LinMot®

Easy Steps

Documentation of the EasySteps Application of the following Drive Series:

- **E1100**
- **B1100**
- **E1200**
-

EasySteps Application

User Manual

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1. System Overview

Where the two drive families E1100/B1100 differ, in the notation this is mentioned with the "/" separator e.g. X4/X14 the two different connector identifiers on the drives. If there is no distinction indicated, the information for the E1200 drive series is the same as for E1100.

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 a any live Parameter (e.g. Adjust Maximal Current with analog input)
- 8/6 digital IO/Inputs mapping to different 'Motion Commands'

All of this functionality can be wired to the X4/X14 connector that is available on all servos of the E1100/B1100 series. 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_Buildxxxxxxxx.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. 1100/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)	-

4. 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

5. 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.

5.1. 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.

5.2. 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.

5.3. 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.

5.4. 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.

6. Analog Parameter Scale

On the two analog inputs X4.4/X14.20 and X4.7/X14.8&X14.21 any live parameter UPID can be mapped for analog scaling of its value.

6.1. Analog Input On X4.4/X14.20

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.

Parameter Name	Parameter Value	Parameter UPID E1100 & E1200	Parameter UPID B1100
UPID	13A2h/6198h	30E0h	6460h
0V Scale	10	30E1h	F231h
10V Scale	100	30E2h	F232h

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).

6.2. Analog Input On X4.7/X14.8&X14.21

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.

Parameter Name	Parameter Value	Parameter UPID E1100 & E1200	Parameter UPID B1100
UPID	13A6h/E19Ch	30F0h	6461h
0V/-10V Scale	0	30F1h	F233h
10V Scale	8000	30F2h	F234h

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).

7. 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	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	6418h	X14.5
X4.6/X14.15 Rising Edge Function	3700h	6428h	X14.18
X4.7/X14.3 Rising Edge Function	3800h	6438h	X14.6
X4.8/X14.16 Rising Edge Function	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.

7.1. Overview of supported Motion Commands

Motion Command Name	UPID (3x00h) Value E1100 & E1200	UPID (64x8h) Value B1100
None	0	0
Goto Abs Position	1	1
Increment Target Position	2	2
Increment Demand Position	3	3
Goto Abs Position From Actual Position	4	4
Increment Actual Position	5	5
Goto Analog Position	6	6
Inc Actual Position Between Rise and Falling Edge	7	7
Start Curve From Actual Position	8	-
Goto Abs Position With Max Current	9	9
Eval Command Table Command	12	-
VAI Stop	13	13
VAI Infinite Motion Positive Direction	14	14
VAI Infinite Motion Positive Direction	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
Teach In	31 (X4.9 only)	31 (X14.4 only)

7.1.1. 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.

7.1.2. 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

7.1.3. 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

7.1.4. 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

7.1.5. 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

7.1.6. 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

7.1.7. 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

7.1.8. 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

7.1.9. 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

7.1.10. 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 maxmal 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

7.1.11. 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

7.1.12. 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

7.1.13. 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

7.1.14. 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

7.1.15. 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).

7.1.16. CAM Enable

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

7.1.17. 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.

7.1.18. 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/Cmd ID	3x20h	64x9h

7.1.19. 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

7.1.20. 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.

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