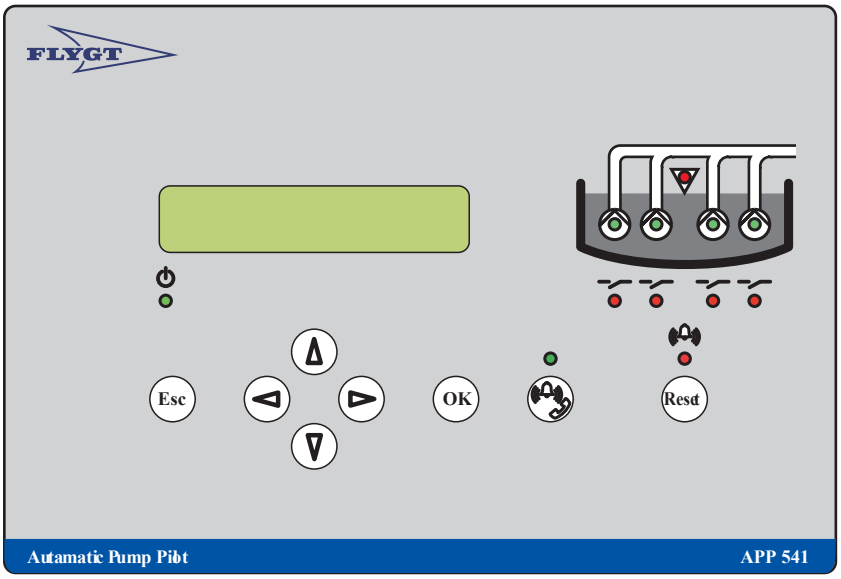
Installation manual



APP 541

FLYGT
a xylem brand

Table of Contents

Read this first

Introduction

Before starting installation of the APP 541 read this chapter carefully. It contains general information on documentation, safety and guarantee.

This manual is applicable to the following APP 541 versions:

Hardware:

- Operator panel: AFH1801 Rev 1.02 or later
- I/O-module: AHH1801 Rev 1.02 or later
- Com-module: TMX1801 Rev 1.00 or later

System Software: 2.73 or later

Application: 1.44 or later

Product Overview

APP 541 is a pump controller. It consists of two parts: a DIN rail-mounted I/O-module, and an operator panel.

APP 541 can use a PSTN, GSM, GPRS or radio modem to communicate with a SCADA system, for example AquaView. A special communication module is available for this purpose.

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.

Guarantee

- Modifications or changes to the unit/installation should be done only after consulting Xylem.
- 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.

This manual

In order to avoid repetition of information, this manual describes how one pump P1, should be read or entered. If a second pump or more pumps, are included in the installation, the corresponding steps must be repeated on those too.

Symbols used

WARNING:

Safety instruction

Risk of personal damage.

Electrical Hazard:

Safety instruction

Risk of personal damage - dangerous voltage.

NOTICE:

Special attention value

Risk of apparatus or component damage.

Safety Instruction

NOTICE:

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

The front surface of the APP 541 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 541 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.

Mechanical installation

Installing the Unit

WARNING:

- The unit must never be installed in an explosive or flammable environment.
- If the pump is installed in an explosive environment, its thermal overload switch must be connected

Equipment cubicle

Ensure that the operating temperature of the cubicle is between -4° F and +122° F. 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.

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.

1. Mark the positions of holes **A** and **B** on the cubicle door.

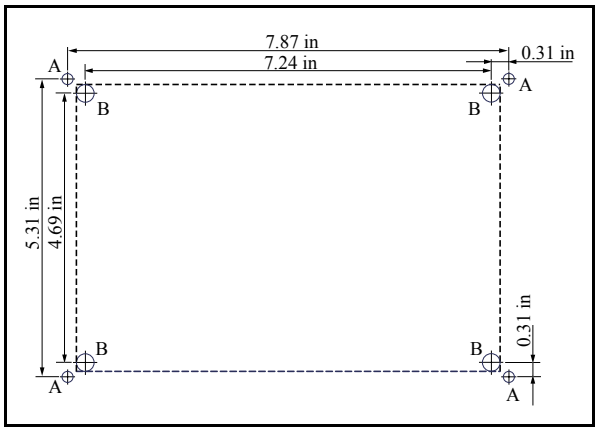


Figure 1

2. Drill small pilot holes, and then open up:
   - Holes marked **A** to **3/16 in** (5 mm) in diameter.
   - Holes marked **B** to **5/16 in** (8 mm) in diameter.

3. Tape with masking tape between the outsides of holes marked **B**.

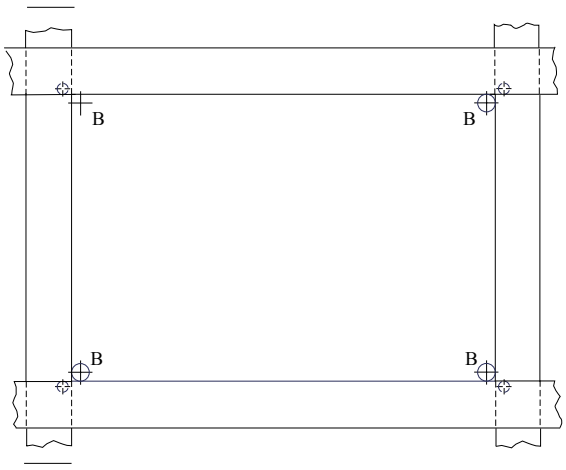


Figure 2

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

Notice about mounting front seal according to IP 65

WARNING:

Be careful not to get any grease in your eyes and avoid prolonged skin contact. Wash your hands afterwards.

To assure a front seal according to IP 65 the front unit has to be mounted on to a rigid and smooth surface.

If otherwise mounted on to a textured surface and/or flexible steel plate cabinet, it is normally necessary to apply a thick layer of grease on the sealing surfaces to obtain sealing according to IP 65.

Suitable grease is "Gleitmo 1810v". After application wipe gently all overflowing grease away.

NOTICE:

Do never use grease containing silicone since this might seriously damage sensitive electric contact surfaces inside the cabinet!

I/O-module

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

1. Place the unit in a suitable location on a DIN rail.
2. 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 6 ft (max length 10 ft).

Level sensor installation

N.B. For details on installation in the pump sump, refer to the level sensor documentation.

4-20 mA level sensor

WARNING:

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

The sensor shield must be connected to the earth (ground) terminal of the APP 541 as shown in the diagram under *Connections* (page 8).

ENM-10 level regulator

WARNING:

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

The figure shows installation of ENM-10 level regulators in the pump sump.

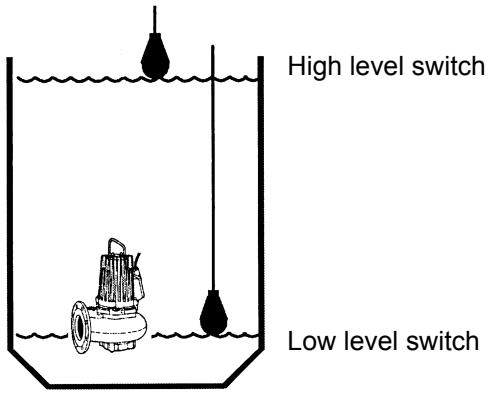


Figure 3

Electrical installation

Safety instruction

Electrical Hazard:

Do not open machine with the grounding wire disconnected.

More than one live circuit.

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 541 to be isolated from the power supply. This isolating switch must be located close to the APP 541 and must be easily accessible to the user.

The isolating switch should be marked to show that it belongs to the APP 541.

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.

Power supply

A separate fuse must protect the APP 541 power supply. Xylem recommends the use of a miniature circuit breaker that opens on all poles.

- One I/O module is designed to operate on 100 to 240 V AC power supply. 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.
- One model designed to operate at 24 v DC.

The I/O module also supplies power to the operator panel.

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

24 VDC, 180 mA, 4.5 Watt

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.

Overvoltage protection

Xylem recommends that the mains power supply unit be provided with overvoltage protection (with lightning protection). Since this will make the APP 541 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 10–7 AWG earthing wire should be used to connect the overvoltage protection to earth.

Emergency operation

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

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.

Connections

The terminal blocks on the APP 541 are described below and are shown in the *Wiring diagram 100-240 V AC* (page 11).

Digital inputs

The digital inputs are connected to terminals 28 -59 (see the *Wiring diagram 100-240 V AC* (page 11)). Each input has power supply, but the (+) terminals for all inputs are connected internally.

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**.

Analogue input

Analogue terminals

Table 1

3	Shield
4	+ (24 VDC)
5	(input)
6	- (0 V)
7-8	Input for current transformer with 0-1 A AC output
9-10	Input for current transformer with 0-1 A AC output

Passive sensor

A passive sensor (4-20 mA) is connected to terminals 4–5 (see the *Wiring diagram* (page 11)) and is powered by the MIO 501 board. The input can carry a maximum total voltage of 16 V.

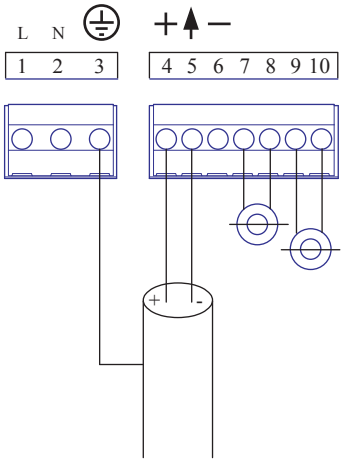


Figure 4

Active sensor

An active sensor (4-20 mA) has its own power supply and is connected to terminals 5–6 (see the *Wiring diagram* (page 11)).

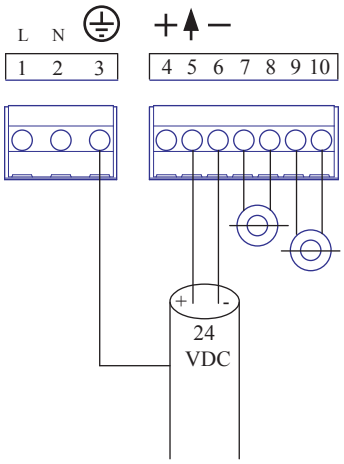


Figure 5

Digital outputs

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

Communication

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

N:B: Make sure that the power supply is disconnected!

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

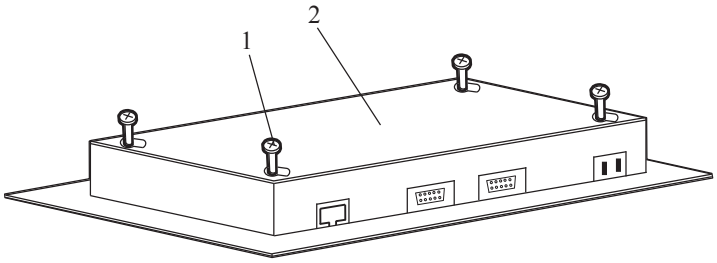


Figure 6

3. Unpack the communication module (3).
4. Place module (3) in the position (4).

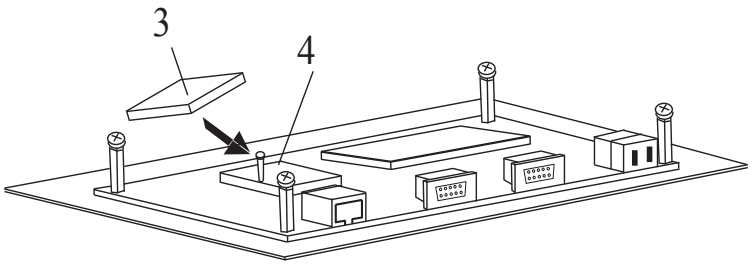


Figure 7

5. Make sure it is securely in position.
6. Refit the rear cover.

Connection to communication equipment

Connect the enclosed dedicated modem cable from the modem/radio to the RS232 connector on the COM1.

Connect the modem/radio to a power supply.

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

Wiring diagram 100-240 V AC

Table 2

	Power supply *(See also Power supply (page 7))*.		Power supply *(See also Power supply (page 7))*.
A	**Power supply**, phase, neutral and ground: **100-240V AC**, 50/60 Hz. (**1, 2, 3**)	M	**Battery backup** 24 V DC (Option) (**26, 27**)
	Analogue inputs *(See also Connections (page 8))*.		Digital inputs *(See also Connections (page 8))*.
B	**Level sensor input**, 4-20 mA. (**4, 5, 6**)	N	**Motor protector** to pump **1**. (**28, 29**).
C	**Current transformer** for pump **1/3**, 0-1 A AC (**7, 8**)	O	**Start-feedback** from pump **1**. (**30, 31**)
D	**Current transformer** for pump **2/4**, 0-1 A AC (**9, 10**)	P	**Motor protector** to pump **2**. (**32, 33**)
	Digital outputs *(See also Connections (page 8))*.	Q	**Start feedback** from pump **2**. (**34, 35**)
E	**Start pump 1** (**11, 12**)	R	**Motor protector** to pump **3**. (**36, 37**)
F	**Start pump 2** (**13, 14**)	S	**Start feedback** from pump **3**. (**38, 39**)
G	**Start pump 3** (**15, 16**)	T	**Motor protector** to pump **4**. (**40, 41**)
H	**Start pump 4** (**17, 18**)	U	**Start feedback** from pump **4**. (**42, 43**)
I	**Common alarm out**put (**19, 20**)	V	**General purpose input 1**. (**44, 45**)
J	**Emergency operation** (**21, 22**)	X	**General purpose input 2**. (**46, 47**)
	Operator panel *(See also Installing the Unit (page 4))*.	Y	**General purpose input 3**. (**48, 49**)
K	**Operator panel 24 V DC** (**23, 24**)	Z	**General purpose input 4**. (**50, 51**)
L	Communication **to operator panel** (**25**)	AA	**General purpose input 5**. (**52, 53**)
		AB	**General purpose input 6**. (**54, 55**)
		AC	**General purpose input 7**. (**56, 57**)
		AD	**General purpose input 8**. (**58, 59**)

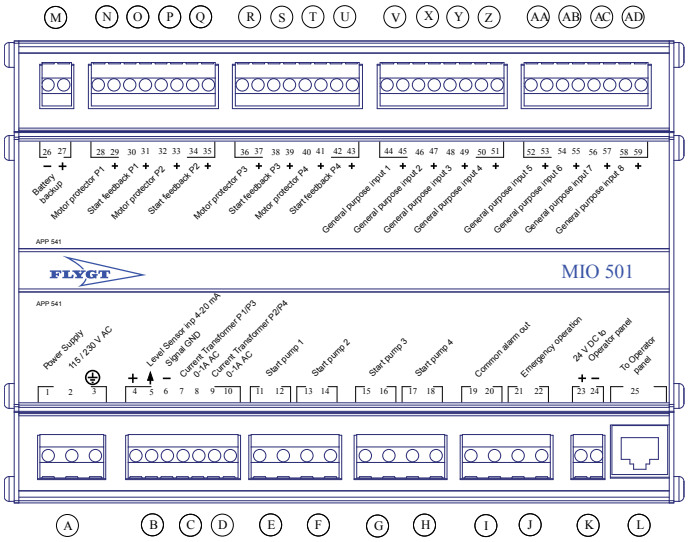


Figure 8

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 activated at normal operation.

Wiring diagram 24 V DC

Table 3

A	Ground (**3**)		Power supply *(See also Power supply (page 7))*.
	Analogue inputs*(See also Connections (page 8))*.	M	**Power** supply **24 V DC** input or **Battery backup** 24 V DC (Option) (**26, 27**)
B	**Level sensor input**, 4-20 mA. (**4, 5, 6**)		Digital inputs *(See also Connections (page 8))*.
C	**Current transformer** for pump **1/3**, 0-1 A AC (**7, 8**)	N	**Motor protector** to pump **1**. (**28, 29**)
D	**Current transformer** for pump **2/4**, 0-1 A AC (**9, 10**)	O	**Start-feedback** from pump **1** (**30, 31**)
	Digital outputs *(See also Connections (page 8))*.	P	**Motor protector** to pump **2**. (**32, 33**)
E	**Start pump 1** (**11, 12**)	Q	**Start feedback** from pump **2**. (**34, 35**)
F	**Start pump 2** (**13, 14**)	R	**Motor protector** to pump **3**. (**36, 37**).
G	**Start pump 3** (**15, 16**)	S	**Start feedback** from pump **3**. (**38, 39**)
H	**Start pump 4**(**17, 18**)	T	**Motor protector** to pump **4** (**40, 41**)
I	**Common alarm out**put (**19, 20**)	U	**Start feedback** from pump **4**. (**42, 43**)
J	**Emergency operation** (**21, 22**)	V	**General purpose input 1**. (**44, 45**)
	Operator panel *(See also Installing the Unit (page 4))*.	X	**General purpose input 2**. (**46, 47**)
K	**Operator panel 24 V DC** (**23, 24**)	Y	**General purpose input 3**. (**48, 49**)

L	Communication **to operator panel (25)**	Z	**General purpose input 4. (50, 51)**
		AA	**General purpose input 5. (52, 53)**
		AB	**General purpose input 6. (54, 55)**
		AC	**General purpose input 7. (56, 57)**
		AD	**General purpose input 8. (58, 59)**

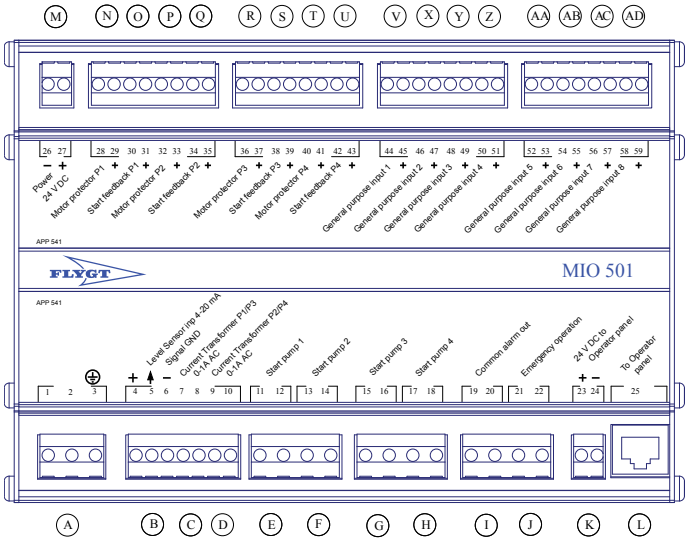


Figure 9

N.B. Terminals 6, 8 and 10 are connected together internally.

N.B. Terminals 29, 31, 33.....59 are connected together internally.

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Troubleshooting

Troubleshooting

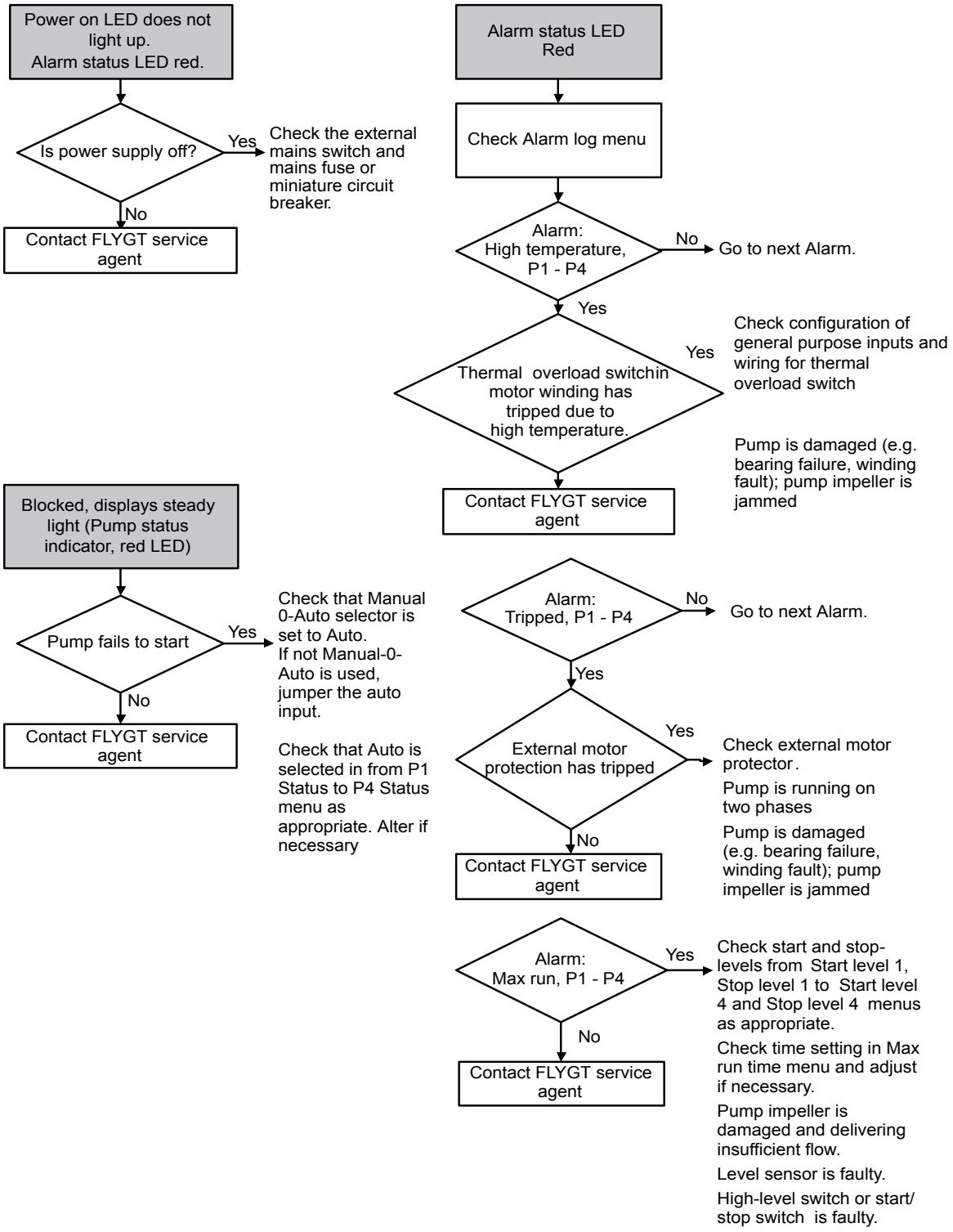

Figure 10

Technical Specification

Technical specification

Approved Standards

EMC emission Standard	EN61000-6-3
EMC immunity standard	EN61000-6-2
LVD electrical safety	EN61010-1
CSA	C22.2 No. 14-95
UL	UL 61010-1

Power Supply

AC version

Rated Voltage	100-240 V AC 50-60 Hz
Rated Power	25 W
Current Consumption	< 200 mA at 230 V AC
Fuse	3,15 A

DC version

Rated Voltage	24 V DC (18-36 V DC)
Rated Power	20 W
Current Consumption	<1 A at 24 V DC
Fuse	1,1 A

Environment

Operational temperature	-4° F to +122° F[1]
Storage Temperature	+14° F to +158° F
Humidity (non-condensing)	90% RH
Enclosure, Operator panel, front side:	IP 65
Enclosure, I/O unit, Operator panel, back side:	IP 20

[1] LCD display will respond more slowly at temperatures below 32° F.

Material

I/O Unit

Weight	2.0 lb
Enclosure	Aluminum
Side gable	Painted steel
Upper side	Polycarbonate
Mounting	Cabinet
Dimensions (LxWxH)	8.27 x 5.87 x 1.85 in

Operator Panel

Weight	2.2 lb
Enclosure	Galvanized steel
Gasket	EPDM
Overlay	Polyester
Mounting	Cabinet
Dimensions (LxWxH)	8.66 x 5.91 x 0.98 in

Data Processing Power

Processor	Freescale HCS12
Executed word length	16 bits
Clock frequency	29,5 MHz
Application Memory (Flash)	256 kB
System Memory (Flash)	256 kB
Parameter Memory (EEPROM)	8 kB
Battery backup	Yes, Real-time clock
Watchdog	Yes

User Interface

Display	LCD 2x20 character
Push buttons	8 pcs
LED indications	12 pcs

Digital Inputs

Note! APP 541 only supports analog level sensor, and not digital start and stop level switches.

Motor protector (thermal) [3]:

- Pump 1, Pump 2, Pump 3, Pump 4

Start relay feedback:

- Pump 1, Pump 2, Pump 3, Pump 4

General input 1, 2, 3 and 4: [4]

- Blocking of pumps
- External alarm
- High level switch
- Low level switch
- Manual mode pump 1 (input 1 only) [5]
- Manual mode pump 2 (input 2 only) [5]
- Manual mode pump 3 (input 3 only) [5]
- Manual mode pump 4 (input 4 only) [5]
- Overflow sensor
- Personnel alarm
- Power failure
- Pump 1 fault (thermal, leakage) [3]
- Pump 2 fault (thermal, leakage) [3]
- Pump 3 fault (thermal, leakage) [3]
- Pump 4 fault (thermal, leakage) [3]
- Rain meter [2]

General input 5, 6, 7 and 8: [4]

- Auto mode pump 1 (input 5 only)
- Auto mode pump 2 (input 6 only)
- Auto mode pump 3 (input 7 only)
- Auto mode pump 4 (input 8 only)
- Blocking of pumps
- External alarm
- High level switch
- Low level switch
- Overflow sensor
- Personnel alarm
- Power failure
- Rain meter [2]

[2] Counter input.

[3] Input when using thermal contact or supervision relay.

[4] Monitoring up to eight external circuits, the general inputs can be assigned in all combinations that make logical sense.

[5] Mandatory in ATEX mode.

Analogue Inputs

Level sensor input

Analogue level	4-20 mA
Inaccuracy	0,5% FS
Resolution	10 bits

Current transformer inputs

Analogue current CT[6] 0-1 A AC	Pump 1 and 3, Pump 2 and 4 [7]
Inaccuracy	2% FS
Resolution	10 bits

[6] CT=external current transformer with 0-1 A on secondary side.

[7] Pump currents are measured in pairs.

Digital Outputs

Start pump	Pump 1, Pump 2, Pump 3, Pump 4
Common alarm	
Emergency operation	
Rated load	2 A by 240 V AC or 30 V DC

Type of Sensors to be Used

- 4-20 mA level sensor
- ENM-10 level regulator

Terminals

Signal	16 AWG
Power	13 AWG

Ethernet Cable

Connects	I/O unit and operator panel
Cable type	Crossover UTP RJ 45 cat 5e
Cable length	6 ft (max length 10 ft)

Communication

Protocol:

- AquaCom
- Comli
- Modbus
- SMS text

Approved Modems

Contact your local Xylem supplier for valid modems in your area.

Options and Accessories

Table 4: Power supply and Battery backup unit

	Part No	Description
☐	40 501483	Power supply with batteries 2.2Ah
☐	40 501517	Power supply with batteries 7.2Ah
☐	40 501216	Power supply DR-75-24 => 230 or 115VAC/24 VDC 3.2A

	Part No	Description
☐	40 501190	APP battery backup unit (2Ah) to be used with (40 501216)

Table 5: Level sensor 4-20 mA (pressure transmitter)

	Part No	Description
☐	40 501200	LTU501, Range 0-5,0 m, 15 m cable
☐	40 501201	LTU501, Range 0-10,0 m, 15 m cable
☐	40 501202	LTU501, Range 0-2,0 m, 10 m cable
☐	40 501203	LTU501, Range 0-5,0 m, 10 m cable
☐	40 501204	LTU501, Range 0-5,0 m, 20 m cable
☐	40 501205	LTU501, Range 0-5,0 m, 30 m cable
☐	40 501206	LTU501, Range 0-10,0 m, 10 m cable
☐	40 501207	LTU501, Range 0-10,0 m, 20 m cable
☐	40 501208	LTU501, Range 0-10,0 m, 30 m cable
☐	843061	LS100, Range 0-3,5 m, 20 m cable
☐	843058	LS100, Range 0-5,0 m, 15 m cable
☐	843062	LS100, Range 0-5,0 m, 25 m cable
☐	843059	LS100, Range 0-10 m, 15 m cable

Table 6: Ultrasonic level sensors 4-20mA

	Part No	Description
☐	839422	LSU100, Range 0-5 m, 15 m cable
☐	839424	LSU100, Range 0-10 m, 10 m cable

Table 7: Overflow sensor

	Part No	Description
☐	843053	S003, Overflow sensor, 15 m cable
☐	843054	S003, Overflow sensor, 25 m cable

Table 8: Level regulator (Can only be used for High/Low level)

	Part No	Description
☐	582 88 02	ENM-10 Blue, 1,2 kg / 0,95-1,10 / 6m
☐	582 88 03	ENM-10 Blue, 1,7 kg / 0,95-1,10 / 13m

	Part No	Description
☐	582 88 04	ENM-10 Blue, 2,2 kg / 0,95-1,10 / 20m

Table 9: Over voltage protection (Zener barrier)

	Part No	Description
☐	843052	Single channel safety barrier for transmitters 4-20 mA (Active)
☐	840107	Two channel safety barrier for ENM-10 (Digital Switch)

Table 10: Current transformer

	Part No	Description
☐	40 501210	Current transformer 50/1A
☐	40 501481	Current transformer 100/1A

Table 11: Communication equipment

	Part No	Description
☐	40 501152	Communication module including modem cable
☐	40 501529	Modem, TDW-33 12-36 VDC, (V90) Europe
☐	40 501530	Modem, TDW-33 12-36 VDC, (V23), Europe
☐	40 501300	Modem, GDW-11 GSM modem, 24 VDC
☐	40 501465	Modem, EDW-100 serial ethernet adapter, 24 VDC
☐	40 501275	Antenna, Low-Profile Roof Mounted GSM antenna
☐	40 500956	Power supply, PS-12 12 V 10W for TDW-33, GDW-11, EDW-100

Installation date .....

Name .....

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1) The tissue in plants that brings water upward from the roots
2) A leading global water technology company

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The original instruction is in English. All non-English instructions are translations of the original instruction.

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