Data sheet

Ejector controller

EKE 80

EKE 80 Ejector Controller can integrate into existing cooling solutions with effort in terms of physical working conditions and regulatory compliance

Description

The EKE 80 controller can drive a number of High Pressure (HP) or Low Pressure (LP) Industrial Large Ejectors (ILE), Multi-ejectors (ME), and ICAD B actuators that operates the Danfoss ICMTS motor operated valve, in order to facilitate lifting of the Medium Temperature (MT) suction flow to offload the MT compressor thereby decreasing the overall energy consumption of a cooling system.
It is compatible with the Danfoss AK-PC 782A, AK-PC 782B, and is Modbus RTU interoperable with PLCs. The EKE 80 driver is able to integrate into existing cooling solutions with minimal effort both in terms of physical working conditions and regulatory compliance.
The EKE 80 driver requires 2 input signals (1 x DI enabling signal and 1 x AI capacity reference signal) from the main controller/PLC. It will then be responsible for providing the appropriate output signals to the ejectors and valve-actuators.
The EKE 80 is also responsible for driving its expansion module when more than 4 ejectors require driving. The EKE 80 and the EKE 80 expansion module are able to support the use of:

- up to 8 Industrial Large Ejectors, or 7 Industrial Large Ejectors and 1 Multi-ejectors, and
- 2 ICAD B units that operate Danfoss ICMTS
- Modbus communication

Features & benefits

- Modbus RTU communication
- Seamless ejector and valve control of a wide load range
- LCD interface
- Designed ready-to-connect supply power, sensors, ejectors and MOV actuators needed for HP and LP control applications using ejectors
- Alarms

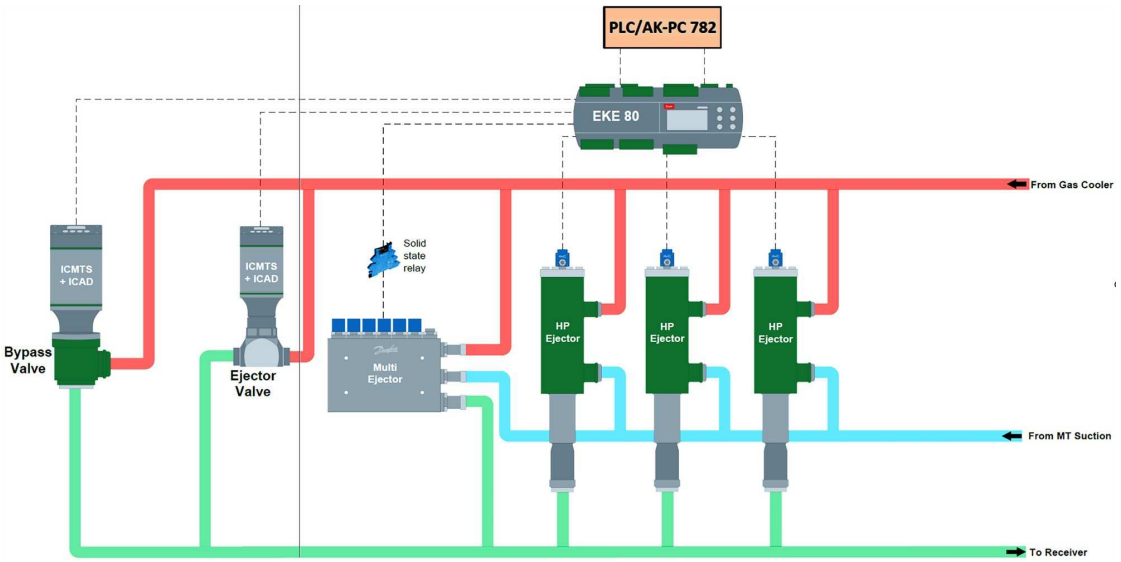
Principles

General

The EKE 80 controller can set up to drive different configurations of ejectors, main HP Valve and Balancing valve to suit the customer's application and provide significant energy savings. The driver's flexibility covers the majority of applications, some of which are detailed in the following chapter. Below is a typical application in which the EKE 80 driver is configured to drive a HP system that consists of

- 1 x Main HP Valve (Bypass Valve)
- 1 x Balancing valve (Ejector Valve)
- 1 x Multi-ejector
- 3 x Industrial ejectors

Once the driver is configured with the ejectors and valves used in the application, the driver receives a DI signal from the PLC/AK-PC 782 main controller to start Suction Flow Control. Subsequently, an AI signal from the PLC/AK-PC 782 main controller, which represents the system capacity, is received. This signal drives the opening and closing of each device to match the capacity reference signal.

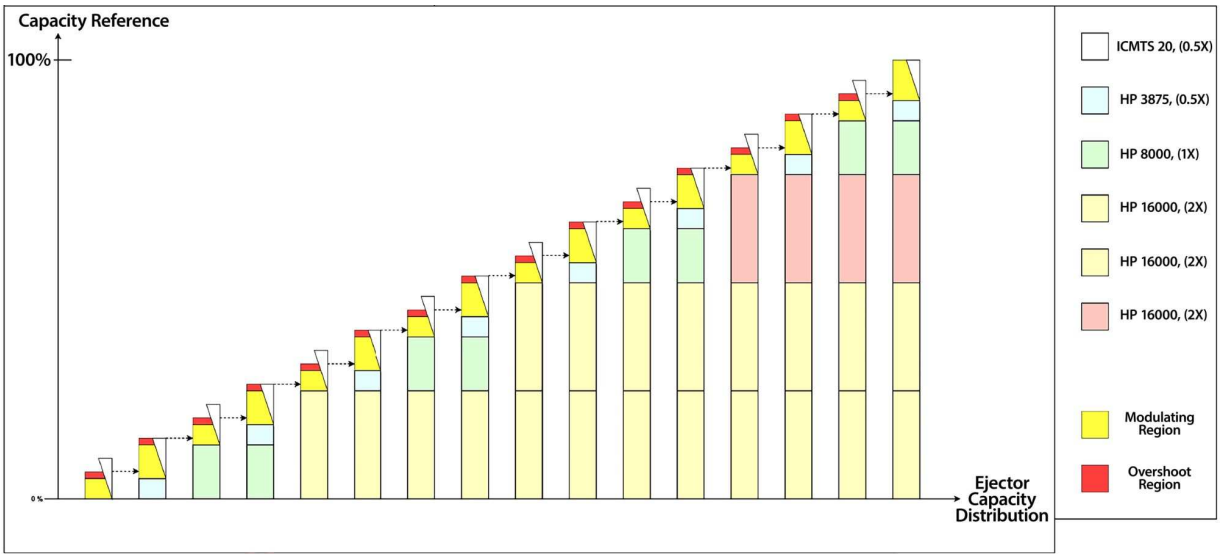


- Supports Danfoss ejectors
  - HP3875
  - HP8000
  - HP16000
  - LP1935
  - LP4400
  - LP8800
- Supports Danfoss ejector control and bypass valves
  - ICMTS20-B66
  - ICMTS20-B
  - ICMTS20-C
  - ICMTS50-A
  - ICMTS80-A
  - ICMTS80-B
- Supports feedback signals from
  - Main HP Valve (Bypass Valve) ICAD actuator showing signal error
  - Balancing valve (Ejector Valve) ICAD actuator showing signal error
- Supports alarming via
  - General alarm Digital output
- Multiple alarms and warnings

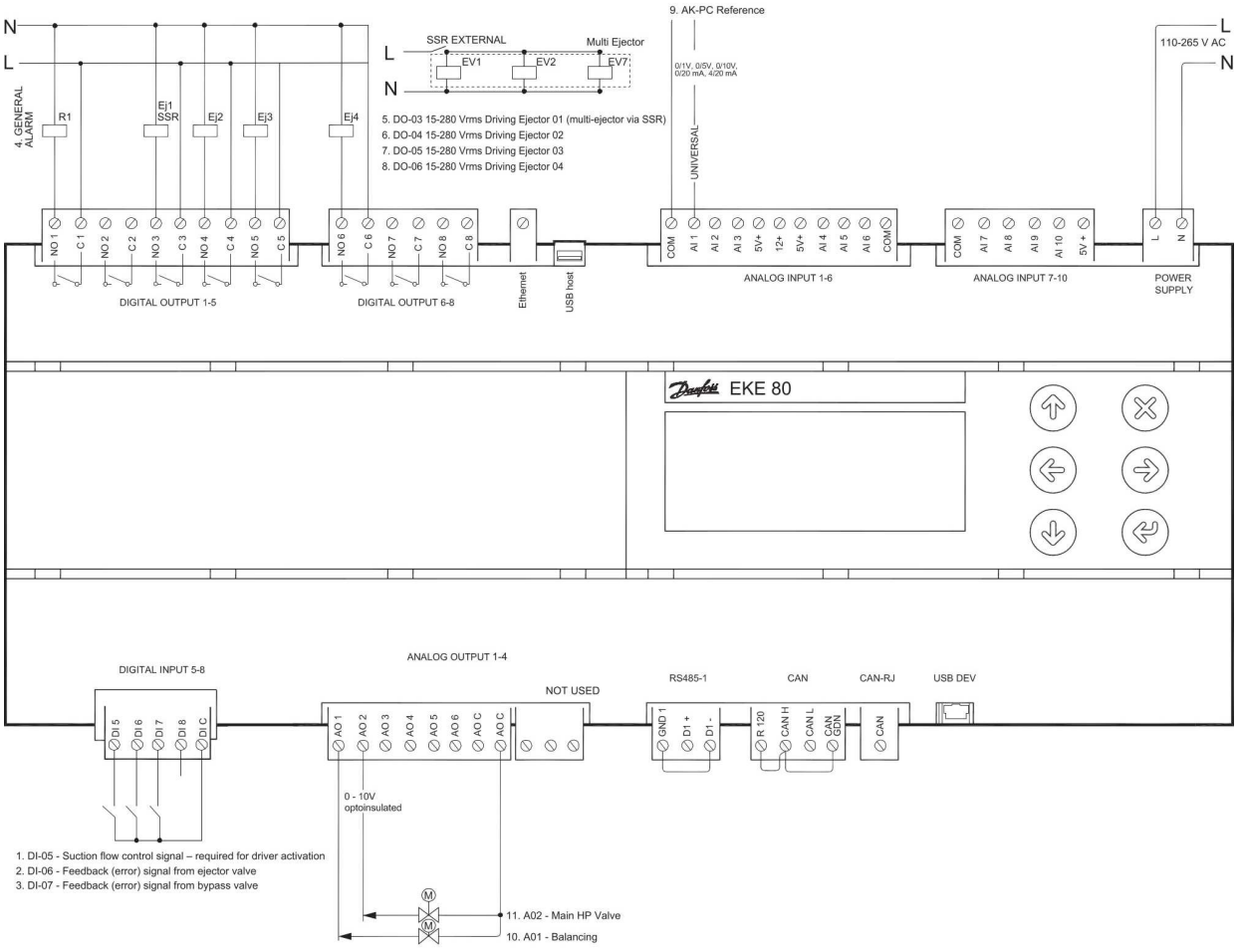
Capacity reference – ejector and valve operating principal

An analogue input signal 0-10V from the AK-PC 782 or PLC indicated requested capacity for controlling high pressure flow to be handled by the EKE 80. Below is an example of capacity distribution for HP lift solution, consisting of one small HPV, one HP Multi Ejector (HP 3875) and 4 HP industrial ejectors, with increasing capacity request from 0 to 100%.

An intelligent sequencing of ejectors and balancing valve allows for seamless capacity regulation across the entire range.



Electrical Circuit Drawing EKE 80



Ordering

Product code numbers

Material Description	Display type	Code number
EKE 80 Ejector Controller	LCD	080G5022

Associated products	Code
Cartridge assembly HP 16000	032F1600
Cartridge assembly HP 8000	032F1601
Cartridge assembly HP 8800	032F1602
Cartridge assembly LP 4400	032F1603
Housing assembly HP16000/LP8800 DIN	032F1604
Housing assembly HP8000/LP4400 DIN	032F1605
Housing assembly HP16000/LP8800 ANSI	032F1606
Housing assembly HP8000/LP4400 ANSI	032F1607
Inspection kit	032F1610
Service kit	032F1611
Repair kit	032F1612
CTM 6 LP 1935	032F5679
CTM 6 HP 3875	032F5674

Overview

Product portfolio

IMPORTANT NOTE:

The EKE 80 driver is specifically designed to drive Danfoss ejectors. Any other ejectors connected to the EKE 80 will likely result in a reduction in system performance and possibly ejector lifetime.

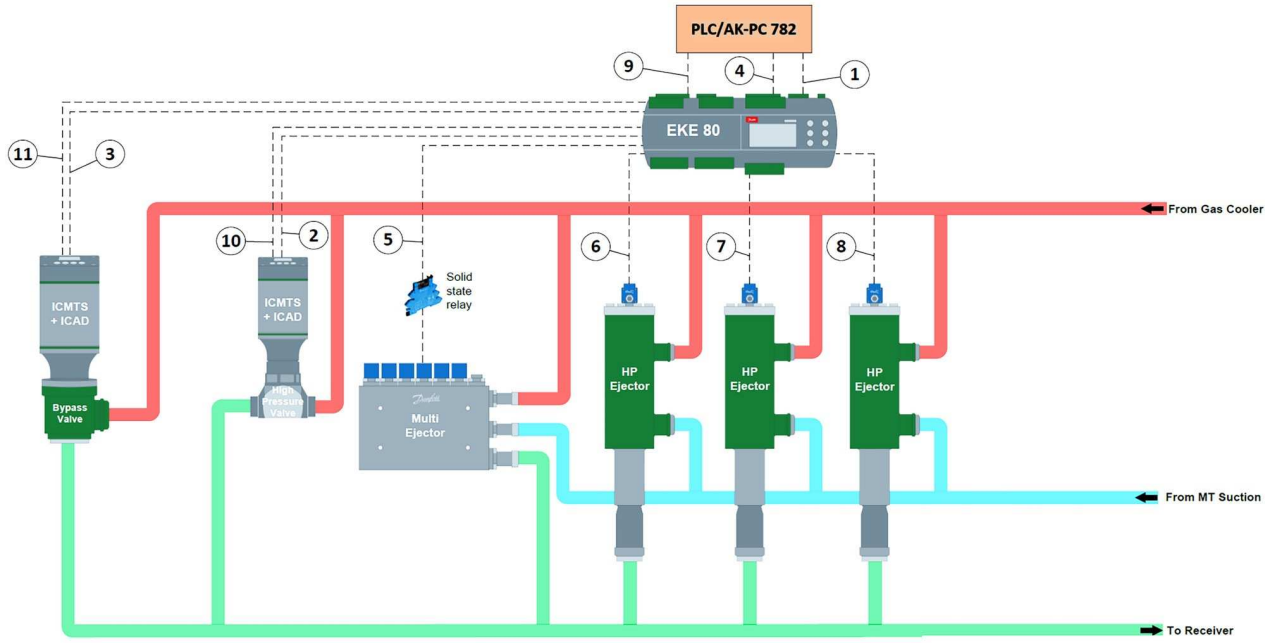
Application examples

Application example 01:

Examples of setup for driver applications with:

- 1 x Main HP Valve (Bypass Valve) with error signal feedback
- 1 x Balancing valve (Ejector Valve) with error signal feedback
- 1 x multi-ejector control
- 3 x industrial ejector control

This application example offers an accurate high-pressure control both at high and low gas cooler pressures/outlet temperatures. At low gas cooler pressure/outlet temperature there is no gain from running the ejector and in that case the controller closes the ejectors and run only on the HP valve. During operation with ejectors, the controller ensures a smooth capacity control by combining the Industrial Ejectors with the Multi Ejectors steps and smoothen the steps with the Ejector Balancing valve.



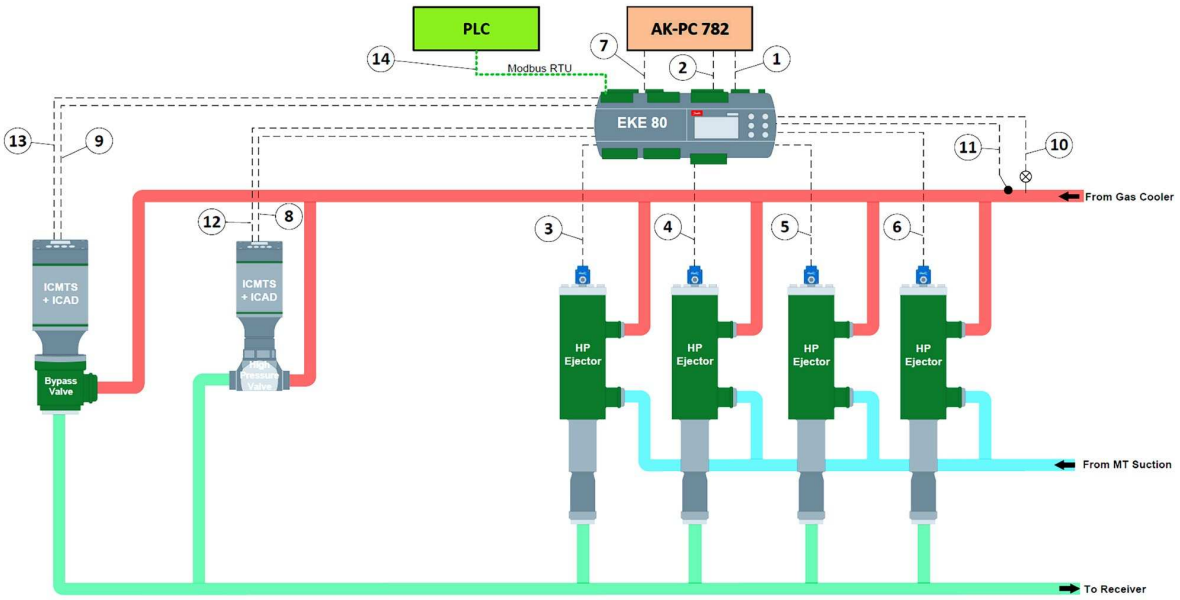
Label	IO port	Signal type	Description
1	DI-05	Dry contact or 24 V AC	Suction flow control signal – required for driver activation
2	DI-06	Dry contact or 24 V AC	Feedback (error) signal from ejector valve
3	DI-07	Dry contact or 24 V AC	Feedback (error) signal from bypass valve
4	DO-01	250 V AC	General alarm
5	DO-03	15-280 V_{rms}	Driving Ejector 01 (multi-ejector via SSR)
6	DO-04	15-280 V_{rms}	Driving Ejector 02
7	DO-05	15-280 V_{rms}	Driving Ejector 03
8	DO-06	15-280 V_{rms}	Driving Ejector 04
9	AI-01	0-10 V/0-5 V/2-10 V/0-20 mA/4-20 mA	Capacity reference from PLC or main controller – required for driver activation
10	AO-01	0-10 V/2-10 V	Balancing valve control signal
11	AO-02	0-10 V/2-10 V	Main HP Valve control signal

Application example 02:

Examples of setup for driver applications with:

- 1 x Main HP Valve (Bypass Valve) with position feedback signal
- 1 x Balancing valve (Ejector Valve) with position feedback signal
- 4 x industrial ejector control

This application example is a simpler version of the first application example by not using the Multi Ejector. For this application example the Multi Ejector is not filling the gaps between the larger Industrial Ejectors and thus the Ejector Balancing Valve needs to be bigger than in the first example as it needs to fill the gaps between the Industrial Ejectors and not the smaller gaps in the Multi Ejector. As a consequence, this setup is less efficient than the first application example, as no ejector function is gained from the Ejector Balancing Valve. However, not using the Multi Ejector allows for using another Industrial Ejector in it's place and thus the capacity of this setup is higher than the first application example.

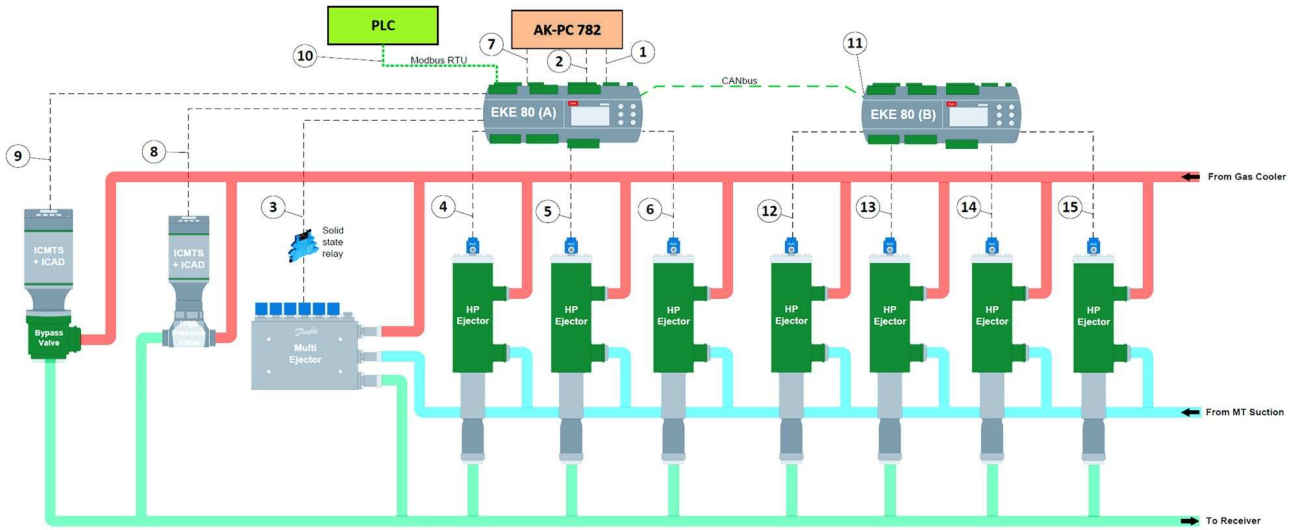


Label	IO port	Signal type	Description
1	DI-05	Dry contact or 24 V AC	Suction flow control signal from rack controller – required for driver activation
2	DO-01	250 V AC	General alarm to rack controller
3	DO-03	15-280 V_{rms}	Driving Ejector 01
4	DO-04	15-280 V_{rms}	Driving Ejector 02
5	DO-05	15-280 V_{rms}	Driving Ejector 03
6	DO-06	15-280 V_{rms}	Driving Ejector 04
7	AI-01	0-10 V/0-5 V/2-10 V/0-20 mA/4-20 mA	Capacity reference from rack controller – required for driver activation
8	AI-02	0-20 mA/4-20 mA	Ejector valve position feedback
9	AI-03	0-20 mA/4-20 mA	Bypass valve position feedback
10	AI-04	0-10 V/0-5 V/0-20 mA/4-20 mA	Line pressure transmitter reading
11	AI-05	0-10/NTC-10K/PT1000	Line temperature sensor reading
12	AO-01	0-10 V/2-10 V	Balancing valve control signal
13	AO-02	0-10 V/2-10 V	Main HP Valve control signal
14	RS485-1	Modbus RTU	PLC polled data - status, alarms etc.

Application example 03:

Examples of setup for driver applications with:

- 1 x Main HP Valve (Bypass Valve)
- 1 x Balancing valve (Ejector Valve)
- 1 x multi-ejector control
- 7 x industrial ejector control
- This application example shows one way to utilize two controllers for a larger capacity. Communication between the controllers ensure that the staging of ejectors is done so the optimal efficiency is achieved.



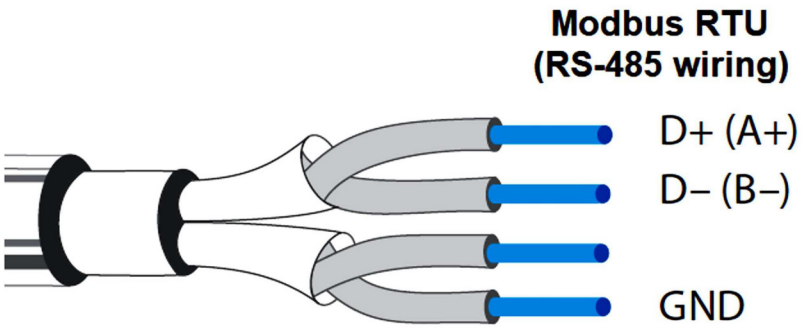
Label	IO port	Signal type	Description
EKE 80 (A)			
1	DI-05	Dry contact or 24 V AC	Suction flow control signal from rack controller – required for driver activation
2	DO-01	250 V AC	General alarm to rack controller
3	DO-03	15-280 V_{rms}	Driving Ejector 01
4	DO-04	15-280 V_{rms}	Driving Ejector 02
5	DO-05	15-280 V_{rms}	Driving Ejector 03
6	DO-06	15-280 V_{rms}	Driving Ejector 04
7	AI-01	0-10 V/0-5 V/2-10 V/0-20 mA/4-20 mA	Capacity reference from rack controller – required for driver activation
8	AO-01	0-10 V/2-10 V	Balancing valve control signal
9	AO-02	0-10 V/2-10 V	Main HP Valve control signal
10	RS485-1	Modbus RTU	PLC polled data - status, alarms etc.
EKE 80 (B)			
11	CAN	CANbus	EKE 80 used as an extension module
12	DO-03	15-280 V_{rms}	Driving Ejector 05
13	DO-04	15-280 V_{rms}	Driving Ejector 06
14	DO-05	15-280 V_{rms}	Driving Ejector 07
15	DO-06	15-280 V_{rms}	Driving Ejector 08

Functions

Settings

External wiring considerations: Fieldbus

The wiring of Modbus RTU (RS485) must be carried out in accordance with the standard ANSI/TIA/EIA-485-A-1998. Galvanic separation shall be provided for segments crossing buildings. Common ground shall be used for all devices on the same network including router, gateways etc. All bus connections in the cables are made with twisted pair wires. The recommended cable for this is AWG 22/0.32 mm2.



Available Modbus RTU parameters in each controller

For a complete overview of all the available Modbus registers for each controller device (there are 200+ Modbus values available per controller) please refer to the datasheet section below: Modbus Register Overview for comprehensive descriptions and details.

Solid state relay technical requirements

Internal Solid State Relay for Industrial (DO3-DO6)
Ejector Coils:
15–280 V_{rms}, 0.5 A
UL: Making current: 7 A,
Breaking current: 0.7 A, Pilot duty (cos θ 0.35), 240 V AC, N.O

IMPORTANT: For a Multi-Ejector, an external Solid State Relay is necessary between the assigned DO and the Multi-Ejector solenoid coils, meeting the following specifications: leakage current suppression and at least a 2 A rating for both 110 V and 230 V Multi-Ejector coils.

IMPORTANT: All interposing SSRs must have leakage current suppression (Due to SSR to SSR connection).

Product details

General data

Power supply	**21–265 V AC, 50/60Hz** **40–230 V DC** **Max power consumption: 15W** **Isolation between power supply and the extra low voltage: reinforced**
Plastic housing	DIN rail mounting complying with EN 60715 Self-extinguishing V0 according to IEC 60695-11-10 and glowing / hot wire test at 960 °C according to IEC 60695-2-12
Ball test	125 °C according to IEC 60730-1 Leakage current: ≥ 250 V according to IEC 60112
Operating conditions	CE: -20T60 / UL: 0T50, 90% RH non-condensing
Storage conditions	-30T80, 90% RH non-condensing
Integration	In Class I and / or II appliances
Index of protection	IP40 only on the front cover
Period of electric stress across insulating parts	Long
Resistance to heat and fire	Category D
Immunity against voltage surges	Category II Category III for versions without display
IO: Analog Inputs AI-01 to AI-05	Max 13.5 V input voltage
IO: Analog Inputs AI-11 to AI-14	Max 13.5 V input voltage
IO: Analog Outputs AO-01 to AO-02	Analog Outputs galvanically isolated, minimum load 1K Ω (10 mA) for each output
IO: Digital Inputs DI-01 to DI-04	24 V or 230 V depending on port used. 24 V Opto-isolated, 24 V AC 50/60 Hz or 24 V DC Rated current: 5 mA @ 24 V AC 230 V Opto-isolated, 86–265 V AC / 50/60 Hz, Reinforced isolation, Rated current: 2,5 mA @ 265 V AC
IO: Digital Inputs DI-05 to DI-07	Dry contact and/or 24 V AC
IO: Digital Output DO-01	5 A 250 V AC for resistive loads – 100,000 cycles 3 A 250 V AC for inductive loads – 100,000 cycles with cos(phi) = 0.4 UL: 3 A resistive, 250 V AC, 100,000 cycles; 1/8 hp, 125/250 V AC, 30,000 cycles; C300 pilot duty, 125/250 V AC, 30,000 cycles
IO: Digital Outputs DO-03 to DO-06	Internal Solid State Relay for Industrial Ejector Coils: 15–280 V_{rms}, 0.5 A UL: Making current: 7 A, Breaking current: 0.7 A, Pilot duty (cos θ 0.35), 240 V AC, N.O
RS-485-1 and RS-485-2 ports	Communication bus to BMS as a Modbus slave Note: RS-485-1 can be polarized as master from the application Physical layer according to EIA 485 Ref3. Provide 500 V peak transient galvanic isolation
CANbus	For connection to user interfaces, MCX controllers, service tools etc. Physical layer according to ISO 11898-2 High Speed CAN bus Frame format according to CAN 2.0B specification Transceiver not isolated (power supply has reinforced isolation)

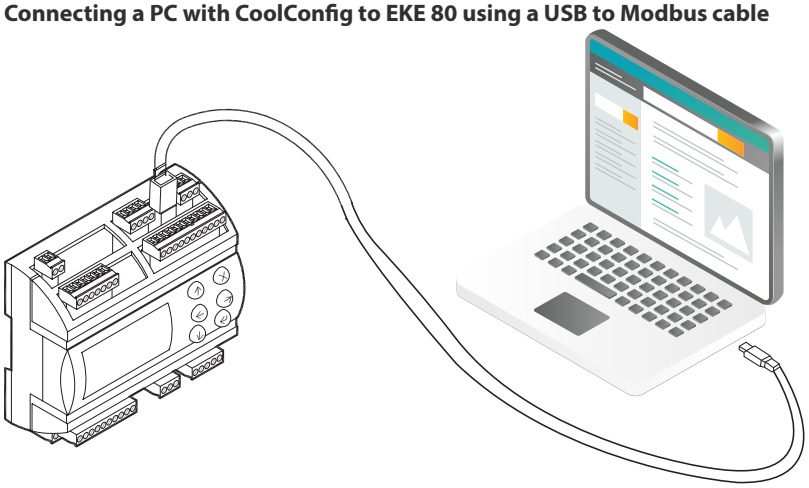
Main functionalities

Quick startup

Connecting CoolConfig to the EKE 80

To connect CoolConfig to the controller, you will need to connect a USB port of your PC to the controller using a 'Modbus to USB' cable. Most available 'Modbus to USB' cables will suffice.

Connecting a PC with CoolConfig to EKE 80 using a USB to Modbus cable



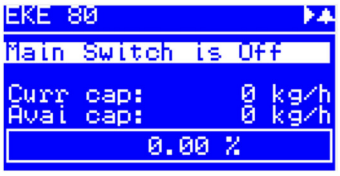
Before connecting the controller to CoolConfig, you will need to start up the EKE 80 controller and possibly assign a Modbus address. As default, the controller has address 1, but if you are configuring more than one controller on the Modbus network, you need to assign the different controller addresses using the display of the controller (note that CoolConfig supports easy configuration of multiple controllers in a network).

To change to controller Modbus address do the following:

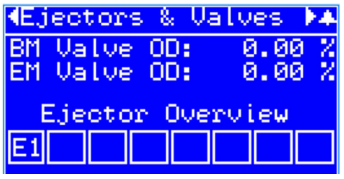
1. Power up controller and enter password:
   - A. Press a key on the controller
   - B. Press and hold the Enter key until the password screen appears
   - C. Enter password using arrow keys (move to next digit by pressing Enter) and finish pressing Enter. Default
   - D. passwords:
     - a. 100 - Password level 1. Read only access
     - b. 200 - Password level 2. For installer for adjusting parameters
     - c. 300 - Password level 3. For system configuration
2. Set Modbus address:
   - A. Enter level 3 password
   - B. Go to "System | Network" menu
   - C. Select "Modbus address" and set the wanted modbus address of the controller

You are ready to use CoolConfig to configure the controller – or controllers – when you connect the controller to your PC's USB port using a "Modbus to USB" cable.

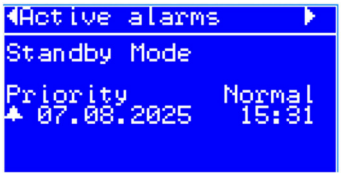
startup – Using LCD display



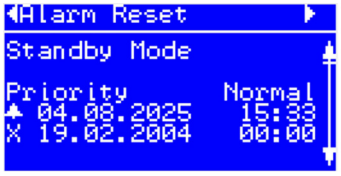
1. "Curr cap" - Current capacity shows the actual estimated capacity output of the open ejectors and valve.
"Avai cap" - Available capacity shows the maximum capacity of the ejectors and ejector mode valve.
If the system is in bypass mode it shows the current / available capacity of the bypass valve.



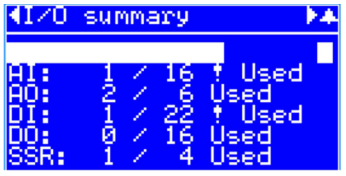
2. The opening degree of the bypass mode (BM) valve and ejector mode (EM) valve.
The ejector overview can be used to monitor the opening/closing of the ejectors.
Transparent means "off", white (reverse) means "on".



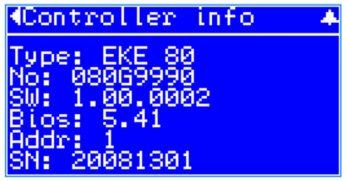
3. "Active alarms" - the list of active alarms.



4. "Alarm reset" - the list of reseted alarms.



4. "I/O summary" - status of inputs and outputs



5. "Controller Info" - Software information

Modbus Register Table

Introduction

The Modbus table columns are explained as follows:

Column	Explanation
Label	The label of the parameter. Short name used to uniquely define a parameter. Can be used to search for a specific parameter in CoolConfig
Name	Short name of the parameter as seen in the display of the controller
Enum	Description of the different values the register can take in a register that consists of a predefined, fixed set of named values
Min	Minimum value the parameter can take
Max	Maximum value the parameter can take
Factory	Default value
Unit	Unit (if any)
Dec.	Number of decimals the parameter has. A Modbus value is read as a Word value, so if a value of 568 is read and number of decimals is 2, then the value is 5.68
Lock	If true then this parameter can only be changed when Main switch is off – i.e., this parameter cannot be changed when the controller is in control mode
Read only	If true then value of the parameter can only be read – if false, the value can also be changed by writing a new value to the Modbus address
Password level Read – Write	Password level needed to read or write a parameter. Note that CoolConfig always require password level 3 to change parameters
Persistent	If true then the value is saved even if power to controller is switched off
Register	The 1-based Modbus register address

Start/Stop

Main switch

This can be accessed through the display or through CoolConfig. The driver does not start driving ejectors and valves until "Main switch" is set On, and moreover, many of the parameters in the EKE 80 require "Main switch" to be Off before they can be changed – this means that these parameters require you to stop controlling before they can be changed. See the column "Lock" in the Modbus table.

Label	Name	Enum	Min	Max	Factory	Unit	Dec.	Lock	Level (R-W)	RW or RO	Persistent	Register
M01	Main Switch	0: Off; 1: On	Off	On	Off	N/A	0		0 - 2	RW	Yes	3001

Ejector configuration

General description of terms:

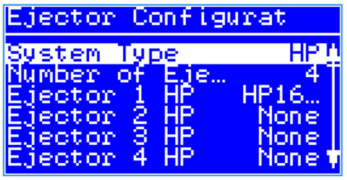
HP: High pressure

LP: Low pressure

Label	Name	Enum	Min	Max	Factory	Unit	Dec.	Lock	Level (R-W)	RW or RO	Persistent	Register
V01	Ejector system type	0: HP; 1: LP	0	1	0	N/A	0	x	0 - 3	RW	Yes	3100
V04	Number of ejectors	N/A	1	8	1	N/A	0	x	0 - 3	RW	Yes	3101
High pressure ejectors												
V0D	HP ejector 1	0: None 1: HP3875 2: HP8000 3: HP16000										3102
V0E	HP ejector 2											3103
V0F	HP ejector 3											3104
V10	HP ejector 4		0	3	0	N/A	0	x	0 - 3	RW	Yes	3105
V11	HP ejector 5											3106
V12	HP ejector 6											3107
V13	HP ejector 7											3108
V14	HP ejector 8											3109
Low pressure ejectors												
V15	LP ejector 1	0: None 1: LP1935 2: LP4400 3: LP8800	0	3	0	N/A	0	x	0 - 3	RW	Yes	3110
V16	LP ejector 2											3111
V17	LP ejector 3											3112
V18	LP ejector 4											3113
V19	LP ejector 5											3114
V1A	LP ejector 6											3115
V1B	LP ejector 7											3116
V1C	LP ejector 8											3117
Ejector mass flow rates												
V06	HP3875 Capacity	N/A	0	###	3875	kg/h	0	x	0 - 3	RW	Yes	3118
V07	HP8000 Capacity				8000							3119
V08	HP16000 Capacity				16000							3120
V0A	LP1935 Capacity				1935							3121
V0B	LP4400 Capacity				4400							3122
V0C	LP8800 Capacity				8800							3123

Valve configuration

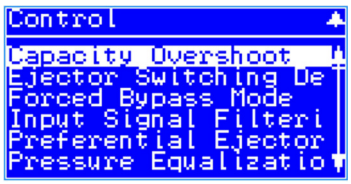
General description of terms:



Label	Name	Enum	Min	Max	Factory	Unit	Dec.	Lock	Level (R-W)	RW or RO	Persistent	Register
V02	Ejector Control Valve	0: ICMTS20-B66 1: ICMTS20-B 2: ICMTS20-C 3: ICMTS50-A 4: ICMTS80-A 5: ICMTS80-B	0	5	0							3124
V25	Ejector Control Valve Error Signal	0: No 1: Yes	0	1	1							3125
V03	Bypass Valve	0: ICMTS20-B66 1: ICMTS20-B 2: ICMTS20-C 3: ICMTS50-A 4: ICMTS80-A 5: ICMTS80-B	0	5	0	N/A	0	x	0 - 3	RW	Yes	3127
V26	Bypass Valve Error Signal	0: No 1: Yes	0	1	1							3128

Control

General description of terms:



Capacity overshoot

The capacity will always be distributed across the largest possible ejectors first before capacity is distributed towards smaller ejectors, while the ejector valve is continually regulating the capacity to account for the gaps in capacity caused by the fixed increments in capacity of the ejectors. The total capacity of the ejector valve is thereby expected to be greater than or equal to the modulation capacity and overshoot capacity to ensure that these regions can be fully covered. The capacity distribution shall behave differently depending on whether the Capacity Reference value is increasing or decreasing:

> **Increasing capacity:** An ejector will be opened when the Capacity Reference value is larger than or equal to the current total system capacity in addition to the modulation capacity + overshoot capacity.
>
> **Decreasing capacity :** An ejector will be closed when the Capacity Reference value is smaller than the current total system capacity.

Ejector switching delay

A minimum ejector off time and a minimum ejector on time that applies for all connected ejectors, so that each individual ejector cannot be turned on after having been turned off before the user defined minimum ejector off time has elapsed. Nor can they be turned off after having been turned on before the user defined minimum ejector on time has elapsed.

Forced bypass mode

A feature that forces the system to always operate in Bypass Mode, regardless of the Operating Mode and Suction Flow Control signals received from the AK-PC 782 controller or PLC.

Ejector pressure equalization

A feature that opens all connected ejectors in order to equalize motive, suction, and release flows, before normal operation commences.

Soft opening

A feature where a pulsing signal is sent for a time defined by the user upon starting to open an ejector before the signal is held constant.

Capacity reference

An input signal from the AK-PC 782 or PLC to indicate the total capacity to be handled in either Bypass Mode or Ejector Mode.

HP flow control

An input signal from the AK-PC 782 or PLC that indicates if the application can commence normal operation.

Label	Name	Enum	Min	Max	Factory	Unit	Dec.	Lock	Level (R-W)	RW or RO	Persistent	Register
Capacity Overshoot												
C0E	Capacity overshoot	0: Off 1: On	0	1	1	N/A	0		0 - 3	RW	Yes	3200
C0F	Capacity overshoot value	N/A	0	100	20	%	0		0 - 3	RW	Yes	3201
Ejector Switching Delay												
C0A	Ejector switching delay	0: Off 1: On	0	1	0	N/A	0		0 - 3	RW	Yes	3202
C0B	Switching delay minimum open time	N/A	0	30	10	s	0		0 - 3	RW	Yes	3203
C0C	Switching delay minimum close time	N/A	0	30	10	s	0		0 - 3	RW	Yes	3204
Force Bypass Mode												
C0D	Force bypass mode	0: Off 1: On	0	1	0	N/A	0		0 - 3	RW	No	3205
Input Signal Filtering												
C01	Input signal filtering	0: Off 1: On	0	1	1	N/A	0		0 - 3	RW	Yes	3206

C12	Input signal filtering number of samples	N/A	4	20	10	N/A	0		0 - 3	RW	Yes	3207
C13	Input signal filtering sample time	N/A	50	##	100	ms	0		0 - 3	RW	Yes	3208
Ejector Activation Equalization												
C0G	Ejector activation equalization	0: Off 1: On	0	1	1	N/A	0		0 - 3	RW	Yes	3209
	Pressure											
C02	Pressure equalization	0: Off 1: On	0	1	1	N/A	0		0 - 3	RW	Yes	3210
C03	Pressure equalization duration	N/A	0	30	6	s	0		0 - 3	RW	Yes	3211
Soft Opening												
C04	Soft opening	0: Off 1: On	0	1	1	N/A	0		0 - 3	RW	Yes	3212
C08	Soft opening duration	N/A	0	20	6	s	0		0 - 3	RW	Yes	3213
C05	Soft opening period	N/A	100	400	280	ms	0		0 - 3	RW	Yes	3214
C06	Soft opening Duty cycle	N/A	0	100	50	%	0		0 - 3	RW	Yes	3215
Modbus Parameter Control												
C10	Capacity reference input	0: Analog Input 1: Modbus RS485	0	1	0	N/A	0	x	0 - 3	RW	Yes	3216
C11	Capacity reference from modbus	N/A	0	100	0	%	1		0 - 0	RW		3217
CM02	Operation mode	0: None 1: Ejector 2: Bypass 3: Forced Bypass	0	3	1	N/A	0	x	0 - 0	RW	Yes	3218
C14	Ejector control valve method	0: Analog Input 1: Modbus RS485	0	1	0	N/A	0	x	0 - 0	RW	Yes	3219
C15	Ejector control valve modbus address	N/A	0	255	10	N/A	0		0 - 0	RW	Yes	3220
C16	Bypass valve method	0: Analog Input 1: Modbus RS485	0	1	0	N/A	0	x	0 - 0	RW	Yes	3221
C17	Bypass valve modbus address	N/A	0	255	11	N/A	0		0 - 0	RW	Yes	3222
C18	Suction flow control input	0: Digital Input 1: Modbus RS485	0	1	0	N/A	0	x	0 - 0	RW	Yes	3223
C19	Suction flow control	0: Off 1: On	0	1	0	N/A	0		0 - 0	RW	No	3224

Sensors

General description of terms:

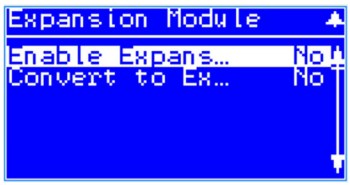
Additional sensor

Additional sensors may be connected to the EKE 80 for monitoring purposes only i.e. they will not be included in any control algorithms.

Label	Name	Enum	Min	Max	Factory	Unit	Dec.	Lock	Level (R-W)	RW or RO	Persistent	Register
S01	Pressure Transmitter											3300
S02	Temperature Sensor											3301
S03	Additional Sensor 1	0: No 1: Yes	0	1	0	N/A	0	x	0 - 3	RW	Yes	3302
S04	Additional Sensor 2											3303
S05	Additional Sensor 3											3304
S06	Additional Sensor 4											3305

Expansion module

General description of terms:



Expansion module

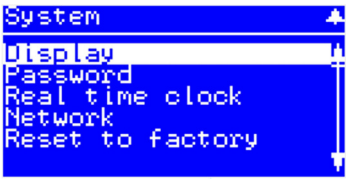
An additional EKE 80 may be added as a slave device to operate an additional 4 industrial ejectors via DO signals. By adding an expansion module the maximum number of supported ejectors increases to 8 ejectors.

Label	Name	Enum	Min	Max	Factory	Unit	Dec.	Lock	Level (R-W)	RW or RO	Persistent	Register
EX15	Enable expansion module	0: No 1: Yes	0	1	0			x			Yes	3714
EX01	Convert to expansion module	0: No 1: Yes	0	1	0			x			Yes	3700
EX02	Slave unit id	N/A	0	256	2			x			Yes	3701
EX03	Number of ejector	N/A	0	8	0						No	3702
EX04	Open ejector 5	0: Closed										3703
EX05	Open ejector 6	1: Opened 2: Opening	0	4	0							3704
EX06	Open ejector 7	3: Opened Hold On 4: Closed Hold Off									No	3705
EX07	Open ejector 8					N/A	0		0 - 0	RW		3706
EX08	Start expansion application			1								3707
EX09	Expansion running			1								3708
EX10	Pulsing period	N/A	0	##								3709
EX11	Pulsing duty cycle			100								3710
EX12	Pulsing duration			100	0						No	3711
EX13	Master detected			1								3712
EX14	Expansion module enabled	0: No 1: Yes	0	1	0						Yes	3713
EX16	Master node id	N/A	0	256	1							3715

Label	Name	Enum	Min	Max	Factory	Unit	Dec.	Lock	Level (R-W)	RW or RO	Persistent	Register
P16	Automatic io port assignment	0: No 1: Yes	0	1	1	N/A	0	x	0 - 3	RW	Yes	3306

System

General description of terms:



Display unit
Onboard graphic LCD display for parameter configuration, reading key values, and alarms.

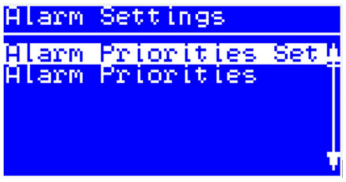
Reset ejector activations
The EKE 80 logs the number of ejector activations. This feature allows the user to reset the number of ejector activations to zero.

Reset ejector wear parts service
The EKE 80 will warn the user that a service of the ejector's mechanical wear parts is advised based on lifetime activations. Following a service, the user may reset this activation lifetime count.

Label	Name	Enum	Min	Max	Factory	Unit	Dec.	Lock	Level (R-W)	RW or RO	Persistent	Register
Display												
P01	Display unit	0: MET 1: IMP	0	1	0	N/A						3400
G01	Language	0: English	0	0	0	N/A		x				3401
G02	Time format	0: 24-hour format 1: 12-hour format	0	1	0	N/A			0 - 2	RW	Yes	3402
G03	Screen saver time	N/A	1	60	2	min						3403
G04	User logout time	N/A	1	60	2	min	0					3404
G05	Display contrast	N/A	0	100	30	%						3405
Password												
G07	Level 1				100			1 - 1				3406
G08	Level 2	N/A	0	999	200	N-A	0	2 - 2		RW	Yes	3407
G09	Level 3				300			3 - 3				3408
Network												
G11	Modbus Address	N/A	1	120	1	N/A						3409
G12	Baudrate	0: 0 1: 12 2: 24 3: 48 4: 96 5: 144 6: 192 7: 288 8: 384	0	8	6	N/A	0	x	1 - 3	RW	Yes	3410
G13	Serial Mode	0: 8N1 1: 8E1 2: 8N2	0	2	1	N/A						3411
Reset to Factory												
G14	Reset to Factory	0: No 1: Yes										3412
G15	Reset Ejectors Activations	0: No 1: Yes										3413

G16	Reset Ejector Wear Parts Service	0: None 1: Ejector 1 2: Ejector 2 3: Ejector 3 4: Ejector 4 5: Ejector 5 6: Ejector 6 7: Ejector 7 8: Ejector 8	0	1	0	N/A	0	x	3 - 3	RW	N/A	3414

Alarms and alarm settings



Label	Name	Enum	Min	Max	Factory	Unit	Dec.	Lock	Level (R-W)	RW or RO	Persistent	Register
Alarm Priorities Settings												
P02	Alarm Output	0: No relay 1: Critical alarms 2: Severe alarms 3: All alarm						x				3500
P03	Buzzer Management		0	3	0	N/A	0		0 - 3	RW	Yes	3501
Alarm Priorities												
A01	IO Configuration Missing											3502
A02	Control is stopped by Main Switch											3503
A03	Output in Manual Mode											3504
A04	Capacity Reference Signal Out of Range											3505
A05	ICAD Ejector Mode Feedback Signal Out of Range											3506
A06	ICAD Bypass Mode Feedback Signal Out of Range											3507
A07	Pressure Transmitter Signal Out of Range											3508
A08	Temperature Sensor Signal Out of Range											3509
A09	Error from ejector control valve											3510
A10	Error from bypass valve											3511
A11	Operating Mode Incorrect Switching											3512
A12	ICMTS Ejector Mode Incorrect Size	0: Critical 1: Severe 2: Normal 3: Disable										3513
A13	ICMTS Bypass Mode Incorrect Size		0	3	2	N/A	0		0 - 2	RW	Yes	3514
A14	Incorrect Ejector Configuration											3515
A15	Ejector 1 Wear Parts Service											3516
A16	Ejector 2 Wear Parts Service											3517
A17	Ejector 3 Wear Parts Service											3518
A18	Ejector 4 Wear Parts Service											3519
A19	Ejector 5 Wear Parts Service											3520
A20	Ejector 6 Wear Parts Service											3521
A21	Ejector 7 Wear Parts Service											3522
A22	Ejector 8 Wear Parts Service											3523
A23	Expansion Module Disconnected											3524
A24	Expansion IO config error											3525
Alarm messages												
A00	General Alarm										1901.1	
A01	Control is stopped by Main Switch										1901.1	
A02	Control is stopped by Main Switch	N/A	N/A	N/A	N/A	N/A	N/A		N/A	RO	1901.1	
A03	Output in Manual Mode										1901.1	
A04	Capacity Reference Signal Out of Range										1901.1	

Status Variables

General description of terms:

Ejector mode

The suction flow is being controlled by opening and closing of the ejectors.

Suction flow control

An input signal from the AK-PC 782 or PLC that indicates if the application can commence normal operation.

Pressure equalization

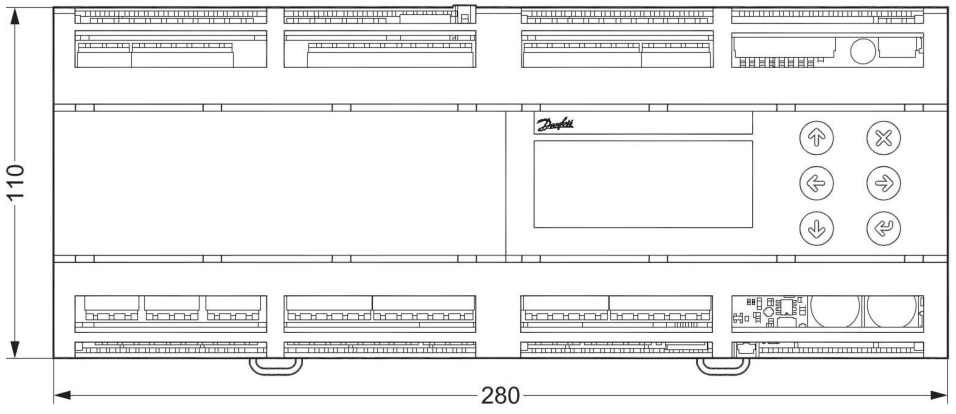
Opening of all connected ejectors in order to equalize motive, suction, and release flows, before normal operation commences.

Label	Name	Enum	Min	Max	Factory	Unit	Dec.	Lock	Level (R-W)	RW or RO	Persistent	Register
Control Alarms												
I01	Active Alarm Status	N/A	###	##	0		0		0 - X	RO		3525
I02	Number of Active Alarms	N/A	0	##	0		0		0 - X	RO		3526
I03	Number of Cleared Alarms	N/A	0	##	0		0		0 - X	RO		3527
Control General												
S01	Control state	N/A	0	0	0		0		0 - X	RO		3600
S1A	Control States Translated	0: Device is Starting 1: Main Switch is off 2: Main Switch is on 3: Manual Control 4: Io Configuration Error 5: Suction Flow Control Off 6: Pressure Equalization 7: Ejector Mode 8: bypass Mode 9: Forced Bypass Mode 10: Check Ejector Configuration 11: Error Mode			0 = Device is Starting		0		0 - X	RO		3601
S2A	Merge Main Switch	N/A	0	100	0		0		0 - X	RO		3602
S0F	Suction Flow Control	0: None 1: On 2: Off			0 = None		0		0 - X	RO		3603
S0G	Operating Mode	0: None 1: Ejector 2: Bypass 3: Forced Bypass			0 = None		0		0 - X	RO		3604
S02	Capacity Reference	N/A	0	100	0	%	1		0 - X	RO		3605
S0L	Capacity Reference Valid	0: No 1: Yes			0 = No		0		0 - X	RO		3606
S0J	Ejector Control Valve Requested Opening Degree	N/A	0	100	0	%	2		0 - X	RO		3607
S0K	Bypass Valve Requested Opening Degree	N/A	0	100	0	%	2		0 - X	RO		3608

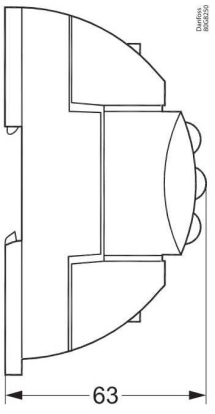
S0D	Pressure	N/A	-1	140	0	barg	2		0 - X	RO		3609
S0E	Temperature	N/A	-100	200	0	°C	2		0 - X	RO		3610
S0H	Ejector Control Valve Feedback Signal	N/A	0	20	0	mA	0		0 - X	RO		3611
S0B	Ejector Control Valve Opening Degree Feedback	N/A	0	100	0	%	2		0 - X	RO		3612
S0I	Bypass Valve Feedback Signal	N/A	0	20	0	mA	0		0 - X	RO		3613
S0C	Bypass Valve Opening Degree Feedback	N/A	0	100	0	%	2		0 - X	RO		3614
Control Advanced												
S21	Status Buzzer	N/A	0	100	0		0		0 - X	RO		3615
S22	Total Available Capacity	N/A	0	##	0	kg/h	0		0 - X	RO		3616
S24	Total Actual Capacity	N/A	0	##	0	kg/h	0		0 - X	RO		3618
S23	Total Requested Capacity	N/A	0	##	0	kg/h	0		0 - X	RO		3620
S27	Total Available Ejector Capacity	N/A	0	##	0	kg/h	0		0 - X	RO		3622
S49	Total Actual Ejector Capacity	N/A	0	##	0	kg/h	0		0 - X	RO		3624
S25	Available Ejector Control Valve Capacity	N/A	0	##	0	kg/h	0		0 - X	RO		3626
S28	Actual Ejector Control Valve Capacity	N/A	0	##	0	kg/h	0		0 - X	RO		3628
S26	Available Bypass Valve Capacity	N/A	0	##	0	kg/h	0		0 - X	RO		3630
S50	Actual Bypass Valve Capacity	N/A	0	##	0	kg/h	0		0 - X	RO		3632
S29	Capacity Difference	N/A	###	##	0	kg/h	0		0 - X	RO		3634
S38	Capacity Reference Raw	N/A	0	100	0	%	1		0 - X	RO		3636
S30	Ejector 1 State	0: Closed 1: Opened 2: Opening 3: Opened Hold On 4: Closed Hold Off			0 = Closed		0		0 - X	RO		3637
S31	Ejector 2 State	0: Closed 1: Opened 2: Opening 3: Opened Hold On 4: Closed Hold Off			0 = Closed		0		0 - X	RO		3638
S32	Ejector 3 State	0: Closed 1: Opened 2: Opening 3: Opened Hold On 4: Closed Hold Off			0 = Closed		0		0 - X	RO		3639
S33	Ejector 4 State	0: Closed 1: Opened 2: Opening 3: Opened Hold On 4: Closed Hold Off			0 = Closed		0		0 - X	RO		3640
S34	Ejector 5 State	0: Closed 1: Opened 2: Opening 3: Opened Hold On 4: Closed Hold Off			0 = Closed		0		0 - X	RO		3641

S35	Ejector 6 State	0: Closed 1: Opened 2: Opening 3: Opened Hold On 4: Closed Hold Off			0 = Closed		0		0 - X	RO		3642
S36	Ejector 7 State	0: Closed 1: Opened 2: Opening 3: Opened Hold On 4: Closed Hold Off			0 = Closed		0		0 - X	RO		3643
S37	Ejector 8 State	0: Closed 1: Opened 2: Opening 3: Opened Hold On 4: Closed Hold Off			0 = Closed		0		0 - X	RO		3644
S51	Ejector 1 Activations high byte	N/A	0	##			0		1 - X	RO	Yes	3645
S52	Ejector 1 Activations low byte	N/A	0	##			0		2 - X	RO	Yes	3646
S53	Ejector 2 Activations high byte	N/A	0	##			0		3 - X	RO	Yes	3647
S54	Ejector 2 Activations low byte	N/A	0	##			0		4 - X	RO	Yes	3648
S55	Ejector 3 Activations high byte	N/A	0	##			0		5 - X	RO	Yes	3649
S56	Ejector 3 Activations low byte	N/A	0	##			0		6 - X	RO	Yes	3650
S57	Ejector 4 Activations high byte	N/A	0	##			0		7 - X	RO	Yes	3651
S58	Ejector 4 Activations low byte	N/A	0	##			0		8 - X	RO	Yes	3652
S59	Ejector 5 Activations high byte	N/A	0	##			0		9 - X	RO	Yes	3653
S60	Ejector 5 Activations low byte	N/A	0	##			0		10 - X	RO	Yes	3654
S61	Ejector 6 Activations high byte	N/A	0	##			0		11 - X	RO	Yes	3655
S62	Ejector 6 Activations low byte	N/A	0	##			0		12 - X	RO	Yes	3656
S63	Ejector 7 Activations high byte	N/A	0	##			0		13 - X	RO	Yes	3657
S64	Ejector 7 Activations low byte	N/A	0	##			0		14 - X	RO	Yes	3658
S65	Ejector 8 Activations high byte	N/A	0	##			0		15 - X	RO	Yes	3659
S66	Ejector 8 Activations low byte	N/A	0	##			0		16 - X	RO	Yes	3660

Dimensions



LCD display

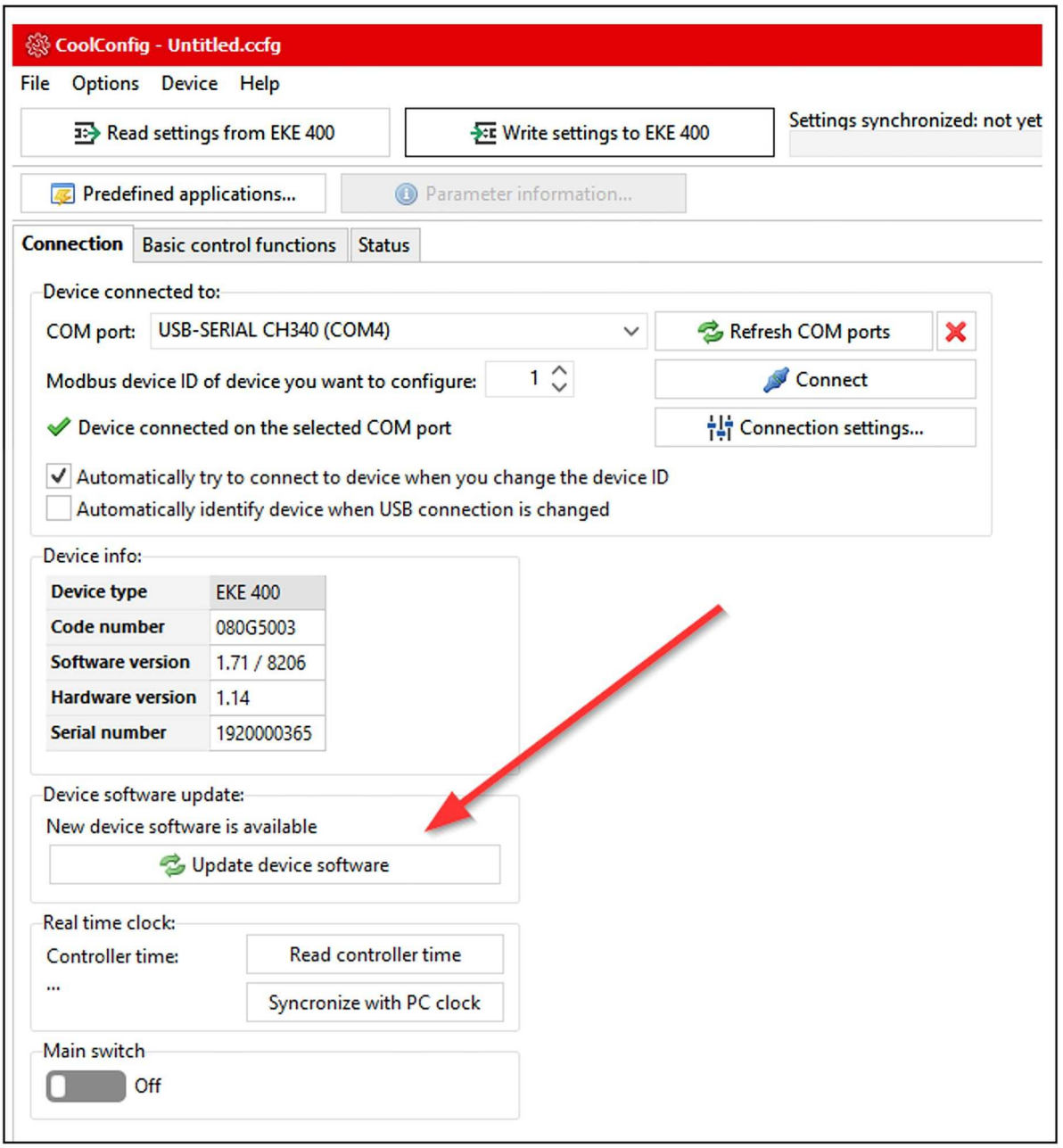


Installation

Software updates

Controller software update

If CoolConfig is connected to a controller and the PC running CoolConfig is connected to the internet, CoolConfig will automatically check if the connected controller has the latest device software installed.
If a new device software is found, then CoolConfig will display a message that a new device software is found and is ready for install.
The installation process will take a few minutes, and the controller will restart one or more times depending on the update.



NOTE: It is strongly recommended to save the controller setup before updating the device software! Do this by reading the controller setup using CoolConfig and save it to a file before updating the device software.

NOTE: When setting up a new controller, always check if there is a new controller software available.

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.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Certification body	Approval topic
Manufacturer's Declaration	Manufacturer's declaration 080R5336.AA	Danfoss	Explosive
EU Declaration	EU Declaration 080R5337.AA	Danfoss	LVD
Export Control Declaration	Controller for Industrial CO2 ejector	Danfoss	

Contact details

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Danfoss offers a wide range of support along with our products, including digital information, software, mobile apps and expert guidance. See the possibilities below.

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Discover the Design Center, our advanced digital platform that streamlines product selection. With integrated tools and enhanced type pages, it's simpler than ever to access product information and documentation, and to select the right products. Check the availability of Danfoss products at partner locations and enjoy seamless transitions from selection to purchase with our basket-to-basket functionality. Whether you're buying from our distributors or directly from the Product Store, the Design Center simplifies your experience. Learn more at: designcenter.danfoss.com.

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