



BWT PERMAQ®
PRO 2510-2540
Reverse Osmosis Plant

For You and Planet Blue.



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1. GENERAL

This user guide applies to the BWT PERMAQ® PRO 2500 series of total desalination plants.

The guide contains **important** information about the correct installation and operation of the RO plant, consequently below instructions are very **important**:

1. Enclosed "Start-up control" shall be completed during start-up and filed together with the operating journal.
2. Operating journal shall be updated as described under "Enclosures".
3. There must be a floor drain close to the plant.
4. The RO plant removes 95-98 % of all salts so you have to consider possible post-treatment with mixed bed, if a better water quality is requested.
5. This manual must be read carefully before assembly and start-up of the plant. Correct installation and operation will form the basis of our 12-month warranty.

Your BWT PERMAQ® PRO 2500 plant is a compact design with reservoir (option) and softening unit/antiscalant (option) installed externally so that the plant takes up least possible space and can be installed in the most appropriate way.

The BWT PERMAQ® PRO 2500 plant with its compact and finished design, is very easy to install since all internal installations have been pre-assembled and tested in our factory and afterward disassembled for transport

purposes. These installations just have to be refitted.

The BWT PERMAQ® PRO 2500 plant is designed for minimum service and for long and unproblematic operation.

This, however, is determined by correct installation and maintenance.

You should always read this guide prior to taking the plant into use.

2. EXPLANATION OF WORDS

Permeate: Is the treated total-desalinated water which the RO produces and supplies to the reservoir.

Concentrate : Is the water which is led to drain. This water contains the salts and minerals which have been removed from the raw water.

Raw water: Is the water which is led to the RO plant and which must be desalinated in the RO plant.

TDS: The amount of totally dissolved salts is measured in mg/l.

Conductivity Is a designation for the salt concentration of the water and is measured in µS/cm. The lower the figure, the

better is the water quality.

Membranes : Is the plant filter which by high pressure and flow is capable of desalinating the raw water.

RO: Abbreviation for reverse osmosis.

Reservoir pump: The pump which transports the treated water from the reservoir to the consumer.

Level sensor A sensor which gives signal to the RO plant to start and stop and to stop the reservoir pump in case the reservoir is drained.

Softening unit: Is a pre-filter which softens the water, i.e. it removes hardness from the water.

3. PLACING OF PLANT

The plant must be placed in a frost-free location on a level foundation, so that the water in the reservoir (option) does not overflow when the tank is full.

The foundation must be able to stand a weight load of 400 kg in total which is the approximate weight of the RO plant in operation. Also take into consideration the weight of the softening unit and the reservoir!

When placing the plant you must remember that there shall also be

room for installing softening unit/antiscalant (option) and possibly a reservoir tank (option).

You must expect 1000 mm extra height in order to be able to take out the plant membranes. Also there shall be room at both sides of the plant for water installations, especially you must consider the outlet drain from the plant. **A resistance must never occur in those!**

Furthermore, there are readings which have to be made at the front of the plant, e.g. the flow meter, manometer, conductivity meter and alarms.

The front of the plant shall never be covered up, but must always be visible.

In case of an error, situations may arise where either the level in the reservoir (Option) may overflow or another form of leak may occur. There shall always be a floor drain close to the plant, so that this water cannot cause damage.

4. WATER QUALITY

The raw water, which is to be treated in the BWT PERMAQ® PRO 2500 plant, must be of drinking water quality and contain maximum 500 mg/l TDS.

The raw water may maximum contain:

- **Hardness 0.5 °dH (can be obtained by means of a softening unit(option))**
- **Fe: 0.05 mg/l**
- **Mn: 0.05 mg/l**
- **Free chlorine 0.1 mg/l (if higher, install a carbon filter (option))**
- **Turbidity max. 1.0 NTU**

- **Silt index: 3.0**
- **KMnO₄ max.: 10 mg/l**

Maximum temperature:25 °C.
Note! The plant has been adjusted in our factory to operate at 10 °C .

If you have doubts about the composition of the raw water, you should always make a water analysis.

The plant must be connected to a raw-water pressure of minimum 3 bar and maximum 6 bar. The quality of the treated water will normally be under 20 µS/cm at 10 °C.

5. WATER CONNECTIONS

Note! All water connections must be in compliance with local regulations.

For connection of raw water to the softening unit (option), see the guide which is enclosed the softening unit.

Connection of softening to the RO plant:

Connect soft water to the connection at the left side of the plant. The best operating result is obtained by connecting to minimum 1 ½" raw water pipe. In that way you will usually obtain the necessary pressure and flow to the plant.

If the raw-water connection is too small, there is the risk of outages on the plant due to lacking water pressure/amount, e.g. when flushing membranes, when starting up the plant and a poor functionality of the softening unit.

Connection of permeate outflow

The outflow of the RO plant (D) shall be connected to hold-up tanks or BWT reservoir (option).

You will benefit by connecting with 1" flexible pressure hoses. BWT sell complete assembly kits for the BWT PERMAQ® PRO 2500- series.

Item No.	Designation	Dimension
A	Intake soft water Micron filter (option)	1 ½" nipple
B	Outflow concentrate discharge	1 ¼" coupler
C	Outlet permeate to consumption	1 ¼" coupler

Connection of drain (permeate (C)/concentrate (B))

The permeate and concentrate outlet can with advantage be installed with two 25 mm PVC pipes. Keep in mind that the permeate drain must be made of corrosion-proof material. Permeate and concentrate outflows are led to the floor drain in two pipes. These two pipes may never be united into one pipe (see figure 1).

Important! The outlet pipe may not be led all the way down into the outlet water of the floor drain, as you will then risk that the water is sucked back into the plant by standstill.

Important! A resistance may never occur in the outlet pipe, as this will damage the membrane(s).

Connection of outlet water from the reservoir pump (option)

Connect the outlet water with 1" flexible pressure hose to the

reservoir pump (see encl. layout drawing).

Note! Totally desalinated water can accelerate corrosion, therefore you should always use corrosion-proof piping for the treated water, e.g. stainless steel or PVC-pipe.

6. ELECTRICAL CONNECTIONS

Note! The electrical connections must be made in compliance with local regulations.

The electrical connection to the BWT PERMAQ® PRO 2500 plant must be as follows:

2500 Series	2510	2520	2530	2540
Voltage [V]	3 x 400 V + 0 + PE			
Net	TN-S			
Frequency [Hz]	50 Hz			
Consumption, control panel [VA]	110 VA			
Consumption RO plant (kW), [A]	5,5 kW 11 A		7.5 kW 11,5 A	
Minimum fuse excl. of Res. [A] (Class gL/gI)	16 A		25 A	

See also encl. electrical diagram

7. START-UP OF PLANT

Check before starting up that all water and electrical connections are made as described in the

previous paragraphs and carried out in compliance with the local regulations.

Before start-up, adjust the softening unit (option) at the actual hardnesses of the raw water supply and start it up. Follow the instruction manual on the softening unit.

On assumption that the softening unit is now running, check if the plant supplies soft water at the sample valve (V5). A test kit is included in all deliveries of new softening units.

Completely open the outlet valve V4. (See diagram of principle).

Completely close the recirculation valve V3. (See diagram of principle).

Now switch on the power supply to the plant.

The plant is operating.

Check that the motor is running in the right direction.

If the plant shuts down and the alarm for low inlet pressure shines, then the raw-water supply is inadequate (see paragraph "Water connection").

The plant shall operate and flush to drain for 20-30 minutes. Then the valve must be readjusted. After final flushing, adjust the outlet/recirculation valves V3/V4.

7.1 Adjustment of outlet amount

Important! Read the entire paragraph "Start-up of Plant" before adjustment is commenced.

The outlet amount must be adjusted. The raw-water quality is

decisive for which outlet amount suits your plant best. Too high water recovery will damage the membranes. With softened raw water (recommended) a recovery of 70- 80 % can be obtained, dependent on whether the water is surface or ground water.

Permeate adjustment valve V1

If the plant has a larger capacity than prescribed, V1 must be adjusted at the prescribed capacities.

Plant type	Permeate capacity l/h	Drainage amount l/h 75 %
2510	3100	1033
2520	4300	1433
2530	5100	1700
2540	6200	2067

7.2 Adjustment of the Recirculation Amount

If it is not possible to reduce the permeate amount at the prescribed amount or maximum 10 % more, the pressure shall be adjusted on valve V1.

Following must be checked regularly:

If the operating conditions of the plant are changed compared to the adjustment on the start-up day, then the plant must be checked to see if it is necessary to replace the membranes. (The plant capacity changes, if the temperature of the water is not 10 °C. For each degree Celsius the capacity changes. If the water is 12 °C, the capacity will increase by approx. 6 %).

Note! Warranties are given on condition that the operating and maintenance instructions are complied with, and that the operating journal is completed at the stated intervals. In case of deviations you may contact BWT's service department.

- **if the capacity has dropped more than 10 %**
- **if the pressure after the high-pressure pump has increased**
- **if the conductivity has increased.**

When the requested pressure and permeate capacity has been reached, check that the outlet amount is adjusted correctly.

When both valves have been adjusted, lock the valves V3/V4. Important! Both lock nuts must be locked/tightened on the valves.

Check the current operational pressure on the high-pressure manometer PI2.

Operational pressure can vary by different temperatures and capacities.

Now check the quality at the permeate outlet to make sure the conductivity is below set point (normally 20 µS/cm). this can be read on the conductivity meter.

The plant reservoir (option) will now fill with permeate.

Write the operating data in the enclosed operating journal (see encl. "operating journal").

8. OPERATING MANUAL FOR OPERATOR MENU



8.1.1 Information in menu:

All screen displays are constructed with a header where date, time and plant type can be monitored.

When an alarm occurs, the alarm text in the operator button to the right will start to flash at a slow frequency.

Press **ALARM**

On the alarm screen all active alarms will be indicated.

Press **MENU**

to return to this directory.

Press **yy/mm/dd**

to adjust date and time.

8.1.2 Functions in menu:

Press **Operation**

On the operation screen you are able to start and stop flushing and possible CIP-cleaning.

Press **Opr. Settings**

In operation setting you choose settings for start-up of RO plant and automatic flush of plant.

(This display is protected by a Password (see paragraph 14.0))

Press **Mimic**

On the mimic screen you can see operation and valve/pump status.

Press **Alarm setting**

In alarm setting you can make selections for set point and delay of alarms.

(This display is protected by a password (see paragraph 8.10))

Press **Language**

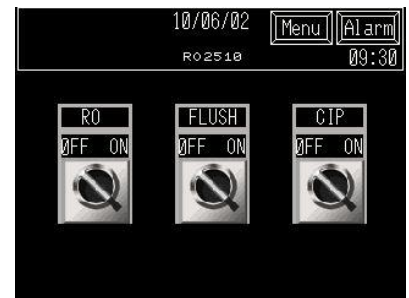
On the language screen you can choose between various languages to be displayed on the screens.

Press **RO Model**

On the plant type screen you can select plant type and options.

(This display screen is protected by a password (see paragraph 8.10))

8.2 Operation



8.2.1 Information in Operation:

Buttons for start, stop of plant and start, stop manual flush. When the CIP-option is installed it is operated from here.

When the button is activated, it changes position from off to on.

Operating status for the RO plant is indicated in the fields beside the text line.

8.2.2 Functions in Operation:

Press **OFF-ON** RO:

For start/stop of plant.

Press **OFF-ON** FLUSH:

For start/stop flush of plant.

Press **OFF-ON** CIP:

For start/stop CIP cleaning of plant.

8.3 Opr. Setting 1



8.3.1 Information in Operation setting 1:

Times of delays of start-up, valves and pump operations.

8.3.2 Funktions in Opr. setting 1:

Here you can change times of delays of start and stop of plants on level switches.

You may insert delays for start of pump and opening/closing of valves.

Data change:

To change a setting, press one of the fields. A pop-up keyboard will appear on the screen, and the new value can be entered. Confirm by pressing ENT.

8.4 Opr. Setting 2



8.4.1 Information in Opr. setting 2:

Time for delays of automatic flush of the RO plant.

The time for duration of automatic flush of RO plant.

Delays of levels in the reservoir

8.4.2 Functions Opr. Setting 2:

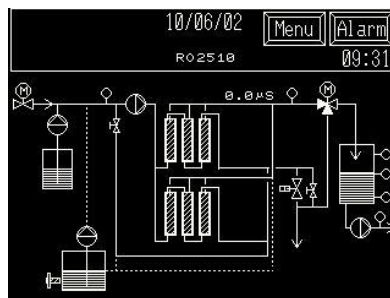
Here you can change times for flush of the RO plant and times for delays of levels

In the reservoir (option) these times are used for controlling the reservoir pump P3 (option).

Data change:

To change a setting, press one of the fields. A pop-up keyboard appears on the screen and the new value can be entered and confirmed on ENT.

8.5 Mimic



8.5.1 Information in Mimic:

Operating status of the plant

Operating status of valves and pumps.

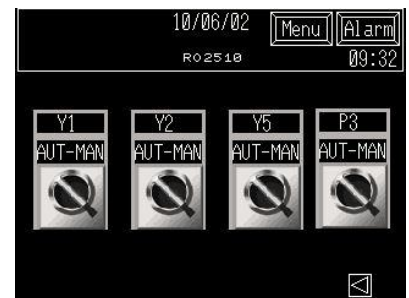
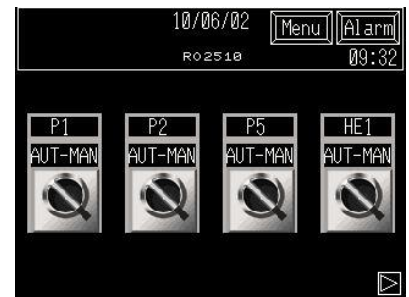
Pumps change colour (black = stopped, white = operating)

Valves change colour (black = closed, white = open.)

8.5.2 Functions in Mimic:

When pressing a valve or a pump you gain access to manual operation of the components.

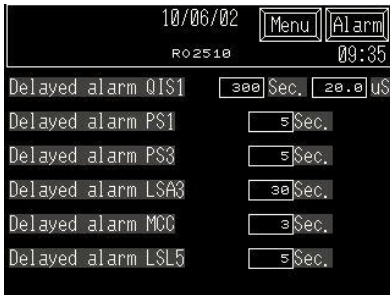
This option is protected by a password.



You must change to manual to make operation active. The plant must be in stop position before you can operate the buttons.

When you change back to operating position, all components change back to Auto. The plant must be in stop position to enable manual operation.

8.6 Alarm Setting



8.6.1 Information in Alarm setting:

Delays of alarms and set point for conductivity.

8.6.2 Functions in Alarm setting:

Setting of times by delay of alarms and set point for conductivity in operation.

Data change:

To change a setting, press a field. A pop-p keyboard appears on the screen and the new value can be entered. Confirm on ENT.

8.7 Plant type



8.7.1 Information in Plant type:

RO Type and selection of option.

8.7.2 Functions in Plant type:

Press on the button for the desired plant.

8.8 Alarm log:



8.8.1 Information in Alarm log:

This display with alarm log appears when pressing the Alarm button to the right.

If an alarm occurs on the plant, the alarm button will start a flash frequency. The alarm will be presented with date and time of its occurrence. When the alarm is reset on the alarm button, the alarm text disappears and the alarm button returns to fixed text.

8.8.2 Functions in Alarm log:

At the left side of the screen there are two buttons which are used for scrolling up and down in the alarm display.

8.9 Date/time



8.9.1 Information in Date/time:

Date and time in operator panel.

8.9.2 Functions in Date/time:

Date and time is set by pressing on the individual button and entering the new value. Store by pressing ENT.

8.10 Password



8.10.1 Information in Password:

The Password screen will appear automatically if you select a password-protected screen.

If you enter correct password, the requested screen will appear.

If the correct password has not been entered within 10 seconds, the screen will automatically shift back to Menu.

8.10.2 Functions in Password:

Data Entering:

Enter the correct password and press ENT.

8.10.3 Password:

Password will be informed if you contact

BWT A/S

Tel.: +45 43600500

Service Department

9. MAINTENANCE AND TROUBLE-SHOOTING

9.1 Maintenance:

The RO plant is produced and designed for a minimum of servicing and maintenance. There are, however, some functions that should be checked regularly (the interval is described below).

following must be checked regularly:

If the operating conditions of the plant are changed compared to the settings on the day of start-up, the plant must be checked with regard to possible cleaning of the membranes or adjustment of the plant capacity.

- **If the capacity has dropped by more than 10%**
- **If the pressure after the high-pressure pump has increased**
- **If the conductivity has increased**

Daily:

6. Take daily water samples (this applies only if you have a softening unit installed ahead of the RO plant). The hardness after a softening plant must be less than 1°dH.
7. Check also the salt tank, refill if necessary (this applies only if 304* you have a softening unit installed ahead of the RO plant).
8. Read the values and enter these in the operating journal

Every week:

Flush of membranes shall be carried out minimum once a week. Open valve V4 completely for ½ hour while the plant is operating. Then adjust valve V4, so that the concentrate flow is again 20-25 %, see paragraph for Start-up of Plant.

Every 6 months:

9. Check pipelines and connectors for leaks.
10. Check all pressure switches, i.e. their function and settings.
11. Test alarm functions.

12. Replace defective/buzzing switches and relays

Note! If the plant has to be taken out of operation for a long time, or there is a risk it will be exposed to frost, each membrane element must be preserved.

How long the plant must be out of service before you need to preserve the membranes depends on how large the organic growth is. With surface water the membranes must be preserved by a shutdown of 3 days or longer, and when using ground water, the membranes must be preserved by a shutdown lasting more than 7 days.

for preservation purposes, fill the membranes with a solution of:

Mixing rate	Preservation [%]	Frost-Protection [%]
MonoPropylene glycol	-	20
Sodium bisulphite	1	1

By long-time preservations, be aware of the risk of organic growth. By frost protection you should make sure that the pH-value never drops to a level under pH 3. In that case there will be a risk that the bisulphite oxidises into sulphuric acid.

9.2 Troubleshooting

This paragraph deals with the problems that may arise on the plant.

9.2.1 The plant capacity has decreased

This can be read on the flow meter (F11) while the RO plant is operating.

Check:

The plant operating pressure PI3. If the operating pressure is low, check that the raw-water pressure PI1 is the same as by start-up. If it is under 3 bar, locate the error in the water supply, possibly a clogged filter.

Check:

the differential pressure across F1.

Check:

raw-water temperature. If the raw-water temperature has dropped compared to the day of commissioning (winter/summer), then the capacity will drop likewise. It rises again in case of an increase in temperature.

Check:

if the softening unit functions optimally. If there is a defect in the plant, so that hard water is supplied to the membrane, it will cause damage on the membrane and hence a capacity decrease.

Check:

if there is a antiscalant in the tank, air in the dosing pump.

9.2.2 The quality of the treated water is higher than 20µS/cm.

Check:

if the plant has been shut down for a long time, i.e. 2 weeks or longer.

correct the error by letting the plant operate for 1-2 hours with open drain valve and then keep it operating minimum every 3rd

day. After rinsing the outlet amount must be readjusted, see paragraph for Start-up of the Plant.

Check:

if raw water comes in connection with the treated water.

correct the error by tightening leaks, if any, empty out all water from the reservoir and let the plant take in new, clean, treated water, < 20 µS/cm.

If none of these errors are present, the membrane(s) is (are) defective and must be replaced.

9.2.3 Alarms

Check:

if the raw-water pressure is present.

9.2.4 The plant does not run

Check:

if the mains power is connected.

Check:

the level sensor of the tank, if it is "stuck" or defective.

Check:

if the plant needs to operate? – or if there is no "request" for water!

If none of the above-mentioned errors exist, then perhaps the high-pressure pump or the PCB is defective – check this.

9.2.5 Hard water is measured from the test valve:

See instruction for the softening unit.

10. REPLACEMENT OF MEMBRANES

Read this paragraph **before** dismantling/replacing the plant membranes.

Switch off the power and water to the plant.

Dismantle the U lock placed at the top of the membrane pipe. (The U-lock keeps the membrane end plate in place).

Pull out the pin from the U-lock and pull the U-lock out of the pipe.

The end plate can now be pulled out of the membrane pipe by wriggling the end plate from side to side and pull upwards at the same time.

The membrane can now be pulled up of the membrane pipe. **note!** At which end the large black O-ring is placed on the outside of the membrane is placed. When the new membrane is mounted, this O-ring must be placed at the same end of the membrane as the old one, i.e. if the O-ring sits at the top of the membrane pipe, then the O-ring of the new membrane must also be placed in this way, so that the O-ring is located at the top when the membrane is refitted in the membrane pipe.

When the membrane(s) has/have been replaced and the end plates have been refitted with the U-lock in place, reconnect all hoses.

When all connections have been re-installed and end plates secured with the U-lock, then the plant shall be started again. See paragraph Start-up- of Plant.

Write down in the operating journal:

13. Date of replacement of membranes.
14. New capacity of the plant (flow meter F11 and F12)
15. Water quality (µS/cm)
16. Operating pressure (manometer)
17. Raw water temperature
18. Raw-water pressure..

11. PRE-TREATMENT (OPTION)

11.1 Dosing of Antiscalant

Antiscalant is a product which is added the raw-water so that precipitation of lime on the membrane does not occur and cause the membranes to clog.

A water analysis should always be made before the plant is put into operation, so that dosage of antiscalant can be adjusted correctly.

Antiscalant is mixed in the measuring tank in a 10 % solution. do not fill in more antiscalant in the tank than for one month's consumption, as it will decay over time and then cannot be reused.

Antiscalant shall be doses in proportion to the water content of salts, lime etc. and adjusted when starting up the plant. You shall dose 4 ml concentrated antiscalant per m³ raw water, i.e. when you have a 10 % solution, the pump must dose 40 ml/m³.

On the outlet of the dosing pump, a flow control is fitted which indicate if there is flow or not. If the flow fails, the flow control will

register this, stop the plant, and trigger the alarm. Adjustment of the flow control is done as follows:

19. Push the flow control all the way down.
20. Let the dosing pump operate for 15 minutes, until it is warm and all air has escaped from the pump.
21. Lift the dosing control until the control signal disappears, and then lower it just enough to make the signal reappear.
22. Check that the dosing nipple (the dosing location) is tight, and the plant is ready for operation.

See also diagram for standard adjustments of the dosing pump.

Important!

The stroke length of the dosing pump must not set below 50 %.

- **Every week the tank shall be emptied and flushed and then refilled with new antiscalant.**
- **Every 3rd month the tank is flushed and cleaned before new antiscalant is filled in.**

Above-mentioned dosing amount is calculated on basis of our standard dimensioning conditions. If you have doubts, BWT A/S offers to calculate the correct amount for your plant.

12. CIP-CLEANING OF MEMBRANES (OPTION)

Introduction

A CIP unit is not installed on the plant as standard. This unit is available as an option. However, the plant is prepared for this mechanically.

During normal operation, dependent on inlet, water quality, temperature, operating conditions etc. the RO membranes will lose capacity successively due to the water's varying content of mineral salts, biological matter, colloid particles and other insoluble, organic particles.

These deposits will accumulate during operation and cause an increased pressure loss across the membrane and thus a drop in capacity and poorer water quality.

Membranes must be CIP-cleaned minimum once/year or immediately when the capacity has dropped 10 % compared to the original capacity.

Please be aware that the capacity drops by lower water temperatures (approx. 3 % per °C), CIP-cleaning is not needed if this is the case.

Conditions

it is necessary to perform the CIP cleaning with chlorine-free water of a good quality at a temperature of approx. 20°C.

During circulation of cleaning fluid in the membranes, the temperature may never exceed 35 °C and the pH value shall be kept between 2 and 11.5.

The flow direction during CIP cleaning must be the same as during operation.

BWT CIP 4 is an acid cleaning agent used for dissolving inorganic layers including iron, whereas the alkaline cleaning agent **BWT CIP 10** is used for dissolving organic layers including oil.

Never use sulphuric acid H₂SO₄ for CIP cleaning as there will be

a risk of precipitation of gypsum (calcium sulphate).

When mixing cleaning agents, preferably use permeate; soft water can also be used. However you have to use a larger amount of acid or alkaline to obtain the desired pH value, which for acid must be approx. pH 4 and for alkaline solutions must be approx. pH 10.

BWT CIP 4 is sold by BWT Item No.: 70 19 57 020

BWT CIP 10 is sold by BWT Item No.: 70 19 57 010

While the plant is operating, fill the CIP tank with permeate.

Open valve V8 (See diagram of principle)

When the CIP tank has been filled with permeate, stop the RO-plant and press "stop".

High pressure pump P1 may **never** operate during CIP cleaning.

Adjust the valves as follows:

Close valve: V2, V10 (See diagram of principle).

Open valve: V7, V8, V9 (See diagram of principle).

Mix the cleaning agent.

It is of advantage if the temperature is kept at approx. 35 °C during the CIP cleaning.

Start the CIP cleaning on the panel front.

P2 and HE1 start and the CIP-agent now circulates across the membranes.

Check that there is enough CIP agent in the tank, so that P2 does not run dry.

When the CIP fluid has circulated for approx. 15 minutes, stop the CIP pump P2 by pressing "stop" on the panel front.

Let the membranes soak for about 1 hour. If the membranes are very clogged up, allow up to 15 hours of soaking.

Start the CIP pump P2 again and let the CIP agent circulate for approx. 5-10 minutes. If the CIP fluid is very turbid, you must perform a new CIP cleaning.

Check the pH value regularly. If the pH value varies by more than 0.5 pH units, you must add more, so that the pH value reaches minimum 2 or maximum 11.5.

When the cleaning is finished, stop the CIP pump. Neutralise the CIP fluid at pH 7.

Displace chemicals in the RO plant.

Fill up the CIP tank with soft water or permeate. Start the CIP pump P2 and displace the content of liquid from the RO plant.

Check on the pH meter.

Stop the CIP pump P2.

Empty and flush the CIP tank.

Close valve V8, V9, V7 (See diagram of principle).

Open valve V2, V10 (See diagram of principle).

Start the RO plant "in operation".

Let the RO plant operate for minimum 15 minutes, or until the conductivity is below the limit value, normally 20 $\mu\text{S}/\text{cm}$.

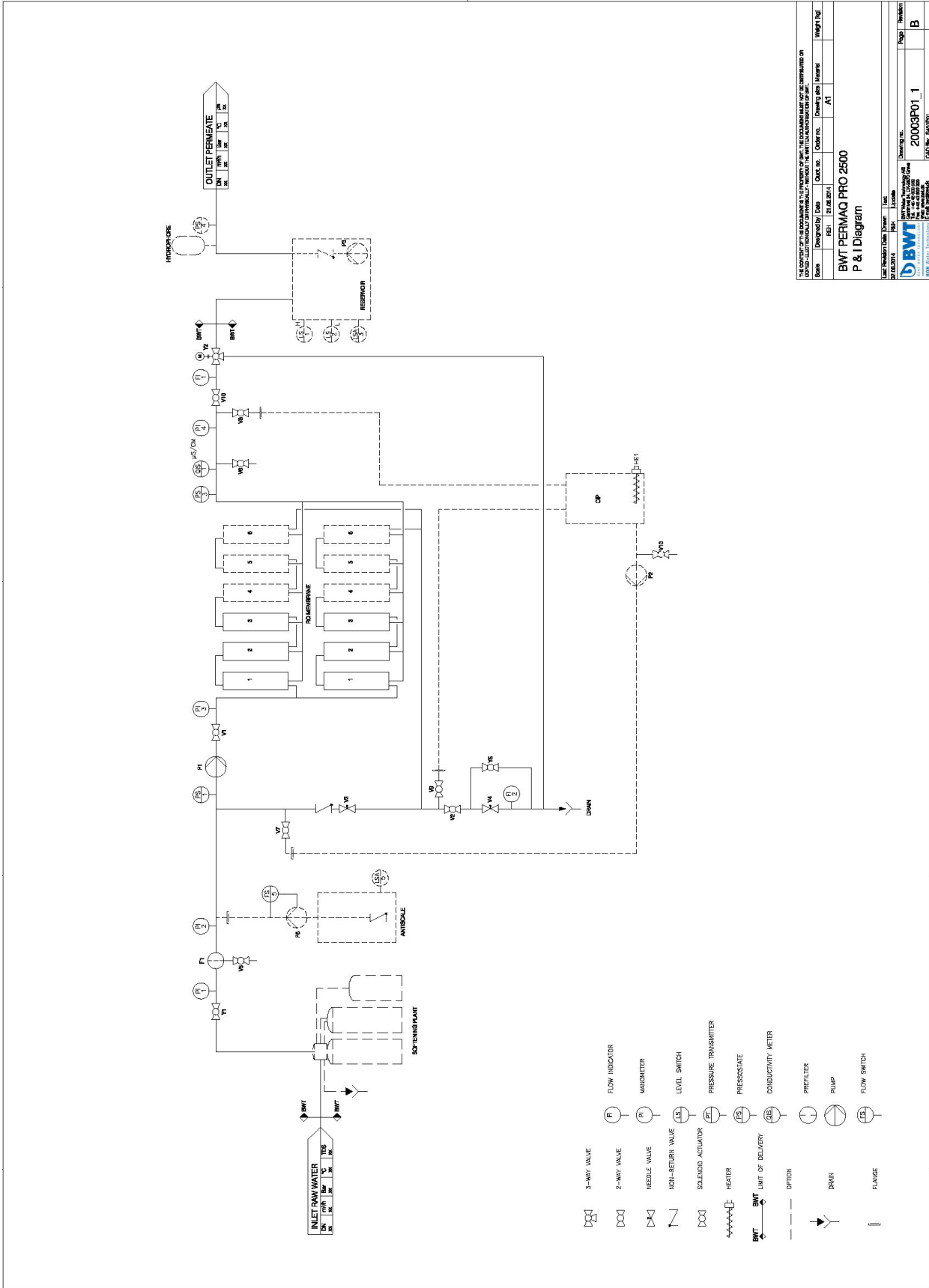
Then adjust valve the RO plant according to the paragraph "Start-up of plant".

Start by cleaning with **BWT CIP 10** and then clean with **BWT CIP 4**. Always follow the safety directions of the supplier concerning handling of dangerous chemicals.

13. VARIOUS ENCLOSURES

- 13.1 P & I diagram
- 13.2 Lay-out drawing
- 13.3 Operating journal
- 13.4 List of components and
spare parts for RO
- 13.5 Spare parts drawing
- 13.6 Declaration of Conformity
- 13.7 Circuit diagram

13.1 P & I Diagram



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Scale	Designed by	Date	Drawn by	Checked by	Order no.	Drawing title	Material	Weight (kg)
	PSH	11.02.2004		AT		BWT PERMAQ PRO 2500 P & I Diagram		

Unit	Revision	Date	Drawn by	Checked by	Order no.	Drawing title	Material	Weight (kg)
	1				20003P01_1	B		

BWT
BWT Water Treatment Systems, Inc.
10000 W. 16th Avenue, Golden, CO 80401, USA
www.bwt.com

13.2 Layout Drawing

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Scale	Designed by	Date	Order no.	Drawing size	Material	Weight (kg)
	RBH	21.05.2014		A2		

BWT PERMAQ PRO 2500
Arrangement Drawing

Last Revision	Date	Drawn	Text

Drawing no.	Page	Revision
20003M10_1	1	A

BWT BWT Water Technology AG
 Gerningstr. 41, D-72670 Gernsheim
 Tel. +49 7141 25-1000
 Fax. +49 7141 25-8000
 Web: www.bwt.de
 BWT Water Technology | Berlin, Brandenburg | CAD file:

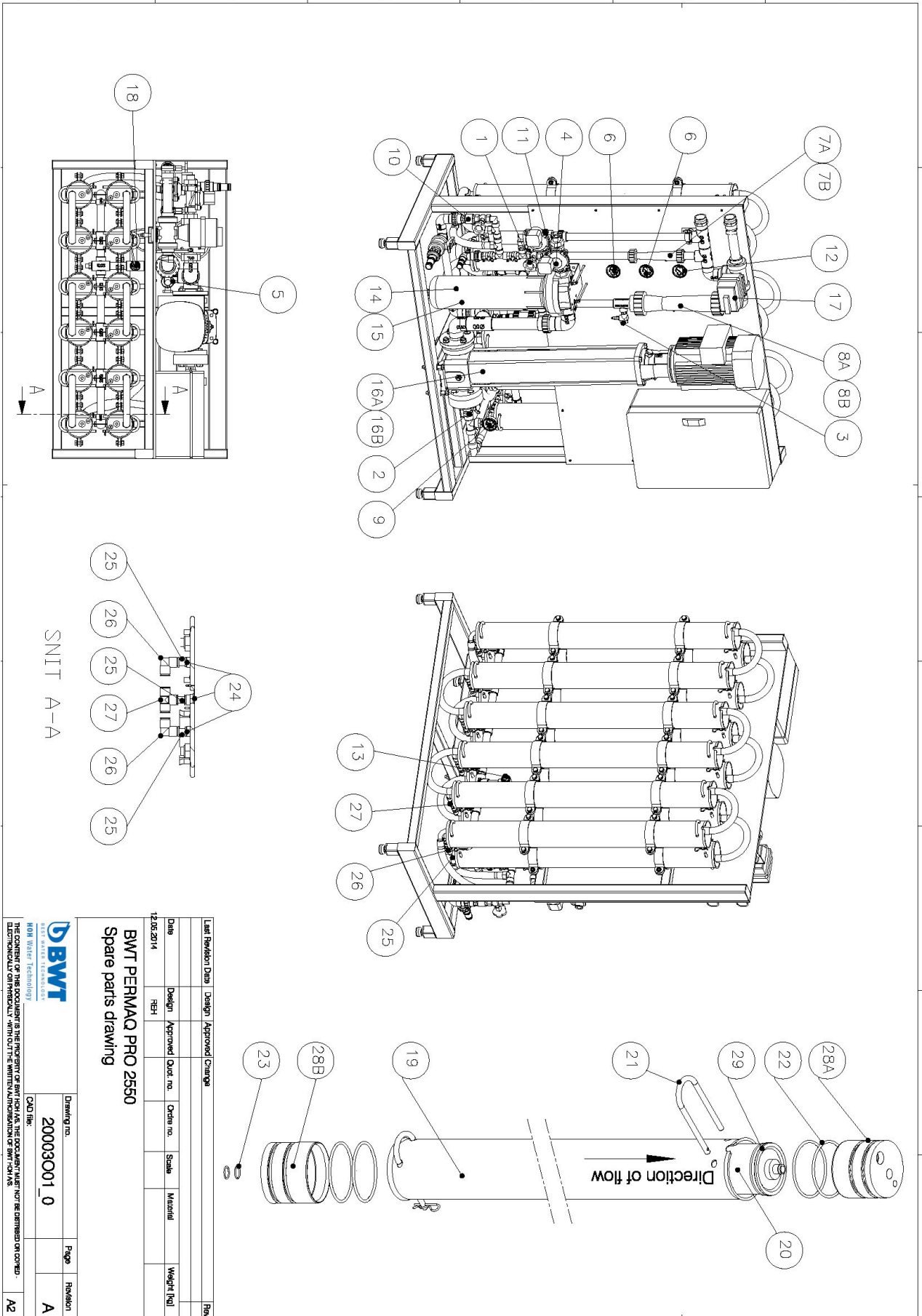
13.4 List of components and Spare parts for the BWT PERMAQ® PRO 2500 series

Item No.	Item text – RO plant	Recommended spare parts	Item No.	Recommended replacement frequency (month)
01	¾" Needle valve with counter nuts	1	200731006	
02	1" Ball valve		200742008	
03	¼" test valve, PVC		200721010	
04	1" solenoid valve NC		200755008	
05	Pressure switch 0.5 bar (PS1)	1	452550005	
06	Manometer 0-6 bar	1	452263000	
07A	Flow meter concentrate 2500 l/h		453010325	
07B	Flow meter electronic		453017032	
	Flow sensor		453017010	
08A	Flow meter permeate 6500 l/h		453010365	
08B	Flow meter electronic		453017032	
	Flow sensor		453017010	
09	Manometer 0-40 bar	1	452266000	
10	¾" non-return valve, brass	1	200726006	
11	¾" solenoid valve NC	1	200755006	
12	Manometer 0-2.5 bar	1	452268000	
13	Sensor conductivity meter		750000392	36-48
14	20" Filter housing		321403000	
15	Filter bag 5µ	3	321435000	6
16A	High-pressure pump (2510, 2520, 2530)		454102614	
16B	High-pressure pump (2540)		454102618	
17	Ø32, 3 vejs ball valve, PVC		200719032	
18	Pressure switch 0.8 bar (PS3)	1	452550008	
19	4" pressure pipes		451404079	

Item No.	Item text – RO plant	Recommended spare parts	Item No.	Recommended replacement frequency (month)
20	4" Membrane	6-12	451404960	48-60*
21	4" lock fittings		451404095	
22	O-ring outside	24-48	451404211	24-36
23	O-ring inside	24-48	451404215	24-36
24	½" x 14 mm union	1	454060014	48-60
25	14 mm collector	1	454097014	48-60
26	14 mm elbow	1	454090014	48-60
27	14 mm T-piece	1	454095014	48-60
28A	4" end plate	3	451404113	48-60
28B	4" end plate	3	451404112	48-60
29	Lip ring for 4" membrane	6-12	451404208	48-60

* Contact your local BWT dealer for detailed information.

13.5 Spare parts drawing



13.6 Declaration of Conformity

EC Declaration of Conformity

for Machinery Directive 2006/42/EC, Annex II, A

Low Voltage Directive

EMC Directive



BWT HOH A/S

Geminivej 24 - DK-2670 Greve

tel.: +45 43 600 500 - fax: +45 43 600 900

bwt@bwt.dk - www.bwt.dk

Herewith declares that:

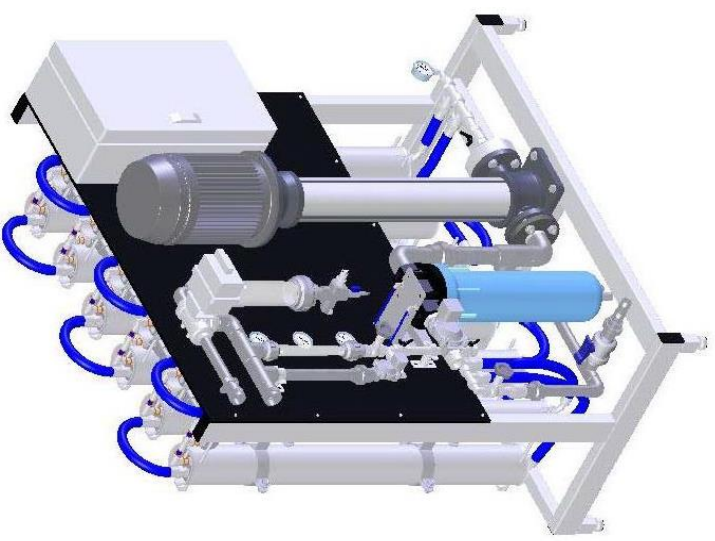

- **BWT PERMAQ® Pro 2510, 2520, 2530, 2540**
- is in conformity with the provisions of the Machinery Directive (Directive 2006/42/EC)
- is in conformity with the provisions of the following other EC directives
- Low Voltage Directive (2006/95/EC)
- EMC Directive (2004/108/EC)
- Place: Greve, Denmark
- Date: 19-09-2014

Signature


Lars Jensen
Head of Product Management



13.7 Circuit diagram

	Customer: BWT HOH A/S		Appr.				Next page: <i>Cont.</i>		
	Project title: BWT PERMAQ Pro 2500		Rev	28-05-2014		Man no.	20003	Page no.	F
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	BWT HOH A/S Geminivej 24 - DK-2670 Greve Tel.: +45 43 600 500 - bwt@bwt.dk - www.bwt.dk								


Pos.	Title	Revision	Page no.
1	IEC/EN 60757 - Wire colours and no. in HOH panels	A	Info
2	Mekansk Layout	A	Layout
3	Control circuit	A	1
4	PLC Reference, 16 Digital input +16 Digital output	B	2
5	PLC Reference, 4 Analog input +2 Analog output	A	3
6	P1 High pressure pump	B	4
7	P2 CIP Pump	B	5
8	P3 Transport Pump	B	6
9	P5 Dosing pump	B	7
10	HE1 E1 heater-CIP	A	8
11	High speed counter	A	9
12	XDi Digital input	B	10
13	XDo Digital output - Valves	A	11
14	XDi Digital input	A	12
15	XDo Digital output - Valves	A	13
16	Analog input	B	14
17	Component list	B	15
18	Terminal list	A	17
19	Cabelplan	B	20
20	Cabelplan	A	21
21	Cabelplan	A	22
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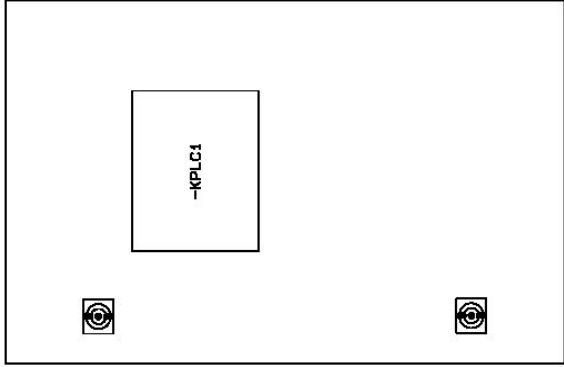
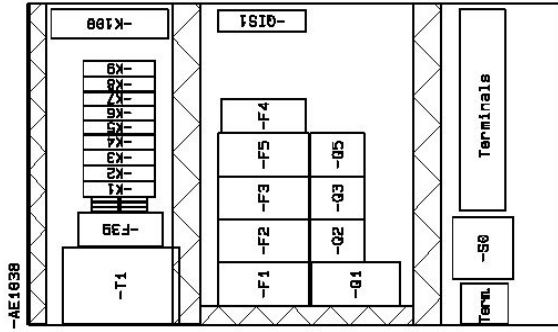
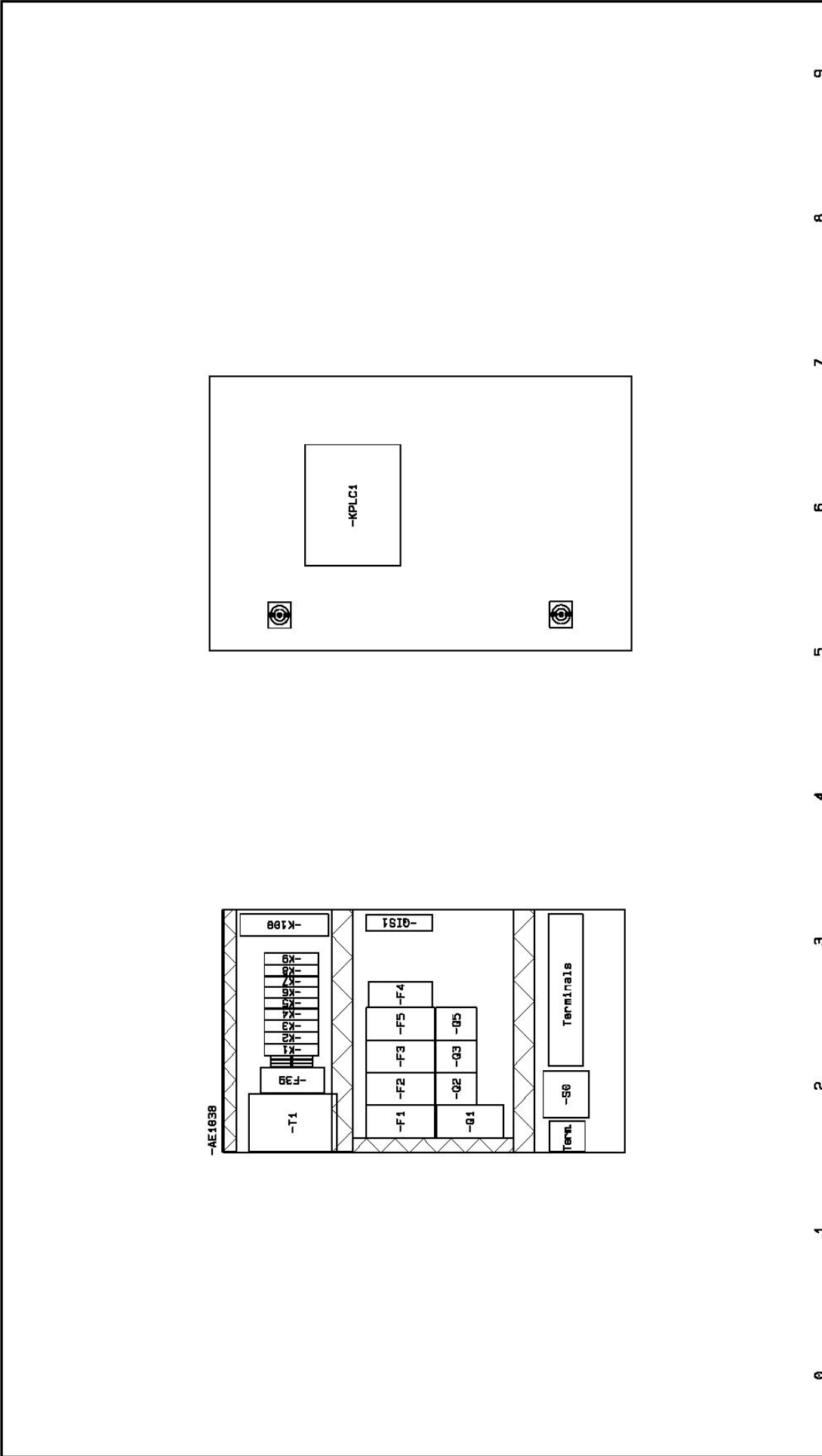
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Appr.	Rev.	17-09-2013	MF	Ass.	Appr.	Date	

Wire no.	Colour	Control current wire	Ø	5mm ²	Ø	75mm ²	500V-0.5mm ² /300V
4	GY-Gray	PVT	L+	/	VDC+		
5	BU-Dark blue	PVT	L-	/	VDC-		
9	PK-Pink	PVT			Connection wire		
21	WHYE-White/Yellow	-			Connection wire		
22	WHRD-White/Red	-			Connection wire		
23	WHGY-White/Gray	-			Connection wire		
24	WHBU-White/Blue	-			Connection wire		
25	WHBN-White/Brown	-			Connection wire		
26	WHGN-White/Green	-			Connection wire		
27	WHBK-White/Black	-			Connection wire		
28	WHVT-White/Violet	-			Connection wire		
29	WHOG-White/Orange	-			Connection wire		
30	YERD-Yellow/Red	-			Connection wire		
31	YEGY-Yellow/Gray	-			Connection wire		
32	YEBU-Yellow/Blue	-			Connection wire		
33	YEBN-Yellow/Brown	-			Connection wire		
34	YEBK-Yellow/Black	-			Connection wire		
35	ROBU-Red/Blue	-			Connection wire		
36	ROGN-Red/Green	-			Connection wire		
37	ROBK-Red/Black	-			Connection wire		
38	GYRD-Gray/Red	-			Connection wire		
39	GYBU-Gray/Blue	-			Connection wire		
40	GYBN-Gray/Brown	-			Connection wire		
41	GYGN-Gray/Green	-			Connection wire		
42	GYBK-Gray/Black	-			Connection wire		
43	BUGN-Blue/Green	-			Connection wire		
44	BUBK-Blue/Black	-			Connection wire		
45	BNRD-Brown/Red	-			Connection wire		
46	BNBU-Brown/Blue	-			Connection wire		
47	BNGN-Brown/Green	-			Connection wire		
48	BNBK-Brown/Black	-			Connection wire		
49	GNBK-Green/Black	-			Connection wire		

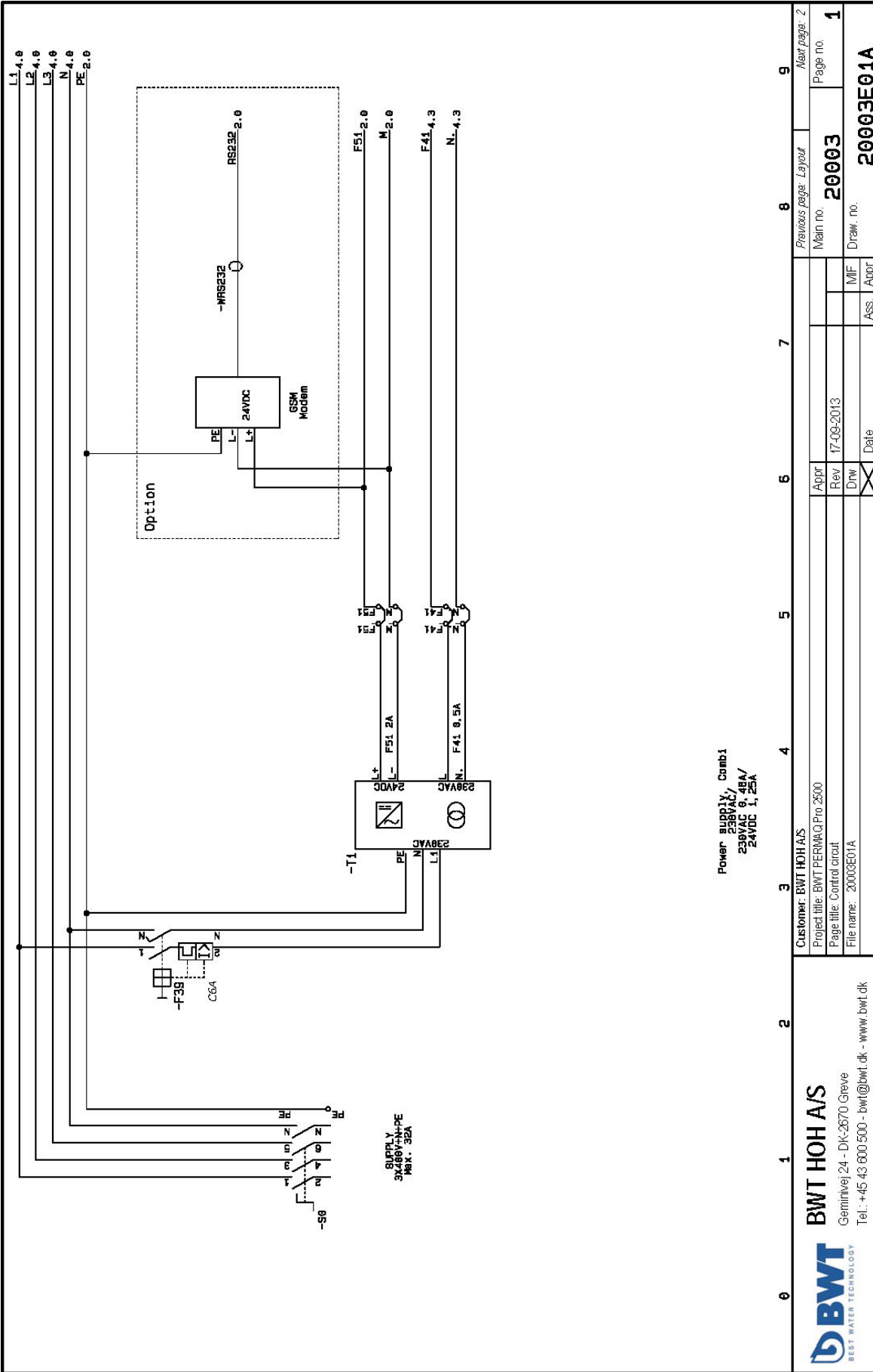
IEC/EN BWT	60757	UK	DK
1	BK	Black	Sørt
	BN	Brown	Brun
6	RD	Red	Rød
12	OG	Orange	Oranga
	YE	Yellow	Gul
	GN	Green	Grøn
5	BU	Blue/Dark blue	Blå
2	BU	Light blue	Lyseblå
8	VT	Violet	Violet
4	GY	Gray	Grå
7	WH	White	Hvid
9	PK	Pink	Pink
	GO	Gold	Guld
	TQ	Turquoise	Turkis
	SR	Silver	Sølv
3	GNYE	Green/Yellow	Grøn/Gul

Wire no.	Colour	Main power min.	1.5mm ² /500VAC	
1	BK-Black	PVT	L1/U	
1	BK-Black	PVT	L2/V	
1	BK-Black	PVT	L3/W	
2	BU-Light blue	PVT	N	
3	GNYE-Green/Yellow	PVT	PE	
Wire no.	Colour	Control current wire	Ø	75mm ² /500V-0.5mm ² /300V
6	RD-Red	PVT	L	Phase
2	BU-Light blue	PVT	N	
Wire no.	Colour	Wires in measuring circuit	foreign voltage act.	
12	OG-Orange	PVT	External supplied wires	

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Power supply, Comb1
 238VAC/2A
 238VAC 6,25A/
 24VDC 1,25A

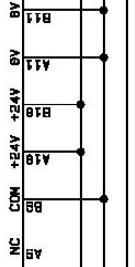
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-KPLC1

PLC/HMI Logic-touch entries, 5, 7' monochrome HMI, 16 DI/16 DO

IX.1.00.00 9/1	IND0 High speed counter FT01	B1	OX.1.01.00 4/4	OUT00 Start order P1 High pressure pump	B12
IX.1.00.01 9/4	IND1 Thermostat CIP	A1	OX.1.01.01 5/5	OUT01 Start order P2 CIP Pump	A12
IX.1.00.02 9/2	IND2 High speed counter FT02	B2	OX.1.01.02 6/5	OUT02 Start order P3 Transport pump	B13
IX.1.00.03 4/7	IND3 Run Signal P1 High pressure pump	A2	OX.1.01.03 7/5	OUT03 Start order P5 Dosing pump	A13
IX.1.00.04 5/7	IND4 Run Signal P2 CIP Pump	B3	OX.1.01.04 8/5	OUT04 Start order HE1 EI heater CIP	B14
IX.1.00.05 6/7	IND5 Run signal P3 Transport Pump	A3	OX.1.01.05 11/1	OUT05 Y01 Rawwater inlet valve	A14
IX.1.00.06 7/7	IND6 Error Signal P5 Dosing pump	B4	OX.1.01.06 11/3	OUT06 Y02 Permeate valve	B15
IX.1.00.07 8/7	IND7 Run Signal HE1 CIP Heater	A4	OX.1.01.07 11/5	OUT07 Y05 Concentrate valve	A15
IX.1.00.08 10/1	IND8 LSH01 High level reservoir	B5	OX.1.01.08 12/1	OUT08 Available O08	B16
IX.1.00.09 10/2	IND9 LSL02 Low level reservoir	A5	OX.1.01.09 12/2	OUT09 Available O09	A16
IX.1.00.10 10/3	IND10 LSL03 Low alarm level reservoir	B6	OX.1.01.10 12/3	OUT10 Available O10	B17
IX.1.00.11 10/4	IND11 LSL04 Low level CIP	A6	OX.1.01.11 12/4	OUT11 Available O11	A17
IX.1.00.12 10/5	IND12 PS01 Low pressure rawwater inlet	B7	OX.1.01.12 12/5	OUT12 Available O12	B18
IX.1.00.13 10/6	IND13 PS03 High pressure permeate outlet	A7	OX.1.01.13 12/6	OUT13 Available O13	A18
IX.1.00.14 10/7	IND14 PS04 Low pressure reservoir pump	B8	OX.1.01.14 12/7	OUT14 Available O14	B19
IX.1.00.15 10/8	IND15 INT5 Ext. Start/Stop	A8	OX.1.01.15 13/1	OUT15 Ext. signal Common alarm	A19

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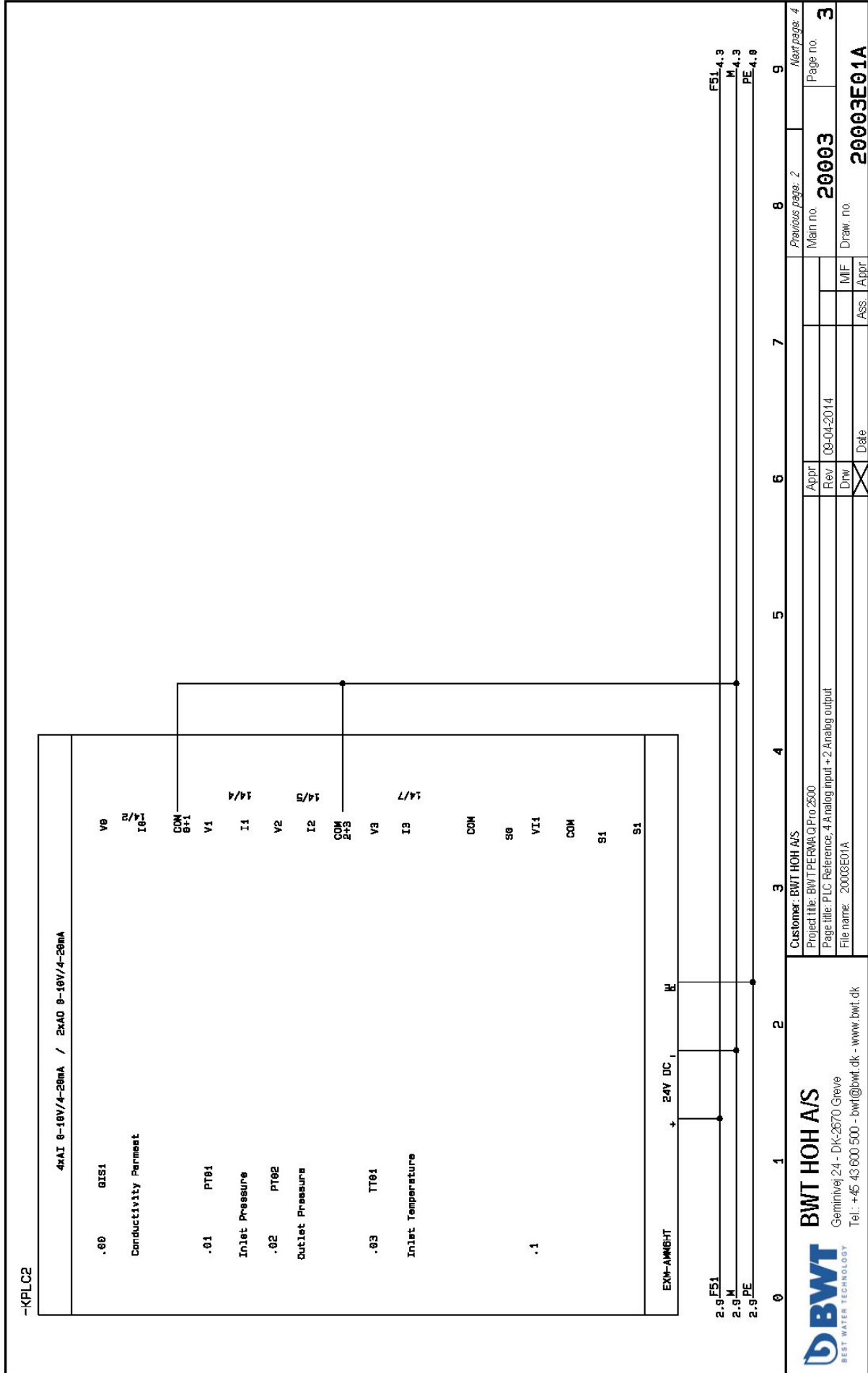


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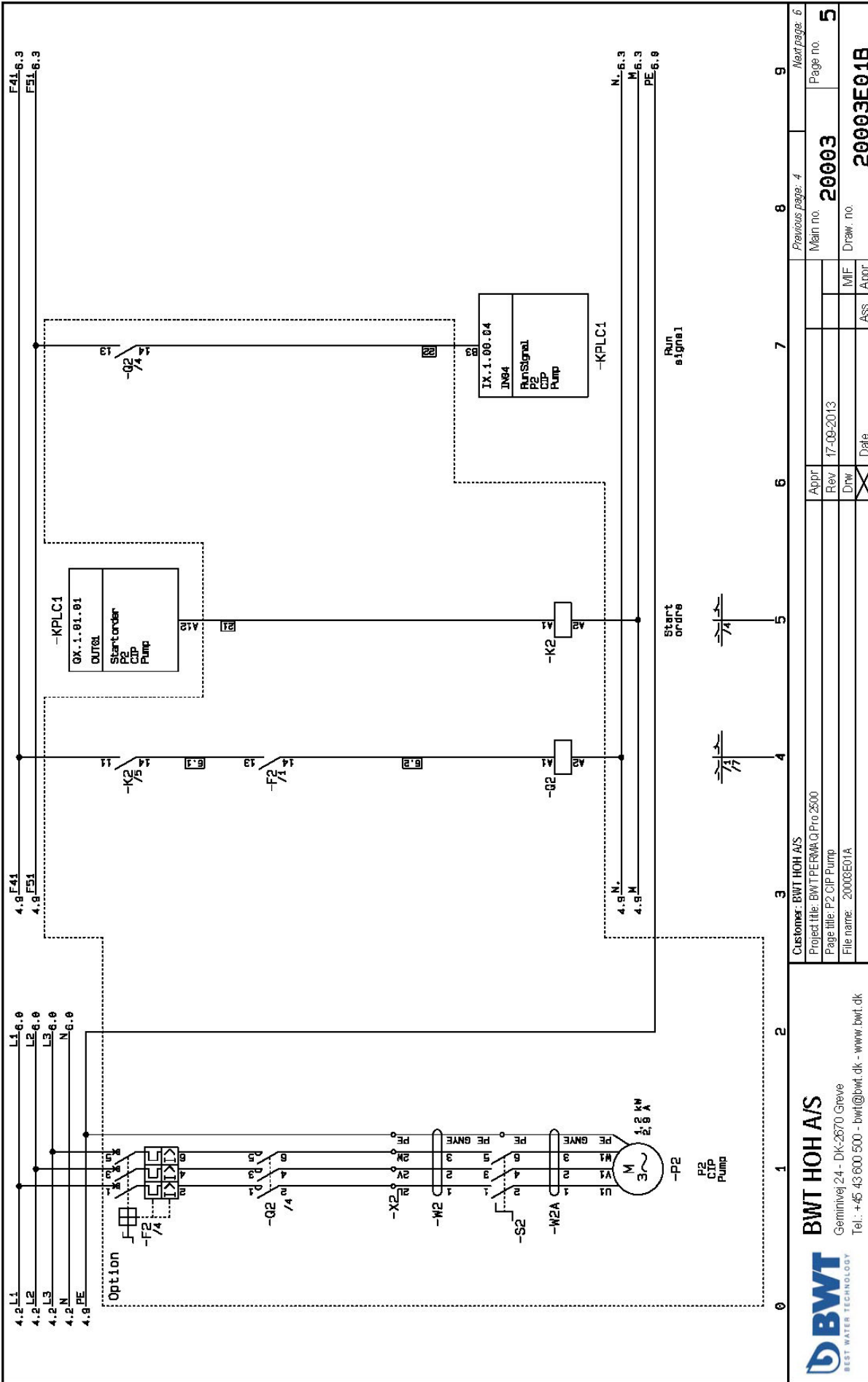
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Page title: PLC Reference: 4 Analog input +2 Analog output		Rev	09-04-2014		
File name: 20003E01A		Draw	MIF		
		Date	20003E01A		



4.2 L1
4.2 L2
4.2 L3
4.2 N
4.2 PE

L1 6.0
L2 6.0
L3 6.0
N 6.0

Option

4.8 F41
4.8 F51

4.9 F41
4.9 F51

4.9 N
4.9 M

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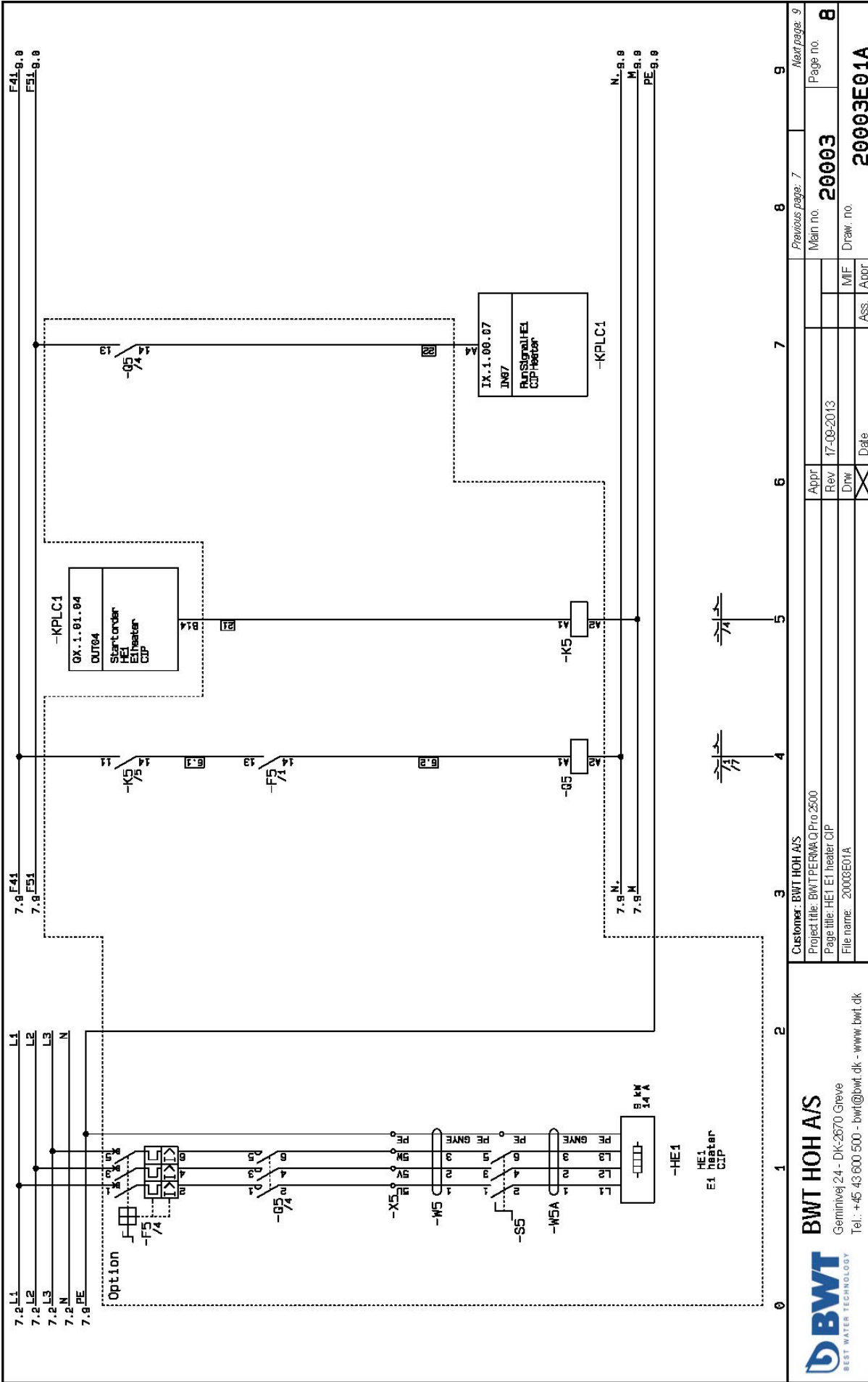
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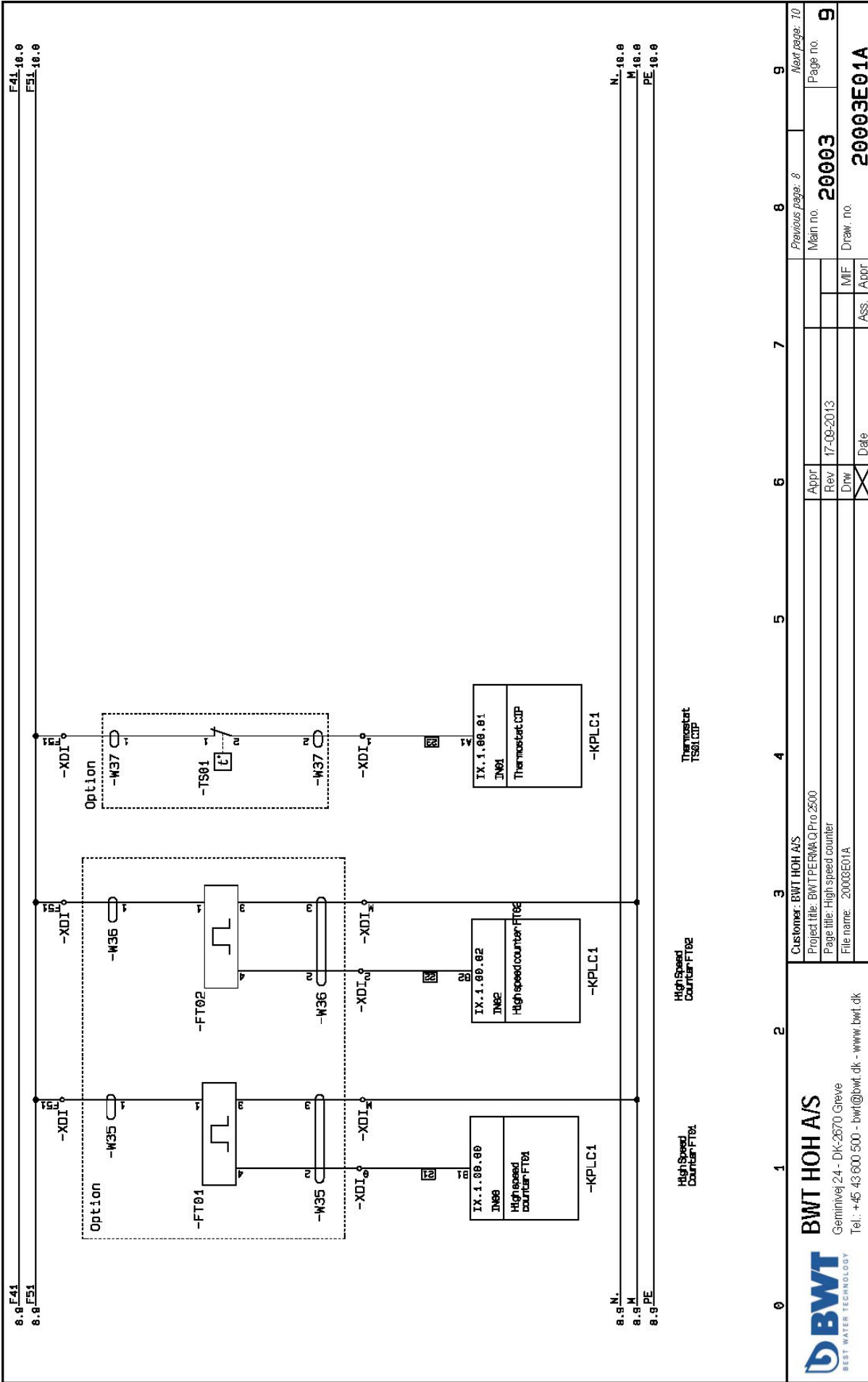
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Page title: P2 CIP Pump		Rev 17-09-2013	
File name: 20003E01A		Drw MIF	Ass. Appr
Date		Draw. no. 20003E01B	

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Customer: BWT HOH AIS		Previous page: 7	8	9
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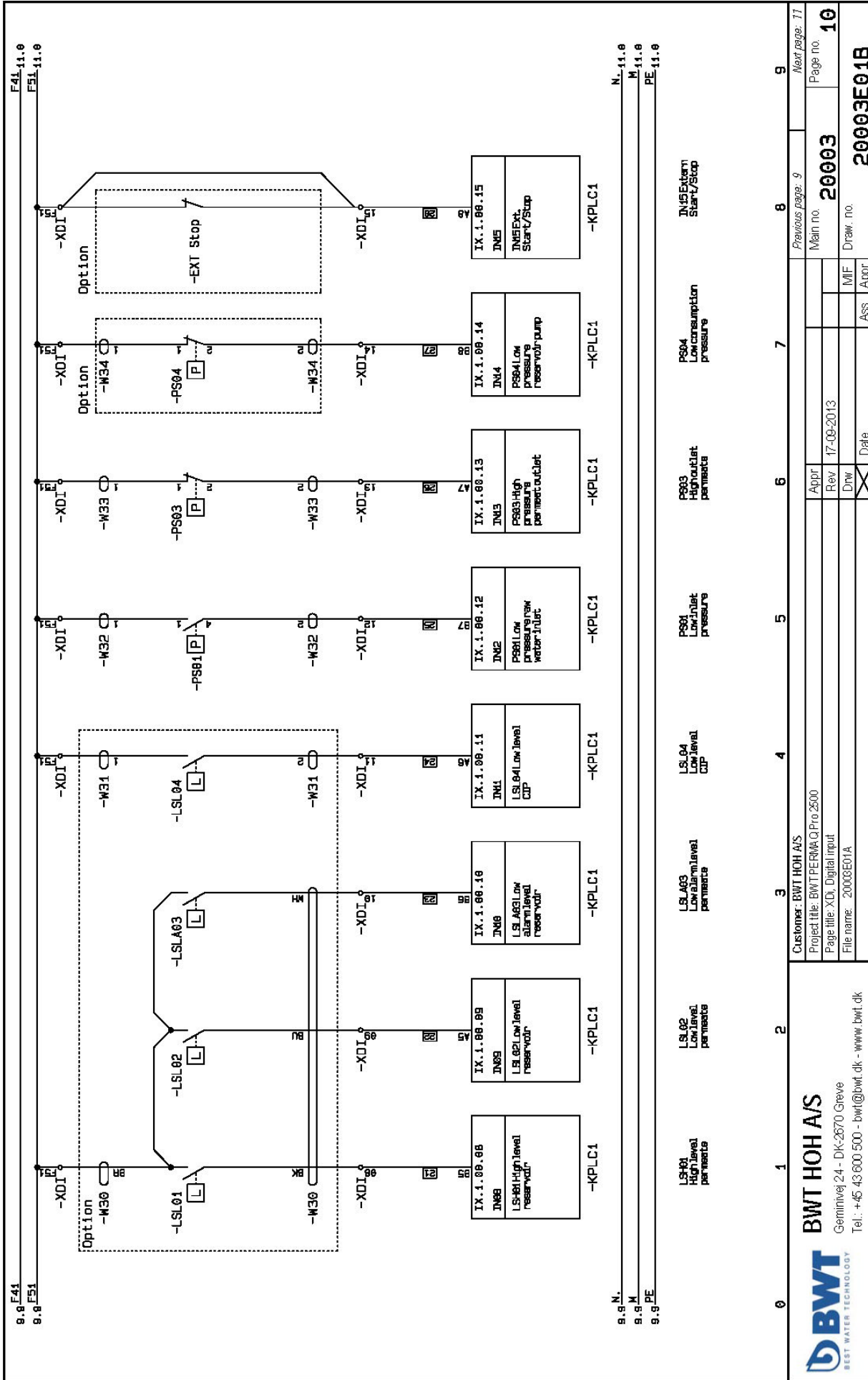
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F51 18.0

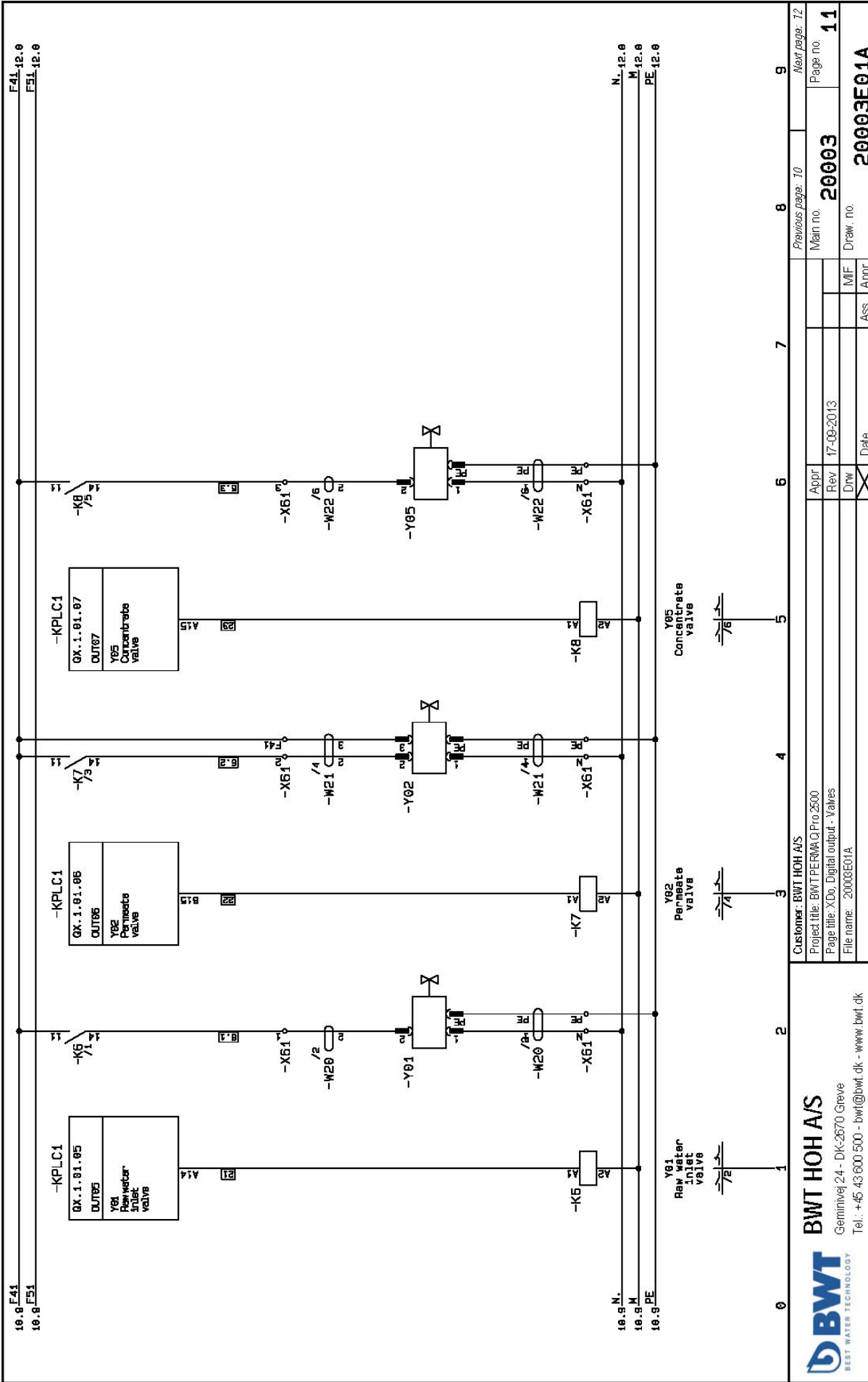
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PE. 18.0

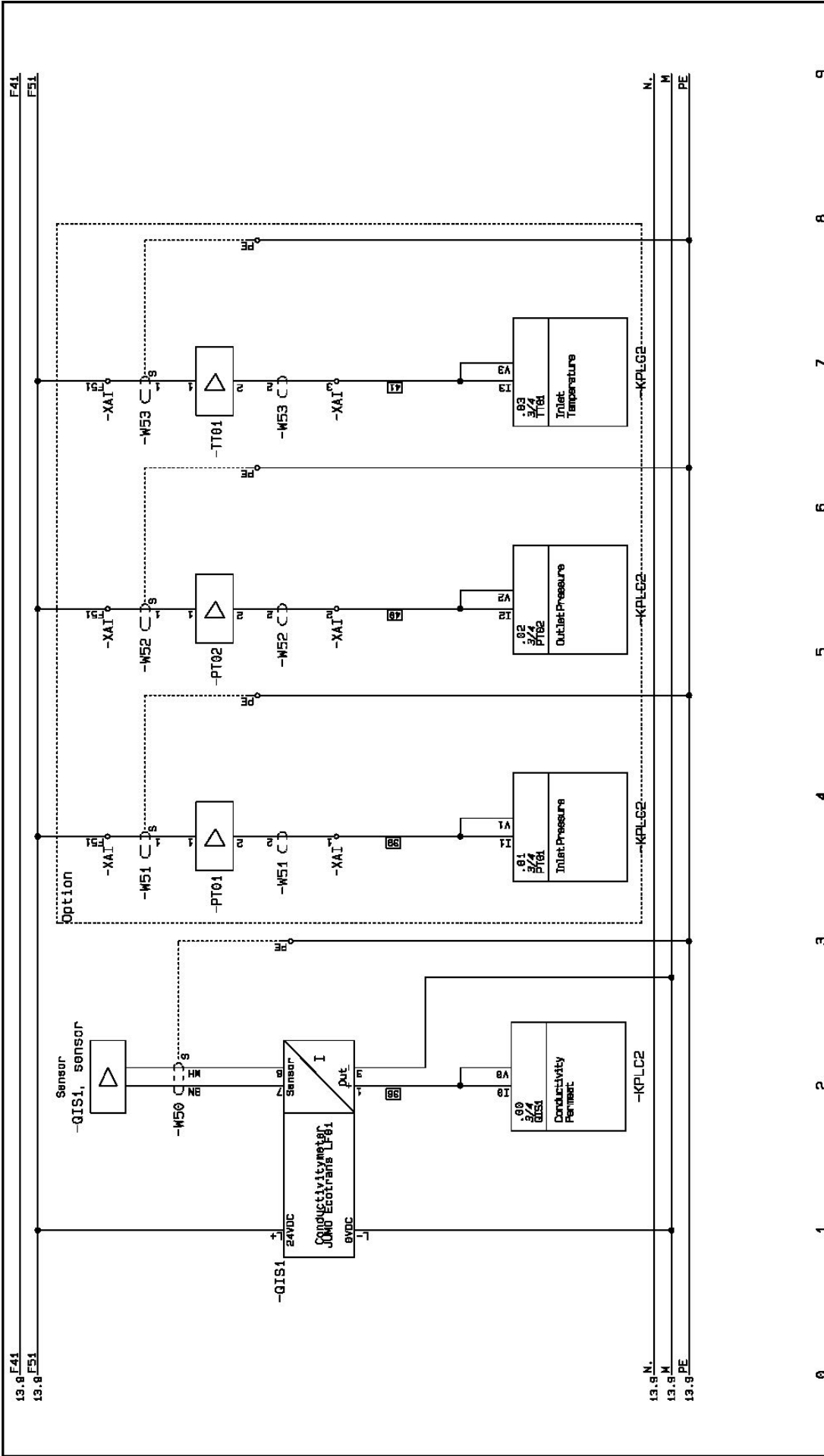
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			<p>Appr. _____ Rev. 17-09-2013 Dnw _____ Date _____</p>			<p>Ass. _____ MIF _____</p>			





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Project title: BWT PERMIO Pro 2500																	
Page title: XDo, Digital output - Valves																	
File name: 20003E01A																	
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Appr.	Date	Ass.	Appr.														
Rev 17-09-2013		IMF															
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13.9 F41	13.9 F51	13.9 N	13.9 M	13.9 PE	0	1	2	3	4	5	6	7	8	9
<p>BWT BEST WATER TECHNOLOGY</p> <p>BWT HOH A/S Geminivej 24 - DK-2670 Greve Tel.: +45 43 600 500 - bwt@bwt.dk - www.bwt.dk</p>														
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<p>Main no. 20003 Page no. 14</p>														
<p>Draw. no. 20003E01B</p>														
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Pos.	Component names	Description	Part no.	Type	Manufacturer	Position
1	-F1	Circuit-breaker 800, cl.10, A-udl, 7-10A, N-udl, 130A screw	4011208712482	3RV2011-1JA10	SIEMENS	4/1
2	-F1*	Circuit-breaker 800, cl.10, A-udl, 14...20A, N-udl, 280A screw	4011208712522	3RV2021-4BA10	SIEMENS	4/0
3	-F2	Circuit-breaker 800, cl.10, A-udl, 2.8-4A, N-udl, 52A screw	4011208712464	3RV2011-1EA10	SIEMENS	5/1
4	-F2	Transverse aux. switch 1NO+1NC screw	4011208730084	3RV2301-1E	SIEMENS	5/4
5	-F3	Circuit-breaker 800, cl.10, A-udl, 3.5-5A, N-udl, 65A screw	4011208712461	3RV2011-1FA10	SIEMENS	6/1
6	-F3	Transverse aux. switch 1NO+1NC screw	4011208730084	3RV2301-1E	SIEMENS	6/4
7	-F4	Miniature Circuit-Breaker 1P+N 0.8A	5SY6 506-7	5SY6 506-7	Siemens	7/1
8	-F5	Circuit-breaker 80, cl.10, A-udl, 11-16A, N-udl, 208A screw	4011208712515	3RV2021-4A410	SIEMENS	8/1
9	-F5	Transverse aux. switch 1NO+1NC screw	4011208730084	3RV2301-1E	SIEMENS	8/4
10	-F39	Miniature Circuit-Breaker 1P+N 0.8A	5SY6 506-7	5SY6 506-7	Siemens	1/3
11	-K1	Auxiliary relay, 2P 8A, 24VDC LED	750001326	RCIKIT24 VDC 200 LD/FPB	Weidmüller	4/4
12	-K2	Auxiliary relay, 2P 8A, 24VDC LED	750001326	RCIKIT24 VDC 200 LD/FPB	Weidmüller	5/5
13	-K3	Auxiliary relay, 2P 8A, 24VDC LED	750001326	RCIKIT24 VDC 200 LD/FPB	Weidmüller	6/6
14	-K4	Auxiliary relay, 2P 8A, 24VDC LED	750001326	RCIKIT24 VDC 200 LD/FPB	Weidmüller	7/5
15	-K5	Auxiliary relay, 2P 8A, 24VDC LED	750001326	RCIKIT24 VDC 200 LD/FPB	Weidmüller	8/5
16	-K6	Auxiliary relay, 2P 8A, 24VDC LED	750001326	RCIKIT24 VDC 200 LD/FPB	Weidmüller	11/1
17	-K7	Auxiliary relay, 2P 8A, 24VDC LED	750001326	RCIKIT24 VDC 200 LD/FPB	Weidmüller	11/3
18	-K8	Auxiliary relay, 2P 8A, 24VDC LED	750001326	RCIKIT24 VDC 200 LD/FPB	Weidmüller	11/5
19	-K9	Auxiliary relay, 2P 8A, 24VDC LED	750001326	RCIKIT24 VDC 200 LD/FPB	Weidmüller	13/1
20	-K100	GSM Modem	G21501	G21501	Moxa OneCell	1/7
21	-KPLC1	PLC/HMI Logic-touch series, 5,7" monochrome HMI, 16 D/16 DO	LT3301-L1-D24-C	LT3301-L1-D24-C	Pro-face	2
22	-KPLC1	PLC/HMI Logic-touch series, 5,7" monochrome HMI, 16 D/16 DO	LT3301-L1-D24-C	LT3301-L1-D24-C	Pro-face	2
23	-KPLC2	Analog input module 4 x AI + 2 x AO, 0-10V/4-20mA	750001283	EXM-AMM6HT	Pro-face	3/2
24	-Q1	SOFTSTARTER 500, 7.5KW/400V, 230V	4011208719688	3RW6018-1BB14	Siemens	4/1
25	-Q2	Contact. AC-3, 3kW/400V, 1NO, AC 230V, 50/60 HZ, 3-pole, 500 screw	4011208730767	3RT2015-1AP01	SIEMENS	5/4
26	-Q3	Contact. AC-3, 3kW/400V, 1NO, AC 230V, 50/60 HZ, 3-pole, 500 screw	4011208730767	3RT2015-1AP01	SIEMENS	6/4
27	-Q5	Contact. AC-3, 4kW/400V, 1NO, AC 230V, 50/60 HZ, 3-pole, 500 screw	4011208733304	3RT2016-1AP01	SIEMENS	8/4
28	-QIS1	Conductivity transmitter 24VDC, 4-20mA	JUMO Ecotrans LP01	JUMO Ecotrans LP01	JUMO	14/1
29	-QIS1, sens or	Sensor JUMO Conductivity Sensor JUMO Conductivity	Sensor JUMO Conductivity	Sensor JUMO Conductivity	JUMO	14/2
30	-S0	MAIN CONTROL SWITCH 3-POLE ILE=32, PIAC=32A AT 400V	4011208402277	3LD2244-0TK51	Siemens	1/1
31	-S0N	N-CONDUCTOR LEADING FOR BASE MOUNTING UP TO 32A (A	4011208403970	3LD9220-0C	Siemens	1/1
32	-S2	Isolator switch, 3p 16A IP65	3LD0064-0TB51	3LD0064-0TB51	Siemens	5/1
33	-S3	Isolator switch, 3p 16A IP65	3LD0064-0TB51	3LD0064-0TB51	Siemens	6/1
34	-S5	Isolator switch, 3p 16A IP65	3LD0064-0TB51	3LD0064-0TB51	Siemens	8/1
35	-T1	Power supply, Combit- 230VAC/230VAC/24VDC	24RC-0TB8107	24RC-0TB8107	Noratel	1/4
36	-W1	Flexible cards, Grey, Tr-500 m	57.05152.033122	Flex Y-JZ 4G1.5	Nexans	4/1
37	-W2	Flexible cards, Grey, Tr-500 m	57.05152.033122	Flex Y-JZ 4G1.5	Nexans	5/1
38	-W2A	Flexible cards, Grey, Tr-500 m	57.05152.033122	Flex Y-JZ 4G1.5	Nexans	5/1
39	-W3	Flexible cards, Grey, Tr-500 m	57.05152.033078	Flex Y-JZ 3G1.5	Nexans	5/1
40	-W3A		4G1.5 mm² H07RNLF	4G1.5 mm² H07RNLF		6/1
41	-W4		3G0.75 mm² H06VNF-F	3G0.75 mm² H06VNF-F		7/1
42	-W5	Flexible cards, Grey, Tr-500 m	57.05152.034129	Flex Y-JZ 4G2.5	Nexans	8/1
43	-W5A	Flexible cards, Grey, Tr-500 m	57.05152.034129	Flex Y-JZ 4G2.5	Nexans	8/1
44	-W10		5 x 0.34 LIYY	5 x 0.34 LIYY		7/6
45	-W11		3 x 0.75 mm² LIYY	3 x 0.75 mm² LIYY		7/7

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Page title: Component list

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Customer: BWT HOH A/S

Project file: BWT PERMAQ Pro 2500

Page title: Component list

File name: 20003E01A

Pos.	Component names	Description	Part no.	Type	Manufacturer	Position
46	-WZ0			30,75 mm ² Multiflex		112
47	-WZ1			40,75 mm ² Multiflex		114
48	-WZ2			30,75 mm ² Multiflex		116
49	-WZ0			4 x 0,75 mm ² Multiflex		101
50	-WZ1			2 x 0,75 mm ² Multiflex		104
51	-WZ2			2 x 0,75 mm ² Multiflex		105
52	-WZ3			2 x 0,75 mm ² Multiflex		106
53	-WZ4			2 x 0,75 mm ² Multiflex		107
54	-WZ5			3 x 0,75 mm ² Multiflex		91
55	-WZ6			3 x 0,75 mm ² Multiflex		93
56	-WZ7			2 x 0,75 mm ² Multiflex		94
57	-WZ0			2 x 0,34 LIYY + S		142
58	-WZ1			2 x 0,34 LIYY + S		144
59	-WZ2			2 x 0,34 LIYY + S		145
60	-WZ3			2 x 0,34 LIYY + S		147
61	-WRS232		RS232	RS232		18
62	-X1		102000	WDU 2.5		41
63	-X1	Feed through terminal screwscrew	5706472157896	WDU 2.5 102000 rntmont. Skru	Weidmüller	41
64	-X2		102000	WDU 2.5		51
65	-X3		102000	WDU 2.5		61
66	-X4		102000	WDU 2.5		71
67	-X5		102000	WDU 2.5		81
68	-X6		104110	WDK 2.5 ZQV		77
69	-X61		102000	WDU 2.5		112
70	-X63		102000	WDU 2.5		132
71	-X65		102000	WDU 2.5		132
72	-X41		4008190169627	WDU 2.5		144
73	-XDI		104110	WDK 2.5 ZQV		91
74	-XDO		104110	WDK 2.5 ZQV		121
75	-XF41	Double feed through terminal screwscrew 2,5mm ²	4008190169627	WDK 2.5	Weidmüller	15
76	-XF41N	Double feed through terminal screwscrew 2,5mm ²	4008190169627	WDK 2.5	Weidmüller	15
77	-XF51	Double feed through terminal screwscrew 2,5mm ²	4008190169627	WDK 2.5	Weidmüller	15
78	-XF51M	Double feed through terminal screwscrew 2,5mm ²	4008190169627	WDK 2.5	Weidmüller	15
79	-XPE	PE-Busbar	PE-Busbar	PE-Busbar	Weidmüller	11
80	-XPE1	PE-Busbar	PE-Busbar	PE-Busbar	Weidmüller	61
81	-XPE3	PE-Busbar	PE-Busbar	PE-Busbar	Weidmüller	146
82	-XPE4	PE-Busbar	PE-Busbar	PE-Busbar	Weidmüller	148
83						
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	Date				



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Pos.	Terminal no.	:Pin	Function	Part no.	Type	Position	Cable name	To	:Pin
1	-KPLC1	0		LT3801-L1-D24-C	LT3801-L1-D24-C	2	PLCHMI Logic touch series, 5,7" monochrome HMI, 16 DIN/16 DO		
2									
3	-X1	1U		5709472157686	WDU 2,5 102000 rdtmont. Skru	41	-W1	-P1	-U1
4	-X1	1V		102000	WDU 2,5	41	-W1	-P1	-V1
5	-X1	1W		102000	WDU 2,5	41	-W1	-P1	-W1
6									
7	-X2	2U		102000	WDU 2,5	51	-W2	-S2	:1
8	-X2	2V		102000	WDU 2,5	51	-W2	-S2	:3
9	-X2	2W		102000	WDU 2,5	51	-W2	-S2	:5
10									
11	-X3	3N		102000	WDU 2,5	61	-W3	-S3	:3
12	-X3	3U		102000	WDU 2,5	61	-W3	-S3	:1
13									
14	-X4	4N		102000	WDU 2,5	71	-W4	-P5	:N
15	-X4	4U		102000	WDU 2,5	71	-W4	-P5	:L
16									
17	-X5	5U		102000	WDU 2,5	81	-W5	-S5	:1
18	-X5	5V		102000	WDU 2,5	81	-W5	-S5	:3
19	-X5	5W		102000	WDU 2,5	81	-W5	-S5	:5
20									
21	-X60	1		104110	WDK 2,5 ZGM	77	-W10	-P5	:1
22	-X60	2		104110	WDK 2,5 ZGM	77	-W10	-P5	:2
23	-X60	F51		104110	WDK 2,5 ZGM Alarm signal	77	-W11	-P5	:3
24	-X60	3		104110	WDK 2,5 ZGM	77	-W11	-P5	:4
25									
26	-X61	F41		102000	WDU 2,5	114	-W21	-Y02	:3
27	-X61	1		102000	WDU 2,5	112	-W20	-Y01	:2
28	-X61	2		102000	WDU 2,5	114	-W21	-Y02	:2
29	-X61	3		102000	WDU 2,5	116	-W22	-Y05	:2
30	-X61	N		102000	WDU 2,5	112	-W22	-Y05	:1
31	-X61	N		102000	WDU 2,5	112	-W21	-Y02	:1
32	-X61	N		102000	WDU 2,5	112	-W20	-Y01	:1
33									
34	-X63	2		102000	WDU 2,5	132			
35	-X63	3		102000	WDU 2,5	132			
36									
37	-X65	1		102000	WDU 2,5	132			
38									
39	-X41	1		4008190465149	WDU 2,5	144	-KPLC2	-KPLC2	:11
40	-X41	2		4008190465149	WDU 2,5	145	-KPLC2	-KPLC2	:2
41	-X41	3		4008190465149	WDU 2,5	147	-KPLC2	-KPLC2	:3
42	-X41	F51		4008190465149	WDU 2,5	144	-W51	-PT01	:1
43	-X41	F51		4008190465149	WDU 2,5	145	-W52	-PT02	:1
44	-X41	F51		4008190465149	WDU 2,5	147	-W53	-TT01	:1
45									

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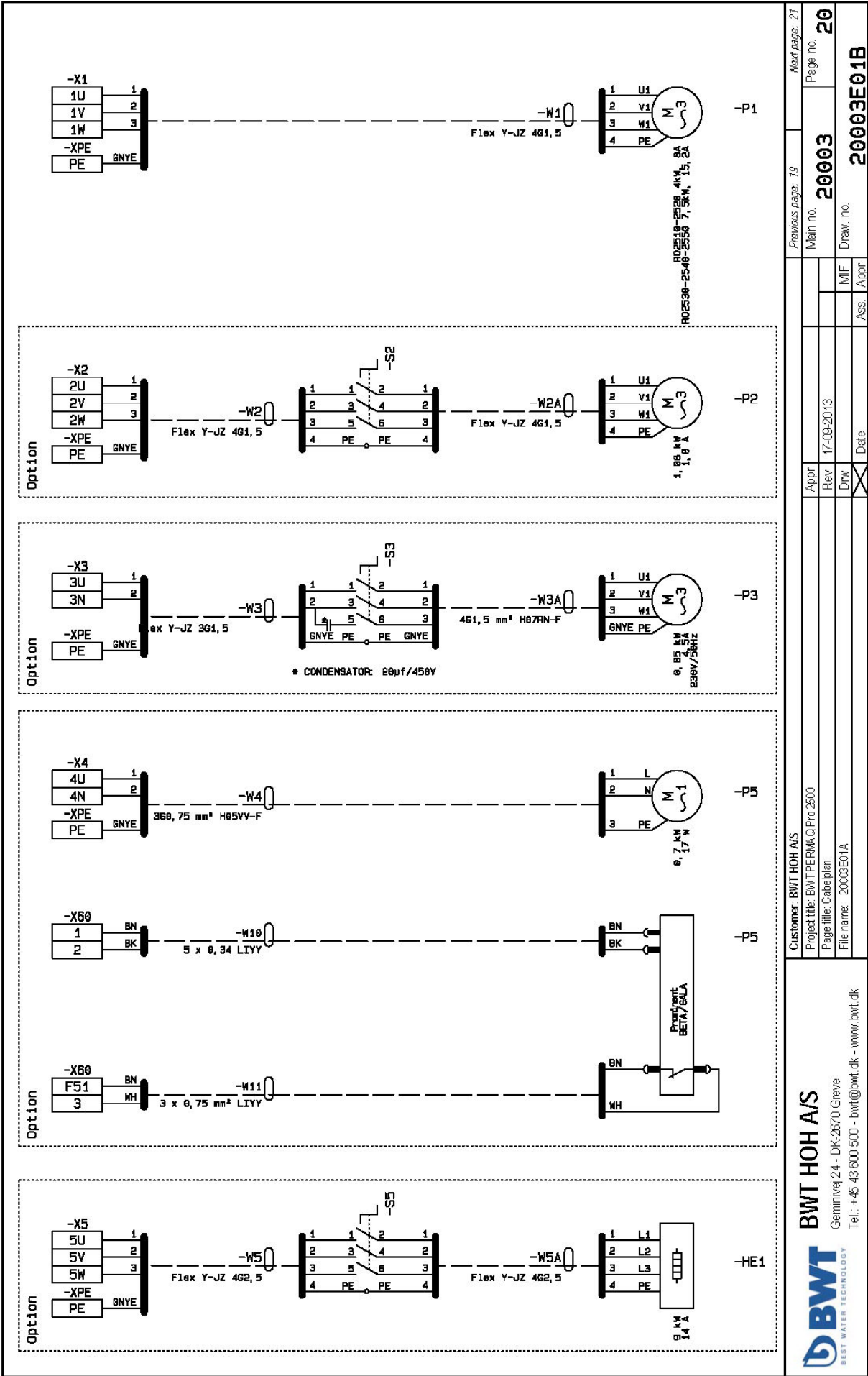
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Pos.	Terminal no.	:Pin	Function	Part no.	Type	Position	Cable name	To	:Pin
46	-XDI	M		104110	WDK 2,5 ZON	92	-W36	-FT02	:3
47	-XDI	M		104110	WDK 2,5 ZON	92	-W35	-FT01	:3
48	-XDI	F51		104110	WDK 2,5 ZON	101	-W30	-LSL01	:1
49	-XDI	08		104110	WDK 2,5 ZON	101	-W30	-LSL01	:2
50	-XDI	09		104110	WDK 2,5 ZON	102	-W30	-LSL02	:2
51	-XDI	10		104110	WDK 2,5 ZON	103	-W30	-LSLA03	:2
52	-XDI	F51		104110	WDK 2,5 ZON	104	-W31	-LSL04	:1
53	-XDI	11		104110	WDK 2,5 ZON	104	-W31	-LSL04	:2
54	-XDI	F51		104110	WDK 2,5 ZON	105	-W32	-P301	:1
55	-XDI	12		104110	WDK 2,5 ZON	105	-W32	-P301	:4
56	-XDI	F51		104110	WDK 2,5 ZON	106	-W33	-P303	:1
57	-XDI	13		104110	WDK 2,5 ZON	106	-W33	-P303	:2
58	-XDI	F51		104110	WDK 2,5 ZON	107	-W34	-P304	:1
59	-XDI	14		104110	WDK 2,5 ZON	107	-W34	-P304	:2
60	-XDI	F51		104110	WDK 2,5 ZON	108	-EXT Stop	-EXT Stop	:1
61	-XDI	F51		104110	WDK 2,5 ZON	108	-XDI	-XDI	:15
62	-XDI	15		104110	WDK 2,5 ZON	108	-EXT Stop	-EXT Stop	:2
63	-XDI	15		104110	WDK 2,5 ZON	108	-EXT Stop	-EXT Stop	:2
64	-XDI	F51		104110	WDK 2,5 ZON	92	-W36	-FT02	:1
65	-XDI	F51		104110	WDK 2,5 ZON	92	-W35	-FT01	:1
66	-XDI	0		104110	WDK 2,5 ZON	91	-W35	-FT01	:4
67	-XDI	2		104110	WDK 2,5 ZON	92	-W36	-FT02	:4
68	-XDI	1		104110	WDK 2,5 ZON	94	-W37	-T301	:2
69	-XDI	F51		104110	WDK 2,5 ZON	94	-W37	-T301	:1
70									
71	-XDO	M		104110	WDK 2,5 ZON	121			
72	-XDO	8		104110	WDK 2,5 ZON	121			
73	-XDO	M		104110	WDK 2,5 ZON	122			
74	-XDO	9		104110	WDK 2,5 ZON	122			
75	-XDO	M		104110	WDK 2,5 ZON	123			
76	-XDO	10		104110	WDK 2,5 ZON	123			
77	-XDO	M		104110	WDK 2,5 ZON	124			
78	-XDO	11		104110	WDK 2,5 ZON	124			
79	-XDO	M		104110	WDK 2,5 ZON	125			
80	-XDO	12		104110	WDK 2,5 ZON	125			
81	-XDO	13		104110	WDK 2,5 ZON	126			
82	-XDO	M		104110	WDK 2,5 ZON	127			
83	-XDO	14		104110	WDK 2,5 ZON	127			
84									
85	-XF41	F41		4008190163627	WDK 2,5	15			
86	-XF41	F41		4008190163627	WDK 2,5	15			
87									
88	-XF41N	N		4008190163627	WDK 2,5	15			
89	-XF41N	N		4008190163627	WDK 2,5	15		-T1	:N
90									

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Customer: BWT HOH A/S		Project title: BWT PERMAQ Pro 2500	
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Appr.		MF	
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Pos.	Terminal no.	:Pin	Function	Part no.	Type	Position	Cable name	To	:Pin
91	-XF51	F51		4008190169627	WDK 2,5	1/5		-XF51	:F51
92	-XF51	F51		4008190169627	WDK 2,5	1/5		-XF51	:F51
93	-XF51	F51		4008190169627	WDK 2,5	1/5		-T1	:L+
94									
95	-XF51M	M		4008190169627	WDK 2,5	1/5			
96	-XF51M	M		4008190169627	WDK 2,5	1/5		-T1	:L-
97									
98	-XPE1	PE		PE-Busbar	PE-Busbar	6/1	-WS	-SS	:PE
99									
100	-XPE3	PE		PE-Busbar	PE-Busbar	14/6			
101									
102	-XPE4	PE		PE-Busbar	PE-Busbar	14/8			
103									
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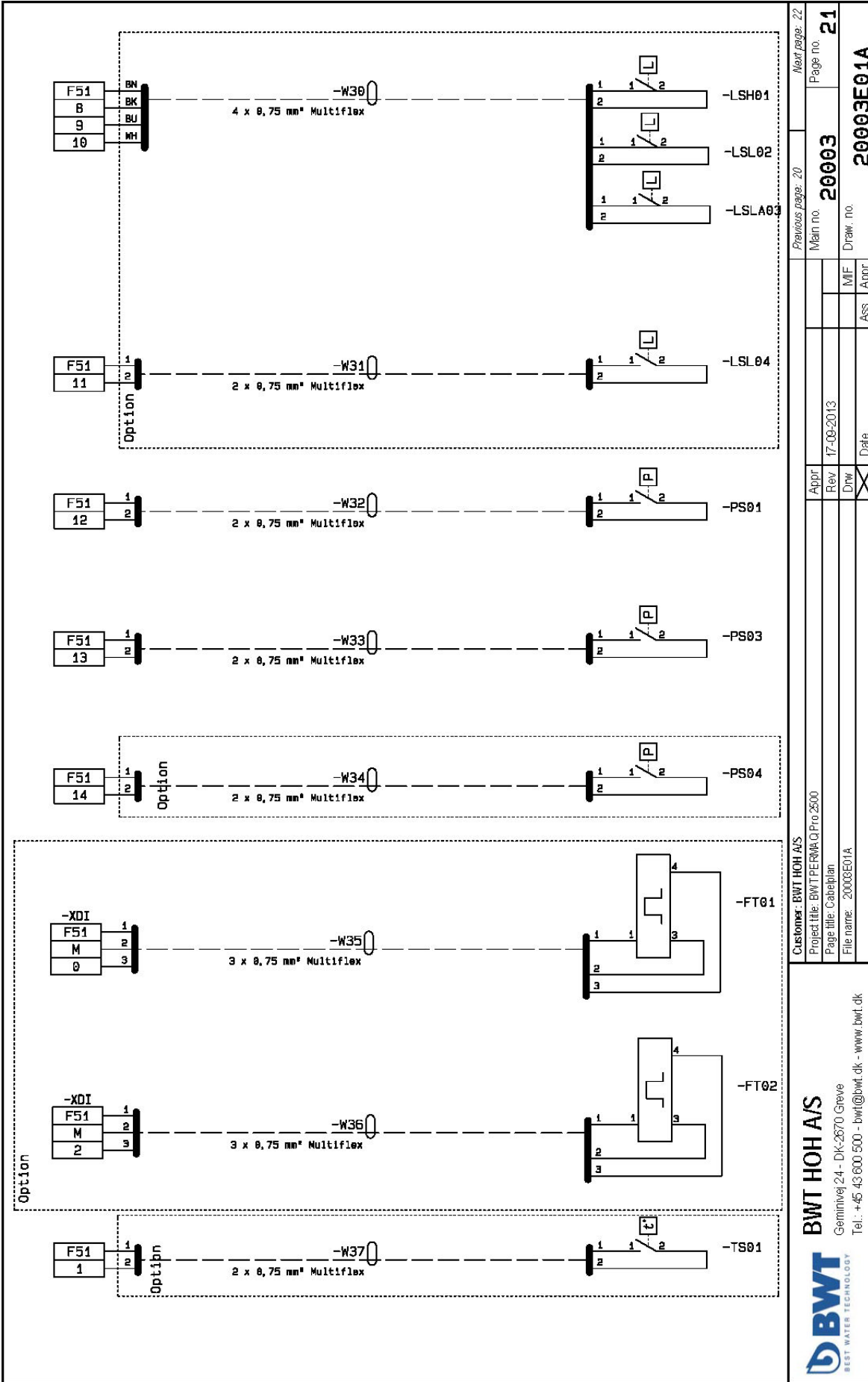
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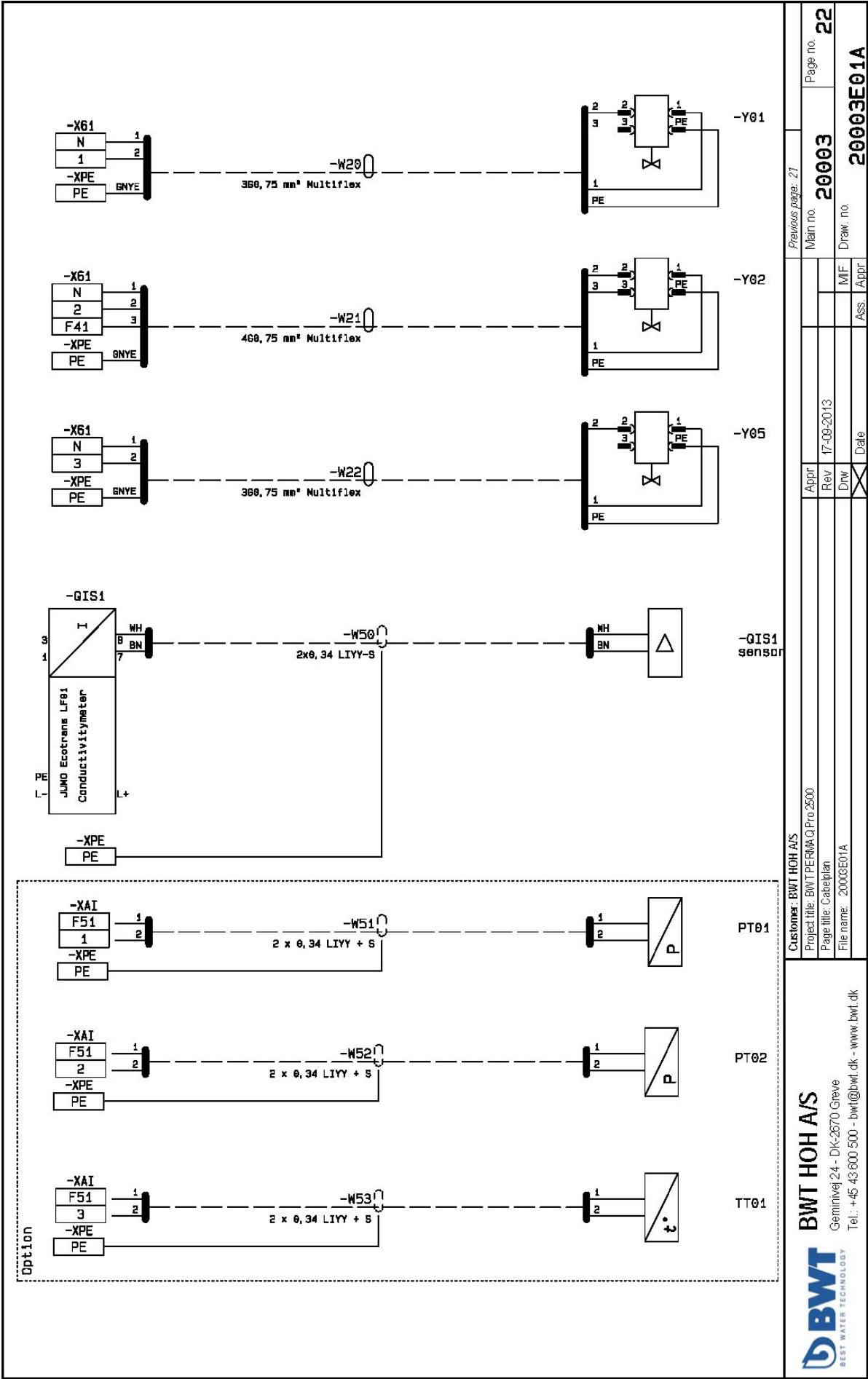
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File name: 20003E01A		Ass. MIF	Appr.
		Date	

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