
LinMot[®]

**Easy
Steps**

**Documentation of the EasySteps Application of the
following Drive Series:**

B1100 / E1100

E1200 / E1400

C1100 / C1200



EasySteps Application User Manual

© 2018 NTI AG

This work is protected by copyright.

Under the copyright laws, this publication may not be reproduced or transmitted in any form, electronic or mechanical, including photocopying, recording, microfilm, storing in an information retrieval system, not even for didactical use, or translating, in whole or in part, without the prior written consent of NTI AG.

LinMot® is a registered trademark of NTI AG.

Note

The information in this documentation reflects the stage of development at the time of press and is therefore without obligation. NTI AG reserves itself the right to make changes at any time and without notice to reflect further technical advance or product improvement.

Document version 3.16/ August, 2018

| | |
|-----------------------------------------------------------------------|-----------|
| 1. SYSTEM OVERVIEW..... | 4 |
| 2. INSTALLATION ON DRIVE..... | 4 |
| 3. IO MAPPINGS..... | 5 |
| 3.1. E1100/E1200 X4 IO MAPPING..... | 5 |
| 3.2. B1100 INPUT MAPPING..... | 5 |
| 3.3. C1100/C1200 INPUT MAPPING..... | 5 |
| 4. SMART CONTROL WORD BEHAVIOR..... | 6 |
| 4.1. INTF SWITCH ON FLAG BEHAVIOR..... | 6 |
| 4.2. INTF HOME FLAG BEHAVIOR..... | 6 |
| 4.3. INTF ERROR ACKNOWLEDGE FLAG BEHAVIOR..... | 6 |
| 4.4. INTF GO TO INITIAL POS FLAG BEHAVIOR..... | 6 |
| 5. ANALOG PARAMETER SCALE..... | 7 |
| 5.1. ANALOG INPUT 1..... | 7 |
| 5.2. ANALOG INPUT 2..... | 7 |
| 6. IO MOTIONS..... | 8 |
| 6.1. OVERVIEW OF SUPPORTED MOTION COMMANDS..... | 9 |
| 6.1.1. <i>None</i> | 9 |
| 6.1.2. <i>Goto Abs Position</i> | 9 |
| 6.1.3. <i>Increment Target Position</i> | 10 |
| 6.1.4. <i>Increment Demand Position</i> | 10 |
| 6.1.5. <i>Goto Abs Position From Actual Position</i> | 10 |
| 6.1.6. <i>Increment Actual Position</i> | 10 |
| 6.1.7. <i>Goto Analog Position</i> | 11 |
| 6.1.8. <i>Inc Actual Position Between Rise and Falling Edge</i> | 11 |
| 6.1.9. <i>Start Curve From Actual Position</i> | 11 |
| 6.1.10. <i>Goto Abs Position With Max Current</i> | 11 |
| 6.1.11. <i>Eval Command Table Command</i> | 12 |
| 6.1.12. <i>VAI Stop</i> | 12 |
| 6.1.13. <i>VAI Infinite Motion Positive Direction</i> | 12 |
| 6.1.14. <i>VAI Infinite Motion Negative Direction</i> | 12 |
| 6.1.15. <i>CAM Go To Synch Pos</i> | 12 |
| 6.1.16. <i>CAM Enable</i> | 12 |
| 6.1.17. <i>Encoder Winding Start With Def Par</i> | 12 |
| 6.1.18. <i>Encoder Curve Winding Start With Def Par</i> | 13 |
| 6.1.19. <i>Master Homing</i> | 13 |
| 6.1.20. <i>Reset</i> | 13 |
| 6.1.21. <i>Teach In IO Motion</i> | 13 |
| 7. CONTACT ADDRESSES..... | 14 |


1. System Overview

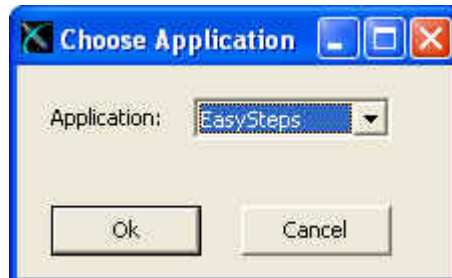
The EasySteps Application SW is an easy to use SW with the following functionality:

- Smart Control Word behavior (Enable, Home and Error Acknowledge over one single IO possible)
- 2 analog channel mapping to any live Parameter (e.g. Adjust Maximal Current with analog input)
- up to 8 digital IO/Inputs can be mapped to different 'Motion Commands'

All of this functionality can be wired to the X4/X14 connector that is available on the servos drives. The MC-SW allows a free mapping of the X4/X14 inputs to the control word respective status word bits, so no additional mapping is done in the EasySteps SW regarding this functionality. Every unused/undefined pin on the X4 connector can be used as normal general purpose IO or in special function as defined in the MC-SW parameter tree.

2. Installation on Drive

For installing the EasySteps firmware on the drive, start the LinMot-Talk software and press the install firmware button . Choose the file "Firmware_Buildxxxxxxx.sct" and press "Open". The wizard will guide you through the installation. When asking for the application software choose "EasySteps":



Press ok and follow the rest of the wizard.

3. IO Mappings

3.1. E1100/E1200 X4 IO Mapping

| Descriptor | Special Function | EasySteps Function |
|------------|-----------------------------------|------------------------------------|
| X4.1 | GND | GND |
| X4.2 | 24 VDC | 24 VDC |
| X4.3 | Brake (Output) | - |
| X4.4 | Analog In | Motion Cmd Ch1 / An UPID Scale Ch1 |
| X4.5 | Capture Input | Motion Cmd Ch2 |
| X4.6 | Trigger (Input) | Motion Cmd Ch3 |
| X4.7 | Home Switch (Input) | Motion Cmd Ch4 / An UPID Scale Ch2 |
| X4.8 | Limit IN (Input) | Motion Cmd Ch5 |
| X4.9 | Limit OUT (Input) | Motion Cmd Ch6 |
| X4.10 | PTC 1 (Input) | Motion Cmd Ch7 |
| X4.11 | PTC 2 (Input) | Motion Cmd Ch8 |
| X4.12 | SVE Safety Voltage Enable (Input) | - |

3.2. B1100 Input Mapping

| Descriptor | Special Function | EasySteps Function |
|--------------|------------------------------|-----------------------|
| X14.13 | GND | Supply GND |
| X14.25 | 24 VDC | Supply 24 VDC |
| X14.8/X14.21 | Diff Analog Input -10V..+10V | Analog UPID Scale Ch1 |
| X14.20 | Analog input 0V..10V | Analog UPID Scale Ch2 |
| X14.14 | | Motion Cmd Ch1 |
| X14.2 | Home Switch | Motion Cmd Ch2 |
| X14.15 | Trigger | Motion Cmd Ch3 |
| X14.3 | | Motion Cmd Ch4 |
| X14.16 | | Motion Cmd Ch5 |
| X14.4 | | Motion Cmd Ch6 |

3.3. C1100/C1200 Input Mapping

| Descriptor | Special Function | EasySteps Function |
|-------------|------------------|--------------------|
| X4.1 | GND | GND |
| X4.2 | 24 VDC | 24 VDC |
| X4.3 | General Output | - |
| X4.4 | General Output | - |
| X4.5 | General (Input) | Motion Cmd Ch1 |
| X4.6 | General (Input) | Motion Cmd Ch2 |
| X4.7 | General (Input) | Motion Cmd Ch3 |
| X4.8 | General (Input) | Motion Cmd Ch4 |
| X4.9 | Analog In | An UPID Scale Ch1 |
| X4.10/X4.11 | Analog In Diff | An UPID Scale Ch2 |

4. Smart Control Word Behavior

All Control Word actions that are configured in the EasySteps SW are done to the Interface Control Word bits. So if a Control Word bit is mapped to a X4 IO or forced by parameter this still has priority and the behaviour rests unchanged.

4.1. Intf Switch On Flag Behavior

It is strongly recommended to influence the Control Word bit 0 'Switch On' over a serial bus connection or a digital input. For a testing system it might be helpful if the systems starts up automatically of powered on, for this case the switch On can be set to autostart.

4.2. Intf Home Flag Behavior

Setting the Intf Home Flag Behavior to 'Autohome' starts the homing procedure automatically if the state 8 'Operation Enabled' is reached and Status Word bit 11 'Homed' is not set. After the homing sequence has finished the interface Control Word bit 11 'Home' is reset and the state 8 is entered again.

4.3. Intf Error Acknowledge Flag Behavior

Setting the Intf Error Acknowledge Flag Behavior to '/Switch On Flag' sets the interface Control Word bit 7 'Error Acknowledge' when releasing the 'Switch On' Flag.

4.4. Intf Go To Initial Pos Flag Behavior

Setting the Intf Go to Initial Pos Flag Behavior to 'Enter Operation Enabled' sets the interface Control Word bit 13 'Go To Initial Position' in state 'Ready to Operate' (State: 6), normal operation of this behaviour is to move to the 'Initial position' after an enabling.

5. Analog Parameter Scale

On the analog inputs (see input mappings above), any live parameter UPID can be mapped for analog scaling of its value.

5.1. Analog Input 1

In the following example the live parameter 'P Gain' of the position controller Set A with the UPID 13A2h/6198h is scaled in the range 1..10 A/mm with the analog value on X4.4 (E1100).

| Parameter Name | Parameter Value | Parameter UPID E1100 / E1200 / E1400 | Parameter UPID C1100 / C1200 | Parameter UPID B1100 |
|----------------|-----------------|--------------------------------------------|---------------------------------|-------------------------|
| UPID | 13A2h/6198h | 30E0h | 30E0h | 6460h |
| 0V Scale | 10 | 30E1h | 30E1h | F231h |
| 10V Scale | 100 | 30E2h | 30E2h | F232h |
| Connector | | X4.4 | X4.9 | X14.20 |

The scaled value of the parameter can be monitored in the variable section of the EasySteps application SW with the variable 'Scaled Value On X4.4' (UPID 3A98h/F448h).

5.2. Analog Input 2

In the following example the live parameter 'Maximal Current' of the position controller Set A with the UPID 13A6h/E19Ch is scaled in the range 0..8 A with the analog value on X4.7 (E1100).

| Parameter Name | Parameter Value | Parameter UPID E1100 / E1200 / E1400 | Parameter UPID C1100 / C1200 | Parameter UPID B1100 |
|----------------|-----------------|--------------------------------------------|---------------------------------|-------------------------|
| UPID | 13A6h/E19Ch | 30F0h | 30F0h | 6461h |
| 0V/-10V Scale | 0 | 30F1h | 30F1h | F233h |
| 10V Scale | 8000 | 30F2h | 30F2h | F234h |
| Connector | | X4.7 | X4.10 & X4.11 | X14.8 & X14.21 |

The scaled value of the parameter can be monitored in the variable section of the EasySteps application SW with the variable 'Scaled Value On X4.7' (UPID 3ACAhF449h).

6. IO Motions

The third functionality of the EasySteps application SW is to define the different motion commands evaluated on a rising edge of the inputs on X4.4 through X4.11.

With the Parameters (UPIDs 0x3381..0x3388) the logic of each input could be inverted separately.

The motion command can be selected with parameters:

| Parameter Name | Parameter UPID E1100 E1200 E1400 | Parameter UPID C1100 C1200 | Parameter UPID B1100 | Linked Output B1100 (only) |
|----------------------------------|-------------------------------------------|----------------------------------|-------------------------|----------------------------------|
| X4.4/X14.14 Rising Edge Function | 3500h | - | 6408h | X14.17 |
| X4.5/X14.2 Rising Edge Function | 3600h | 3600h | 6418h | X14.5 |
| X4.6/X14.15 Rising Edge Function | 3700h | 3700h | 6428h | X14.18 |
| X4.7/X14.3 Rising Edge Function | 3800h | 3800h | 6438h | X14.6 |
| X4.8/X14.16 Rising Edge Function | 3100h | 3100h | 6448h | X14.19 |
| X4.9/X14.4 Rising Edge Function | 3200h | - | 6458h | X14.7 |
| X4.10 Rising Edge Function | 3300h | - | - | - |
| X4.11 Rising Edge Function | 3400h | - | - | - |

The table below shows the supported motion commands. All are supported identically on all four inputs. The motion command parameters are parameters of the EasySteps-SW and may be used for different motion commands, the table in the detailed description of the motion commands shows the mapping of the EasySteps parameters to the motion command parameters.

The last evaluated motion command can be read out with the LinMot-Talk configuration software in the control panel.

The EasySteps-SW writes directly into the copied 'Motion Command Interface' therefore it doesn't change the value of the motion command counter of the interface 'Motion Command Interface'. Of course it has to be programmed very carefully if the EasySteps Motion Commands are used together with Motion Commands over a serial bus interface.

The linked output functionality exists only on the B1100 drive. With the linked output the "In Target Position" or "/Motion Active" of the selected rising edge input motion can be mapped.

6.1. Overview of supported Motion Commands

| Motion Command Name | UPID (3x00h) Value E1100 E1200 E1400 | UPID (3x00h) Value C1100 C1200 | UPID (64x8h) Value B1100 |
|---------------------------------------------------|-----------------------------------------------------|--------------------------------------------|-----------------------------------|
| None | 0 | 0 | 0 |
| Goto Abs Position | 1 | 1 | 1 |
| Increment Target Position | 2 | 2 | 2 |
| Increment Demand Position | 3 | 3 | 3 |
| Goto Abs Position From Actual Position | 4 | 4 | 4 |
| Increment Actual Position | 5 | 5 | 5 |
| Goto Analog Position | 6 | 6 | 6 |
| Inc Actual Position Between Rise and Falling Edge | 7 | - | 7 |
| Start Curve From Actual Position | 8 | 8 | - |
| Goto Abs Position With Max Current | 9 | 9 | 9 |
| Eval Command Table Command | 12 | 12 | - |
| VAI Stop | 13 | 13 | 13 |
| VAI Infinite Motion Positive Direction | 14 | 14 | 14 |
| VAI Infinite Motion Positive Direction | 15 | 15 | 15 |
| CAM Go To Synch Pos | 16 | - | 16 |
| CAM Enable | 17 | - | - |
| Encoder Winding Start With Def Par | 24 | - | - |
| Encoder Curve Winding Start With Def Par | 25 | - | - |
| Master Homing | 26 | 26 | 26 |
| Reset | | 30 X4.8 only | |
| Teach In | 31 X4.9 only | | 31 X14.4 only |

6.1.1. None

If none is selected no action is taken on rising edge on this input. The input can be used as general purpose input and be configured therefore in the MC-SW.

6.1.2. Goto Abs Position

On a rising edge on the input a motion from any position to the defined absolute position is started. (MC-SW Motion Command 010xh).

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|-------------------------------------|-----------------------|---------------|
| Position (Absolute Target Position) | 3x10h | F2x0h/F2x8h |
| Max Speed | 3x11h | F2x1h/F2x9h |
| Acceleration | 3x12h | F2x2h/F2xAh |
| Deceleration | 3x13h | F2x3h/F2xBh |

6.1.3. Increment Target Position

On a rising edge of the input the target position of the last VAI- motion is incremented and the VAI motion is started or continued. (MC-SW Motion Command 012xh).

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------------|-----------------------|---------------|
| Position (Target Position Increment) | 3x10h | F2x0h/F2x8h |
| Max Speed | 3x11h | F2x1h/F2x9h |
| Acceleration | 3x12h | F2x2h/F2xAh |
| Deceleration | 3x13h | F2x3h/F2xBh |

6.1.4. Increment Demand Position

On a rising edge of the input the target position is set to (demand position + demand position increment) then the VAI motion is started or continued. (MC-SW Motion Command 011xh).

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------------|-----------------------|---------------|
| Position (Demand Position Increment) | 3x10h | F2x0h/F2x8h |
| Max Speed | 3x11h | F2x1h/F2x9h |
| Acceleration | 3x12h | F2x2h/F2xAh |
| Deceleration | 3x13h | F2x3h/F2xBh |

6.1.5. Goto Abs Position From Actual Position

On a rising edge of the input the demand position is set to the actual position then the VAI motion is started or continued. (MC-SW Motion Command 013xh).

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|-------------------------------------|-----------------------|---------------|
| Position (Absolute Target Position) | 3x10h | F2x0h/F2x8h |
| Max Speed | 3x11h | F2x1h/F2x9h |
| Acceleration | 3x12h | F2x2h/F2xAh |
| Deceleration | 3x13h | F2x3h/F2xBh |

6.1.6. Increment Actual Position

On a rising edge of the input the target position is set to (actual position + actual position increment) then the VAI motion is started or continued. (MC-SW Motion Command 015xh).

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------------|-----------------------|---------------|
| Position (Actual Position Increment) | 3x10h | F2x0h/F2x8h |
| Max Speed | 3x11h | F2x1h/F2x9h |
| Acceleration | 3x12h | F2x2h/F2xAh |
| Deceleration | 3x13h | F2x3h/F2xBh |

6.1.7. Goto Analog Position

On a rising edge of the input a motion from any position to the analog position defined with X4.4, on B1100 X14.20 or X14.8/21, is started. (MC-SW Motion Command 019xh). For this reason this command is not available on input X4.4.

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------|-----------------------|---------------|
| Max Speed | 3x11h | F2x1h/F2x9h |
| Acceleration | 3x12h | F2x2h/F2xAh |
| Deceleration | 3x13h | F2x3h/F2xBh |

6.1.8. Inc Actual Position Between Rise and Falling Edge

This command calculates the middle position between the rising and falling edge of the selected input, then a relative motion to this middle position is performed. The captured rising and falling edge actual positions and the calculated middle position are stored and available in the variable section of the Easy Steps in the LinMot-Talk.

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------------|-----------------------|---------------|
| Position (Demand Position Increment) | 3x10h | F2x0h/F2x8h |
| Max Speed | 3x11h | F2x1h/F2x9h |
| Acceleration | 3x12h | F2x2h/F2xAh |
| Deceleration | 3x13h | F2x3h/F2xBh |

6.1.9. Start Curve From Actual Position

On a rising edge of the input the curve offset is calculated then the specified time curve started. (MC-SW Motion Command 041xh).

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------|-----------------------|---------------|
| Curve/Cmd ID | 3x20h | 64x9h |

6.1.10. Goto Abs Position With Max Current

On a rising edge of the input a motion from any position to the defined absolute position is started. (MC-SW Motion Command 0C5xh), deceleration = acceleration and the maximal current is limited to the maximal current value.

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|-------------------------------------|-----------------------|---------------|
| Position (Absolute Target Position) | 3x10h | F2x0h/F2x8h |
| Max Speed | 3x11h | F2x1h/F2x9h |
| Acceleration = Deceleration | 3x12h | F2x2h/F2xAh |
| Maximal Current | 3x21h | 64xAh |

6.1.11. Eval Command Table Command

On a rising edge of the input the specified Command Table Command is evaluated. (MC-SW Motion Command 200xh).

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------|-----------------------|---------------|
| Curve/Cmd ID | 3x20h | 64x9h |

6.1.12. VAI Stop

On a rising edge of the input a running motion can be stopped (ramped down). (MC-SW Motion Command 017xh).

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------|-----------------------|---------------|
| Deceleration | 3x13h | F2x3h/F2xBh |

6.1.13. VAI Infinite Motion Positive Direction

On a rising edge of the input an infinite motion in positive direction is started (MC-SW Motion Command 0CExh).

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------|-----------------------|---------------|
| Max Speed | 3x11h | F2x1h/F2x9h |
| Acceleration = Deceleration | 3x12h | F2x2h/F2xAh |

6.1.14. VAI Infinite Motion Negative Direction

On a rising edge of the input an infinite motion in negative direction is started (MC-SW Motion Command 0CFxh).

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------|-----------------------|---------------|
| Max Speed | 3x11h | F2x1h/F2x9h |
| Acceleration = Deceleration | 3x12h | F2x2h/F2xAh |

6.1.15. CAM Go To Synch Pos

On a rising edge of the input a motion to the CAM synchronous position is started (MC-SW Motion Command 102xh).

6.1.16. CAM Enable

On a rising edge of the input the encoder CAM is enabled (MC-SW Motion Command 100xh).

6.1.17. Encoder Winding Start With Def Par

On a rising edge of the input the encoder winding without curve is started (MC-SW Motion Command 300xh).

To stop the winding use another motion command on another input e.g. Goto Abs Position.

6.1.18. Encoder Curve Winding Start With Def Par

On a rising edge of the input the encoder winding with curve is started (MC-SW Motion Command 310xh).

To stop the winding use another motion command on an other input e.g. Goto Abs Position.

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------|-----------------------|---------------|
| Curve/Command ID | 3x20h | 64x9h |

6.1.19. Master Homing

On a rising edge of the input the motion command 'Master Homing' is setup (MC-SW Motion Command 009xh).

| Motion Command Parameter Names | UPID E1100 & E1200 | UPID B1100 |
|--------------------------------|-----------------------|---------------|
| Position (Home Position) | 3x10h | F2x0h/F2x8h |

6.1.20. Reset

This command restarts the firmware on the drive.

6.1.21. Teach In IO Motion

Used to teach change the position parameter of a IO motion (UPID 31x0h/F2x0h or F2x8h). For this reason teach in can also be used to change the target position increment of the "Increment Target Position" IO motion command, with stacking, de-stacking applications.

Teach In sequence:

1. Select the IO motion to teach in, by setting the corresponding input high
2. Set the Teach In input X4.9/X14.4 high, this makes the motor currentless
3. Move the currentless motor manually to the new wanted position
4. On the falling edge the new position is stored remanent (is still available after a power cycle) and the motor is powered and position controlled again.

7. Contact Addresses

SWITZERLAND**NTI AG**

Bodenaeckerstrasse 2
CH-8957 Spreitenbach

Sales and Administration: +41-(0)56-419 91 91
office@linmot.com

Tech. Support: +41-(0)56-544 71 00
support@linmot.com

Tech. Support (Skype) : [skype:support.linmot](https://www.skype.com/contact/linmot)

Fax: +41-(0)56-419 91 92

Web: <http://www.linmot.com/>

USA**LinMot USA Inc.**

N1922 State Road 120, Unit 1
Lake Geneva, WI 53147

Phone: 262-743-2555

E-Mail: usasales@linmot.com

Web: <http://www.linmotusa.com/>

Please visit <http://www.linmot.com/> to find the distribution near you.

Smart solutions are...

