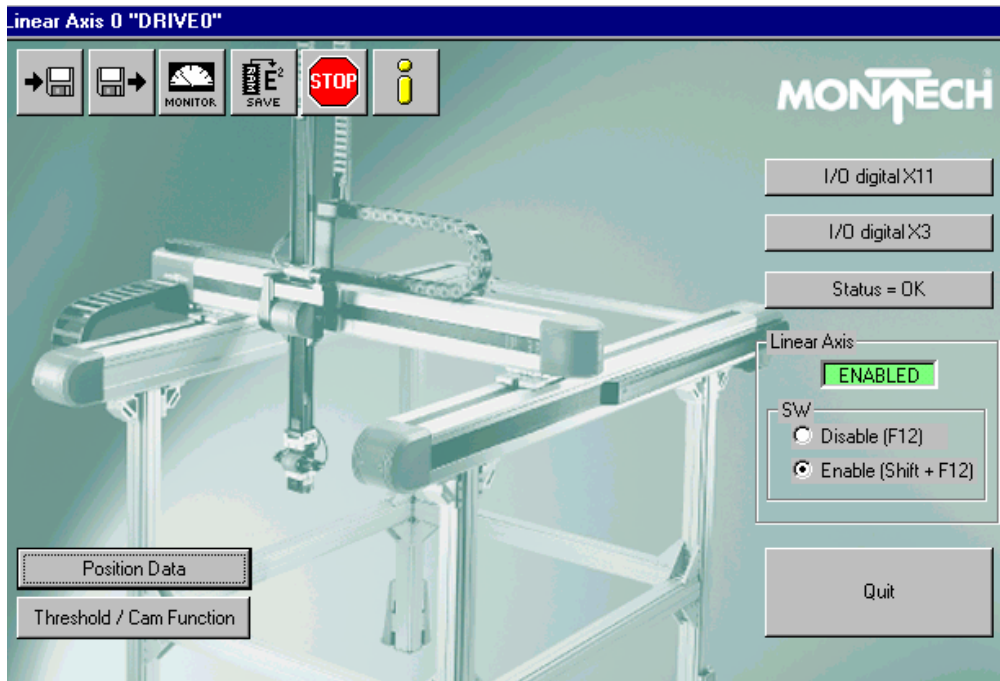
Press the key <<F12>> on the keyboard. This disables the output stage. You can also select this function on the screen page <<Linear axis>> under Disable (F12).

In the field <<DIGITAL-IN1/function>> select the <<RESET>> function by clicking the arrow.

Click on OK to return to the <<Linear axis>> screen page with the MONTECH logo top right.

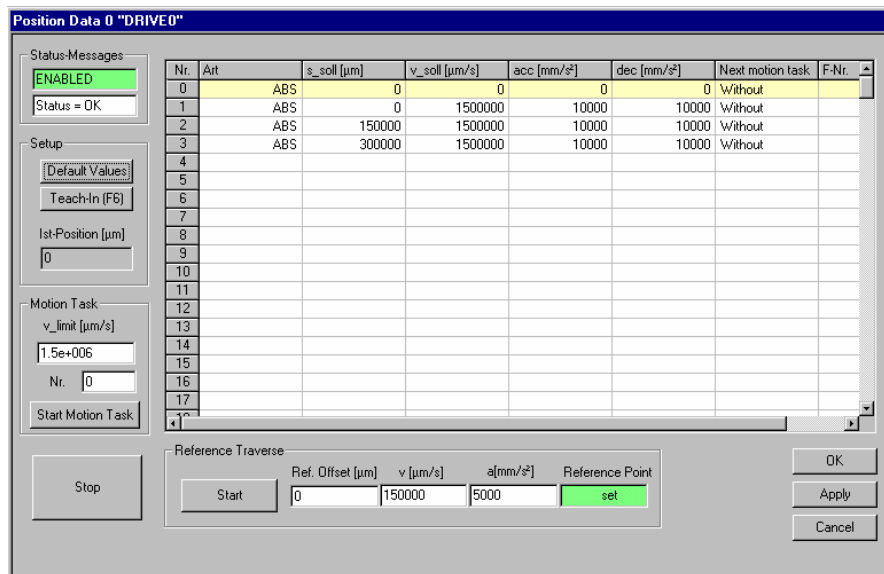
Respond to the prompt: <<Store data in EEPROM and reset the amplifier>> by clicking on<<Yes>>

3.2 Setting the motion tasks



Click on the field Positioning data.

You reach the <<Positioning data>> screen page. See also MMSS chapter 2.4.



Enter the desired data (in the present example, two motion tasks are required). (Motion task <<0>> can only be used by a field bus system). To enter the data, click on <<Default values>> in the <<Setup>> field to the left of the table.

You reach the <<Default values>> screen page. See also MMSS chapter 2.4.4.1.

Under <<Type>> select <<ABS>> (absolute motion task) by clicking on the arrow and selecting <<ABS>> from the list.

Under <<v_cmd>> enter the desired value, e.g. <<1,000,000>>; this denotes the speed in $\mu\text{m/s}$. Confirm your entry by pressing <<Return>>. Refer to MMSS chapter 2.15.2 for the limit (maximum value).

Under <<acc>> enter the desired value, e.g. <<3,750>>; this denotes the acceleration in mm/s^2 . Confirm your entry by pressing <<Return>>. Refer to MMSS chapter 2.15.2 for the limit (maximum value).

Under <<dec>> enter the desired value, e.g. <<3,750>>; this denotes the brake acceleration in mm/s^2 . Confirm your entry by pressing <<Return>>. Refer to MMSS chapter 2.15.2 for the limit (maximum value).

Under <<Next motion task>> select <<Without>> by clicking the arrow, and from the list selecting <<Without>>.

Click on <<OK>> to store the data in the EEPROM. You have now directly reached the <<Positioning data>> screen page.

Press key <<F12>> on the *keyboard*; this will disable the output stage.

Doubleclick on the field <<Art. - no. 1>> and select <<ABS>>. The values which you have entered in the <<Default values>> window will automatically be written to the input fields v_cmd; acc; dec; and Next motion task. Now enter a value in the field s_cmd.

Doubleclick on the field <<no. 1 - s_cmd [μm]>> and enter the desired value, e.g. << 200,000 >>; this denotes the travel in μm . Confirm your entry by pressing <<Return>>.

The 1st motion task has thus been completely defined. Independently of the current position, the slide of the servo axis will move to position 200,000 μm at the respective acceleration and speed.

Doubleclick on the field <<Art. - no. 2>> and select <<ABS>>. The values which you have entered in the <<Default values>> window will automatically be written to the input fields v_cmd; acc; dec; and Next motion task. Now enter a value in the field s_cmd.

Doubleclick on the field <<No.2 - s_cmd [μm]>> and enter the desired value, e.g. << 0 >>; this denotes the travel in μm . Confirm your entry by pressing <<Return>>.

The 2nd motion task has thus been completely defined. Independently of the current position, the slide of the servo axis will move to position 0 μm (reference point) at the respective acceleration and speed.

Click on <<OK>> to store the data in the EEPROM. You have now directly reached the <<Linear axis>> screen page with the MONTECH logo top right.

3.3 End of parameter setting

Initialisation of the amplifier has now been completed. You can switch back to the Windows desktop level.

Click on <<Quit>> and confirm the prompt <<Quit>> by pressing <<Yes>>.

You are now back on the screen page <<Communication>>.

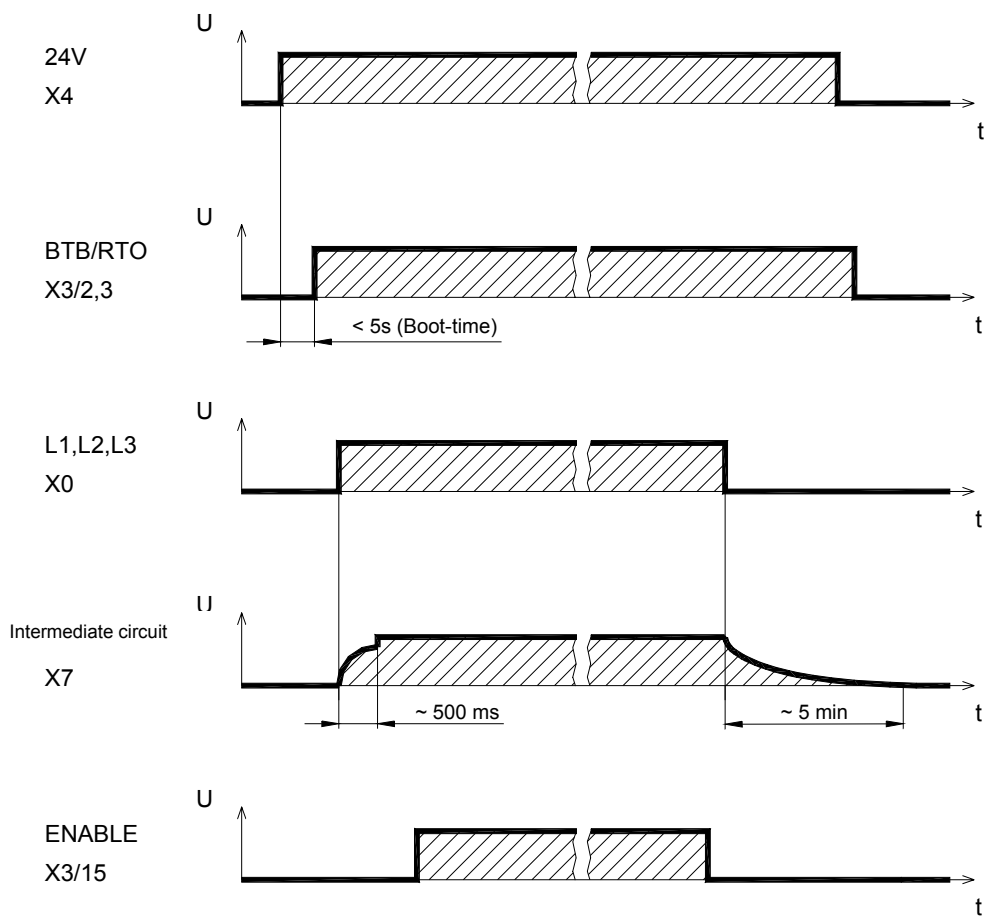
Under <<File>>, select <<Quit>>.

You will reach the desktop level of the PC.

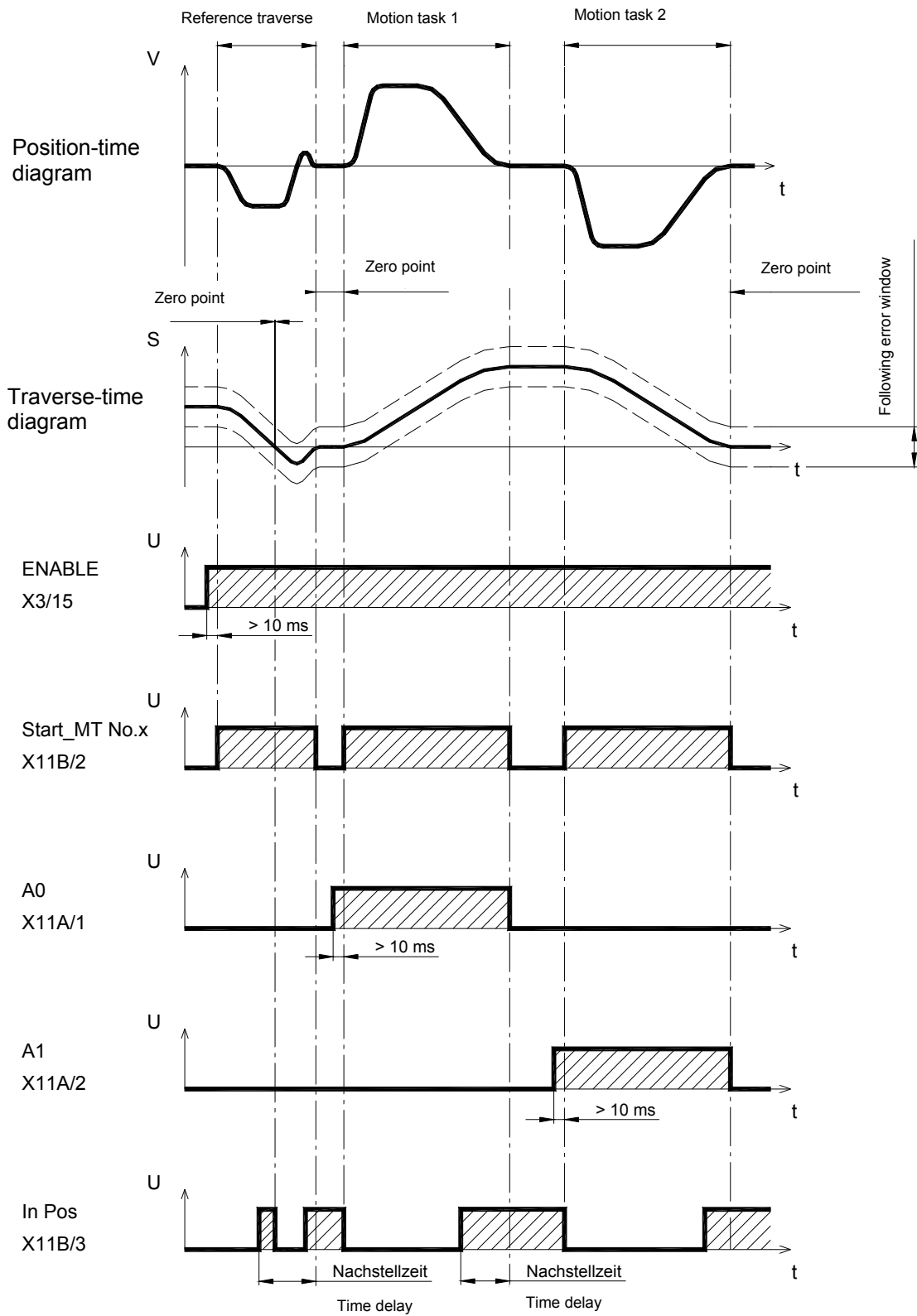
4. Switching on and off behavior

The diagram below shows the correct sequences that needs to be observed when switching the servo amplifier on and off.

See also MMSA chapter 2.1.



5. Motion task sequence



5.1 Reference traverse

Prerequisite (signal state):

Software enable (keyboard <<Shift + F12>>)	: enable
Hardware enable (terminal X3/15)	: high
A0 to A7 (terminals X11/1 to 8)	: low
FError (terminal X11B/5)	: high
START_MT No.x (terminal X11B/2)	: switch from low to high

5.1.1 Starting the reference traverse

The reference traverse is initiated if a "high" signal is present at terminal X11B/2 (Start_MT No.x), and a "low" signal is present at terminals X11A/1 to 8 or A0 to A7.

5.1.2 Reference traverse carried out

During the reference traverse it can happen that the slide of the servo axis overshoots the zero point, respectively signal In Pos is "high" while the slide is not on the zero point. This behaviour depends on the brake ramp or the acceleration ramp, and the size of the servo axis. To ensure that the slide will reach the zero point, the signal Start_MT No.x should drop out at a delay when Signal In Pos reports a high signal. (Time delay of Signal In Pos. in the above diagram.)

5.1.3 Stopping the reference traverse

The reference traverse can be stopped at any time by withdrawing the start signal (START_MT No.x). The drive slows down at the set deceleration until standstill, and remains there with torque.

5.2 Motion task number 1 or A0

Prerequisite (signal state):

Software enable (keyboard <<Shift + F12>>)	: enable
Reference point	: set
Enable (terminal X3/15)	: high
A0 (terminal X11/1)	: high
FError (terminal X11B/5)	: high
START_MT No.x (terminal X11B/2)	: switch from low to high

5.2.1 Starting motion task A0

The motion task is initiated if a "high" signal is present at terminals X11B/2 (Start_MT No.x) and X11A/1 (A0). The signal of motion task A0 should be present for at least 10 ms at the respective terminal, before the "high" signal Start_MT No.x is issued.

5.2.2 Motion task A0 carried out

To ensure that the slide will reach the position entered, the signal Start_MT No.x should be withdrawn at a delay when Signal In Pos reports a high signal. (Time delay of Signal In Pos. in the above diagram.)

5.2.3 Stopping the motion task

The motion task can be stopped at any time by withdrawing the start signal (START_MT No.x). The drive slows down at the set deceleration until standstill, and remains there with torque. The stopped motion task can be resumed by setting anew the start signal START_MT No.x).

6. Appendix

6.1 Abbreviations and acronyms

The table below shows abbreviations and acronyms used in this manual.

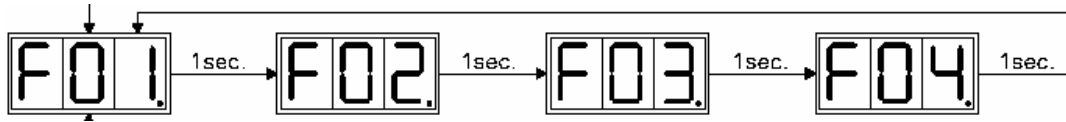
Abbreviation / acronym	Explanation
A0 to A7	Motion task in binary code (inputs, amplifier)
MMSS	Manual Montech Setup Software (version I/O). Item number 507001
MMMP	Manual Montech Mechanical Part . Various item numbers
MMSA	Manual Montech Servo Amplifier (version I/O). Item number 507019
BTB/RTO	Ready to operate
COM	Serial interface of a PC-AT
DGND	Digital ground
I/O GND	Digital ground of the expansion card I/O
PLC	Programmable logic controller
V AC	Volt, alternating current
V DC	Volt, direct current
XGND	Ground of the 24V supply voltage

6.2 Glossary

C	CPU	C entral P rocessing U nit of the PLC
E	EEPROM	E lectrically E rasable and P rogrammable R ead- O nly M emory Electrically erasable memory in the servo amplifier. Data stored in the EEPROM is not lost when the auxiliary voltage is switched off.
	E ² PROM	See EEPROM
	Enable	Enable signal for the servo amplifier
M	Motion block	Data set with all the control parameters which are required for a motion task.
I	I/O	I nputs/ O utputs (extension card in the servo amplifier)
R	Reset	Restart the micro processor
S	Start_MT No.x	Start_ M ulti T ask no. x Start_ motion task no. x

6.3 Error messages

All errors which occur are shown in sequence for the duration of 4 blinking cycles.



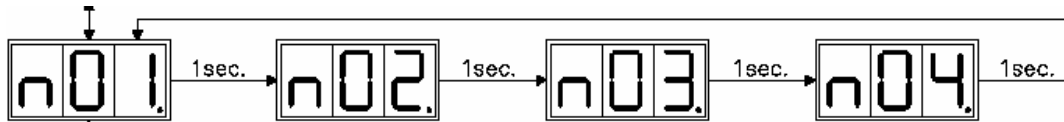
All error messages result in the following action: the BTB contact (terminals X3/2 and X3/3) opens; the drive switches off in a managed way (braking with emergency ramp); and the output stage of the amplifier switches off (motor loses all torque). The holding brake of the motor is activated (SVA-130 only).

Number	Designation	Explanation
F01*	Heat sink temperature	Heat sink temperature is too high Limit has been set to 80°C by the manufacturer
F02*	Overvoltage	Overvoltage in the DC-link circuit Limit depends on the mains supply voltage
F03*	Following error	Message from the position controller
F04	Feedback	Broken cable, short-circuit, short to ground
F05*	Undervoltage	Undervoltage in the DC link Limit has been set to 100V by the manufacturer
F06	Motor temperature	Temperature sensor faulty or motor temperature too high Limit has been set to 145°C by the manufacturer
F07	Auxiliary voltage	Internal auxiliary voltage not OK
F08*	Overspeed	Motor running away, speed is higher than is permissible
F09	EEPROM	Checksum error
F10	Flash-EPROM	Checksum error
F11	Brake	Broken cable, short-circuit, short to ground (SVA only)
F12	Motor phase	Motor phase is missing (broken cable or similar)
F13*	Internal temperature	Internal temperature in the amplifier is too high
F14	Output stage	Fault in the power output stage
F15	I _t max.	I _t max. value exceeded
F16*	Mains BTB	2 or 3 supply phases are missing
F17	A/D converter	Error in the analog-digital conversion
F18	Regen	Regen circuit faulty or setting incorrect
F19*	Mains phase	A supply phase is missing
F20	Slot error	Hardware error on the expansion card
F21	Handling error	Software error on the expansion card
F22	Earth fault	Inactive
F23	CAN bus inactive	Communication interrupted by CAN bus
F24-F31	Reserved	Reserved
F32	System fault	System software not responding correctly

* = These error messages can be cleared without resetting the amplifier. If only one of these errors is present and the RESET button or the I/O function RESET is used, then the error is reset without cold start.

6.4 Warnings

All warnings which are issued are shown in sequence for the duration of 4 blinking cycles.

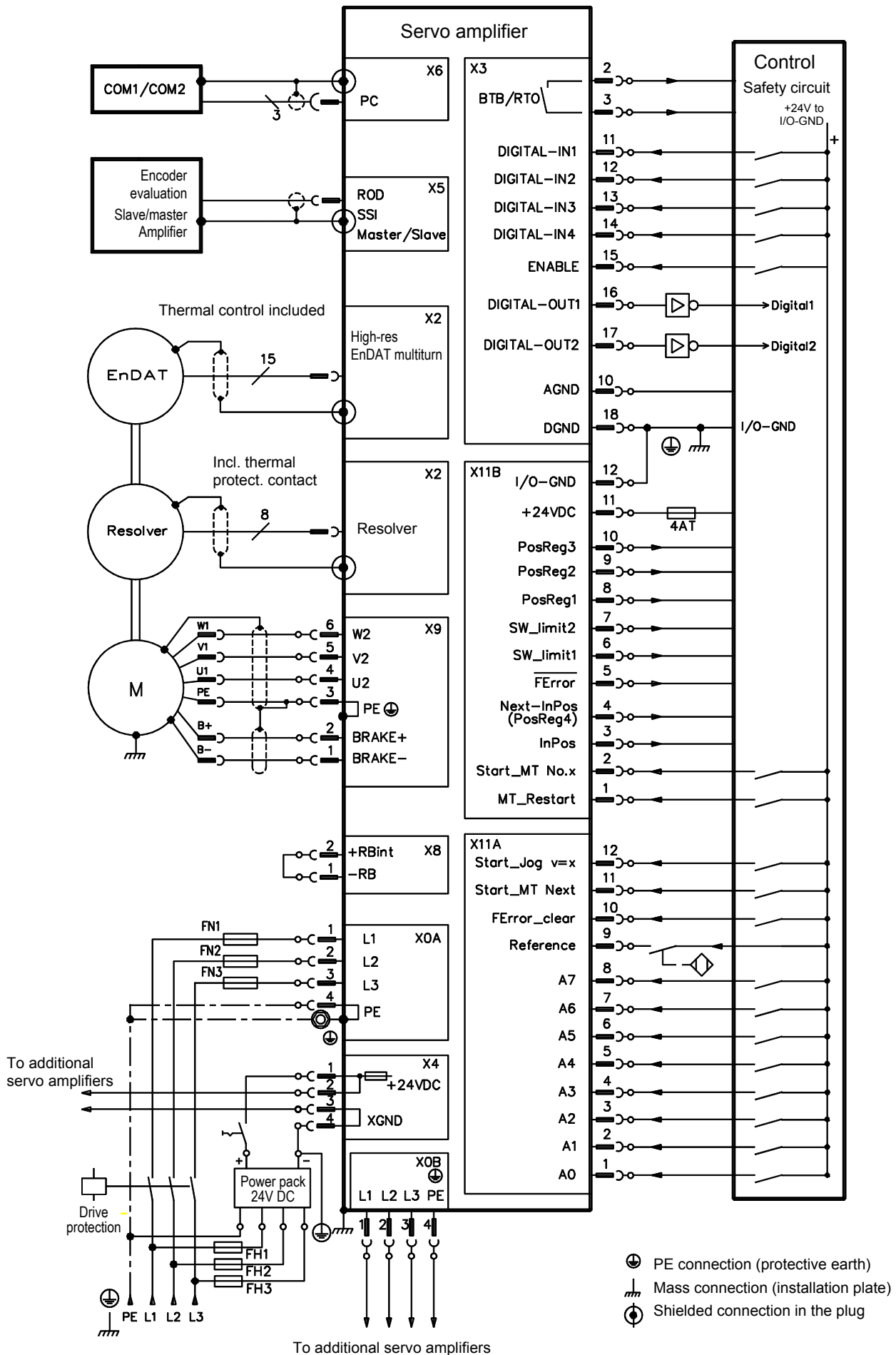


Faults that occur but do not cause a switch-off of the amplifier output stage (BTB contact remains closed) are displayed as a numerical warning code in the LED display on the front panel and on the screen page "STATUS". Warnings that are recognised by the supply monitoring system will only be reported after the servo amplifier has been enabled.

Number	Designation	Explanation
n01	I ² t	I ² t message threshold exceeded
n02	Regen power	Preset regen power reached
n03*	FError	Preset following error window exceeded
n04*	Response monitoring	Response monitoring (field bus) active
n05	Mains phase	Mains phase missing
n06*	SW limit switch 1	Software limit switch 1 exceeded
n07*	SW limit switch 2	Software-limit switch 2 exceeded
n08	Motion task_error	A faulty motion task was started
n09	No reference point	No reference point set at start of task
n10*	PSTOP	Hardware limit switch PSTOP activated (servo axes without hardware limit switch)
n11*	NSTOP	Hardware limit switch NSTOP activated (servo axes without hardware limit switch)
n12	Default values	Inactive
n13	Expansion card	Expansion card not functioning correctly
n14	HIPERFACE®	Inactive
n15	Table error	Inactive
n16-n31	Reserved	Reserved
n32	Firmware beta version	Firmware version has not been released
A	Reset	RESET is present at DIGITAL IN1

* = These warning messages lead to a controlled shut-down of the drive (braking with the emergency ramp)

6.5 Connection diagram





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