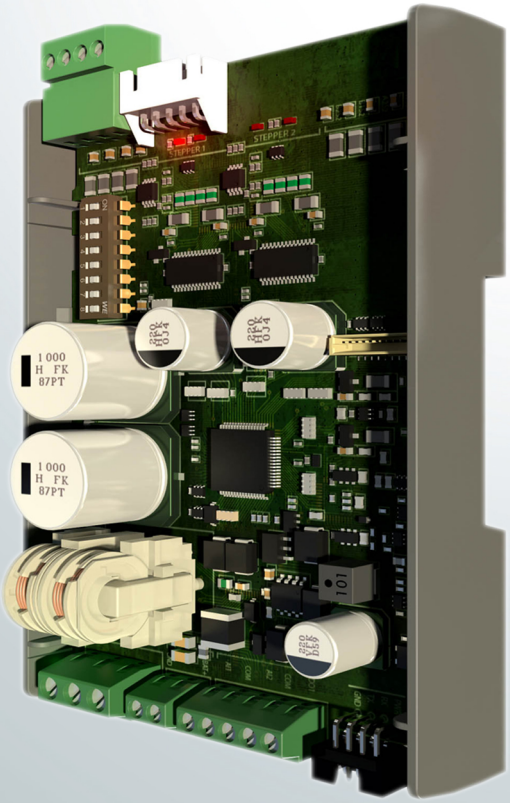
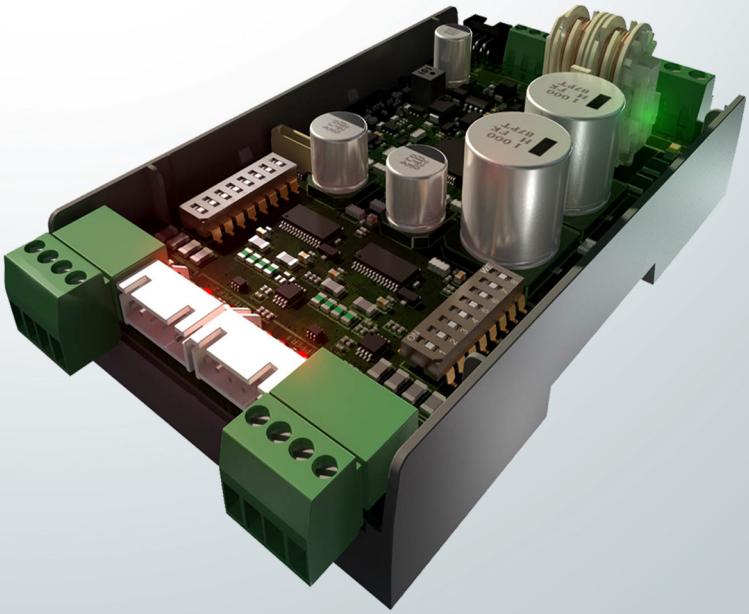
ENGINEERING
TOMORROW

User Guide

Stepper valve driver
Type **EKF 1A, EKF 2A**

Driver for stepper motor valves SW V1.25





Introduction

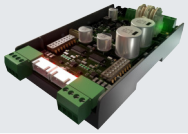
Stepper valve driver EKF series is used where stepper valves must be accurately controlled typically in commercial air conditioning, heat pumps, commercial refrigeration and food retail applications.

Features

- Support both Bipolar and Unipolar stepper motor valves
- Driven by analog input signal
- Fast installation and setup
- Lost step prevention
- Open circuit detection
- LED indication for valve movement and alarm/warnings
- On board DIP switch for quick selection
- Plug and play
- 4 pole terminal block and JST-XHP 5 pin connections
- Phoenix connector terminals
- Digital output for alarm signal
- 1 and 2 valve driver version available

Portfolio overview

Table 1: Portfolio overview

Features	EKF 1A	EKF 2A
		
Code number	080G5030	080G5035
Power supply	24 V AC/DC	24 V AC/DC
Number of valves	1 stepper motor valve	2 stepper motor valves
Valve type	Unipolar/Bipolar	Unipolar/Bipolar
Analog inputs	1	2
Digital outputs	1	1
Dip switch	1	2
Battery backup support	Yes	Yes
Mounting	35 mm, 4 DIN	35 mm, 4 DIN
Dimension (H x W)(mm)	110 x 70	110 x 70

Applications

EKF series stepper valve drivers can be used in application where accurate control of stepper motor valves are needed using analog input signals (0-10V, 0-5V, 4-20 mA, 0-20 mA) from unit programmable controllers. The product can be used for both Bipolar and Unipolar type valves. General applications include use in commercial air conditioning, heat pumps, commercial refrigeration and food retail application

Figure 1: EKF 1A

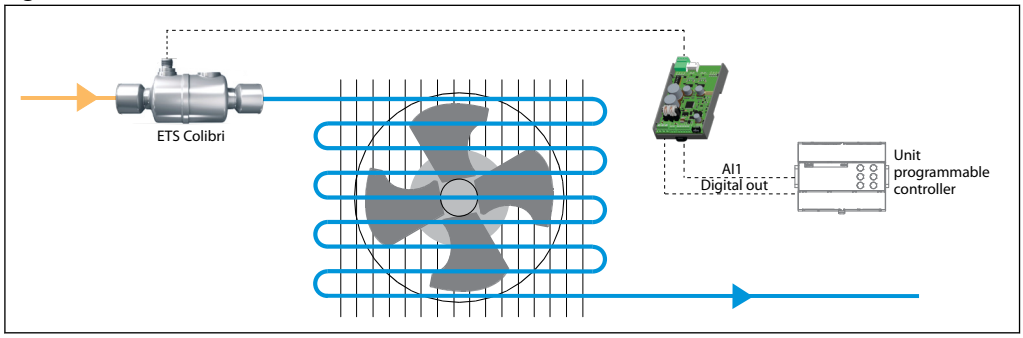
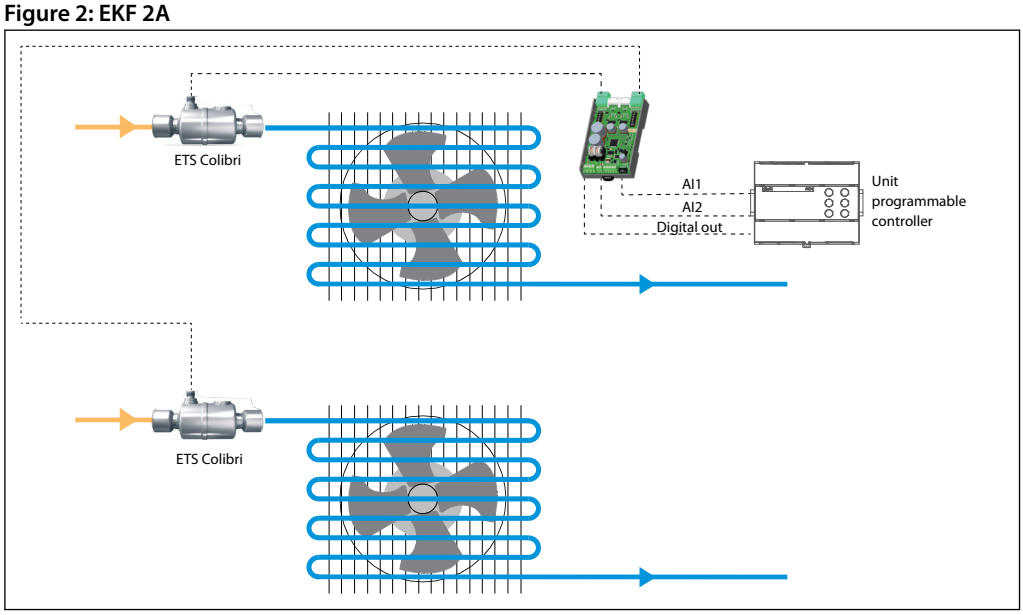


Figure 2: EKF 2A



AI1	Analog input signal 1
AI2	Analog input signal 2

Installation

Wiring terminals

Figure 3: EKF 1A

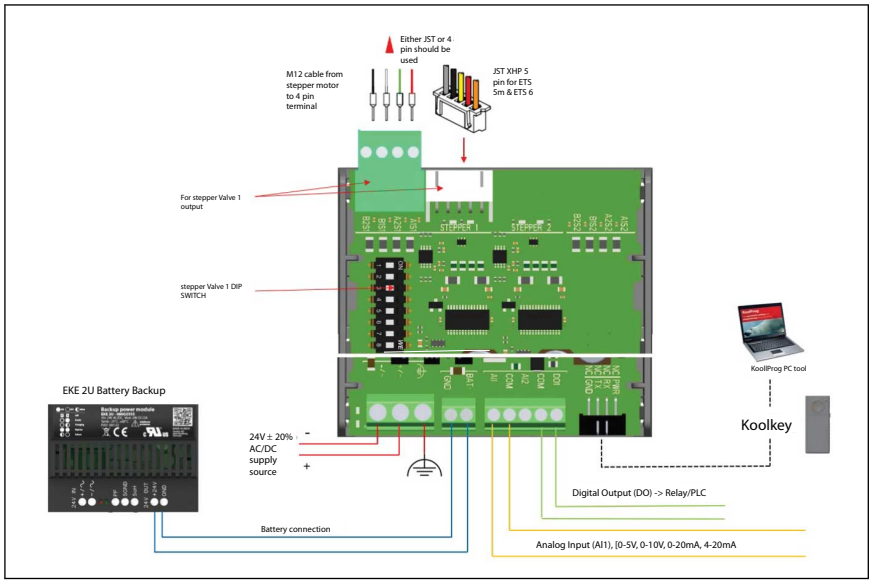
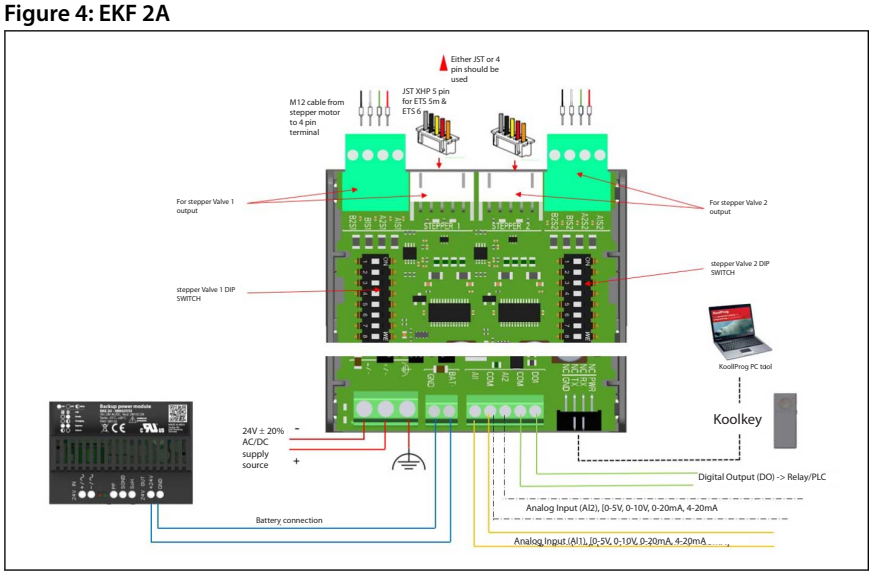


Figure 4: EKF 2A



NOTE:
There are both 4 pin terminal and JST 5 pin terminal available on the board per stepper drive output.
Only one of the terminals should be used per valve.
Do not connect valves to both 4 pin terminal and JST terminal of the same stepper driver output.

Power sharing

EKF can share power from the same source with a battery backup or unit controller only if battery backup/unit controller ports are galvanically isolated.

Danfoss recommends to use EKE 2U as the preferred battery backup device.

NOTE:
EKE 2U can only support 2 valves for emergency closing, thus EKE 2U should not be shared with more than one EKF 2A or more than two EKF 1A.

Configuration

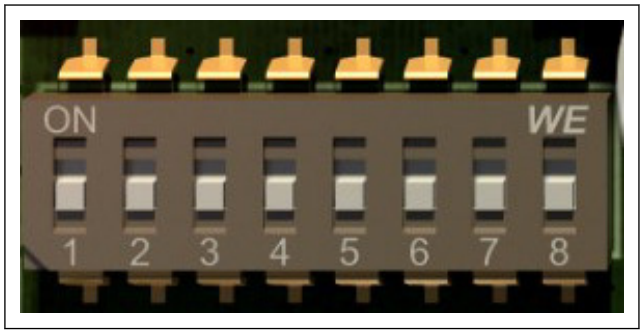
EKF can be configured using
1. DIP switch
2. Koolkey & KoolProg PC tool

DIP Switch configuration

The basic product configuration can be done through DIP switch present on the hardware.

EKF 1A supports 1 stepper drive output and 1 Dip switch for settings.
EKF 2A supports 2 stepper drive output and 2 Dip switch for settings.

Figure 5: DIP switch



The image above shows a schematic of a dip switch
Each DIP switch consists of 8 switches.
The below table shows what each Dip switch section represents.

Table 2: Dip switch section

Switch numbers	Selection
Switch 1-5	Valve selection
Switch 6	Analog sharing selection
Switch 7 & 8	Analog signal selection

Steps to follow to configure EKF using Dip switch:

1. Disconnect the EKF from power supply.
2. Connect the valves and AI inputs to EKF.
3. Make the needed settings on the EKF dip switch.
4. Turn the power back on to EKF.
5. EKF is ready to use with the new settings

NOTE:
Any changes made to EKF dip switch while EKF is powered ON will result in warning and the new settings are not active. In case of the above error switch the power OFF and then ON the EKF. The newly made settings will now be active.

The tables below can be used to help select dip switch positions.

Valve selection (Switch 1-5)
Green denotes ON position of DIP switch

Figure 6: DIP valve section

Group	Valve	DIP Switch							
		1	2	3	4	5	6	7	8
A	No Valve (Default)								
B	ETS 12C, ETS 24C, ETS 25C, ETS 50C, ETS 100C, KVS 2C, KVS 3C, KVS 5C	■							
C	ETS 5M Unipolar		■						
D	ETS 6, UKV, UKV-J	■	■						
E	ETS12.5, ETS 25, ETS 50, KVS15			■					
F	ETS 100	■		■					
G	ETS 250, ETS 400, KVS 42		■	■					
H	Manifold Valves (ETS 500P, ETS 800P)	■	■	■					
I	JKV				■				
J	CCMT 2, CCMT4, CCMT8	■			■				
K	CCMT 16		■		■				
L	CCMT 24	■	■		■				
M	CCMT30			■	■				
N	CCMT 42	■		■	■				
O	CCM 10, CCM 20, CCM 30		■	■	■				
P	CCM 40	■	■	■	■				
Q	CTR 20					■			
R	CCMT 3L, CCMT 5L, CCMT 8L, CCMT 10L	■				■			
S	ETS 175L, ETS 250L, ETS 400L		■			■			
T	ETS 175L, ETS 250L, ETS 400L oil free and high temperature	■	■			■			
V	ETS 500L			■		■			
X	ETS 500L oil free and high temperature	■		■		■			
Y	ETS 8M Bipolar		■	■		■			
Z	ETS 8M Unipolar	■	■	■		■			

NOTE:

Only applicable for EKF 2A When using Manifold valves.
Dip switch 1 for stepper driver 1 should be selected to base valve type.
Eg: ETS C should be selected in Dip switch 1 if ETS Colibri is used in manifold operation.
ETS 250/400 should be selected if using ETS 500P/ETS 800P.
Dip switch 2 for stepper driver 2 should be selected as manifold valve (Group H).
While setting Dip switch 2 as manifold valve EKF automatically recognize that it is using only 1 Analog input to control both valves and by default AI1 is used as the analog input. Analog sharing function is automatically activated.

Analog input selection (Switch 7 & 8)
Green denotes ON position of DIP switch

Figure 7: DIP analog input selection

Configure Analog signal type by selecting DIP switch as shown in table below (green denotes ON) .

Analog Input	DIP Switch							
	1	2	3	4	5	6	7	8
0 - 10 V (Default)								
0 - 5 V							■	
4 - 20 mA								■
0 - 20 mA							■	■

Analog sharing selection (Switch 6)
Green denotes ON position of DIP switch

Figure 8: DIP analog sharing selection

Stepper driver 1	DIP Switch							
	1	2	3	4	5	6	7	8
Analog Input AI1								
Analog input AI2						■		

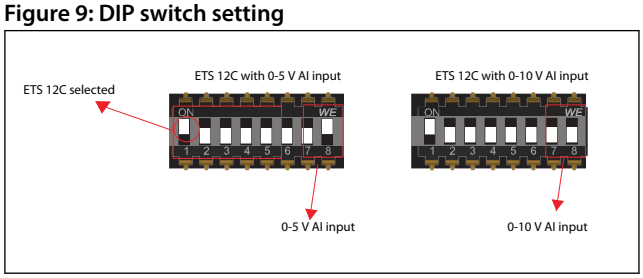
Stepper driver 2	DIP Switch							
	1	2	3	4	5	6	7	8
Analog Input AI1						■		
Analog input AI2								

NOTE:

Analog sharing is used only in EKF 2A.
Analog sharing can be done to run 2 valves using the same analog input.

If stepper driver 1 should use analog input from AI2 (AI2 is meant for stepper driver 2 analog input).
Then Dip switch 1 should have switch 6 at position ON.
EKF 2A will then use AI2 signal to control stepper valve 1.
If stepper driver 2 should use analog input from AI1 (AI1 is meant for stepper driver 1 analog input).
Then Dip switch 2 should have switch 6 at position ON.
EKF 2A will then use AI1 signal to control stepper valve 2.

Figure 9: DIP switch setting



Connecting to PC

EKF Series stepper drivers can be connected to PC for

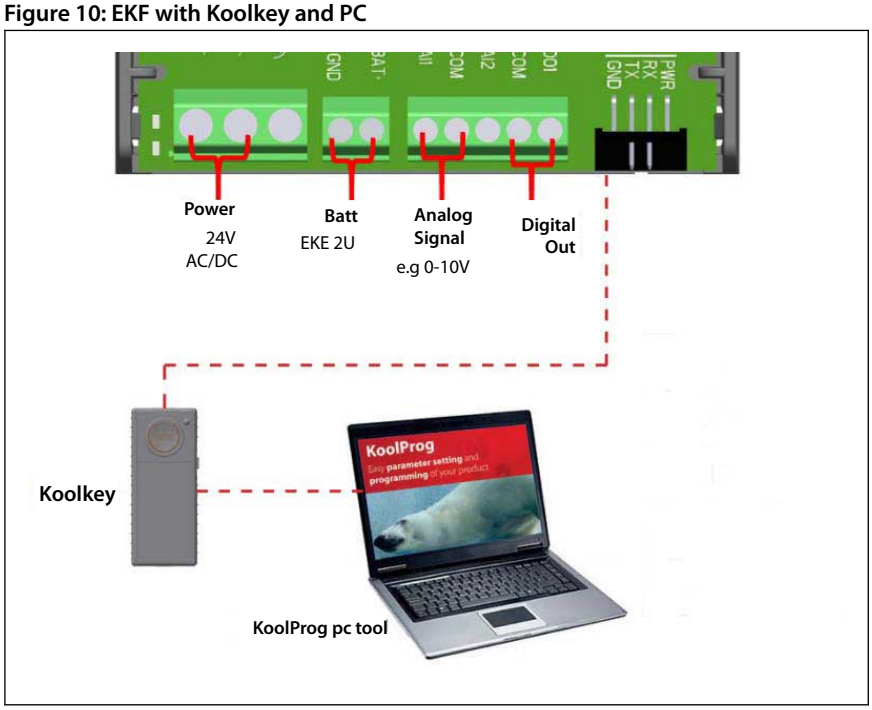
1. Accessing and changing advanced settings
2. Accessing alarm/warning and diagnostic readouts
3. Performing service

If the advanced parameter settings are not needed, the product can be set using Dip switch only.
While using the Dip switch option a connection to PC is not required.
To connect EKF to pc the below tools are needed

1. KoolProg PC software (Check KoolProg website if the version supports EKF)
2. Koolkey
3. Cables to connect Koolkey to PC and EKF(available as Koolkey accessory)

The schematic below shows how to connect EKF with Koolkey and PC

Figure 10: EKF with Koolkey and PC

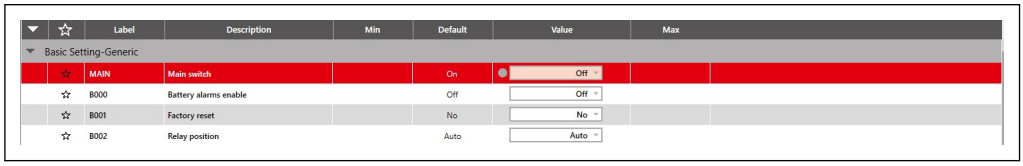


Steps to follow while connecting EKF to KoolProg:

1. Connect EKF to power, make sure power is ON
2. Connect Valve and input signals to EKF.
3. Connect Koolkey to EKF and PC

4. Select **On-line service** option in Koolprog.
5. Select **SW Main switch to OFF**
6. Make necessary changes to parameters from drop down lists.
7. After completing all changes set **SW Main switch** to **ON**.
8. EKF is ready to use with the new settings.

Figure 11: On-line service



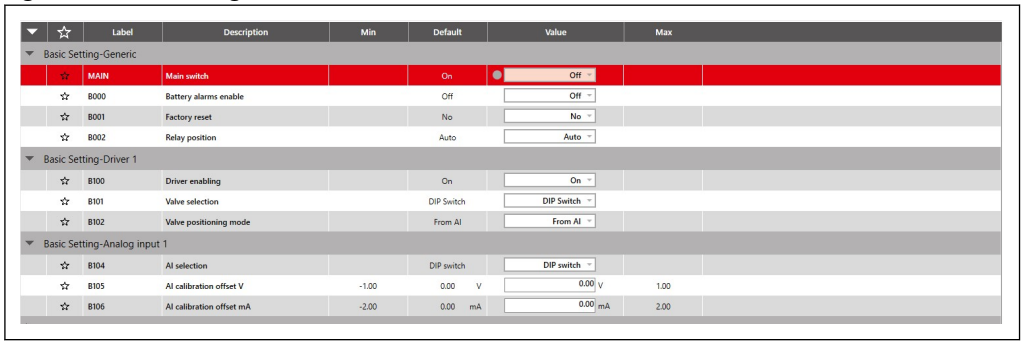
NOTE:
To make changes to the settings of EKF using Koolkey/KooProg software, the SW main switch should be OFF.

By default EKF looks at DIP switch for the settings. If settings are altered to use values for Koolprog then EKF will look at Koolprog settings only and not follow changes in DIP switch. To use DIP switch again, EKF should be changed back to use DIP switch settings using Koolprog

EKF can be configured using PC with the use of Koolkey and Koolprog PC tool.
The KoolProg tool should be used for making advanced selection and setting of EKF.
There are 2 main sections in Koolprog for EKF configuration:
1. Basic setting
2. Valve driver setting

Basic setting

Figure 12: Basic setting



Basic setting – Generic

Main Switch - Main
Main switch should be OFF while making changes to parameters and must be turned back ON to have the settings made active.

Battery alarm enable – B000
This parameter should be used to set battery alarm ON/OFF.
Turning it on will enable alarm through DO(Digital output) when battery voltage is low.

Factory reset – B001
This parameter should be used to factory reset EKF, When full reset of all parameters are required

Relay position – B002
This parameter should be kept at position Auto.
There is an option to force open and close the alarm.
This parameter should be used as service test to see if alarm activates and communicates through DO (Digital output).

Basic setting – Driver

Driver enabling – B100
This parameter should be used to turn ON/OFF driver output.
When OFF is selected EKF will not drive valve connected to corresponding stepper output.

Valve selection – B101
This parameter is used to select which valve the stepper output is connected to and which setting (DIP switch or KoolProg) that EKF has to follow.
When set to Dip switch EKF reads the setting made on DIP switch.
When set to User defined, Additional parameters will be visible in valve driver setting.
This should be used when configuring valves that are not preset into EKF.
When set to groups, EKF will recognize the valves according to the group naming

Valve position mode – B102
This parameter is used to select which input EKF should use to position the valve.
When selecting from AI, EKF will read the AI input and move valve accordingly.
When selecting from register, an additional parameter valve position will be visible.
According to the valve position % (OD%) EKF will move the valve.

Figure 13: Basic setting - Driver1

	Label	Description	Min	Default	Value	Max
Basic Setting-Driver 1						
☆	B102	Valve positioning mode		From AI	From register	
☆	B103	Valve position	0.00	0.00 %	0.00 %	100.00

NOTE:
Valve position mode: From register is only used for service and check purpose.

Basic setting – Valve analog input

AI selection -B104
This parameter is used to set if EKF has to use Dip switch for AI selection or from Koolprog.
When selected to Dip switch EKF will read the dip switch setting.
When selected to other inputs from drop down list EKF will not read from Dip switch instead will use setting selected here.

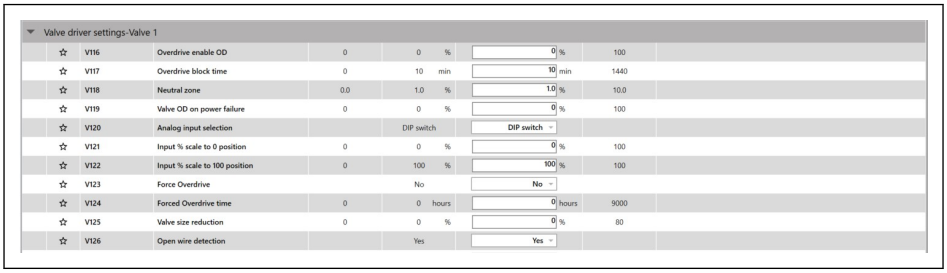
AI calibration offset V - B105
This parameter is used to offset 0 - 10 V, 0 - 5 V AI input signal

AI calibration offset mA – B106
This parameter is used to offset 4 - 20 mA, 0 - 20 mA AI input signal

Figure 14: Valve driver setting

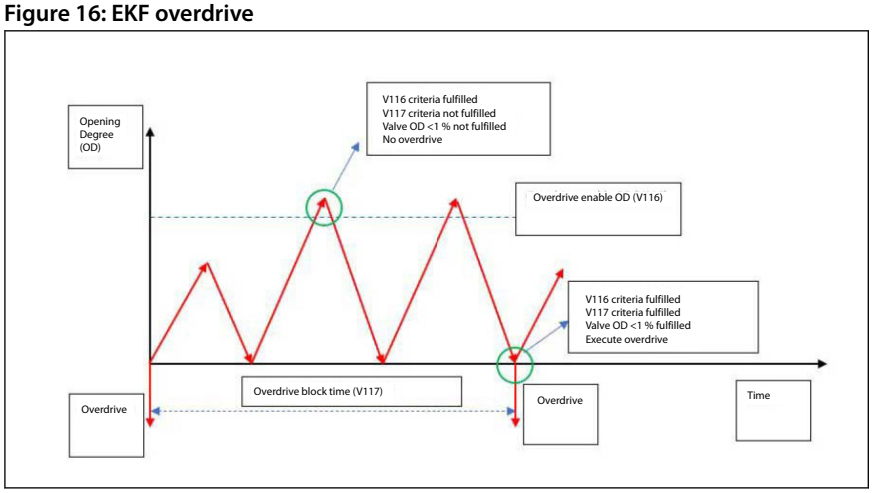
	Label	Description	Min	Default	Value	Max
Valve driver settings-Valve 1						
☆	V116	Overdrive enable OD	0	0 %	0 %	100
☆	V117	Overdrive block time	0	10 min	10 min	1440
☆	V118	Neutral zone	0.0	1.0 %	1.0 %	10.0
☆	V119	Valve OD on power failure	0	0 %	0 %	100
☆	V120	Analog input selection		DIP switch	DIP switch	
☆	V121	Input % scale to 0 position	0	0 %	0 %	100
☆	V122	Input % scale to 100 position	0	100 %	100 %	100
☆	V123	Force Overdrive		No	No	
☆	V124	Forced Overdrive time	0	0 hours	0 hours	9000
☆	V125	Valve size reduction	0	0 %	0 %	80
☆	V126	Open wire detection		Yes	Yes	
☆	V129	Cable length compensation	100	100 %	100 %	150
☆	V130	MOPD current	100	100 %	100 %	150
☆	V131	MOPD OD stop	0	10 %	10 %	100

Figure 15: Valve driver setting - valve 1



Overdrive
Overdrive features are necessary to help driver calibrate the valve position and prevents accumulation of loss of step.
Overdrive will close the valve with extra number of steps towards closing direction.
The number of additional steps for overdrive is valve depended. While using Danfoss valves from valve selection list number of steps for overdrive is automatically set.
For third party products this should be set as a parameter inside user defined valve.
Excess overdrive will increase valve wear rate.

Figure 16: EKF overdrive



Overdrive enable OD – V116

This parameter defines the opening degree that triggers an overdrive. If the actual opening degree of the valve crosses the overdrive enable OD then the driver will be ready for an overdrive the next time the valve actual opening degree reaches below 1% opening degree

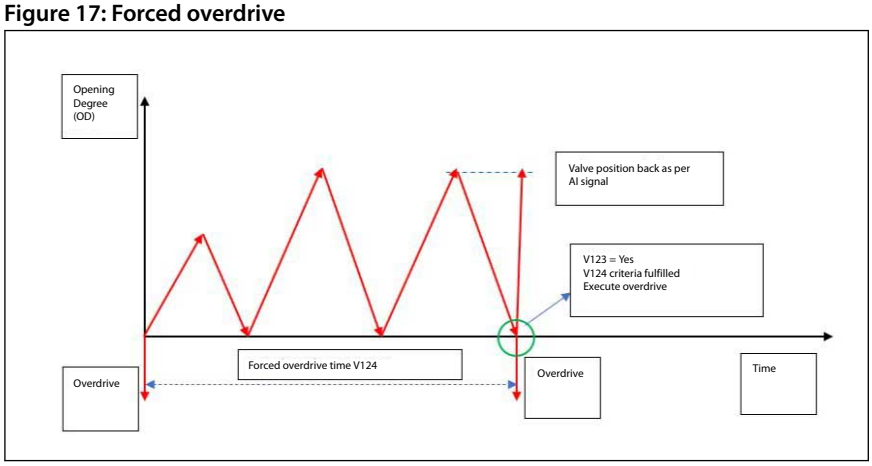
Overdrive block time - V117
This parameter defines the time block between 2 consecutive overdrives

Neutral zone – V118

Valve neutral zone limits the driver from moving the valve from its position if the differential between the current valve position to the new position of the valve is within this percentage. This limits the valve from changing position for small variations in incoming analog signals

By defualt Neutral zone is 1% that is any change in valve opening degree from reference of +0.5% will not move the valve. Any change above this band will move the valve to the new position.

Figure 17: Forced overdrive



Forced Overdrive – V123

Forced overdrive is use to trigger an overdrive purely based on time. The driver will move the valve to 0 position with overdrive and immediately come back to the requested position from analog signal

Forced overdrive time – V124
Forced overdrive time is a timer for forced overdrive.
Forced overdrive has highest priority and will overrule overdrive block time V117.
Overdrive block time V117 will be reset after forced overdrive is made.
After forced overdrive valve will return back to last position.

Valve OD on power failure – V119

This parameter sets the opening degree to which the driver should position the valve during an emergency closing has been done due to power failure

Analog input selection – V120

This parameter is used to select which analog input signal EKF should use to position the valve. If Dip switch is selected then EKF will read the settings made at dip switch else it will use as per the selection made in software.

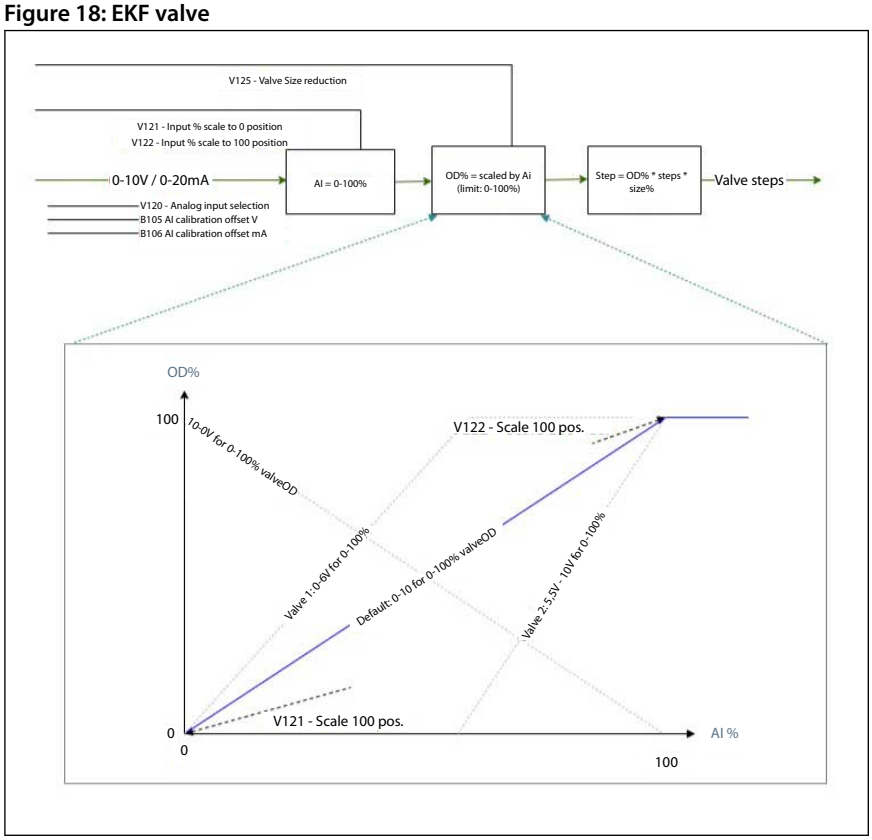
Valve scaling
EKF has parameter that can scale valve opening degree to the input analog signal.

Input % scale to 0 position – V121
In normal operation EKF will linearly control valve from 0 – 100 % opening degree corresponding to 0 – 10 V analog signal.
When input scaling is done from 0 position the Analog input is scaled towards this range.
Eg: If V121 is 0 then valve will move 0 – 100% opening degree with 0 – 10 V.
If V121 is 10 then valve will move 10 – 100% opening degree with 0 – 10 V

Input % scale to 100 position – V122
In a normal operation EKF will linearly control valve from 0 – 100 % opening degree corresponding to 0 – 10 V analog signal.
When input scaling is done from 100 position the Analog input is scaled towards this range.
Eg: If V122 is 100 then valve will move 0 – 100% opening degree with 0 – 10 V.
If V121 is 90 then valve will move 0 – 90% opening degree with 0 – 10 V

Valve size reduction - V125
This parameter can help reduce oversized valves in application.
If V125 is 0 then valve size is 0 – 100% of opening degree
If V125 is 10 then valve size is 0 – 90% of opening degree

Figure 18: EKF valve



Open wire detection – V126

This parameter is used to switch on and off the open wire detection. This helps detect if there is any open wire or discontinuity in stepper coil connection

Parameters

Table 3: BASIC SETTING

Label	Description	Min	Max	Value (Defualt)	Unit	Enumeration	Notes
DRIVER 1							
B100	Driver enabling			1 = On		0=Off;1=On	0:Parameter configuration allowed for update; 1:Normal operation
B101	Valve selection			0 = DIP Switch		DIP switch, User defined, Group B, Group C, Group D, Group E, Group F, Group G, Group H, Group I, Group J, Group K, Group L, Group M, Group N, Group O, Group P, Group Q, Group R, Group S, Group T, Group V, Group X, Group Y, Group Z	0:Valve selection by DIP switch; 1 – 19:DIP switch set by parameter
B102	Valve positioning mode			0 = From AI		0=From AI;1=From register	0:Analog input; 1:parameter B103
B103	Valve position	0	100	0	%		Manual opening degree set by parameter (B102 = AI)
ANALOG INPUT 1							
B104	AI selection			0 = DIP switch		0=DIP switch;1=0 – 10 V; 2=0 – 5 V; 3=4 – 20 mA; 4=0 – 20 mA	0:Type selection by DIP switch; 1 – 4: Type selection by parameter
B105	AI calibration offset V	-1	1	0	V		Offset added to measured signal
B106	AI calibration offset mA	-2	2	0	mA		Offset added to measured signal
DRIVER 2							
B200	Driver enabling			1 = On		0=Off;1=On	0:Parameter configuration allowed for update; 1:Normal operation
B201	Valve selection			0 = DIP Switch		DIP switch, User defined, Group B, Group C, Group D, Group E, Group F, Group G, Group H, Group I, Group J, Group K, Group L, Group M, Group N, Group O, Group P, Group Q, Group R, Group S	0:Valve selection by DIP switch; 1 – 31:DIP switch set by parameter
B202	Valve positioning mode			0 = From AI		0=From AI;1=From register	0:Analog input; 1:parameter B203
B203	Valve position	0	100	0	%		Manual opening degree set by parameter (B202 = AI)
ANALOG INPUT 2							
B204	AI selection			0 = DIP switch		0=DIP switch; 1=0 – 10 V; 2=0 – 5 V; 3=4 – 20 mA; 4=0 – 20 mA	0:Type selection by DIP switch; 1 – 4: Type selection by parameter
B205	AI calibration offset V	-1	1	0	V		Offset added to measured signal
B206	AI calibration offset mA	-2	2	0	mA		Offset added to measured signal
GENERIC							
B000	Battery alarms enable			0 = Off		0=Off;1=On	0:No Alarm; 1:Alarm based on battery voltage
B001	Factory reset			0 = No		0=No;1=Yes	0:No; 1:Yes,Reset all parameters to factory settings
B002	Relay position			0 = Auto		0=Auto;1=Open;2=Close	

Table 4: VALVE DRIVER SETTINGS

Label	Description	Min	Max	Value (Defualt)	Unit	Enumeration	Notes
VALVE 1							
V100	User defined Motor type			0 = Unipolar		0=Unipolar; 1=Bipolar	Type of motor used in the stepper valve (Unipolar/Bipolar).
V101	User defined Decay mode			0 = Fast		0=Fast; 1=Slow; 2=Mixed	Fast decay mode causes a rapid reduction in inductive current and allows the motor to coast toward zero velocity. Slow decay mode leads to a slower reduction in inductive current but produces rapid deceleration.
V102	User defined Step mode			0 = Full		0=Full; 1=Half; 2=1/4; 3=1/8; 4=1/16	Danfoss recommends using 1/8 stepping mode as this provides a good balance between torque and speed and ensures smooth operation.
V103	User defined Step positioning			2 = Auto		0=Fullstep;1=Halfstep;2=Auto	
V104	User defined Total steps	0	10000	0	stp		The total no of steps will vary according to the selected valve motor type, always referring to full steps.
V105	User defined Speed	10	300	10	pps		Desired valve speed drive rate in steps per second.
V106	User defined Start speed	100	100	100	%		Valve Start Speed (1 – 100% of Valve speed)
V107	User defined Emengency speed	50	200	100	%		Emergency close is in use when the main power is lost, and the valve is closed using the battery backup
V108	User defined Drive current	10	1000	10	mA		Current applied to each phase of the stepper motor during actual valve movement.
V109	User defined Acceleration current	100	100	100	%		Current supplied to the coils under acceleration of the stepper motor
V110	User defined Acceleration time	10	10	10	ms		Time used to get from min speed to normal speed
V111	User defined Holding current	0	100	0	%		Percent of Max Phase Current that should be applied to each phase of the stepper output when the valve is stationary.
V112	User defined Valve excitation time after stop	0	1000	10	ms		Time that the drive current is continued after the motor has stopped movement. Next state is holding current.
V113	User defined Compensation backlash	0	10	0	%		Number of steps needed to correct for mechanical hysteresis when a reduction gear is part of the valve design
V114	User defined Valve thermal protection	0	100	100	%		For Danfoss valves don't changemaximum - allowed dutycycle
V115	User defined Overdrive	0	20	5	%		Extra steps for zerocalibrating valve possition, scaled as a percentage of the full opening.
V116	Overdrive enable OD	0	100	0	%		Defines how much the valve must have been open before overdrive is allowed at next close position
V117	Overdrive block time	0	1440	10	min		Defines the minimum time between two overdrive actions. Overdrive calibrations within this time frame will be ignored.
V118	Neutral zone	0	10	1	%		Define how much the requested OD must change before a new OD is set.
V119	Valve OD on power failure	0	100	0	%		Move the valve to a predefined position during power failure
V120	Analog input selection			0 = DIP switch		0=DIP switch; 1=AI 1; 2=AI 2	0:DIP switch; 1:AI 1; 2: AI 2
V121	Input % scale to 0 position	0	100	0	%		Signal type is defined by “B104” “AI selection”

Label	Description	Min	Max	Value (Defualt)	Unit	Enumeration	Notes
V122	Input % scale to 100 position	0	100	100	%		Signal type is defined by "B104" "AI selection"
V123	Force Overdrive			0 = No		0=No;1=Yes	Manually initiate an overdrive. NOTE this will close the valve for some tome
V124	Forced Overdrive time	0	9000	0	hours		Timer based overdrive. If no overdrive has been performed within this period, then a valve close is done (forced overdrive)
V125	Valve size reduction	0	80	0	%		
V126	Open wire detection			1 = Yes		0=No; 1=Yes	
VALVE 2							
V200	User defined Motor type			0 = Unipolar		0=Unipolar; 1=Bipolar	Type of motor used in the stepper valve (Unipolar/Bipolar).
V201	User defined Decay mode			0 = Fast		0=Fast; 1=Slow; 2=Mixed	Fast decay mode causes a rapid reduction in inductive current and allows the motor to coast toward zero velocity. Slow decay mode leads to a slower reduction in inductive current but produces rapid deceleration.
V202	User defined Step mode			0 = Full		0=Full; 1=Half; 2=1/4; 3=1/8; 4=1/16	Danfoss recommends using 1/8 stepping mode as this provides a good balance between torque and speed and ensures smooth operation.
V203	User defined Step positioning			2 = Auto		0=Fullstep; 1=Halfstep; 2=Auto	
V204	User defined Total steps	0	10000	0	stp		The total no of steps will vary according to the selected valve motor type, always referring to full steps.
V205	User defined Speed	10	300	10	pps		Desired valve speed drive rate in steps per second.
V206	User defined Start speed	100	100	100	%		Valve Start Speed (1 – 100% of Valve speed)
V207	User defined Emengency speed	50	200	100	%		Emergency close is in use when the main power is lost, and the valve is closed using the battery backup
V208	User defined Drive current	10	1000	10	mA		Current applied to each phase of the stepper motor during actual valve movement.
V209	User defined Acceleration current	100	100	100	%		Current supplied to the coils under acceleration of the stepper motor
V210	User defined Acceleration time	10	10	10	ms		Time used to get from min speed to normal speed
V211	User defined Holding current	0	100	0	%		Percent of Max Phase Current that should be applied to each phase of the stepper output when the valve is stationary.
V212	User defined Valve excitation time after stop	0	1000	10	ms		Time that the drive current is continued after the motor has stopped movement. Next state is holding current.
V213	User defined Compensation backlash	0	10	0	%		Number of steps needed to correct for mechanical hysteresis when a reduction gear is part of the valve design
V214	User defined Valve thermal protection	0	100	100	%		For Danfoss valves don't changemaximum - allowed dutycycle
V215	User defined Overdrive	0	20	5	%		Extra steps for zerocalibrating valve possition, scaled as a percentage of the full opening.
V216	Overdrive enable OD	0	100	0	%		Defines how much the valve must have been open before overdrive is allowed at next close position

Label	Description	Min	Max	Value (Defualt)	Unit	Enumeration	Notes
V217	Overdrive block time	0	1440	10	min		Defines the minimum time between two overdrive actions. Overdrive calibrations within this time frame will be ignored.
V218	Neutral zone	0	10	1	%		Define how much the requested OD must change before a new OD is set.
V219	Valve OD on power failure	0	100	0	%		Move the valve to a predefined position during power failure
V220	Analog input selection			0 = DIP switch		0=DIP switch; 1=AI 2; 2=AI 1	0:DIP switch; 1:AI 2; 2: AI 1
V221	Input % scale to 0 position	0	100	0	%		Signal type is defined by "B204" "AI selection"
V222	Input % scale to 100 position	0	100	100	%		Signal type is defined by "B204" "AI selection"
V223	Force Overdrive			0 = No		0=No; 1=Yes	Manually initiate an overdrive. NOTE this will close the valve for some tome
V224	Forced Overdrive time	0	9000	0	hours		Timer based overdrive. If no overdrive has been performed within this period, then a valve close is done (forced overdrive)
V225	Valve size reduction	0	80	0	%		
V226	Open wire detection			1 = Yes		0=No; 1=Yes	

Table 5: READOUTS

Label	Description	Min	Max	Value (Defualt)	Unit	Enumeration	Notes
DRIVER 1							
R100	Valve position	0	100	0	%		Actual valve possition
R101	Analog input signal	0	20000	0	uA/mV		Actual analog input signal
DRIVER 2							
R200	Valve position	0	100	0	%		Actual valve possition
R201	Analog input signal	0	20000	0	uA/mV		Actual analog input signal
GENERIC							
R000	Battery voltage	0	30000	0	mV		Measured battery voltage
R001	Software version high	0	65535	0			Software version high.low (the integer part)
R002	Software version low	0	65535	0			Software version high.low (the decimal part)

Product specification

Technical data

Table 6: Valve settings

Function Data	Value
Supply Voltage	EKF 1A: 24 V AC / DC 50 / 60 Hz EKF 2A: 24 V AC / DC, 50 / 60 Hz
Power consumption	Idle operating: < 1 W (without valve) Power consumption for using 1 valve. CCMT 16 – CCMT 42: 25 VA / 15 W ETS 5M, ETS 6: 20 VA / 10 W ETS 12C – ETS 100C, KVS C: 30 VA /15 W ETS 12.5 – 400: 10 VA / 5 W ETS 500P, 800P: 28 VA / 20 W CCMT 2- CCMT 8: 10 VA / 5 W CTR 20: 14 VA / 10 W CCMT L: 20 VA / 10 W When using two valves sum the power consumption of each valve
Number of analog inputs	EKF 1A: 1input (AI1) EKF 2A: 2 inputs (AI1, AI2)
Analog signal supported	0-5 V, 0-10 V, 4-20 mA, 0-20 mA
Digital outputs	1 output for EKF1A / EKF 2A: D01 (open collector), max sink current 10 mA
Valve support	EKF 1A: 1 stepper motor valve output EKF 2A: 2 stepper motor valve output STEPPER 1: A1, A2, B1, B2 STEPPER 2: A1, A2, B1, B2 Bipolar and unipolar stepper motor output: - Danfoss ETS/ ETS L/ KVS/ ETS C/ KVS C/ CCMT 2 – CCMT 42/ CTR/ CCM/ CCMT L Valves - ETS 6 / ETS 5M (unipolar) / ETS 8M (Bipolar) / ETS 8M (Unipolar) Valves Open circuit HW diagnostics is present. This function is not available when using Unipolar valves
Battery backup	1 input for EKF 1A / EKF2A: Vbat Nominal 18 – 24 V DC, Min 16 V DC - Max 28 V DC (Danfoss EKE 2U recommended)
Storage temperature	-30 – 80 °C / -22 – 176 °F
Operating temperature	-20 – 60 °C / -4 – 140 °F
Humidity	<90% RH, non-condensing

Identification

Product label and barcode label is positioned in the back of product

Figure 19: Product label

The product label above is an example (data might change from actual product label)

Stepper valve driver	Product description
EKF 2A	Product type designation
080G5035	Product code number
24V AC/DC 50/60 Hz	Input power rating
PV01	Product version
SW1v00	Software version
QR code	Danfoss product information website
Made in Denmark	Country of origin
Danfoss A/S, 6430 Nordborg, Denmark	Company address

Troubleshooting

Table 7: Driver settings

Label	Alarm/Warning	Description	Troubleshoot
A00	Overcurrent alarm driver 1	Analog signal has received higher current than allowed in AI1 (detected while using current signal selection)	Check Current signal source AI1 input. Check DIP switch/ Software selection of AI1 setting (If wrong selection has been made)
A01	Battery fault	Battery voltage alarm, Activated when Battery voltage <=12 V	Check battery connection Change battery backup unit immediately.
W01	Battery warning	Battery voltage warning, Activated when Battery voltage >12 V or <=16 V	Battery backup needs to be replaced soon Check battery connection
A02	Stepper fault driver 1	Short circuit on the valve output (Stepper driver 1) or over temperature of EKF driver hardware	Check the valve connection in stepper driver 1 Check ambient temp conditions of hardware.
A03	Open circuit fault driver 1	Open circuit detection for valve connection (Stepper driver 1)	Check the valve connection (Stepper driver 1). Broken wires (Stepper driver 1).
A04	Persistent memory fault	Memory error	Replace EKF driver.
W02	DIP Switch position changed after boot driver 1	DIP switch position for stepper driver 1 has been changed while EKF is powered on.	Only change DIP switch with EKF powered off. Reboot EKF
W06	Invalid configuration driver 1	Mistake in software or Dip switch configuration of stepper driver 1.	Review configuration of stepper driver 1.
W03	Configured valve current exceeds the maximum supplied current driver 1	Alarm triggered when max current output is above the limitation of 1A per driver. Alarm detected on stepper driver 1	Max current output per driver is 1 A. Adjust EKF valve parameters to limit current to 1A (if possible)
A06	Overcurrent alarm driver 2	Analog signal has received higher current than allowed in AI2 (detected while using current signal selection)	Check Current signal source AI2 input. Check DIP switch/ Software selection of AI2 setting (If wrong selection has been made)
A07	Stepper fault driver 2	Short circuit on the valve output (Stepper driver 2) or over temperature of EKF driver hardware	Check the valve connection in stepper driver 2 Check ambient temp conditions of hardware.
A08	Open circuit fault driver 2	Open circuit detection for valve connection (Stepper driver 2)	Check the valve connection (Stepper driver 2). Broken wires (Stepper driver 2).
W04	DIP Switch position changed after boot driver 2	DIP switch position for stepper driver 2 has been changed while EKF is powered on.	Only change DIP switch with EKF powered off. Reboot EKF
W07	Invalid configuration driver 2	Mistake in software or Dip switch configuration of stepper driver 2.	Review configuration of stepper driver 2.
W05	Configured valve current exceeds the maximum supplied current driver 2	Alarm triggered when max current output is above the limitation of 1 A per driver. Alarm detected on stepper driver 2.	Max current output per driver is 1 A. Adjust EKF valve parameters to limit current to 1 A (if possible)

Certificates, declarations, and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at danfoss.com or contact your local Danfoss representative if you have any questions.

Table 8: Approvals

CE	RoHS	c UL us	089

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