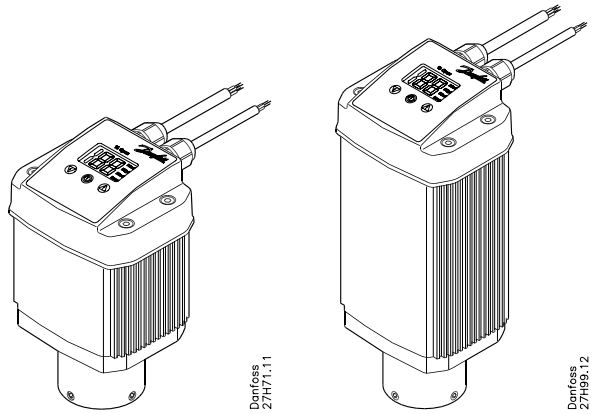
Instruction

Actuator ICAD 600 / ICAD 900

027R9778



ICAD 600 *ICAD 900*

Fig. 1

ICAD 600
ICAD 900

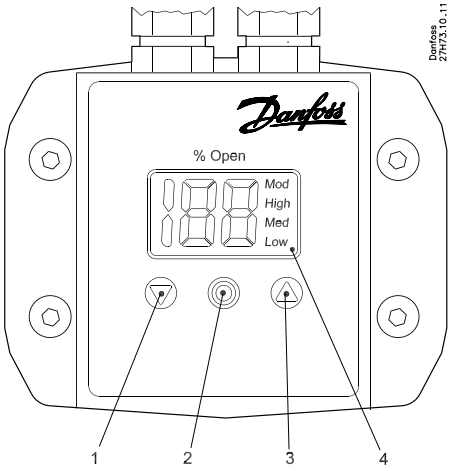
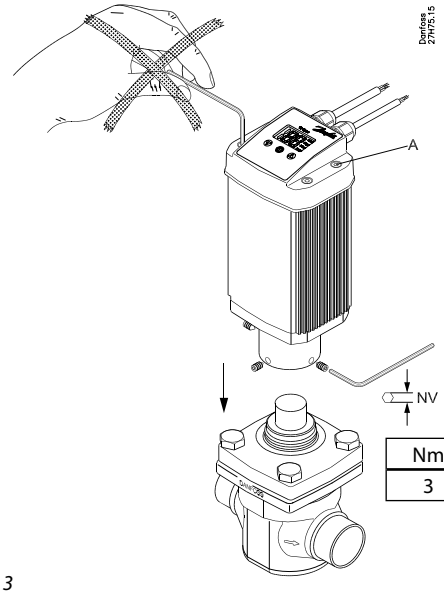


Fig. 2



Nm	LB-feet
3	2.5

Fig. 3

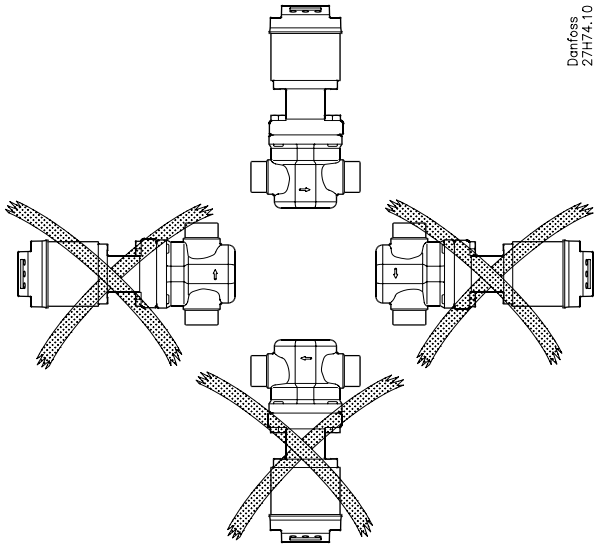


Fig. 4

	mm	in.
H	45	1.77
L_3	25	1

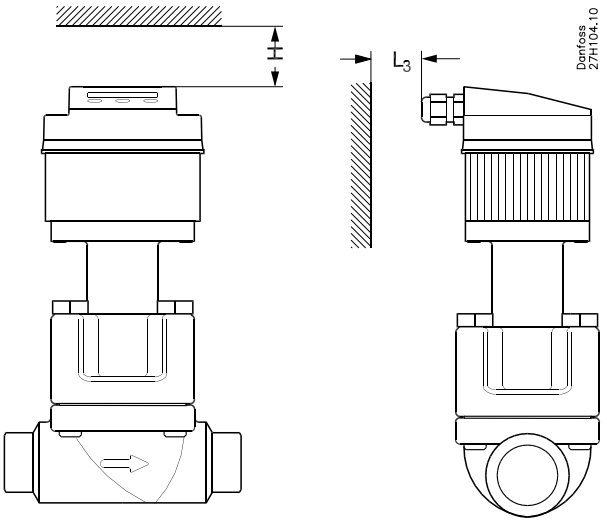


Fig. 5a, ICM + ICAD 600

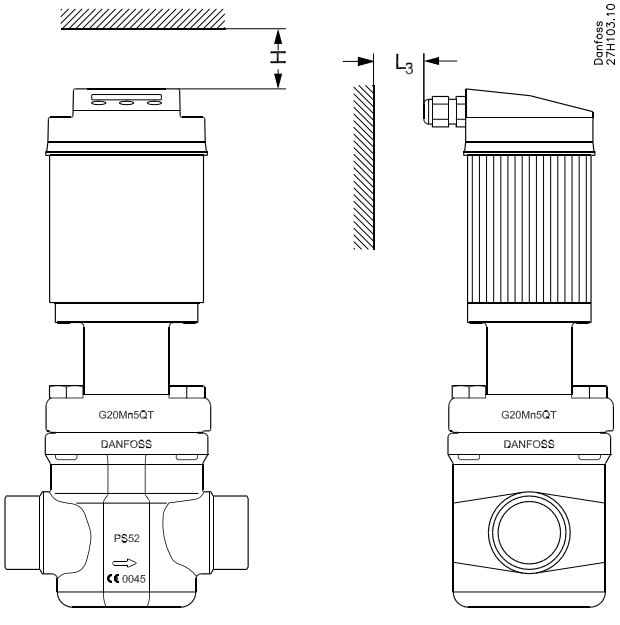
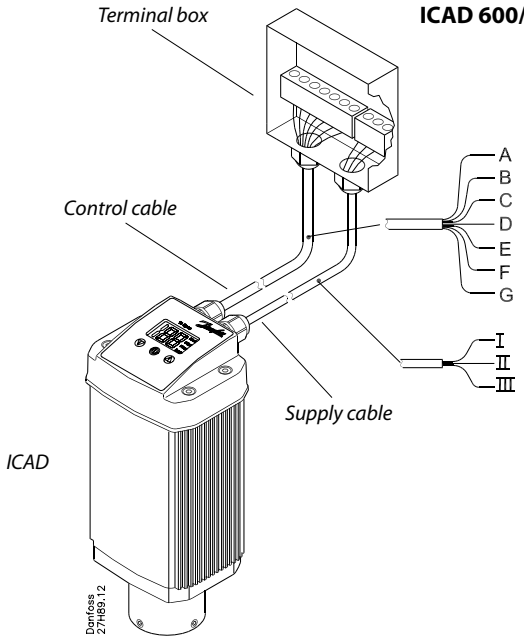


Fig. 5b, ICM + ICAD 900

ICAD 600/900



Reference	Color		Description	
A	White	–	Common Alarm	Digital Ouput
B	Brown	–	ICM fully open	
C	Green	–	ICM fully closed	
D	Yellow	–	GND ground	
E	Grey	+	0/4 - 20 mA Input	Analog In/Output
F	Pink	+	0/2 - 10 V Input	
G	Blue	+	0/4 - 20 mA Output	

I	White	+	Fail safe supply Battery / UPS* 19 V d.c.
II	Brown	+	Supply voltage 24 V d.c.
III	Green	–	

***** Uninterruptible Power Supply

Fig. 6

ICAD 600/900 - Analog I/O for modulating control

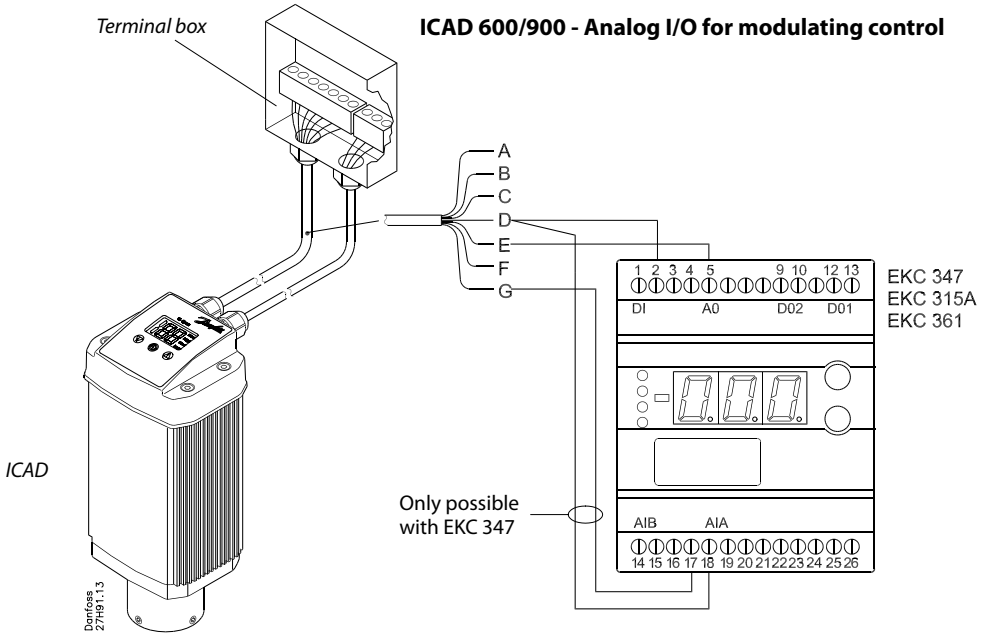


Fig. 7

ICAD 600/900 - Digital I/O for ON/OFF valve operation

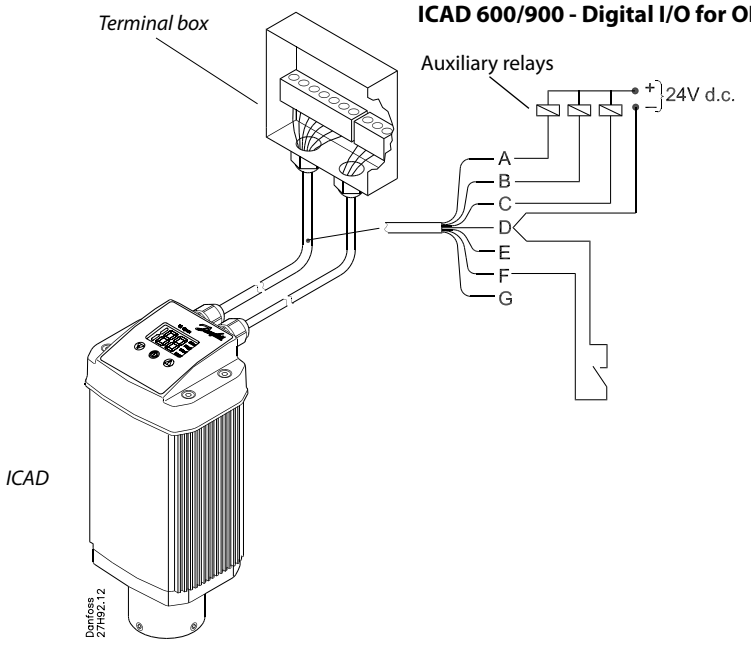


Fig. 8

ENGLISH

Installation

Use
ICAD 600 and ICAD 900 can be used together with the following Danfoss valves (fig. 1, 5a and 5b).

ICAD 600	ICAD 900
ICM 20	ICM 40
ICM 25	ICM 50
ICM 32	ICM 65

Electrical data
Supply voltage is galvanically isolated from in-/output.

Supply voltage
24 V d.c., +10% / -15%
Load ICAD 600: 1.2 A
ICAD 900: 2.0 A

Fail safe supply
Min. 19 V d.c.
Load ICAD 600: 1.2 A
ICAD 900: 2.0 A

Anolog input - Current or Voltage
Current
0/4 - 20 mA
Load: 200 Ω
Voltage
0/2 - 10 V d.c.
Load: 10 kΩ

Analog output
0/4 - 20 mA
Load: ≤ 250 Ω

Digital input - Digital ON/OFF input by means of voltfree contact (Signal/Telecom relays with gold-plated contacts recommended) – Voltage input used
ON: contact impedance < 50 Ω)
OFF: contact impedance > 100 kΩ

Digital output - 3 pcs. NPN transistor output
External supply: 5 - 24 V d.c. (same supply as for ICAD can be used, but please note that the galvanically isolated system will then be spoiled).
Output load: 50 Ω
Load: Max. 50 mA

Temperature range (ambient)
–30°C/+50°C (–22°F/122°F)

Enclosure
IP 65 (~NEMA 4)

Cable connection
Two 1.8 m. (70.7 in.) cables premounted
Supply cable
3 x 0.34 mm² (3 x ~22 AWG) (fig. 6)
I: White (+) 19 - 24 V d.c. fail safe supply (optional).
II: Brown (+) 24 V d.c.
III: Green (–) 24 V d.c.

Control cable
7 x 0.25 mm² (7 x ~24 AWG) (fig. 7)
A: White (–) Digital output. Common Alarm.
B: Brown (–) Digital output. ICM fully open.
C: Green (–) Digital output. ICM fully closed.
D: Yellow (–) GND - Ground.
E: Grey (+) Analog input 0/4-20 mA.
F: Pink (+) Analog input 0/2-10 V / Digital ON/OFF input.
G: Blue (+) Analog output 0/4-20 mA.

Electrical installation
General procedure for ICAD 600/900 installed on all ICM valves.

All necessary electrical connections to be made. Analog or digital operation of ICM valve.

Fig. 6

- *Analog operation* - 7 wired cable (A-G) Modulation control. ICM valve to be controlled from Danfoss electronics, type EKC (fig. 7), or third party electronics (like e.g. PLC).
  – Connect analog input signals. Currrent (mA) or Voltage (V). See **Parameter list** for configuration of analog input signals.
  – Grey (+) and Yellow (GND) are used for current (mA) input.
  or
  – Pink (+) and Yellow (GND) are used for Voltage (V) input.
  – Blue (+) and Yellow (GND) are used for current (mA) output (optional, not mandatory).

Fig. 6

- *Digital operation* - 7 wired cable (A-G) ON/OFF ICM solenoid valve operation. ICM valve to be controlled by means of a digital voltfree contact.
  – Connect digital input signals (fig. 8). See **Parameter list** for configuration of digital input signals.
  – Pink (+) and Yellow (GND) are connected to a voltfree contact.

  Digital output signals are optional, not mandatory.
  – White (–) and Yellow (GND) are connected to auxiliary relay for Common Alarm.
  – Brown (–) and Yellow (GND) are connected to an auxiliary relay indicating ICM fully open.
  – Green (–) and Yellow (GND) are connected to an auxiliary relay indicating ICM fully closed.
- *Supply voltage* - 3 wired cable (I, II, III) ICAD must be connected to a normal 24 V d.c. supply. As an option, a fail safe supply is possible by means of a battery or UPS (Uninterruptible Power Supply). When voltage is applied as described below, ICAD is ready to be configurated. See **Parameter list**.
  ICAD configuration can be done independently whether the ICAD is installed on the ICM valve or not.
  See **Mechanical installation**.
  – Connect the Brown (+) and Green (–) to a 24 V d.c. supply voltage (fig. 6).

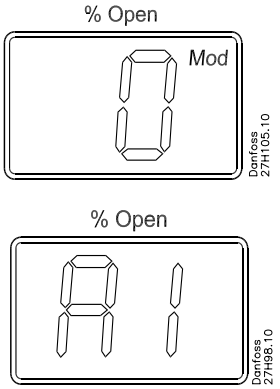
  Fail safe supply as an option (not mandatory).
  – Connect the White (+) and Green (–) to a fail safe supply.

Mechanical installation
General procedure for ICAD 600/900 installed on all ICM valves (fig. 3).

- Check that the four socket set screws are fully unscrewed counter clockwise with a 2.5 mm Hexagon key.
- Mount ICAD by slowly lowering it on top of the ICM valve.
- The magnet coupling will drag the ICM and ICAD together and in position.
- Fasten ICM and ICAD with the four socket set screws using a 2.5 mm Hexagon key.

Special moisture seal is damaged if screws are removed (fig. 3, pos. A)

Startup
When voltage is applied for the first time the display on the ICAD (fig. 2) will alternate between showing: Actual opening degree and **A1**.



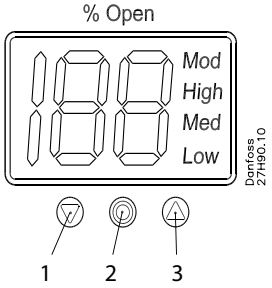
A1 indicates an alarm which corresponds to: No ICM valve selected. See **Alarms** for further information.

Please observe that when the correct ICM valve is entered in parameter **¡26** (see p. 5 for **Parameter list**) an automatic calibration is carried out. I.e it is not necessary to carry out another calibration in parameter **¡05**.

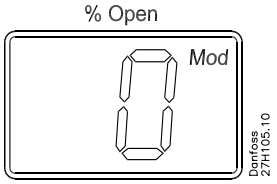
See **Parameter list** for selecting the correct ICM valve.

It is important to select and verify correct valve.

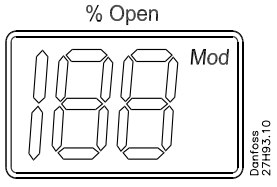
General Operation
ICAD is equipped with an MMI (Man Machine Interface) from which it is possible to see and change different parameters to adapt the ICAD and the corresponding ICM to the actual refrigeration application. The operation of parameters is done by means of the integrated ICAD MMI (fig. 2) and consists of:



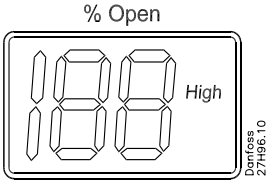
- Down arrow push button (fig. 2, pos. 1) decreases parameter number by 1 for each activation
- Enter push button (fig. 2, pos. 2)
  - Gives access to the **Parameter list** by keeping the push button activated for 2 seconds. A **Parameter list** is shown below (parameter **¡08**):



  - Gives access to change a value once the **Parameter list** has been accessed.
  - Acknowledge and save change of value of a parameter.
  - To exit from the **Parameter list** and return to the display of Opening Degree (OD) keep the push button activated for 2 seconds.
- Up arrow push button (fig. 2, pos. 3)
  - Increases parameter number by 1 for each activation
- Display (fig. 2, pos. 4)
  - Normally the Opening Degree (OD) 0 - 100 % of the ICM valve is displayed. No activation of push buttons for 20 seconds means that the display will always show OD. Like below:



  - Displays the parameter
  - Displays the actual value of a parameter.
- Displays the status by means of text (fig. 2, pos. 4)
  - ***Mod*** represents that ICAD is positioning the ICM valve according to an analog input signal (Current or Voltage).
  - ***Low*** represents that ICAD is operating the ICM valve like an ON/OFF solenoid valve with low speed according to a digital input signal.
  - ***Med*** represents that ICAD is operating the ICM valve like an ON/OFF solenoid valve with medium speed according to a digital input signal.
  - ***High*** represents that ICAD is operating the ICM valve like an ON/OFF solenoid valve with high speed according to a digital input signal. Like below:



Alarms
ICAD can handle and display different alarms.

Description	ICM alarm text	Comments
No valve type selected	**A1**	At start-up **A1** and **CA** will be displayed
Controller fault	**A2**	Internal fault inside electronics
All input error	**A3**	Not active if **¡01** = 2 or **¡02** = 2 When **¡03** = 1 and AI A > 22 mA When **¡03** = 2 and AI A > 22 mA or AI A < 2 mA When **¡03** = 3 and AI A >12 V When **¡03** = 4 and AI A >12 V or AI A < 1 V
Low voltage of fail safe supply	**A4**	If 5 V d.c. < Fail safe supply < 18 V d.c.
Check Supply to ICAD	**A5**	If supply voltage < 18 V d.c.

If an alarm has been detected the display at ICAD (fig. 2) will alternate between showing:

Actual alarm and present Opening Degree.

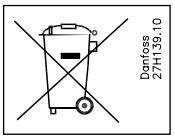
If more than one alarm is active at the same time only the alarm with the highest priority will appear. **A1** has the highest priority, **A5** the lowest.

Any active alarm will activate the Common Digital Alarm output (Normally Open).

All alarms will automatically reset themselves when they physically disappear.

Old alarms (alarms that have been active, but have physically disappeared again) can be found in parameter **¡11**.

Disposal Note



The Product contains electrical components And may not be disposed together with domestic waste.

Equipment must be separate collected with Electrical and Electronic waste. According to Local and currently valid legislation.

Parameter list

Description	Display name	Min.	Max.	Factory setting	Unit	Comments
ICM OD (Opening Degree)	-	0	100	-	%	ICM valve Opening Degree is displayed during normal operation. Running display value (see **¡01**, **¡05**).
Main Switch	**¡01**	1	2	1	-	Internal main switch 1: Normal operation 2: Manual operation. Valve Opening Degree will be flashing. With the down arrow and the up arrow push buttons the OD can be entered manually.
Mode	**¡02**	1	2	1	-	Operation mode 1: Modulating – ICM positioning according to Analog Input (see **¡03**) 2: ON/OFF - operating the ICM valve like an ON/OFF solenoid valve controlled via Digital Input. See also **¡09**.
Analog Input signal	**¡03**	1	4	2	-	Type of Analog Input signal from external controller 1: 0 - 20 mA 2: 4 - 20 mA 3: 0 - 10 V 4: 2 - 10 V
Speed at ON/OFF and Modulating Mode	**¡04**	1	100	100	%	Speed can be decreased. Max. speed is 100 % Not active when **¡01** = 2 If **¡02** = 2 the display will indicate speed in display. **Low**, **Med** and **High** also means ON/OFF operation. If **¡04** < = 33, **Low** is displayed 33 < If **¡04** < = 66, **Med** is displayed If **¡04** > = 67 **High** is displayed
Automatic calibration	**¡05**	0	1	0	-	Not active before **¡26** has been operated. Always auto reset to 0. **CA**" will flash in the display during calibration.
Analog Output signal	**¡06**	0	2	2	-	Type of A0 signal for ICM valve position 0: No signal 1: 0 - 20 mA 2: 4 - 20 mA
Fail safe	**¡07**	1	4	1	-	Define condition at power cut when fail safe is installed. 1: Close valve 2: Open valve 3: Maintain valve position 4: Go to OD given by **¡12**
Digital Input function	**¡09**	1	2	1		Define function when DI is ON (short circuited DI terminals) when **¡02** = 2 1: Open ICM valve (DI = OFF = > Close ICM valve) 2: Close ICM valve (DI = OFF = > Open ICM valve)
Password	**¡10**	0	199	0	-	Enter number to access password protected parameters: **¡26**
Old Alarms	**¡11**	A1	A99	-	-	Old alarms will be listed with the latest shown first. Alarm list can be reset by means of activating down arrow and up arrow at the same time for 2 seconds.
OD at powercut	**¡12**	0	100	50	-	Only active if **¡07** = 4 If fail safe supply is connected and powercut occurs ICM will go to entered OD.
ICM configuration	**¡26**	0	6	0		**NB:** Password protected. Password = **11** At first start up **A1** will flash in display. Enter valve type 0: No valve selected. Alarm **A1** will become active. 1: ICM20 with ICAD 600 2: ICM25 with ICAD 600 3: ICM32 with ICAD 600 4: ICM40 with ICAD 900 5: ICM50 with ICAD 900 6: ICM65 with ICAD 900

Service

Description	Display name	Min.	Max.	Factory setting	Unit	Comments
OD %	**¡50**	0	100	-	%	ICM valve Opening Degree
AI [mA]	**¡51**	0	20	-	mA	Analog Input signal
AI [V]	**¡52**	0	10	-	V	Analog Input signal
AO [mA]	**¡53**	0	20	-	mA	Analog Output signal
DI	**¡54**	0	1	-	-	Digital Input signal
DO Close	**¡55**	0	1	-	-	Digital Output Closed status. ON when OD < 3 %
DO Open	**¡56**	0	1	-	-	Digital Output Open status. ON when OD > 97 %
DO Alarm	**¡57**	0	1	-	-	Digital Output alarm status. ON when an alarm is detected
MAS mP SW ver.	**¡58**	0	100	-	-	Software version for MASTER Microprocessor
SLA mP SW ver.	**¡59**	0	100	-	-	Software version for SLAVE Microprocessor

Reset to factory setting:

1. Remove the power supply.
2. Activate down arrow and up arrow push buttons at the same time.
3. Connect the power supply.
4. Release down arrow and up arrow push buttons.
5. When the display on ICAD (fig. 2) is alternating between showing: **CA** and **A1** the factory resetting is complete.

