ENGINEERING
TOMORROW

Data sheet

Intelligent electrical actuator AMEi 6 iSET

Description

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AMEi 6 **iSET** actuator for intelligent optimization of the District Heating/Cooling substation operation. Automatic adjustment of Δp setting on AFP 2, AFPB 2, AFPQ 2 and AFQMP 2 controllers, used in DHC systems.

Solution for dynamic DH systems with wide span of min - max flow (Domestic Hot Water service) and for systems with improperly sized control equipment (oversized control valves, wrong valve selection/characteristic, poor control ratio...)

Auto stabilization function monitors control signal and stabilizes oscillations at the partial/ low load operating conditions, by adjustment of the Δp over the motorized control valve (MCV).

Constant-real time MCV operation improvement led to more stable control without oscillations and flow delivered up to the real needs (overflow prevention).

This results in stable temperature conditions on the secondary side, improvement of ΔT on the primary side and longer lifetime of installed equipment.

Features:

- Auto stabilization function
- Electrical manual operation
- Position indication, LED signalization
- Adjustable min/max Δp setting by the end switch (adjustable stroke limitation of the pressure actuator)
- Thermal and overload protection
- External reset button
- Easy mounting, pre-fixing with the wire lock
- Anti-rotation strap for preventing actuator from rotating
- Automatic calibration to the pressure actuator stroke-reduced commissioning time
- Maintenance free
- Voltage or current input/output signal Y/X
- Modbus RS485
- Galvanic insulation Y, X
- Equipped with cable glands

Main Data:

- Nominal voltage:
  - 24 V ac/dc, 50/60 Hz
  - 230 V ac, 50/60 Hz
- Control input signal: modulating
- Torque: 7 Nm
- Speed 36 s/turn (18 sec/mm)
- Full stroke time ~30 min
- Compatible with modulating 24 V and 230 V actuators AME 20/23/30/33, AME 55/56, AME 85/86, AME 655/655GA/658/659
- Compatibility with 3 point AMV actuators not available yet

iSET is not the solution for disturbances and oscillations coming from the network.
External oscillations generated by the other substations, disturbances because of the poor control at the heat source, or poor network balancing in general are out of the iSET range and can't be managed.

Ordering

Type	Supply voltage (V)	Code No.
AMEi 6 iSET	230 ac	**082G4300**
AMEi 6 iSET	24 ac/dc	**082G4301**

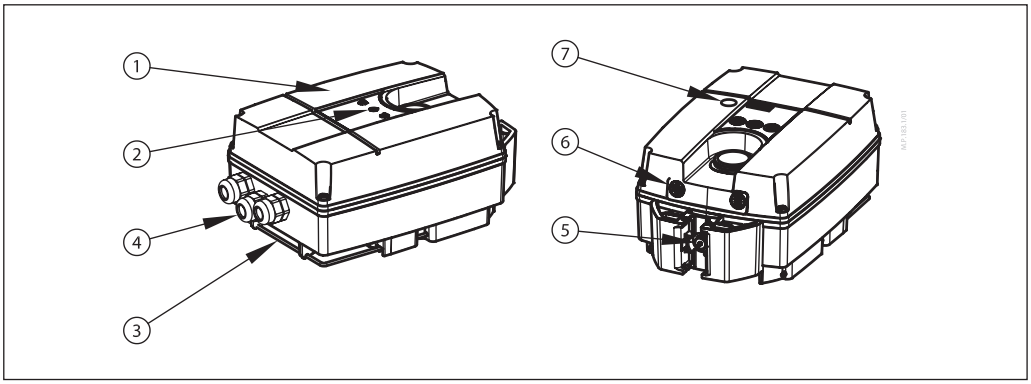
Technical data

Please check power supply and power consumption prior connection!

Actuator type		AMEi 6 iSET
Power supply	V	24 V ac/dc or 230 V ac; +10...-15%
Power consumption	VA	8 (24V) 16 (230V)
Frequency	Hz	50/60
Control input Y	V	0-10 (2-10) [Ri = 40 kΩ]
	mA	0-20 (4-20) [Ri = 500 Ω]
Control output X	V	0-10 (2-10) [Ri = 10 kΩ]
	mA	0-20 (4-20) [Ri = 510 Ω]
Torque	Nm	7
Speed	s/turn	36
Full stroke time	min	30
Max. medium temperature	°C	Depends on valve type. No limitations for 150 °C
Ambient temperature		0 … + 55
Storage and transport temperature		– 40... +70 (storing for 3 days)
Humidity		5-95% (no condensing)
Protection class		230V- protection class II 24V- protection class III
Grade of enclosure		IP 54
Weight	kg	2.5
Manual operation		Electrical
Power failure response		Actuator remains in last position
CE - marking in accordance with the standards		Low Voltage Directive (LVD) 2014/35/EU: EN 60730-1, EN 60730-2-14 Electromagnetic Compatibility Directive (EMC) 2014/30/EU: EN 61000-6-2, EN 61000-6-3

Design

1. Service cover
2. Function buttons
3. Wire lock
4. Cable gland
5. End switch
6. LED signalization for actuator operating modes
7. LED signalization for Modbus communication status



Installation

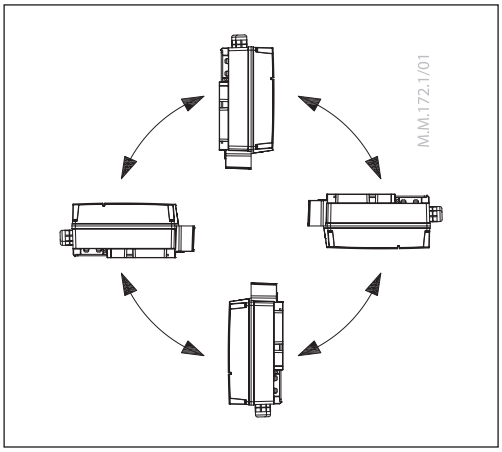
The actuators should be mounted in a dry environment.
In case of outdoor installation, the actuator has to be protected against climatic influences by suitable measures. For exact installation instruction manuals for relevant pressure actuator should be followed.

Mechanical

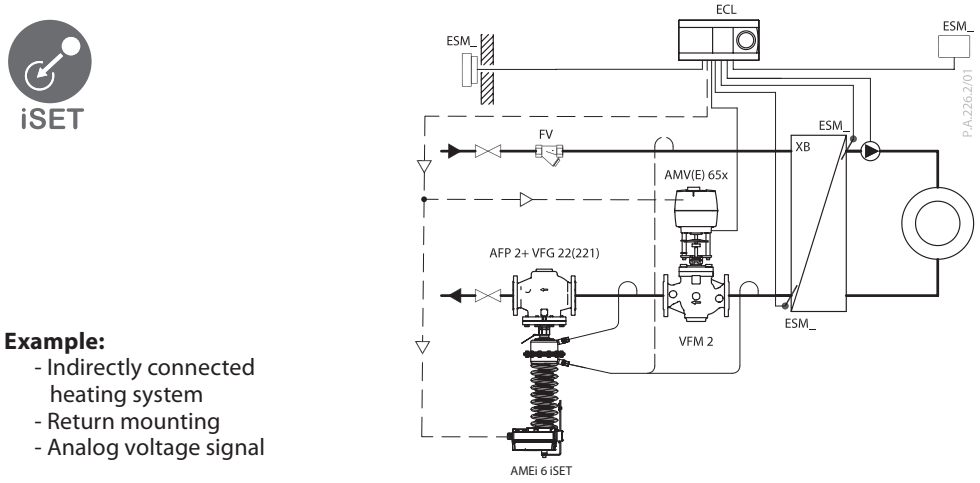
Please check the allowed installation positions for the valve and pressure actuator. AMEi 6 actuator can be installed in all positions (*see scheme*). Allow for necessary clearance for maintenance purposes (*see section Dimensions*).

Electrical connection

Electrical connections can be accessed by removing the service cover.



Application principle



Example:
- Indirectly connected heating system
- Return mounting
- Analog voltage signal

Auto stabilization function

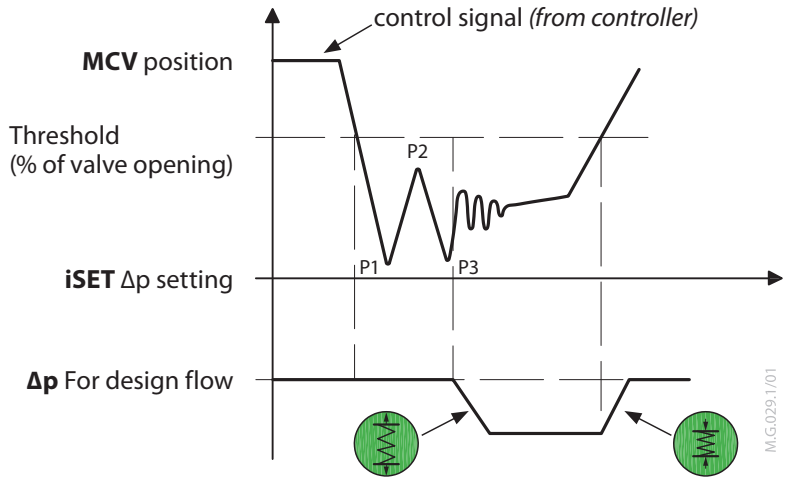


Fig. 1

Auto stabilization function (ASF)
iSET Auto Stabilization Function (ASF) constantly monitors control signal.
In case of appearing signal oscillations, iSET algorithm detects the oscillations and automatically adjusts differential pressure (Δp) over the motorized control valve (MCV) by changing the Δp setting on the differential pressure controller.
This is done by stretching and squeezing the setting spring on the pressure actuator, until the control signal is stabilized. Result is more stable operation conditions of MCV and improved substation/ system efficiency.

Operation principle *(Fig. 1)*
Auto Stabilization Function (ASF) searches for 3 consecutive peaks (P1, P2, P3) in control signal. When peaks are detected and when the MCV position is below treshold, ASF calculates needed Δp reduction, and reduces set Δp over the MCV by stretching the spring on the pressure actuator. When calculated point is reached, it stops.
In case of repeating oscillations, procedure repeats, until the oscillations are eliminated and MCV is opened more than 50% (factory set treshold of the valve stroke/control signal).
As soon as the control signal crosses threshold value, iSET moves towards to the initially set Δp (Δp set for design flow conditions).
If the control signal is stable and below threshold, iSET remains in position.

To prevent the oscillations after the system is stabilized, ASF function monitors not only oscillations, but also analyses type of control signal (slow damping, suitable damping, too strong damping…). Based on signal specifics it provides proper reaction (Δp correction).

Actuator operating modes

LED operating mode indicator
The three-colour (green/yellow/red) LED function indicators are located at the front of actuator top cover. They indicate different operating modes.

RESET button
Actuators AMEi 6 iNET/iSET have external RESET button which is located on top cover of the actuator . With this button you can enter or exit Stand-By mode (press once) or Self positioning mode based on preset end switch positions (press and hold for 5 seconds). See next paragraph for mode details.

LED operating mode indicator
The three-colour (green/yellow/red) LED function indicators are located at the front of actuator top cover. They indicate different operating modes.

Operating modes

- **Calibration mode:**

  For calibration to the desired pressure actuator stroke (min-max spring setting). To start calibration procedure, **press and hold RESET button for 5 seconds** until the green light starts flashing. End positions of the actuator are automatically adopted based on pre-set end switch positions pins. Actuator goes to the stationary mode and starts responding to the control signal.

- **Stand-By mode for manual operation**

  Press the RESET button for 1 sec. to enter Stand-By mode. The actuator stops in current position and stops responding to any control signal. Red light is constantly lit. You can manually operate the actuator **by pressing and holding the SQUEEZE SPRING or STRETCH SPRING button for > 10 sec**. Actuator will start to travel automatically in required direction. To stop it in desired position, **press the SQUEEZE SPRING or STRETCH SPRING button again**.
  For fine adjustments press & hold the SQUEEZE SPRING or STRETCH SPRING button for < 10 sec. Actuator will travel in required direction as long as the button is pressed, but no longer than 10 sec.
  Stand-by mode can be very useful during the commissioning, or for service purposes. To exit Stand-By mode press the RESET button again.

- **Positioning mode**

  The actuator is operating automatically, according to the control signal. When positioning is finished the actuator goes to stationary mode.

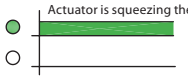
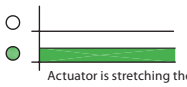
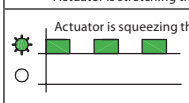
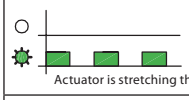
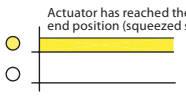
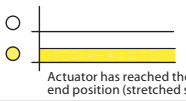
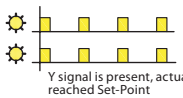
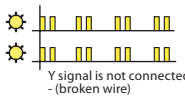
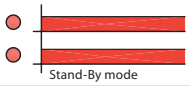
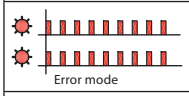
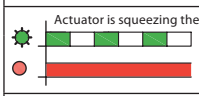
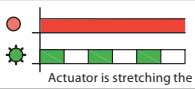
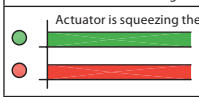
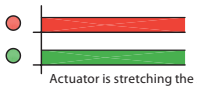
- **Stationary mode**

  The actuator is operating without errors.

- **Error mode**

  Working temperature is too high - check the ambient temperature.
  Actuator is not properly mechanically connected - check the connection. Pressure actuator is blocked.

LED signalling

Indication type				Operating mode
 Actuator is squeezing the spring			Constantly lit	Normal mode Actuator is squeezing the spring
 Actuator is stretching the spring			Constantly lit	Normal mode Actuator is stretching the spring
 Actuator is squeezing the spring			Flashing (1s cycle)	Calibration mode Actuator is squeezing the spring
 Actuator is stretching the spring			Flashing (1s cycle)	Calibration mode Actuator is stretching the spring
 Actuator has reached the upper end position (squeezed spring)			Constantly lit	Normal mode Actuator stops at the upper end position
 Actuator has reached the bottom end position (stretched spring)			Constantly lit	Normal mode Actuator stops at the bottom end position
 Y signal is present, actuator reached Set-Point			Flashing	Normal mode Actuator stopped at the position which match Y set-point
 Y signal is not connected - (broken wire)			2-fast Flash after 1 s period	Normal mode Y signal is not connected - (broken wire) motor stopped at position when Y was last present
 Stand-By mode			Constantly lit	Stand-by mode
 Error mode			Flashing	Error mode
 Actuator is squeezing the spring			Flashing 1s cycle Constantly lit	Manual mode Button „ SQUEEZE SPRING“ >10 sec Actuator is squeezing the spring
 Actuator is stretching the spring			Constantly lit Flashing 1s cycle	Manual mode Button „STRETCH SPRING “ >10 sec Actuator is stretching the spring
 Actuator is squeezing the spring			Constantly lit	Manual mode Button „ SQUEEZE SPRING“ <10 sec Actuator is squeezing the spring
 Actuator is stretching the spring			Constantly lit	Manual mode Button „STRETCH SPRING “ <10 sec Actuator is stretching the spring
Motor stopped in the “SQUEEZE SPRING“positioning mode			Constantly lit	Manual mode Motor stopped in the “SQUEEZE SPRING“ positioning mode
Motor stopped in the “STRETCH SPRING“positioning mode			Constantly lit	Manual mode Motor stopped in the “STRETCH SPRING“ positioning mode

Indication type			Modbus communication status
No power supply		Dark	No communication
		Flashing	RX telegram is for me
			RX activity on BUS
			Error in message interpretation

DIP switch setting

S1/DIP 1
Input signal type selector:
OFF: Input signal Y is set to voltage (V)
ON: Input signal Y is set to current (mA)

S1/DIP 2
Output signal type selector:
OFF: Output signal X is set to voltage (V)
ON: Output signal X is set to current (mA)

S1/DIP 3
Direct or inverse acting selector *(Fig. 2)***:**
OFF: Actuator is direct acting to input signal
ON: Actuator is inverse (reverse) acting to control signal (only for AMEI 6 iNET in combination with AFA 2)

S1/DIP 4
Normal or sequential mode selector:
OFF: Actuator is working in range 0(2)-10 V or 0(4)-20 mA.
ON: Actuator is working in sequential range; 0-5 V or (0-10 mA) or (5-10 V) or (10-20 mA).
Signal range selector S1/DIP 6 sets the sequential range

S1/DIP 5
0-10 V/2-10 V – Input/output
OFF: 0-10 V; input signal is in the range from 0-10 V (voltage input) or from 0-20 mA (current input)
ON: 2 –10 V; input signal is in the range from 2-10 V (voltage input) or from 4-20 mA (current input)
Signal range selector S1/DIP 1 & DIP 2 sets Y and X signal.

S1/DIP 6
Sequential range selector:
OFF: 0-5 V or (0-10 mA)
ON: 5-10 V or (10-20 mA).
[S1/DIP 4 = ON!]

S1/DIP 7
OFF: iSET
ON: iNET**

S1/DIP 8
Not used

*** See AMEi 6 iNET data sheet*

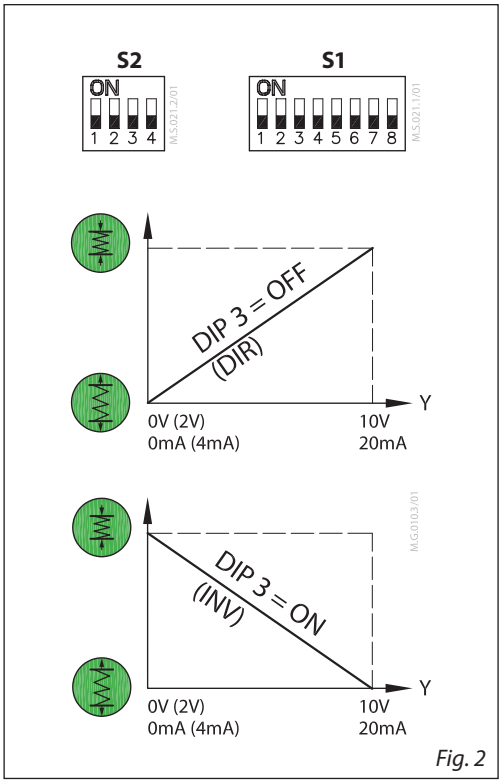


Fig. 2

S2/DIP 1
OFF: analog MCV 1-control signal
ON: 3-point MCV 1-control signal

S2/DIP 2
OFF: analog MCV 2-control signal
ON: 3-point MCV 2-control signal

S2/DIP 3
Not used

S2/DIP 4*
OFF: Analog signal (V/mA)
Actuator operates in **analog mode**
ON: MOD BUS
Actuator operates in **digital mode**

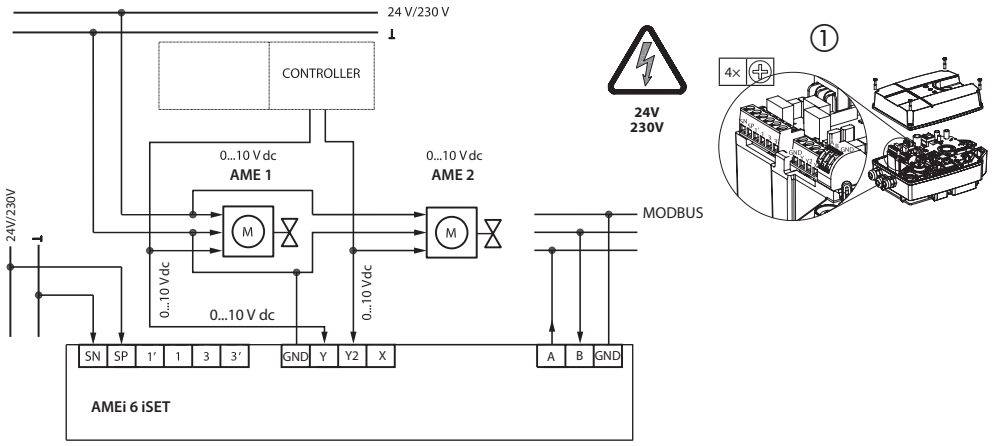
*In **analog mode S2/DIP 4 = OFF**, DIP switches S1/DIP 1-7 work as active functions.
In **digital mode S2/DIP 4 = ON** , DIP switches S1/DIP 1-7 work as a digital addresses.
In digital mode Modbus RS485 could be used either for the monitoring purposes or for the AMEi 6 actuator positioning.

Wiring

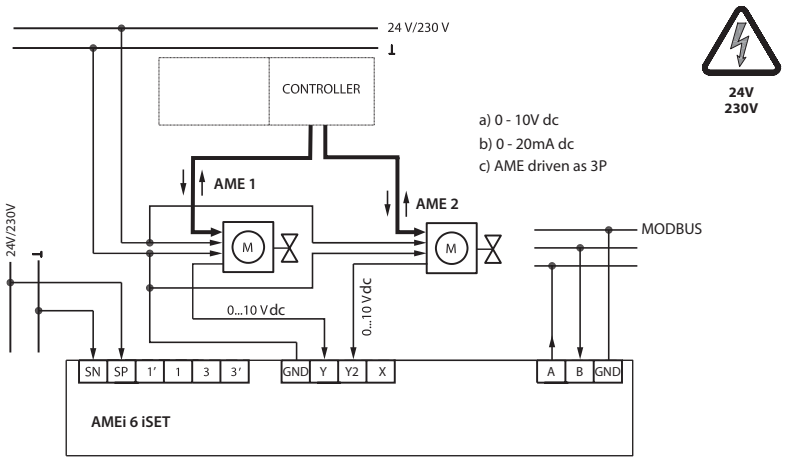
Do not touch anything on the PCB! Do not remove the cover before the power supply is fully switched off.

Recommended cross-sectional area of the wiring is 1.5 mm²

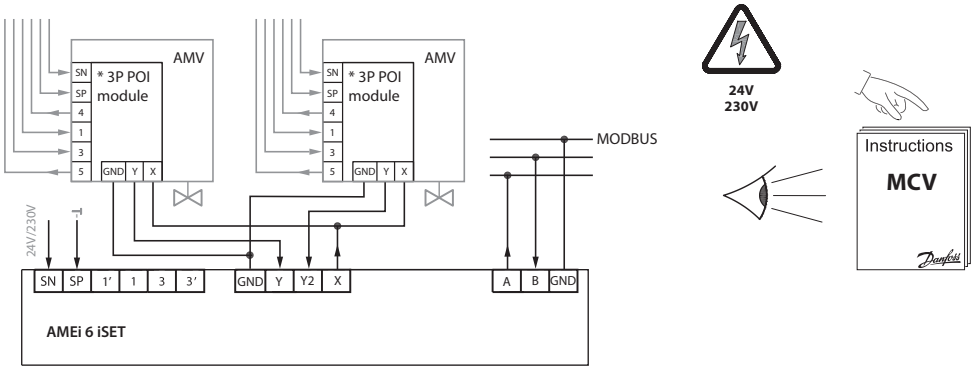
Analog voltage signal



Analog / 3p signal with analog feedback (AME driven as 3P)



3-point MCV control signal (Possible combination with 230V actuators type AMV 2x/3x, 85/86)



* 3P POI - 3P position indication module-plug in accessory for AMV 230V actuators type AMV 2x/3x, 85/86 (not available yet)

Modbus registers - Configuration

MODBUS virtual address [hex]	MODBUS virtual address [dec]	Read/ Write	Modbus func-tion	Modbus Data Type	Category	Object / Param-eter name	Description	Persistent	State Text	Number Of States	Default
0x8000	**32768**	R/W	3,4 & 6	WORD	Configuration	Direct or Inverse operation Mode	Select here between Direct and Inverse operation mode	N	0 - Direct 1 - inverse	2	Direct
0x8001	**32769**	R/W	3,4 & 6	WORD	Configuration	Analog Control signal type and range	Used to select the analog control inputs type and range	N	1: 0-5Vdc 2: 0-10Vdc 3: 2-10Vdc 4: 5-10Vdc 5: 2-6Vdc 6: 6-10Vdc 7: 0-20mA 8: 4-20mA	8	0-10Vdc
0x8002	**32770**	R/W	3,4 & 6	WORD	Configuration	Control mode	Select the actuator application mode	Y	1 - Analog control 2 - Digital control	2	Analog control
0x8010	**32784**	R/W	3,4 & 6	WORD	Configuration	Endian type	Byte ordering for LONG and FLOAT types	Y	0 - Big Endian 1 - Little Endian	2	0 - Big Endian
0x8011	**32785**	R/W	3,4 & 6	WORD	Configuration	Baud Rate	Baud Rate used for Modbus communication	Y	1: Auto Baud rate Detection 2: 9600 bps 3: 19200 bps 4: 38400 bps 5: 57600 bps 6: 76800 bps 7: 115200 bps	7	Auto Baud rate Detection
0x8012	**32786**	R/W	3,4 & 6	WORD	Configuration	UART parity	Select UART parity	Y	1: 1-8-N-2 2: 1-8-O-1 3: 1-8-E-1 4: 1-8-N-1 5: Auto parity	5	Auto parity
0x8020	**32800**	R/W	3,4 & 6	WORD	Configuration	Device Variant	Selection of actuator variant	Y	1: iNET 2: iSET	2	default is production set
0x8021	**32801**	R/W	3,4 & 6	WORD	Configuration	MCV variant	Selection of MCV variant	Y	0: AME 1: AMV	2	default is AME

MODBUS virtual address [hex]	MODBUS virtual address [dec]	Read/ Write	Modbus func-tion	Modbus Data Type	Category	Object / Param-eter name	Description	Persistent	Min	Max	Unit	Default
0x8013	**32787**	R	3,4	WORD	Configuration	MAC Address	MAC Address used for Modbus communication	N	1	127	na	na

Modbus registers - Information

MODBUS virtual address [hex]	MODBUS virtual address [dec]	Read/ Write	Modbus function	Modbus Data Type	Category	Object / Parameter name	Description	Persistent	Reliability	Unit
0x8100	**33024**	R	3&4	FLOAT	Information	Voltage or Current on analog input Y1	Voltage(V) or current (mA) level on the Y1 analog input, measured by the actuator	N	Voltage level measured i.e. 0.000… 10.000 correspond to 0.00… 10.00 V or in mA, i.e. 0.000 … 20.000 correspond to 0.000 … 20.000 mA ; -2 indicate broken wire	Volt / mA
0x8102	**33026**	R	3&4	FLOAT	Information	Analog input Y1 in %	Voltage(V) or current (mA) level on the Y1 analog input, measured by the actuator in %	N	0 - 100 %	%
0x8104	**33028**	R	3&4	FLOAT	Information	Voltage or Current on analog input Y2	Voltage(V) or current (mA) level on the Y2 analog input, measured by the actuator	N	Voltage level measured i.e. 0.000… 10.000 correspond to 0.00… 10.00 V or in mA, i.e. 0.000 … 20.000 correspond to 0.000 … 20.000 mA ; -2 indicate broken wire	Volt / mA
0x8106	**33030**	R	3&4	FLOAT	Information	Analog input Y2 in %	Voltage(V) or current (mA) level on the Y2 analog input, measured by the actuator in %	N	0 - 100 %	%

Modbus registers - Information *(continued)*

MODBUS virtual address [hex]	MODBUS virtual address [dec]	Read/ Write	Modbus function	Modbus Data Type	Category	Object / Parameter name	Description	Persistent	Min	Max	Unit	Default
0x8108	**33032**	R	3 & 4	WORD	Information	Number of connected MCVs	Number of connected MCVs	N	0	2	na	0
0x810A	**33034**	R	3 & 4	WORD	Information	SW version	SW version of the actuator	N	0	0xFFFF	na	0
0x810B	**33035**	R	3 & 4	WORD	Information	HW version	HW version of the actuator	N	0	0xFFFF	na	0
0x810C	**33036**	R	3&4	LONG	Information	Production ID	Serial number of the actuator	N	0	0xFFFFFFFF	na	0
0x8120	**33056**	R/W	3 & 4	STRING	Information	Device name	Ascii coded STRING	Y	-			
0x8140	**33088**	R	3 & 4	STRING	Information	Model name	AMEi 6, iSET or iNET, 24V or 230V	N				
0x8160	**33120**	R	3 & 4	STRING	Information	Vendor name	Danfoss A/S	N				
0x8180	**33152**	R/W	3,4 & 16	STRING	Information	Location name	Ascii coded STRING	Y				
0x81A0	**33184**	R	3 & 4	STRING	Information	Serial number	Description of this object holds the serial number of the actuator, programmed at the production time.	N				

Modbus registers - Operating

MODBUS virtual address [hex]	MODBUS virtual address [dec]	Read/ Write	Modbus function	Modbus Data Type	Category	Object / Parameter name	Description	Persistent	Reliability	Unit	Default
0x8200	**33280**	R/W	3,4 & 16	FLOAT	Operating	Actuator setpoint	Actuator setpoint in %	N	Setpoint of the actuator, i.e. 0 …100 correspond to 0 … 100%. This register is valid only when digital mode is chosen	%	0
0x8202	**33282**	R	3 & 4	FLOAT	Operating	Actuator feedback	Actuator's position indication in %	N	Actuator's position indication in percent, i.e. 0 … 100 correspond to 0 … 100%. This register is valid only when digital mode is chosen.	%	0

MODBUS virtual address [hex]	MODBUS virtual address [dec]	Read/ Write	Modbus function	Modbus Data Type	Category	Object / Parameter name	Description	Persistent	State Text	Number Of States	Default
0x8204	**33284**	R/W	3,4 & 6	WORD	Operating	Actuator Mode and special features	Shows present mode of actuator. Calibration can be started from here	N	1 - No Init mode, 2 - Normal mode, 3 - Calibration mode, 4 - Alarm mode, 5 - Service mode, 6 - Sleep mode,	6	No init mode
0x8205	**33285**	R/W	3,4 & 6	WORD	Operating	Analog output type	Selecting analog output type	N	0 - X signal (voltage) 1 - X signal (current) 2 - Remote analog output (voltage) 3 - Remote analog output (current)	4	0 - X signal (voltage)

MODBUS virtual address [hex]	MODBUS virtual address [dec]	Read/ Write	Modbus function	Modbus Data Type	Category	Object / Parameter name	Description	Persistent	Reliability	Unit	Default
0x8206	**33286**	R/W	3,4 & 16	FLOAT	Operating	Voltage or current on analog output	Voltage (V) or current (mA) analog output (Feedback signal or remote I/O)	N	Voltage level i.e. 0.000 -10.000 correspond to 0.000 -10.000 V, Current level i.e. 0.000 -20.000 correspond to 0mA - 20mA	Volt / mA	0

Modbus registers - Alarms & warnings

MODBUS virtual address [hex]	MODBUS virtual address [dec]	Read/ Write	Modbus func-tion	Modbus Data Type	Category	Object / Parameter name	Description	Persistent	Min	Max	Unit	Default
0x8300	**33536**	R	3&4	WORD	Alarms & warnings	Alarm: Error during calibration	There was an error during calibration of actuator	N	ON	OFF	na	Bit 0: na
0x8300	**33536**	R	3&4	WORD	Alarms & warnings	Alarm: Error in calibration, stroke too high	There has been an error in calibration, stroke too high	N	ON	OFF	na	Bit 1: na
0x8300	**33536**	R	3&4	WORD	Alarms & warnings	Alarm: Error in calibration, stroke too low	There has been an error in calibration, stroke too low	N	ON	OFF	na	Bit 2: na
0x8300	**33536**	R	3&4	WORD	Alarms & warnings	Alarm: Temperature of actuator is too high	The Temperature inside the Actuator is too high	N	ON	OFF	na	Bit 3: na
0x8300	**33536**	R	3&4	WORD	Alarms & warnings	Alarm: Voltage of power supply is too low	Voltage of power supply is measured to be too low	N	ON	OFF	na	Bit 4: na
0x8300	**33536**	R	3&4	WORD	Alarms & warnings	Alarm: Unexpected switch state	Switch is active ouside of defined parameters (in wrong state)	N	ON	OFF	na	Bit 5: na
0x8300	**33536**	R	3&4	LONG	Alarms & warnings	Alarm: Internal Error, replace actuator	An internal error that cannot be corrected was found, replace the actuator	N	ON	OFF	na	Bit 15: na
0x8301	**33537**	R	3&4	WORD	Alarms & warnings	Warning: Voltage of power supply is high	Voltage of power supply is measured to be high	N	ON	OFF	na	Bit 0: na
0x8301	**33537**	R	3&4	WORD	Alarms & warnings	Warning: Voltage of power supply is low	Voltage of power supply is measured to be low	N	ON	OFF	na	Bit 1: na
0x8301	**33537**	R	3&4	WORD	Alarms & warnings	Warning: Unexpected stall	Actuator has detected unexpected stall	N	ON	OFF	na	Bit 2: na
0x8301	**33537**	R	3&4	WORD	Alarms & warnings	Warning: Motor speed too low	Actuator motor does not reach the desired speed	N	ON	OFF	na	Bit 3: na
0x8301	**33537**	R	3&4	WORD	Alarms & warnings	Warning: No Control Signal	The actuator has detected that is has no control signal in	N	ON	OFF	na	Bit 4: na
0x8301	**33537**	R	3&4	WORD	Alarms & warnings	Warning: Actuator position overrange stretch	The actuator position is overrange in the direction stretch	N	ON	OFF	na	Bit 5: na
0x8301	**33537**	R	3&4	WORD	Alarms & warnings	Warning: Actuator position overrange compress	The actuator position is overrange in the direction compress	N	ON	OFF	na	Bit 6: na
0x8301	**33537**	R	3&4	WORD	Alarms & warnings	Warning: Invalid DIP switch setting	MAC address assignment was set with DIP-switches, but is incorrectly set to 0	N	ON	OFF	na	Bit 7: na

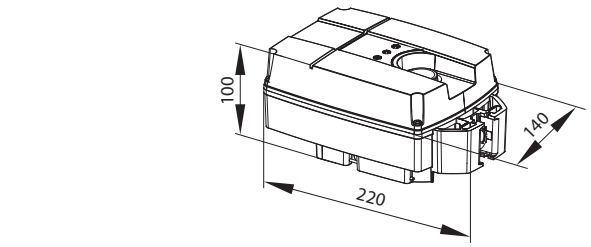
Modbus registers - Troubleshooting & service

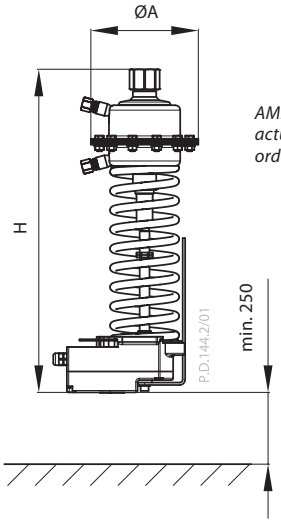
MODBUS virtual address [hex]	MODBUS virtual address [dec]	Read/ Write	Modbus func-tion	Modbus Data Type	Category	Object / Parameter name	Description	Persistent	Min	Max	Unit	Default
0x8400	**33792**	R	3 & 4	LONG	Troubleshooting & service	Calibration cnt	Number of actuator calibration	Y	0	MAX	na	na
0x8402	**33794**	R	3 & 4	LONG	Troubleshooting & service	Fully stretched cnt	Number of how many times actuator was fully stretched	Y	0	MAX	na	na
0x8404	**33796**	R	3 & 4	LONG	Troubleshooting & service	Fully compressed cnt	Number of how many times actuator was fully compressed	Y	0	MAX	na	na
0x8406	**33798**	R	3 & 4	LONG	Troubleshooting & service	Total Operating Hours	Total Operating Hours of the actuator	Y	0	MAX	Hours	na
0x8408	**33800**	R	3 & 4	LONG	Troubleshooting & service	Total steps taken by the actuator	Total steps taken by the actuator since first ON	Y	0	MAX	na	na
0x840A	**33802**	R	3 & 4	LONG	Troubleshooting & service	Minutes since power up	Minutes since actuator was last power on	N	0	MAX	Minutes	na
0x840C	**33804**	R	3 & 4	LONG	Troubleshooting & service	Power up cnt	Number of actuator power ups	Y	0	MAX	na	na
0x840E	**33806**	R	3 & 4	LONG	Troubleshooting & service	Operating high voltage cnt	Number of high voltage power supply events	Y	0	MAX	na	na
0x8410	**33808**	R	3 & 4	LONG	Troubleshooting & service	Operating high voltage minutes	Number of minutes actuator was on high voltage supply voltage	Y	0	MAX	Minutes	na
0x8412	**33810**	R	3 & 4	LONG	Troubleshooting & service	Operating low voltage cnt	Number of low voltage power supply events	Y	0	MAX	na	na
0x8414	**33812**	R	3 & 4	LONG	Troubleshooting & service	Operating low voltage minutes	Number of minutes actuator was on low voltage supply voltage	Y	0	MAX	Minutes	na
0x8416	**33814**	R	3 & 4	LONG	Troubleshooting & service	iSET detected cnt	Number of times oscilations were detected	Y	0	MAX	na	na

Modbus registers - Configuration

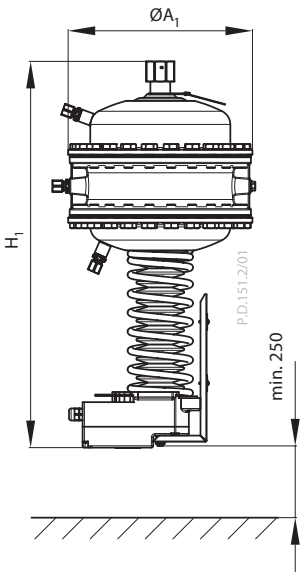
MODBUS virtual address [hex]	MODBUS virtual address [dec]	Read/ Write	Modbus func-tion	Modbus Data Type	Category	Object / Param-eter name	Description	Persistent	State Text	Number Of States	Default State
0x8500	**34048**	W	6	WORD	Special	Reset	Warm or Cold reset	-	0x5741 - Warm, 0x434F-Cold	2	-
0x8501	**34049**	R/W	3,4 & 6	WORD	Special	Update state	-	N	1 - Default, 2 - Preparing, 3 - Ready, 4 - Error, 5 - Received, 6 - Perform update	6	

Dimensions





AMEi 6 iSET intelligent actuator should be ordered separately



AFP 2, AFPB 2, AFQMP 2

AFPQ 2

Pressure actuators

Size (cm^2)	ØA	AFP 2	AFPB 2	AFQMP 2		AFPQ 2	
		H	H	ØA	H	$ØA_1$	H_1
	mm					mm	
80	175	602	515	-	-	-	-
160	228	622	605	228	622	228	727
320	295	622	605	295	622	300	727
630	300	747	730	-	-	-	-

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