

# Installation manual

APP 521





---

This manual is applicable to the following APP 521 versions:

Hardware:

Operator panel: AFH1801 Rev 1.02

I/O-module: AHH1801 Rev 1.02

Com-module: TMX1801 Rev 1.00

System Software: 2,20

Application: 1.00

© Copyright 2004 Flygt AB. All rights reserved. No part of this manual may be reproduced or copied without the written permission of Flygt AB.

Flygt AB  
P.O.Box 2058  
SE-291 02 Kristianstad  
Sweden

Tel +46 44 20 59 00  
September 2004

This document may be changed without any prior notice.

- 1. Read this first..... 4**
  - 1.1. Product documentation ..... 4
  - 1.2. Safety rules for the owner/  
operator ..... 4
  - 1.3. Guarantee ..... 4
  - 1.4. This manual ..... 4
    - 1.4.1. Symbols used ..... 4
    - 1.4.2. Abbreviations ..... 4
- 2. Introduction..... 5**
- 3. Mechanical installation.... 6**
  - 3.1. Installation in explosive areas ..... 6
    - 3.1.1. Installation in an equipment  
cubicle ..... 6
  - 3.2. Level sensor installation ..... 6
    - 3.2.1. 4-20 mA level sensor ..... 6
    - 3.2.2. ENM-10 level regulator ..... 6
  - 3.3. Mounting instructions ..... 7
    - 3.3.1. I/O-module ..... 7
- 4. Electrical installation ..... 8**
  - 4.1. Power supply ..... 8
    - 4.1.1. Earthing (grounding) ..... 8
    - 4.1.2. Overvoltage protection ..... 8
  - 4.2. Emergency operation ..... 8
  - 4.3. Connections ..... 9
    - 4.3.1. Digital inputs ..... 9
    - 4.3.2. Inversion of inputs ..... 9
    - 4.3.3. Analogue input ..... 9
    - 4.3.4. Digital outputs ..... 9
  - 4.4. Communication ..... 9
    - 4.4.1. Connection to a modem or radio ..... 9
    - 4.4.2. Connection to a PC using a fixed  
line ..... 9
- 5. Wiring diagram 24V DC..... 10**
- 6. Fault tracing.....11**
- 7. Specification.....12**

# 1. Read this first

Before starting installation of the APP 521 read this chapter carefully. It contains general information on documentation, safety and guarantee.

## 1.1. Product documentation

Documentation delivered with the APP 521. Check that this manual version is applicable to the delivered APP 521 version (see cover inlet).

## 1.2. Safety rules for the owner/operator

- All government regulations, local health and safety directives must be observed.
- All danger due to electricity must be avoided.

## 1.3. Guarantee

- Modifications or changes to the unit/installation should be done only after consulting ITT Flygt.
- Genuine spare parts and accessories authorized by the manufacturer are essential for compliance with the terms of the guarantee. The use of other parts may invalidate the guarantee.

## 1.4. This manual

In order to avoid repetition of information, this manual describes how information regarding one pump P1, should be read or entered. If a second pump P2, is included in the installation, the corresponding steps must be repeated on it.

### 1.4.1. Symbols used



#### **Safety instruction**

*Personal risk.*



#### **Safety instruction**

*Personal risk - dangerous voltage.*



#### **Special attention value**

*Risk of apparatus or component damage.*

### 1.4.2. Abbreviations

CS = Central system

---

## 2. Introduction

The APP 521 is a pump controller. It consists of two parts, i.e. a DIN rail-mounted I/O-module and a operator panel.

The APP 521 can use a modem, GSM or radio to communicate with a SCADA system e.g. the AquaView. A special communication module is available for this purpose.



*Observe all precautions for handling electrostatically sensitive devices before opening the unit.*

*The front surface of the APP 521 has a high degree of protection against moisture and dirt, but should always be installed so that it will not be unnecessarily exposed to water or the risk of external physical damage.*



*The APP 521 may be used only in the manner specified by the manufacturer.*

*The manufacturer does not allow any internal modifications to be made in the unit.*

*Always keep this manual in the vicinity of the installed unit.*

# 3. Mechanical installation

## 3.1. Installation in explosive areas



*The unit must never be installed in an explosive or flammable environment.*

*For instructions concerning installation of the level sensors in such an environment see section 3.2. Level sensor installation.*

*If the pump is installed in an explosive environment, its thermal overload switch must be connected*

### 3.1.1. Installation in an equipment cubicle

Ensure that the operating temperature of the cubicle is between 0 and 50° C. Heating will normally be required in winter if the cubicle is located outdoors or in a similarly cold environment.

The cubicle temperature may become too high in summer if ventilation is inadequate. Heating of the cubicle is also recommended to avoid condensation.

## 3.2. Level sensor installation

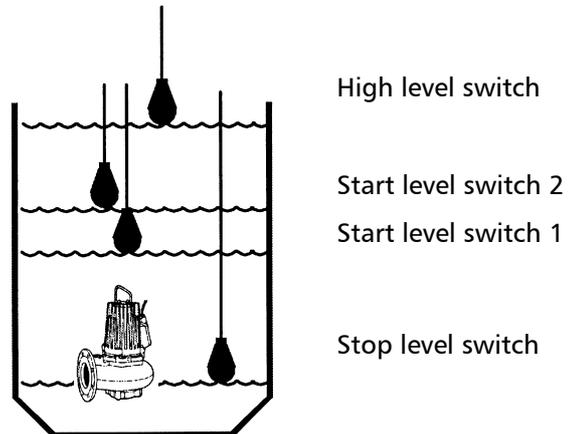
**N.B.** See separate operation and installation manual for details of installation in the pump sump.

### 3.2.1. 4-20 mA level sensor

The sensor shield must be connected to the earth (ground) terminal of the APP 521 as shown in the diagram under "Analogue input" on page 9.

The sensor may be installed in an explosive or flammable environment, provided that an external Ex barrier is used.

### 3.2.2. ENM-10 level regulator



Installation of the ENM-10 level regulator in the pump sump.

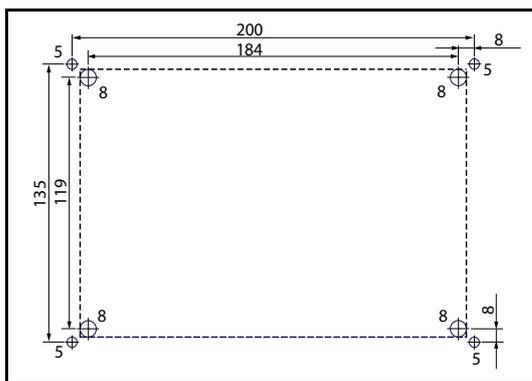
ENM-10 level regulators may be installed in an explosive or flammable environment, provided that an intrinsically safe Ex barrier is used.

### 3.3. Mounting instructions

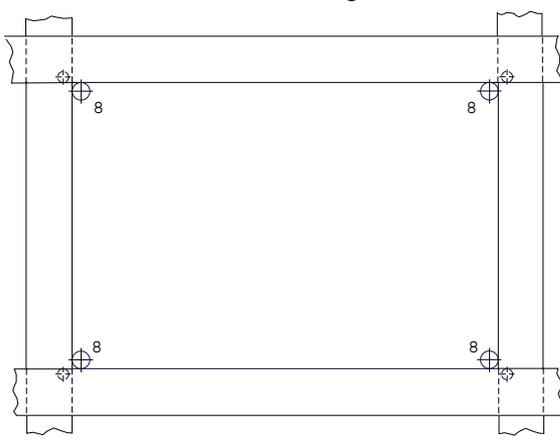
The enclosure is designed for mounting into a rectangular hole in a larger cabinet door.

A rubber gasket will seal against the front surface of the cabinet door. Studs welded to the rear of the front plate must enter into holes in the cabinet door.

- Use the paper template to mark off the opening to be made in the cubicle door.
- Tape the template to the cubicle door. Mark with a centre-punch the positions of holes **5** and **8** in the template.
- First drill a small pilot hole at every punch mark. Then open up the screw holes marked **5** in the template to 5 mm.
- Drill 8 mm dia. holes marked **8** in the template for the corners of the opening in the cabinet door.



- Then tape with masking tape between the outsides of the holes **8**. See the drawing.



- Use a jigsaw or some other suitable tool to make the opening for the operator panel in the cubicle door.
- Place the operator panel in the opening. Fit the washers and nuts, and tighten them firmly.

#### 3.3.1. I/O-module

The I/O-module has clamps at the rear.

- Place the unit in a suitable location on a DIN rail.
- Connect the cables supplied between the operator panel and the I/O-module. Secure the cable so that they will not be nipped.

**Note:** The Ethernet cable is a crossover UTP RJ 45 cat 5e. The cable length is 1.8 (max length 3m).

## 4. Electrical installation



*The electric wiring should be done only by an authorized electrician. All electrical installation work must be carried out with the equipment disconnected from the power supply, without any possibility of being made live, and in accordance with local regulations.*

*An ON / OFF isolating switch must be provided adjacent to the installation to enable the APP 521 to be isolated from the power supply. This isolating switch must be located close to the APP 521 and must be easily accessible to the user.*



*The isolating switch should be marked to show that it belongs to the APP 521.*

When installing electronic measuring and control systems, it is important that the cabling be specified and run so as to minimize interference by electric and magnetic fields.

The many potential sources of such interference include relay coils, solenoid valves, switches, thyristor units, earth (ground) currents and static electrical discharges.

Susceptibility to interference also varies with the electrical environment, i.e. due to factors such as cable lengths, screening and whether or not interference suppression is provided. Many problems can be prevented by good design.

Cables carrying signals of different types (for example, analogue and digital signals) must be run separately. Power and signal cables must never be run in close proximity to one another.

### 4.1. Power supply

A separate fuse must protect the APP 521 power supply. Flygt recommends the use of a miniature circuit breaker that opens on all poles.

The I/O module is designed to operate 24VDC power supply. The I/O module also supplies power to the operator panel.

The unit can also operate on 24 V DC as backup power supply and can charge the backup battery when the mains power supply is on

**N:B.** Max. current available to the modem:

24 V DC, 180 mA, 4.5 Watt

#### 4.1.1. Earthing (grounding)

An equipment earthing (grounding) conductor must be connected to terminal 3 (see Wiring diagram).

The earthing conductor should be connected to the best possible earth, such as an earthed mounting plate or an earth rod. Remember that the earthing conductor must be as short as possible.

The shields of all shielded cables must be earthed.

#### 4.1.2. Overvoltage protection

Flygt recommends that the mains power supply unit be provided with overvoltage protection (with lightning protection). Since this will make the APP 521 less sensitive to overvoltage, it will enable it to be used in more severe environments.

The protection should be connected in series with the power supply, preferably to a separate earth (ground), such as an earth rod, although connection to the earth busbar in the distribution box may sometimes suffice.

A 6-10 mm<sup>2</sup> earthing wire should be used to connect the overvoltage protection to earth.

### 4.2. Emergency operation

When the control unit is in the normal running mode a relay (1) will be activated. If the control unit should fail, due to software, hardware or power supply fault, the relay will be deactivated (0).

This relay can be connected between a high level switch, a timer and a power supply relay controlling the pump. This function will provide an emergency function that will run the station on the high-level switch even if the control unit is out of operation.

- Emergency operation is delayed by 5 seconds after the supply has been switched on.
- External Manual-0-Auto switch is located close to the operator panel.

### 4.3. Connections

The terminal blocks on the APP 521 are described below and are shown in the “Wiring diagram 24VDC” on page 10.

#### 4.3.1. Digital inputs

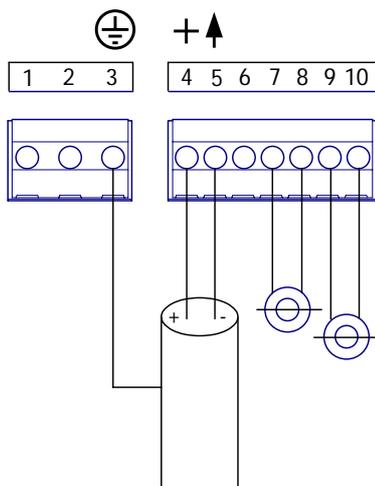
The digital inputs are connected to terminals 28 -59 (see the “Wiring diagram 24VDC” on page 10). Each input has its own power supply.

#### 4.3.2. Inversion of inputs

The digital input signals can be inverted to change the operating mode from closing to opening, or vice versa. 0 indicates no inversion. This is the default state. See the User manual.

#### 4.3.3. Analogue input

The analogue input (4-20 mA) is connected to terminals 4 - 5 (see the Wiring diagram) and has its own power supply. The input can carry a maximum total voltage of 16 V.



Analogue terminals for:

- 3        Shield
- 4        Red +
- 5        Black -
- 7-8     Input for current transformer with 0-1 A AC output
- 9-10    Input for current transformer with 0-1 A AC output

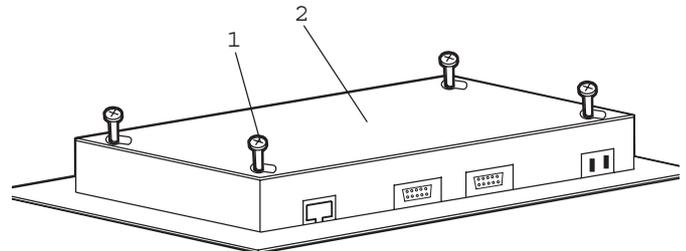
#### 4.3.4. Digital outputs

The digital outputs are connected to terminals 11-22 (see the Wiring diagram). The outputs are potential-free, relays with a max. rating of 2 A at 230 V AC or 30 V DC.

### 4.4. Communication

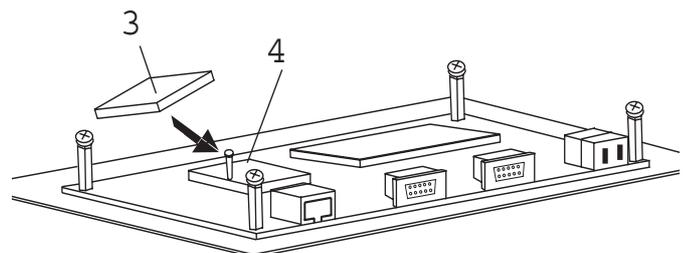
To install the communication module, in the operator panel, follow the instructions below:

**N:B:** Make sure that the power supply is isolated!



1. Release the four screws (1) holding the rear cover to the front of the unit.
2. Lift off the rear cover (2).

Unpack the communication module (3).



3. Place module (3) in the position (4), (see above).
4. Make sure it is securely in position.
5. Refit the rear cover.

#### 4.4.1. Connection to a modem or radio

Connect the enclosed dedicated modem cable from the modem/radio to the RS232 connector on the COM1. Connect the modem/radio to its own power supply.

#### 4.4.2. Connection to a PC using a fixed line

Connect a dedicated null-modem cable from the PC to the RS232 connector on the COM1.

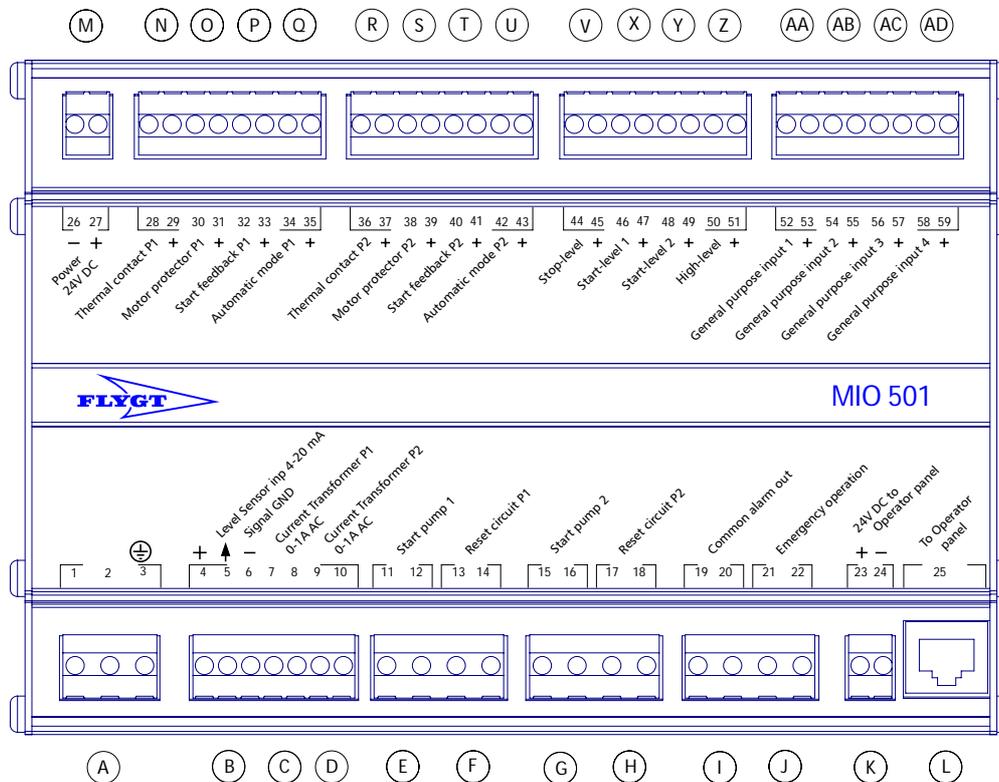
**N.B.** A common misunderstanding is to confuse the use of a modem cable and a null-modem cable. Normally a modem cable has a male contact in one end and female contact in the opposite end. The null-modem cable has normally female contacts in both ends.

Note that they are different connected internally to the contact pins. Be sure to use the right cable for each purpose.

**N.B.** For configuration, see the User manual.

# Wiring diagram 24 V DC

- A Ground (3)
- Analogue inputs (see section 4.3.3):**
- B Level sensor input, 4-20 mA. (4, 5, 6)
- C Current transformer for pump 1, 0-1 A AC (7, 8)
- D Current transformer for pump 2, 0-1 A AC (9, 10)
- Digital outputs (see section 4.3.4):**
- E Start pump 1 (11, 12)
- F Reset circuit 1 (13, 14)
- G Start pump 2 (15, 16)
- H Reset circuit 2 (17, 18)
- I Common alarm output (19, 20)
- J Emergency operation (21, 22)
- Operator panel (see section 3.3.1):**
- K Operator panel 24V DC (23, 24)
- L Communication to operator panel (25)
- Power supply (see section 4.1):**
- M Power supply 24 V DC input or Battery backup 24 V DC (Option) (26, 27)
- Digital inputs (see section 4.3.1):**
- N Thermal contact 1. (28, 29). If not used, jumper the input.
- O Motor protector to pump 1. (30, 31)
- P Start-feedback from pump 1. (32, 33)
- Q Automatic mode for pump 1. (34, 35)
- R Thermal contact 2. (36, 37). If not used, jumper the input.
- S Motor protector to pump 2. (38, 39)
- T Start feedback from pump 2. (40, 41)
- U Automatic mode for pump 2. (42, 43)
- V Stop-level switch. (44, 45)
- X Start-level switch 1. (46, 47)
- Y Start-level switch 2. (48, 49)
- Z High-level switch. (50, 51)
- AA General purpose input 1. (52, 53)
- AB General purpose input 2. (54, 55)
- AC General purpose input 3. (56, 57)
- AD General purpose input 4. (58, 59)



- N.B.** Terminals 6, 8 and 10 are connected together internally.
- N.B.** Terminals 29, 31, 33.....59 are connected together internally.
- N.B.** I and J are closed during normal operation.

# 6. Fault tracing

Power on LED does not light up.  
Alarm status LED red.

Is power supply off?

Yes Check the external mains switch and mains fuse or miniature circuit breaker.

No

Contact FLYGT service agent

Alarm status LED Red

Check Alarm log menu

Alarm: High temperature, P1 or P2

No Go to next Alarm.

Yes

Thermal overload switch in motor winding has tripped due to high temperature.

Yes Thermal overload switch must be wired as shown in wiring diagram. If not used jumper the input.

Pump is damaged (e.g. bearing failure, winding fault); pump impeller is jammed

Contact FLYGT service agent

Blocked, displays steady light (Pump status indicator, red LED)

Pump fails to start

Yes Check that Manual 0-Auto selector is set to Auto. If not Manual-0-Auto is used, jumper the auto input.

No

Contact FLYGT service agent

Check that Auto is selected in P1 Status or P2 Status menu as appropriate. Alter if necessary

Alarm: Tripped, P1 or P2

No Go to next Alarm.

Yes

External motor protection has tripped

Yes Check external motor protector. Pump is running on two phases. Pump is damaged (e.g. bearing failure, winding fault); pump impeller is jammed

No

Contact FLYGT service agent

Alarm: Max run, P1 or P2

Yes Check start and stop-levels in Start level 1, Stop level 1, Start level 2 and Stop level 2 menus as appropriate.

No

Contact FLYGT service agent

Check time setting in Max run time menu and adjust if necessary.

Pump impeller is damaged and delivering insufficient flow.

Level sensor is faulty.

High-level switch or start/stop switch is faulty.

# 7. Specification

Digital inputs	Total of 16: Pump fault, circuit tripped, start feedback, start, stop & high level switches, thermal overload switch, external Manual-0-Auto switch, external alarm, general purpose
Relay outputs	Total of 6: Start pump, reset circuit, common alarm, emergency operation.
Analogue inputs	Total of 3: Analogue level, 4–20 mA, analogue current CT 0-1 A AC
Processor	16-bits Motorola HCS12
Battery back-up for the real time clock	3 V Lithium, Battery will normally last for 8 years.
Current consumption	< 50 mA
Fuses	100/240 V AC: T3. 15 A 24 V DC: 1.1 A
Rated voltage	24 V DC (18 - 36 V DC)
Relay output	Max. load 240 V AC/2 A
Operating temperature	Operating temperature -20° C to + 50° C. The LCD display will respond more slowly at temperatures below 0° C
Storage temperature	-10 °C to + 70 °C
Humidity (non-condensing)	90 % RH
Degree of protection	IP 65 Front, IP 20
EMC emission standard	EN 61000-6-3
EMC immunity standard	EN 61000-6-2
LVD electrical safety	EN 61010-1
Display	LCD 2 x20 character
Push buttons	8
Alarm indications	7 LEDs
Dimensions control pane (l × w × h)	220 x 150 x 25 mm
Dimensions I/O-module (l × w × h)	210 x 149 x 47 mm
Weight of operator panel	1 kg
Weight of I/O-module	0.9 kg
Mounting	Cabinet
Terminals	Signal: 1.5 mm <sup>2</sup> Power: 2.5 mm <sup>2</sup>
Cable from I/O unit to operator panel	Ethernet cable is a crossover UTP RJ 45 cat 5e. The cable length is 1.8 (max length 3 m).
Level sensor types	External level sensor 4-20 mA External level regulator ENM-10



[www.flygt.com](http://www.flygt.com)