ComAp
The heart of smart control

I-Step

Stepper motor driver

SW version 1.1.0

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Global Guide

Table of contents

1 Document information

1.1 Clarification of notation

Note: *This type of paragraph calls readers attention to a notice or related theme.*

IMPORTANT: This type of paragraph highlights a procedure, adjustment etc., which can cause a damage or improper function of the equipment if not performed correctly and may not be clear at first sight.

Example: This type of paragraph contains information that is used to illustrate how a specific function works.

1.2 About this guide

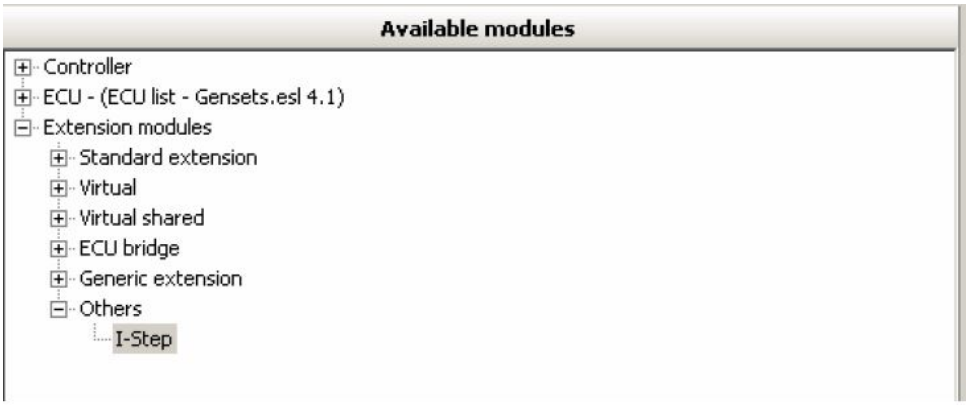
I-Step is a two channel stepper-motor driver. Each channel can operate in one of three modes – Calibration to zero end-point, Calibration to zero and 100 % end-point and without calibration (analogue position feedback information must be used). Each channel can be set to analogue or binary control mode and each channel has its own set of parameters.

In analogue mode, the requested position of each channel is received by CAN line in 0.00 to 100.00 % range.

In Binary mode the stepper position is controlled by Binary inputs Up / Down (sent via CAN bus), adjusted in accordance with the I-Step Command register.

I-Step 1.1 can operate with IS-NT-AFR 1.2 and higher NT-AFR or AFS versions.

The I-Step is configured as an extension module in GenConfig PC software



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Warning: Some forms of technical support may be provided against payment. There is no legal or factual entitlement for technical services provided in connection to resolving problems arising from cyber-attack or other unauthorized accesses to ComAp's Products or Services.

General security recommendations and set of measures

1. AccessCode

• Change the AccessCode BEFORE the device is connected to a network.

• Use a secure AccessCode – ideally a random string of 8 characters containing lowercase, uppercase letters and digits.

• For each device use a different AccessCode.

2. Password

• Change the password BEFORE the device enters a regular operation.

• Do not leave displays or PC tools unattended if an user, especially administrator, is logged in.

3. Controller Web interface

• The controller web interface at port TCP/80 is based on http, not https, and thus it is intended to be used only in closed private network infrastructures.

• Avoid exposing the port TCP/80 to the public Internet.

4. MODBUS/TCP

• The MODBUS/TCP protocol (port TCP/502) is an instrumentation protocol designed to exchange data between locally connected devices like sensors, I/O modules, controllers etc. From it's nature it does not contain any kind of security – neither encryption nor authentication. Thus it is intended to be used only in closed private network infrastructures.

• Avoid exposing the port TCP/502 to the public Internet.

5. SNMP

• The SNMP protocol (port UDP/161) version 1,2 is not encrypted. Thus it is intended to be used only in closed private network infrastructures.

• Avoid exposing the port UDP/161 to the public Internet.

1.4 Document history

Revision number	Related sw. version	Date	Author
1	1.1.0	5. 4. 2019	Dvorak Miroslav

2 General description

2.1 Calibration to zero end-point (CALIBR 0)

Calibration procedure is included after each system switch-on (or can be forced by appropriate command, **see Commands on page 12**). This mode is dedicated for stepper motors without position feedback. Calibration procedure is based on one 0.00 % position sensor and number of steps (NumSteps) setpoint for full range calculation.

Calibration process must be finished until CalibrTimeout setpoint expires. When the calibration process is not finished in this time, the corresponding channel bit CalibrFail and TimeoutFail, **see I-Step Status information on page 11**, are set.

When the I-Step receives information the end-point position is reached, and the value Actual Position does not correspond with this position, following cases could happen:

- The difference between the true position (end-point position is taken as the true value) and value Actual Position (internal, counted value of the I-Step) is smaller then the setpoint PosTolerance. In this case the value Actual Position is reset to zero value. The I-Step can operate with no limitations.
- The difference mentioned above is higher then PosTolerance setpoint. In this case the bit CalibrFail is set and the Actual Value of corresponding channel is reset to zero. The I-Step continues in regulation process of stepper motor.
- The above mentioned difference is higher then 3xPosTolerance setpoint. In this case the bit PositionLost and CalibrFail are set, the bit CalibrDone is reset. Any following commands for stepper position change (both from Analog and Binary inputs) are ignored until the new successful calibration is done.

2.2 Calibration to zero and full end-point (CALIBR 0&100)

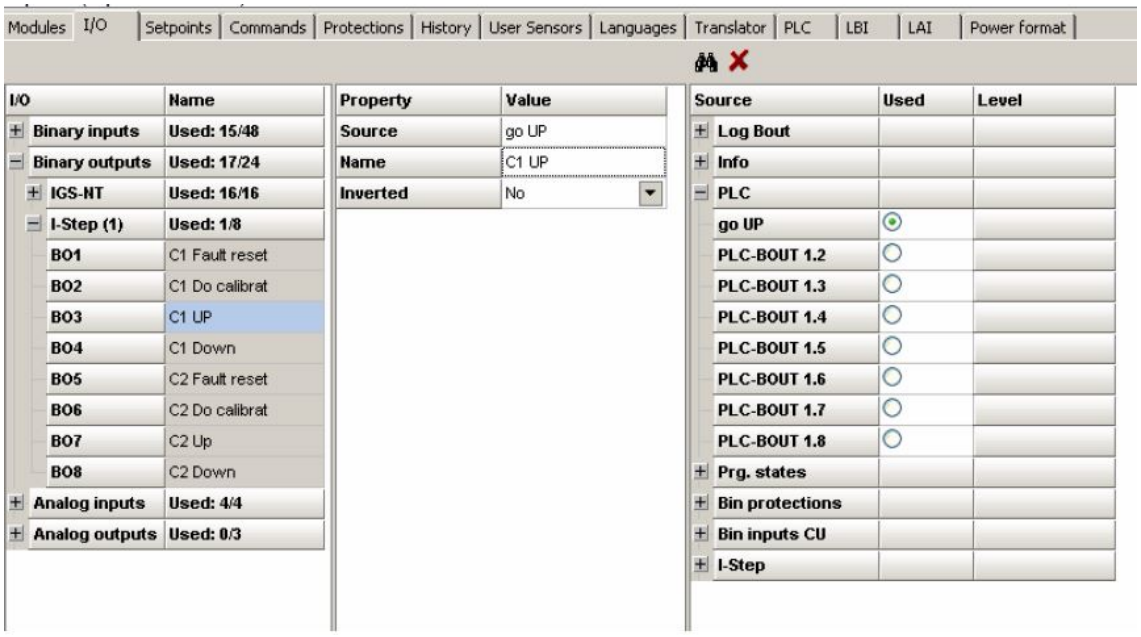
Calibration procedure is included after each system switch-on (or can be forced by command, **see Commands on page 12**). This mode is dedicated for stepper motors without position feedback. Calibration procedure is based on one 0.00 % position sensor and one 100.00 % position sensor. The stepper motor itself counts the number of steps during the calibration process and this value is visible in Values:I-Step: NumSteps. This value has to be rewritten into the setpoint I-Step:NumSteps in I-Step configuration (by the operator).

Calibration process is divided into 2 parts. In the first part the stepper is dedicated to go to 0.00 % end-point. This must be finished until CalibrTimeout setpoint expires. If not, the CalibrFail and TimeoutFail bits are indicated. The second part is calibration to 100.00 % end-point. This part must be finished also until CalibrTimeout setpoint expires (The CalibrTimeout period runs again from the beginning). CalibrTimeout is indicated also in case the I-Step counts more then 15 000 steps during this calibration part (15 000 steps is limiting number, stepper motor with higher number of steps cannot be controlled by I-Step 1.1 neither in this mode nor in the CALIBR 0 mode).

When the I-Step, during normal operational mode, receives information about end-point position (either 0 or 100 % end-point), the similar cases as in the first mode (Calibration to zero end-point) arise.

2.3 Without calibration process (NOCALIBR)

In this mode no calibration process is done. The stepper motor must be equipped with an analogue feedback signal (current 0-20 mA or voltage 0-10 V) determining the actual position of the stepper. This signal must be led to the controller. In the controller this value is dedicated to be compared with the requested position of the stepper motor (using the PLC block Time Comparator e.g) and corresponding Binary outputs – Go UP, Go DOWN must be configured to appropriate bits in I-Step inputs (Up and Down).



When these bits are not configured in this mode, the BinCtrlFail bit will be activated. The minimal pulse length to be accepted by the I-Step is 120 ms.

The information about the position of the stepper should be configured also to the analogue input of the I-Step module (this information must be in range 0.00 – 100.00 % – the internal PLC functions can be used, see IGS-NT manuals at ComAp website), so the I-Step can display this actual position value.

In this mode the setpoints CalibrTimeout, MixerHysteresis have no meaning, are not used. In case in this mode the end-point position will be detected and there will be disproportion between this information and information receiving from the analogue feedback signal from the stepper motor, the bit PositionLost will be adjusted. The FaultReset command is necessary to be sent to the I-Step to refresh the functionality of the I-Step module.

If any channel of the I-Step is switched into another mode (by setpoint CxMode), the bit CalibrFail will be adjusted and it is up to operator to invoke a calibration itself, activating the corresponding bit:StepperCalibr. In case any I-Step channel is switched into mode Calibr 0 or Calibr 0&100, then the calibration process can be invoked by switching off and on the power supply of the I-Step module.

In all three modes both the 0 end-point and 100 % end-point signals have to be configured to assure the correct functionality of the I-Step module. The end-point signals which are not necessary for appropriate mode (CALIBR_0 or NO_CALIBR) have to be configured as permanent open or close, depending on the chosen polarity of the end-point signals.

back to Document information

3 Terminals, dimensions

The I-Step module dimensions, front sticker:

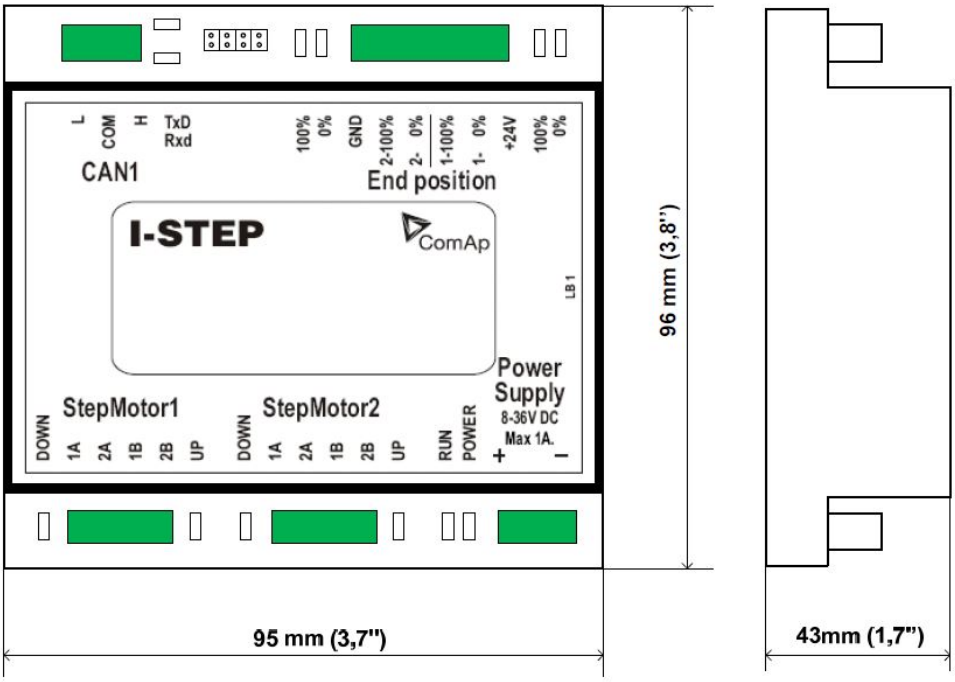


Image 2.1 I-Step dimensions, connectors layout, front sticker

3.1 Jumpers

Label	Position	Function
J1	P34	No function – reserve
J3	P36	No function – reserve
J4	P37	No function – reserve

3.2 LED Indication

LED states description

ON	Continuously lights
OFF	Continuously dark
F1	Blink with 1 sec period
F2	Blink with 200 ms period
F3a,b	Two LED alternates with period 200 ms
F4	"Fast" blinking, dependent on the communication speed

There are following 5 LEDs on I-Step module.

I-Step LED description

LED	State	Description
PWR	ON	The supply voltage is connected to I-Step.
RUN	OFF	I-Step is not working.
	ON	I-Step is ready, communication OK.
	F1	Communication fail.
	F2	Invalid firmware, memory fail.
DOWN 1 (or 2)	OFF	Steady state, not moving.
	ON	Moving to 0.0 % direction.
	F2	Calibration in process.
	F3a	Calibration fail.
UP 1 (or 2)	OFF	Steady state, not moving.
	ON	Moving to 100.0 % direction.
	F2	Calibration in process.
	F3b	Calibration fail.
TxD, RxD	F4	Active communication via CAN 1 line.
0 %, 100 %	ON	In case negative end-point logic: no end-point is detected In case of positive end-point logic: end-point reached
	OFF	In case negative end-point logic: end-point is reached In case of positive end-point logic: no end-point is detected

back to Terminals, dimensions

4 Data

Following status from I-Step can be used for states indication or alarm generation. There is separate status info from each channel.

4.1 I-Step Status information

Bit	Name	Function
BI1	C1/2 Active	= 1 … I-Step channel is active = 0 … I-Step is not enabled
BI2	C1/2 Calibration	= 1 … Calibration is actually in process = 0 … No calibration is processed
BI3	C1/2 InOperation	= 1 … I-Step is in operation – stepper is revolving = 0 … Stepper is idle
BI4	C1/2 Increasing	= 1 … I-Step is actually in Increasing process = 0 … I-Step is not in Increasing process
BI5	C1/2 Decreasing	= 1 … I-Step is actually in Decreasing process = 0 … I-Step is not in Decreasing process
BI6	C1/2 BinaryCtrl	= 1 … Stepper position is controlled via binary signal Up, Down = 0 … Stepper position is controlled via analog signal
BI7	C1/2 BinCtrlFail	= 1 … Wrong combination of binary signal Up, Down was detected, or binary signals are not configured in NO_CALIBR mode. = 0 … No binary signal problems, possibly not configured
BI8	C1/2 CalibrDone	= 1 … Calibration was successfully done = 0 … Calibration is needed
BI9	C1/2 CalibrFail	= 1 … Problem during Calibration process was detected = 0 … The last calibration was successfully
BI10	C1/2 TimeoutFail	= 1 … Calibration wasn't success in given time (CalibrTimeout) = 0 … No expired timeout detected
BI11	C1/2 PositLost	= 1 … Unexpected sensor mark = 0 … no position lost indication
BI12	C1/2 CommError	= 1 … Some communication problems were detected (connection lost) = 0 … No connection lost indication
BI13	C1/2 EEPROM fail	= 1 … EEPROM fail was detected = 0 … EEPROM ok

Bit	Name	Function
BI14	C1/2 WrongParams	= 1 … Some setpoint is out of limit = 0 … No setpoint problem
B1	C1/2 OverProt	= 1 … Overload was detected = 0 … No overload detected
BI16	Not used	For further use

Table 3.1 I-Step Status information

Note: *It is up to operator, to configure appropriate protections on these Status information bits. For example Shutdown in case the PositLost bit is indicated, Warning in case CalibrFail is indicated and so on.*

4.2 Commands

Can be handled from InteliSys^{NT} controller

Bit	Name	Meaning
BO1/BO5	M1/2 Fault reset	= 1 … Clear all fails indication in mixer 1/2 status register = 0 … No meaning
BO2/BO6	M1/2 Do calibrat	= 1 … Calibration process on mixer 1/2 is requested *) = 0 … No meaning
BO3/BO7	M1/2 Up	= 1 … Move mixer 1/2 step engine Up **) = 0 … No request to move Up
BO4/BO8	M1/2 Down	= 1 … Move mixer 1/2 step engine Down **) = 0 … No request to move Down

Table 3.2 I-Step commands

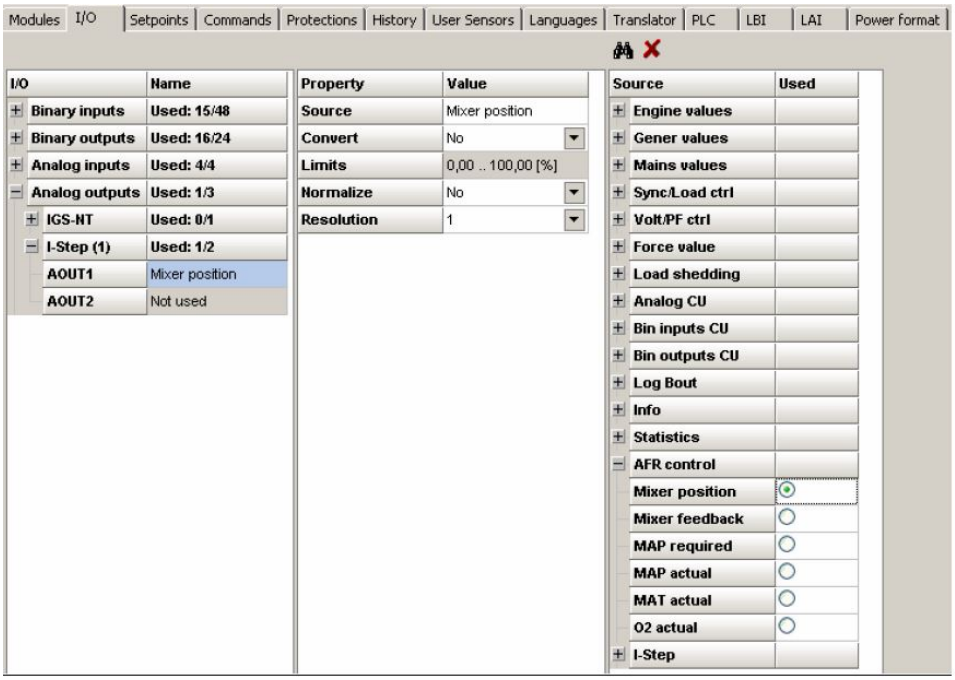
Note:
**) Calibration process starts with transition 0 to 1 on binary signal "Do calibration". Calibration process couldn't be interrupted.*
***) Binary control needs both signals Up and Down to be configured in IS-NT controller. If there is Up and Down request at the same time no request is accepted.*

4.3 Data Analog outputs

	Name	Function
AOUT1	Channel 1 output	0.00 % – 100.00 %
AOUT2	Channel 2 output	0.00 % – 100.00 %

Table 3.3 I-Step analog outputs

On these analog outputs configure the requested position signal, in range 0.00 % – 100.00 %. This signal is for example the logical output "Mixer position" from IS-NT-AFR software:



Note: *Requested position value in 0.00 – 100.00 range only is accepted by I-Step module. Any value out of this range is limited to 0.00 or to 100.00 %.*

back to Data

5 Troubleshooting

- In some cases it is necessary do adjust the I-Step current to lower values (below 0.5 A), otherwise the stepper will not move.
- In case the stepper is moving in opposite way, swap any 2 output wires, which led to the stepper.
- In case of NO_CALIBR mode, the binary control can be used. In this case, the pulses should be rather short. The source for pulses Speed UP and Speed DOWN could be created using the internal PLC functions in controller. The proper hysteresis should be also done, to avoid the inadvisable movement of the stepper around the requested position. The speed of the stepper motor should be adjusted to lower values, **see Setpoints on page 19**.

The following scheme shows the example, how to create the signals for UP and DOWN to control the stepper in binary mode:

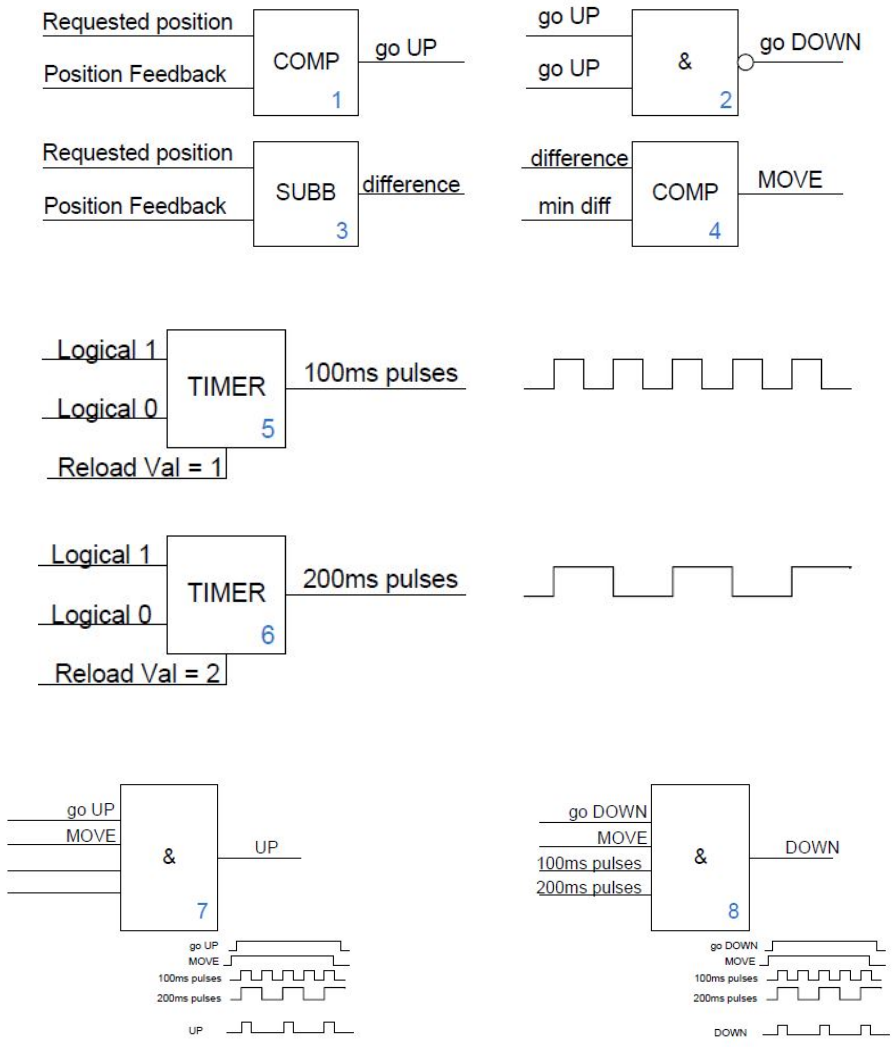


Image 4.1 PLC functions to assure the proper control of the stepper in binary mode, without calibration

- Block n.1 – Comparator, which compares the requested position and actual position of the stepper motor. If the requested position is higher, stepper should move up – output go **UP**

- Block n.2 – Negation of the go UP signal = go **DOWN** signal
- Block n.3 – **Difference** between the Requested position and Actual position of the stepper – used for hysteresis – block n.4
- Block n.4 – Comparison between the difference from block 3 and adjusted limit for **hysteresis**. When the difference between the requested position and actual position of the stepper is higher then adjusted hysteresis limit min diff, the stepper should move.
- Block n.5 – 100 ms rectangular signal
- Block n.6 – 200 ms rectangular signal
- Block n.7 – **UP** = AND function of go UP signal, MOVE signal and xxx ms pulses. The output is dedicated to be configured as source for UP signal of the I-Step. This signal has 100 ms pulse; period of the signal is 400 ms
- Block n.8 – **DOWN** = AND function of go DOWN signal, MOVE signal and xxx ms pulses. The output is dedicated to be configured as source for DOWN signal of the I-Step. This signal has 100 ms pulse; period of the signal is 400 ms

back to Table of contents

6 Technical data

Power supply

Voltage supply	8-36 V DC
Consumption	

Power supply voltage [V]	No stepper connected	1 stepper @ 1 A	1 stepper @ 2 A
12	43	280	850
24	80	570	1700

Operating conditions

Operating temperature	-30 °C to +70 °C
Storage temperature	-30 °C to +80 °C
Protection	IP00
Humidity	95 % w/o condensation
Low Voltage Directive	EN 61010-1:95 +A1:97
Electromagnetic Compatibility	EN 50081-1:94, EN 50081-2:96 EN 50082-1:99, EN 50082-2:97
Vibration	5-25 Hz, ±1.6 mm 25-100 Hz, a = 4 g
Shocks	a = 200 m/s^2

Dimensions and weight

Dimensions	95 × 96 × 43 mm DIN rail mounted
Weight	200 g

Binary inputs

Number of inputs	4
Input resistance	4.4. kΩ
Input range	0-36 V DC
Switching voltage level	0-2 V DC close contact 8-36 V DC open contact

Driver outputs

Number of outputs	2 sets of stepper driver outputs
Output range	0-2.2 A

CAN bus interface

Maximal CAN bus length	200 m
Speed	250 kBd
Nominal impedance	120 Ω
Cable type	twisted pair (shielded)

Following dynamic cable parameters are important especially for maximal CAN bus length:

Nominal Velocity of Propagation	min. 75 % (max. 4.4 ns/m)
Wire crosscut	min. 0.25 mm^2
Maximal attenuation (at 1 MHz)	2 dB / 100 m

Recommended Industrial Automation & Process Control Cables:

- BELDEN (see www.belden.com):
  - 3082A DeviceBus for Allen-Bradley DeviceNet
  - 3083A DeviceBus for Allen-Bradley DeviceNet
  - 3086A DeviceBus for Honeywell SDS
  - 3087A DeviceBus for Honeywell SDS
  - 3084A DeviceBus for Allen-Bradley DeviceNet
  - 3085A DeviceBus for Allen-Bradley DeviceNet
  - 3105A Paired EIA Industrial RS485 cable
- LAPP CABLE (see www.lappcable.com):
  - Unitronic BUS DeviceNet Trunk Cable
  - Unitronic BUS DeviceNet Drop Cable
  - Unitronic BUS CAN
  - Unitronic-FD BUS P CAN UL/CSA

back to Table of contents

7 Appendix

back to Table of contents

7.1 Controller objects

7.1.1 Setpoints

There are 2 setpoint sets; each I-Step channel has its own setpoint set.

Fault reset

There is separate fault reset for each stepper channel.

Control parameters of the stepper motor

Default setting correspond to stepper motor NANOTEC MUNICH L5618×2004-RM

- 200 steps per 1 turn
- 12.5 turns for full 100 % Stepper range
- NumSteps = 2500 for full 100 % Stepper range
- normal (not micro) stepping

Two stepper motors control

- I-Step module is able to control two independent stepper motors – two separate channels
- Each channel has separate request, commands, status and position signal (see tables in chapter **Data (page 11)**)
- The second channel is activated by setpoint Channel 2 [DISABLED / ENABLED]

List of setpoint groups

For full list of setpoints go to the chapter **List of setpoints (page 20)**.

List of setpoints

Group of setpoints: Channel 1 set

Group of setpoints: Channel 2 set

back to Controller objects

Group: Channel 1 set

C1 mode

Setpoint group	Channel 1 set	**Related FW**	1.1.0
Range [units]	CALIBR 0 / CALIBR 0&100 / NOCALIBR [-]		
Default value	CALIBR 0	**Force value Alternative config**	YES
Step	-		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Define in which mode operates the I-Step channel.			

back to List of setpoints

CalibrTimeout 1

Setpoint group	Channel 1 set	**Related FW**	1.1.0
Range [units]	5 .. 120 [s]		
Default value	120	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Till this time interval the calibration, or calibration part, must be done to corresponding mark (described above), otherwise the calibration timeout will be activated. This parameter should be adjusted as time for the change from 0.00 % to 100.00 % position.			

back to List of setpoints

StepperHyst 1

Setpoint group	Channel 1 set	**Related FW**	1.1.0
Range [units]	0.00 .. 100.00 [%]		
Default value	1.00	**Force value Alternative config**	YES
Step	0.01		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
The maximal difference between the requested and the actual position. Stepper motor is moving when the actual difference is higher, in absolute value, than StepperHyst parameter.			

back to List of setpoints

BiasPos 1

Setpoint group	Channel 1 set	**Related FW**	1.1.0
Range [units]	0.00 .. 100.00 [%]		
Default value	50.00	**Force value Alternative config**	YES
Step	0.01		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Initial stepper position in the case of binary (Up / Down) control.			

back to List of setpoints

NumSteps 1

Setpoint group	Channel 1 set	**Related FW**	1.1.0
Range [units]	10 .. 15000 [steps]		
Default value	2500	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Number of steps for full range 100.00 %. In CALIBR 0 mode this parameter is crucial for the right operation of the I-Step. In mode Calibr 0&100 this parameter should be adjusted by operator in accordance with the value, which counts the I-Step during the calibration process. (This value is visible in: Values:I-Step:NumSteps)			

back to List of setpoints

SpeedMax 1

Setpoint group	Channel 1 set	**Related FW**	1.1.0
Range [units]	25 .. 6000 [step/s]		
Default value	500	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Maximal stepper motor speed (in number steps in 1 sec) which is acceptable – no step lost.			

back to List of setpoints

SpeedStart 1

Setpoint group	Channel 1 set	**Related FW**	1.1.0
Range [units]	25 .. 6000 [step/s]		
Default value	500	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Safety speed for stepper motor starting, without step lost.			

back to List of setpoints

StartSteps 1

Setpoint group	Channel 1 set	**Related FW**	1.1.0
Range [units]	10 .. 15000 [step]		
Default value	500	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Number of steps for safety (no step lost) ramping from StartSpeed to MaxSpeed and from MaxSpeed to StartSpeed or zero, in the case of stepper motor stopping.			

back to List of setpoints

BinarySpeed 1

Setpoint group	Channel 1 set	**Related FW**	1.1.0
Range [units]	0 .. 100 [%/s]		
Default value	10	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Stepper speed (% per 1 sec) in the case of binary (Up / Down) control.			

back to List of setpoints

NominalCurr 1

Setpoint group	Channel 1 set	**Related FW**	1.1.0
Range [units]	0.0 .. 2.2 [A]		
Default value	1.4	**Force value Alternative config**	YES
Step	0.1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal stepper motor current (for protection limit).			

back to List of setpoints

PosTolerance1

Setpoint group	Channel 1 set	**Related FW**	1.1.0
Range [units]	0.00 .. 100.00 [%]		
Default value	2.00	**Force value Alternative config**	YES
Step	0.01		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Tolerance range, the end-point position detection is considered as a normal state. State above this tolerance is evaluated as “CalibrFail” (Calibration Fail). If the end switch detection is above 3× PosTolerance, the state will be evaluated as “PositionLost”.			

back to List of setpoints

Group: Channel 2 set

Cannel 2

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	**Force value Alternative config**	YES
Step	-		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Disable or enable the I-Step second channel.			

back to List of setpoints

C2 mode

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	CALIBR 0 / CALIBR 0&100 / NOCALIBR [-]		
Default value	CALIBR 0	**Force value Alternative config**	YES
Step	-		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Define, in which mode operates the I-Step channel.			

back to List of setpoints

CalibrTimeout 2

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	5 .. 120 [s]		
Default value	120	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Till this time interval the calibration, or calibration part, must be done to corresponding mark (described above), otherwise the calibration timeout will be activated. This parameter should be adjusted as time for the change from 0.00 % to 100.00 % position.			

back to List of setpoints

StepperHyst 2

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	0.00 .. 100.00 [%]		
Default value	1.00	**Force value Alternative config**	YES
Step	0.01		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
The maximal difference between the requested and the actual position. Stepper motor is moving when the actual difference is higher, in absolute value, than StepperHyst parameter.			

back to List of setpoints

BiasPos 2

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	0.00 .. 100.00 [%]		
Default value	50.00	**Force value Alternative config**	YES
Step	0.01		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Initial stepper position in the case of binary (Up / Down) control.			

back to List of setpoints

NumSteps 2

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	0 .. 1500 [steps]		
Default value	2500	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Number of steps for full range 100.00 %. In Calibr 0 mode this parameter is crucial for the right operation of the I-Step In mode Calibr 0&100 this parameter should be adjusted by operator in accordance with the value, which counts the I-Step during the calibration process. (This value is visible in: Values:I-Step:NumSteps)			

back to List of setpoints

SpeedMax 2

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	25 .. 6000 [step/s]		
Default value	500	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Maximal stepper motor speed (in number steps in 1 sec) which is acceptable – no step lost.			

back to List of setpoints

SpeedStart 2

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	25 .. 6000 [step/s]		
Default value	500	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Safety speed for stepper motor starting, without step lost.			

back to List of setpoints

StartSteps 2

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	10 .. 15000 [step]		
Default value	500	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Number of steps for safety (no step lost) ramping from StartSpeed to MaxSpeed and from MaxSpeed to StartSpeed or zero, in the case of stepper motor stopping.			

back to List of setpoints

BinarySpeed 2

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	0 .. 100 [%/s]		
Default value	10	**Force value Alternative config**	YES
Step	1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Stepper speed in (% per 1 sec) in the case of binary (Up / Down) control.			

back to List of setpoints

NominalCurr 2

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	0.0 .. 2.2 [A]		
Default value	1.4	**Force value Alternative config**	YES
Step	0.1		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal stepper motor current (for protection limit).			

back to List of setpoints

PosTolerance 2

Setpoint group	Channel 2 set	**Related FW**	1.1.0
Range [units]	0.00 .. 100.00 [%]		
Default value	2.00	**Force value Alternative config**	YES
Step	0.01		
Comm object		**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Tolerance range, the end-point position detection is considered as a normal state. State above this tolerance is evaluated as “CalibrFail” (Calibration Fail). If the end switch detection is above 3× PosTolerance, the state will be evaluated as “PositionLost”.			

back to List of setpoints

back to Appendix