



Danfoss ICAD 600B Actuator Motorized valve control Installation Guide

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Danfoss ICAD 600B Actuator Motorized valve control



Product Information

Specifications

- **Product Name:** ICAD 600B / 600B-TS / 1200B
- **Control:** Power Data
- Analog I/O for modulating control
- Digital I/O for ON/OFF valve operation
- **Class:** Class III product
- **Supply Voltage:** 24 V DC 2A or more per ICAD recommended PSU

Product Usage Instructions

Installation

Do not install ICAD before welding. This applies to both electrical and mechanical installations. Note that when connected to 24 V DC, ICAD may emit acoustic noise at standstill, which does not affect its operation.

Compatible Valves

ICAD 600B, ICAD 600B-TS, and ICAD 1200B can be used with the following Danfoss valves:

- ICAD 600B: ICM 20, ICM 25, ICM 32
- ICAD 600B-TS: ICMTS 20, ICMTS 50, ICMTS 80
- ICAD 1200B: ICM 40, ICM 50, ICM 65, ICM 100, ICM 125, ICM 150, CVE pilot valve

Electrical Data

The supply voltage is galvanically isolated from the input/output. Ensure that the power supplies connected to ICAD are SELV-rated.

FAQ

• **Q: Can ICAD be installed before welding?**

A: No, ICAD should not be installed before welding, both for electrical and mechanical installation processes.

• **Q: What should I do if ICAD emits acoustic noise at standstill?**

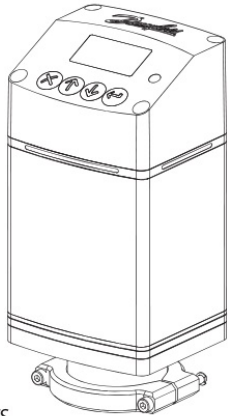
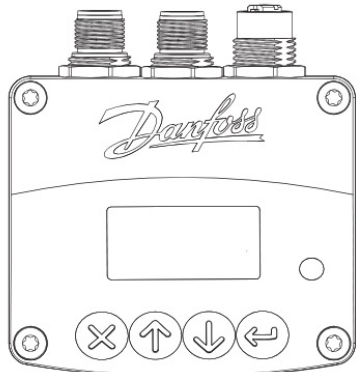
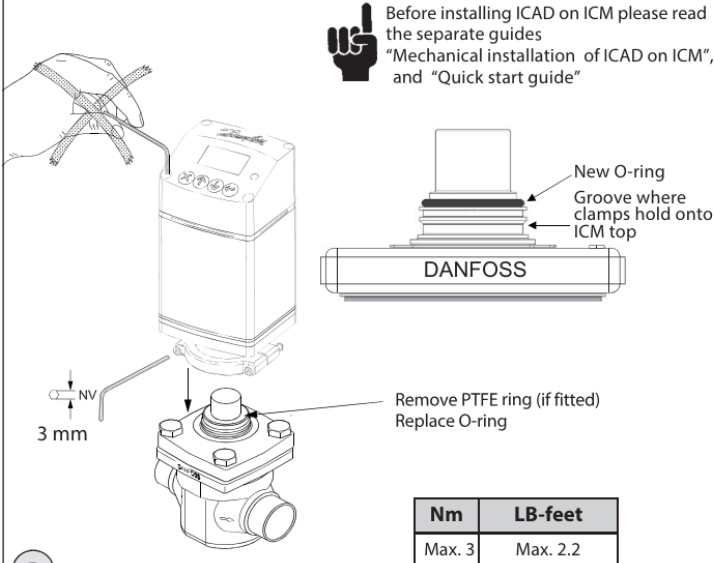
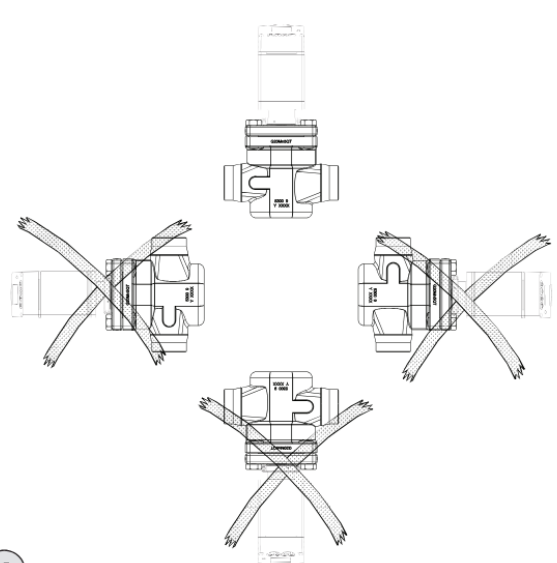
A: The acoustic noise emitted by ICAD when connected to 24 V DC at standstill does not impact its operation.

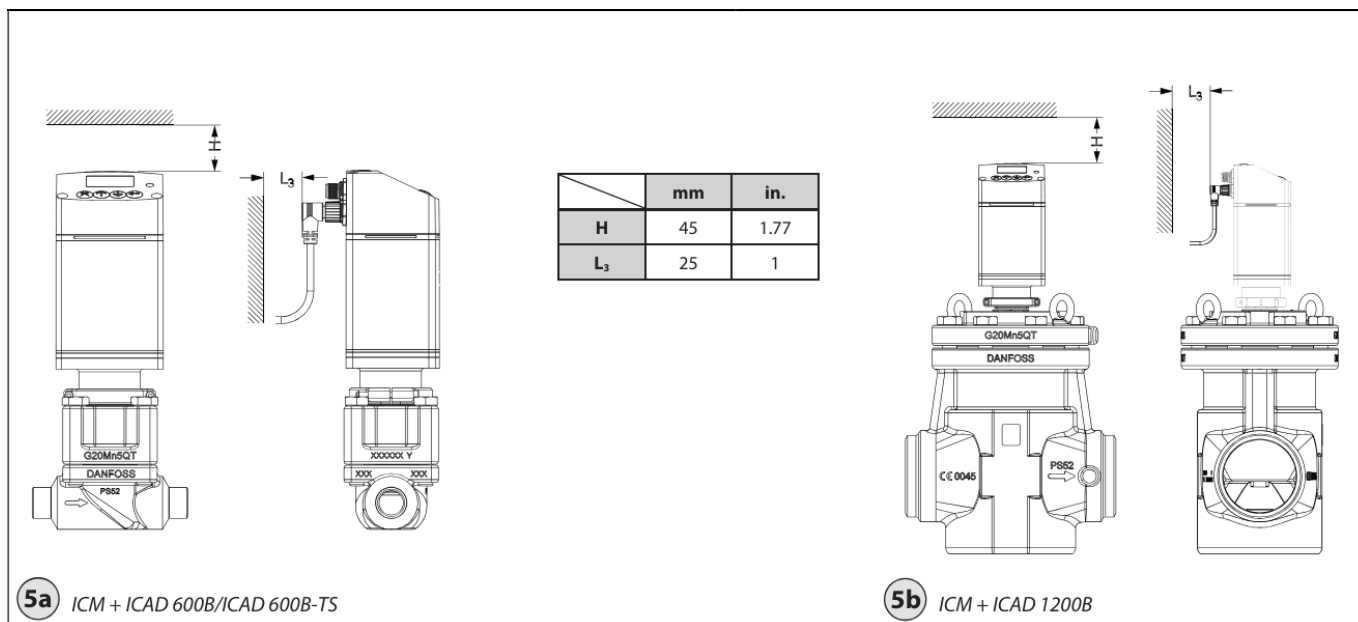
Installation

Do not install ICAD before welding. This apply for electrical as well as for mechanical installation. Please observe that ICAD when connected to 24 V DC, will send out acoustic noise at stand still. This has no influence on the function/ operation of the ICAD.

Use

ICAD 600B, ICAD 600B-TS and ICAD 1200B can be used together with the following Danfoss valves (Fig. 1, 5a and 5b).

<p></p> <p>ICAD 600B ICAD 600B-TS ICAD 1200B</p> <p>1</p>	<p>ICAD 600B ICAD 600B-TS ICAD 1200B</p> <p></p> <p>Buttons and display description in page 4</p> <p>2</p>				
<p></p> <p>Before installing ICAD on ICM please read the separate guides "Mechanical installation of ICAD on ICM", and "Quick start guide"</p> <p>New O-ring Groove where clamps hold onto ICM top</p> <p>Remove PTFE ring (if fitted) Replace O-ring</p> <table border="1"><thead><tr><th>Nm</th><th>LB-feet</th></tr></thead><tbody><tr><td>Max. 3</td><td>Max. 2.2</td></tr></tbody></table> <p>3</p>	Nm	LB-feet	Max. 3	Max. 2.2	<p></p> <p>4</p>
Nm	LB-feet				
Max. 3	Max. 2.2				



ICAD 600B	ICAD 600B-TS	ICAD 1200B
ICM 20	ICMTS 20	ICM 40
ICM 25	ICMTS 50	ICM 50
ICM 32	ICMTS 80	ICM 65
		ICM 100
		ICM 125
		ICM 150
		CVE pilot valve

Electrical data

Supply voltage is galvanically isolated from in-/output. ICAD is a Class III product. PSUs connected to ICAD must be SELV<100 VA For UL compliance: PSU must be Class 2 NEC

Supply voltage

- **24 V DC** (Tolerances; see below table)
- **Load**
 - ICAD 600B, ICAD 600B-TS: 1.2 A
 - ICAD 1200B: 2.0 A

24 Volt DC ONLY

Please observe cable voltage drop.

Distance between the applied DC transformer and the ICAD terminal box may cause a voltage drop. Cross section of cables and size of DC transformer must be calculated so that the voltage at all time at the ICAD terminal box*, both during standstill and during operation of ICAD, is within this range:

Prefabricated ICAD cable length Code number		1.5 m 027H0426	3 m 027H0438	10 m 027H0427	15 m 027H0435
Voltage ICAD terminal (600B/1200B) [V DC]	Min.	21	22	23	24
	Max.	26.4			

Do not measure inside the ICAD itself (value can be checked in ICAD B menu).

Fail safe supply

- **24 V DC** (Tolerances; see table above)
- **Load**
 - ICAD 600B, ICAD 600B-TS: 1.2 A
 - ICAD 1200B: 2.0 A

Data communication

RS 485: It is important that the installation of the data communication cable is done correctly. For further guidance, see literature No. RC8AC902. Remember termination at the bus termination. Max length of cable: 1200 m with specific cable and limited data rate. Follow RS485 standard.

Insulation from power supply input, metallic part and interface output : 500 V DC: *For input/output connections

• Analog Input – Current or Voltage

- **Current**
 - **Input range:** 0/4 – 20 mA
 - **Max input range:** 0 – 24 mA
 - **Input resistance:** 120 W + diode voltage 0.7 V DC
 - **Measurement error:** <±1.5% of the full scale
 - **Reverse polarity protection:** yes
 - **Overcurrent protection:** yes
- **Voltage**
 - **Input range:** 0/2 – 10 V DC
 - **Max input range:** 0 – 12 V DC
 - **Measurement error:** <±1.5% of the full scale
 - **Reverse polarity protection:** yes

• Analog Output

- **Output range:** 0/4 – 20mA
- **Load:** <800 W
- **Output error:** <±1.5% of the full scale
- **Recommended external resistor for Hot application:** $R_{ext}=800\text{ W-load }1\text{ W power rate}$

Digital Input – Digital ON/OFF input by means of voltfree contact (Signal/Telecom relays with gold-plated contacts recommended) – Voltage input used

- **Rth rise(OFF):** >10 kW
- **Rth fall(ON):** < 45 W

Digital Output – 3 pcs. NPN transistor output

- **External supply:**

- 7 – 24 V DC (same supply as for ICAD can be used, but please note that the galvanically isolated system will then be spoiled).

- **On resistance:**

- 55 W + diode voltage 0.7 V DC
- Max 70 W at 50 mA
- **Max Output current:** 50 mA
- **Reverse polarity protection:** Yes
- **Overcurrent protection:** No

- **Temperature range (ambient)**

-30 °C/+50 °C (-22 °F/122 °F)

- **Enclosure**

IP67 (~NEMA 6)

- **Electrical connection**

Connection to ICAD is done via M12 connectors. ICAD has two M12 male and one M12 female connectors build-in:

Power supply: 4 poled M12 male connector

Control signals: 8 poled M12 male connector

Data communication: 4 poled M12 female connector

Power Supply cable with 4 poled M12 female connector

4 x 0.34 mm² (4 x ~22 AWG) (fig. 6)

I:	Black	(+)	19 – 24 V DC fail safe supply (optional)
II:	White	(+)	24 V DC
III:	Brown	(–)	24 V DC
IIII:	Blue	(+)	UPS signal of health

Control cable with 8 poled M12 female connector

7 x 0.25 mm² (7 x ~24 AWG) (fig. 7)

A: Black	(-)	Digital output Common Alarm
B: Brown	(-)	Digital output ICM fully open
C: Red	(-)	Digital output ICM fully closed
D: Orange	(-)	GND - Ground
E: Yellow	(+)	Analog input 0/4 – 20 mA
F: Green	(+)	Analog input 0/2 – 10 V / DI1 - Digital ON/OFF input.
G: Blue	(+)	Analog output 0/4 – 20 mA

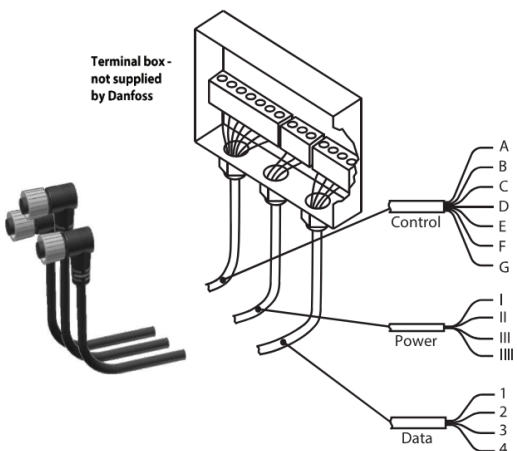
Data communication cable with 4 poled M12 male connector:




	<i>RS 485 / Ethernet</i>	<i>RS 485 / Ethernet</i>
1: White/Blue	(-) / TX+	Data – (B) / Transmit Pair(+)
2: White/Orange	GND / RX+	Ground / Receiving Pair(+)
3: Blue	(+) / TX-	Data + (A) / Transmit Pair(-)
4: Orange	GND / RX-	Ground / Receiving Pair(-)

Electrical installation

General procedure for ICAD 600B/ICAD 600B-TS/1200B installed on all ICM, ICMTS & CVE valves.

ICAD 600B / ICAD 600B-TS / ICAD 1200B



ICAD back	Ref	Color	Description
	A	Black	- Common alarm
	B	Brown	- ICM fully open
	C	Red	- ICM fully closed
	D	Orange	- GND ground
	E	Yellow	+ 0/4 – 20 mA Input
	F	Green	+ 0/2 – 10 V input or digital input for on/off control
	G	Blue	+ 0/4 – 20 mA Output
	I	Black	+ Fail safe supply. Battery / UPS* 19 V DC
	II	White	+ Supply voltage 24 V DC 2A, or more, per ICAD recommended
	III	Brown	- ICAD PSU must be SELV**, >15 W
	IV	Blue	+ UPS Signal of Health - optional depending on ID31: 'UPS supply' set to 'Yes'
RS 485 / Ethernet RS 485 / Ethernet			
	1	White/Blue	(-) / TX+ Data – (B) / Transmit Pair(+)
	2	White/Orange	GND / RX+ Ground / Receiving Pair(+)
	3	Blue	(+) / TX- Data + (A) / Transmit Pair(-)
	4	Orange	GND / RX- Ground / Receiving Pair(-)

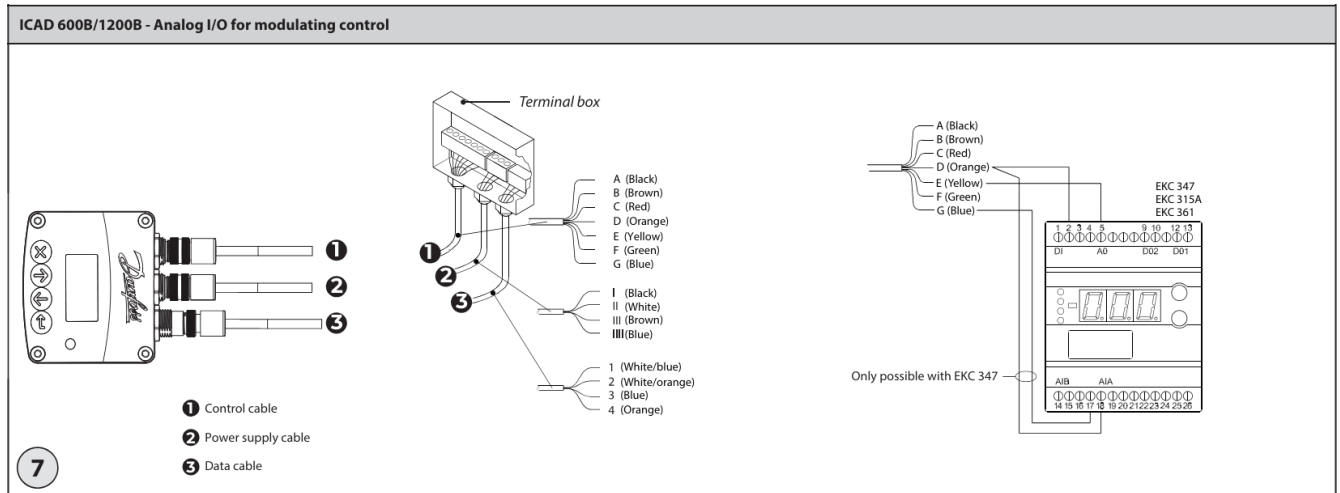
*Uninterruptable Power Supply
** The ICAD is a Class III appliance

6

All necessary electrical connections to be made.

• Analog operation – 7 wired cable (A-G) Fig. 6

Modulation control. Valve to be controlled from Danfoss electronics, type EKC/EKE (fig. 7), or third party electronics (like e.g. PLC).

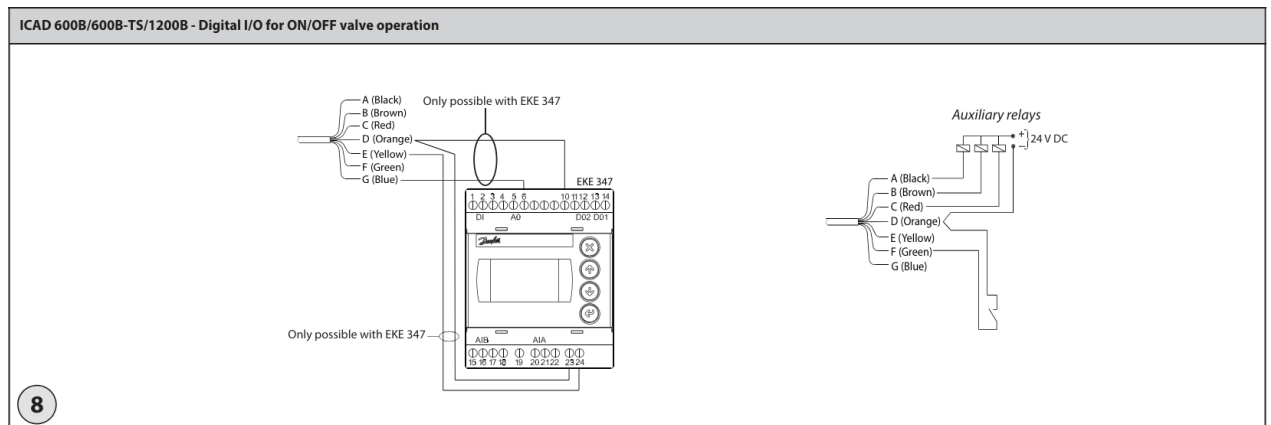


- Connect analog input signals. Current (mA) or Voltage (V). See Parameter list for configuration of analog input signals
- Yellow (+) and Orange (GND) are used for current (mA) input or
- Green (+) and Orange (GND) are used for Voltage (V) input
- Blue (+) and Orange (GND) are used for current (mA) output (optional, not mandatory)

• Digital operation – 7 wired cable (A-G) Fig. 6

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



- Green (+) and Orange (GND) are connected to a voltfree contact
- Digital output signals are optional, not mandatory.
- Black (–) and Orange (GND) are connected to auxiliary relay for Common Alarm
- Brown (–) and Orange (GND) are connected to an auxiliary relay indicating ICM fully open
- Red (–) and Orange (GND) are connected to an auxiliary relay indicating ICM fully closed

• Supply voltage – 4 wired cable(I, II, III, IIIV)

ICAD must be connected to a normal 24 V DC 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 configured.

See Parameter list.

ICAD configuration can be done independently whether the ICAD is installed on the valve or not.

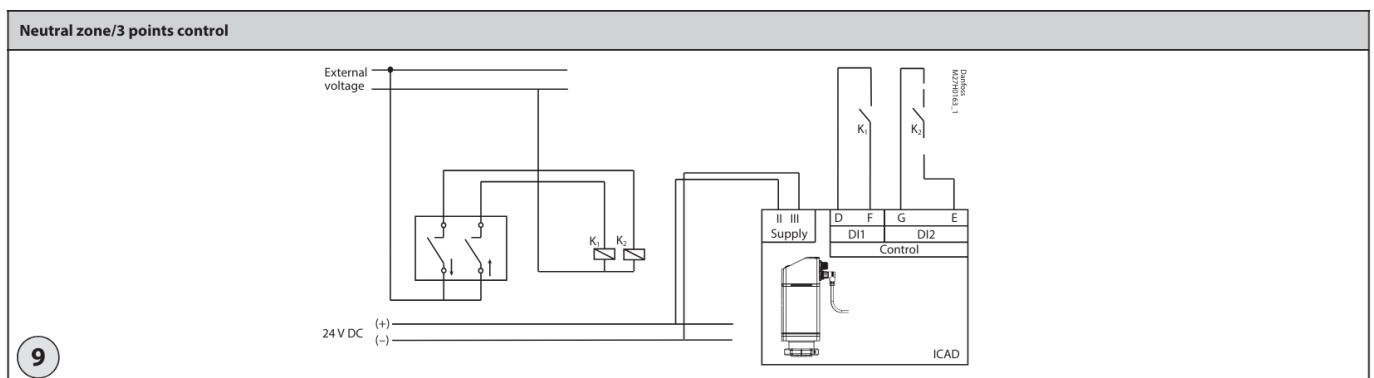
See Mechanical installation.

- Connect the White (+) and Brown (–) to 24 V DC supply voltage (fig. 6)
Fail safe supply as an option (not mandatory).
- Connect the Black (+) and Brown (–) to a fail safe supply.

Mechanical installation

General procedure for ICAD 600B/ICAD 600B-TS/1200B installed on all valves (fig. 3).

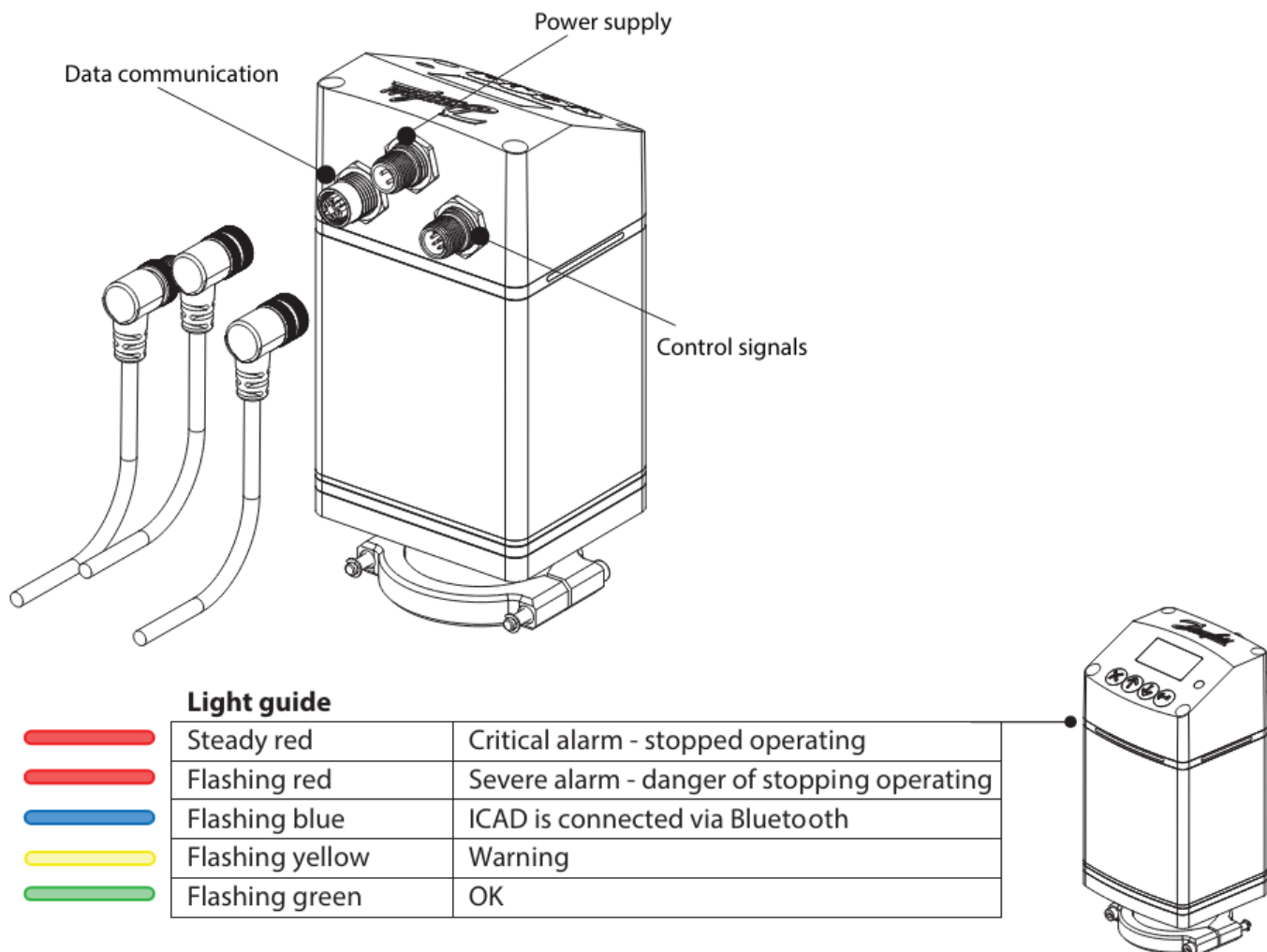
- Check that the two socket screws are fully unscrewed counter clockwise with a 3 mm Hexagon key
- If valve is fitted with PTFE ring and O-ring, remove both and replace it with O-ring included in ICAD (as instructed in fig. 3)
- Mount ICAD by slowly lowering it on top of the valve.
- The magnet coupling will drag the valve and ICAD together and in position
- Push ICAD in place
- Fasten valve and ICAD with the two socket set screws using a 3 mm Hexagon key



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

Power on & start operation

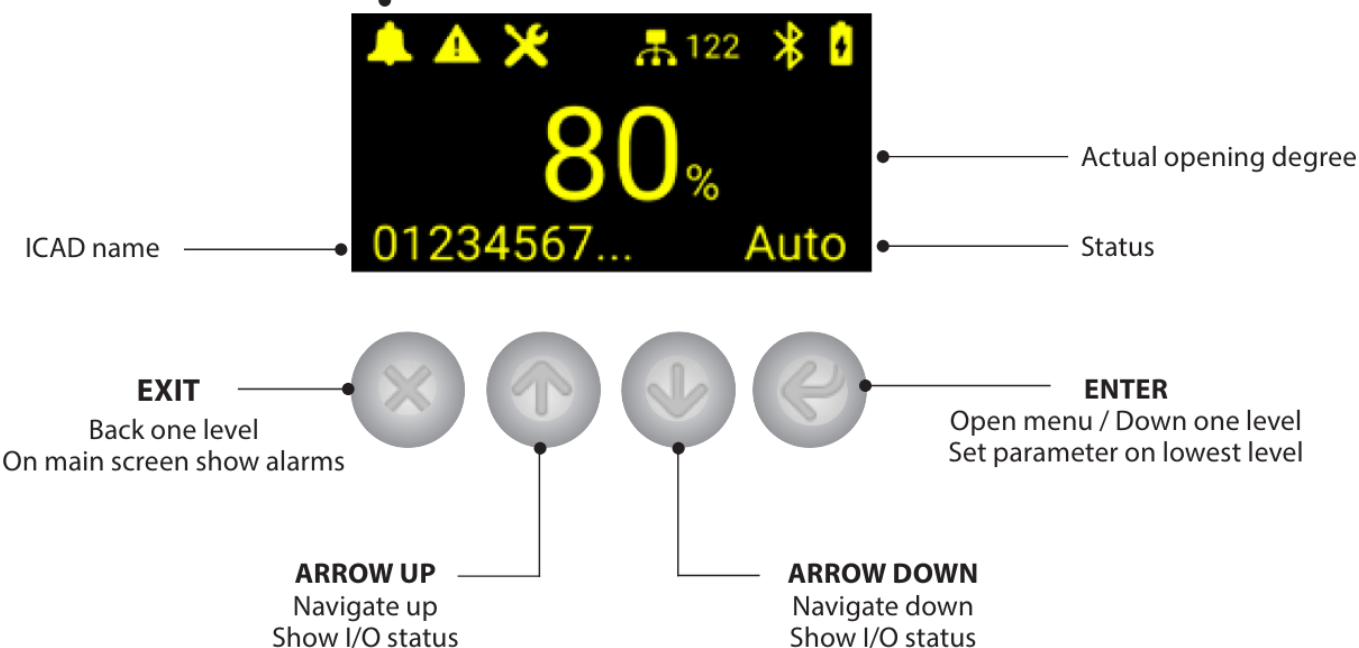
ICAD has a light guide viewable from three sides, which indicates the status. Immediately after power on the light guide and display lights up.



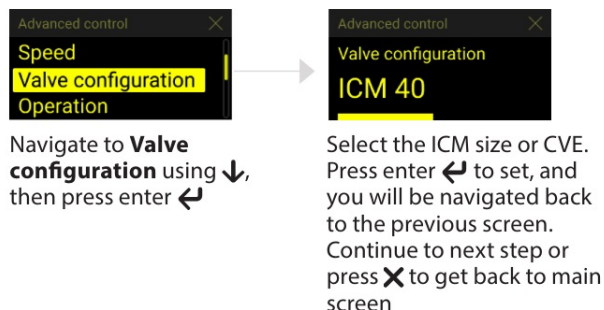
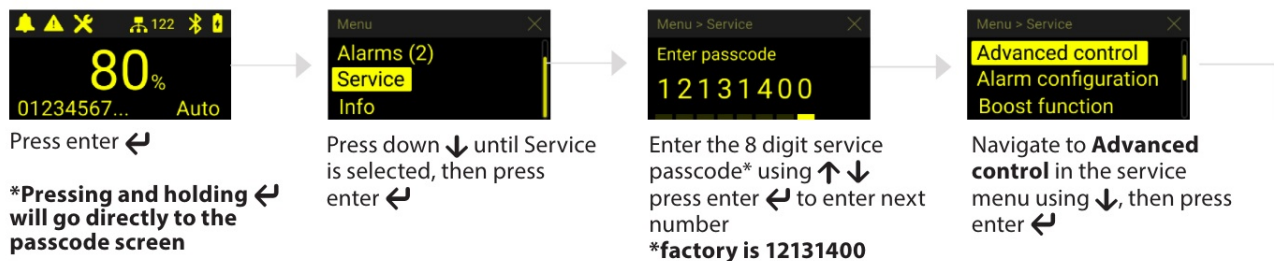
The main screen layout and navigation is as described below. ICAD will start up in alarm mode as the ICM configuration needs to be defined to start operation. Follow the steps on next page to set this up correctly.

STATUS BAR





Alarm | Warning | Service overdue | Modbus address | Bluetooth ON | UPS enabled



Set valve (A1 alarm)

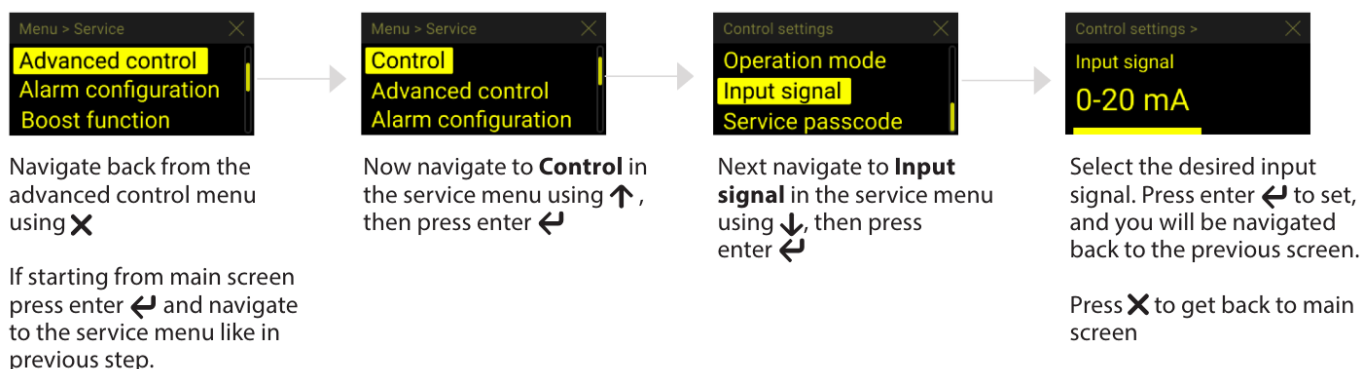


VALVE CONFIGURATION HELP

ICAD 600B	ICM 20	}	
	ICM 25		
	ICM 32		
ICAD 1200B	ICM 40	}	
	ICM 50		
	ICM 65		
	ICM 100	}	
	ICM 125		
	ICM 150		
	CVE		
ICAD 600B TS	ICM TS 20	}	
	ICM TS 50		
	ICM TS 80		

Change analog input signal (optional)

ICAD will function based on factory settings as soon as the valve configuration has been set. The default settings are Modulation using an analog input of 4–20 mA.



Further languages and documentation: www.icadb.danfoss.com

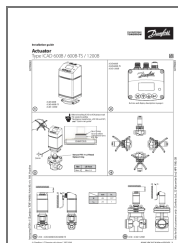
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References

- [User Manual](#)

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