



J. & P. RICHARDSON INDUSTRIES PTY. LTD.
A.C.N. 001 952 325

BRISBANE CITY COUNCIL

LAWSON PLACE

SEWER PUMPING STATION *Nº280*



OPERATION AND MAINTENANCE MANUAL

BY
J & P RICHARDSON INDUSTRIES PTY LTD
CAMPBELL AVENUE WACOL BRISBANE 4076
ACN. 001 952 325
Ph. (07) 3271 2911
Fax. (07) 3271 3623

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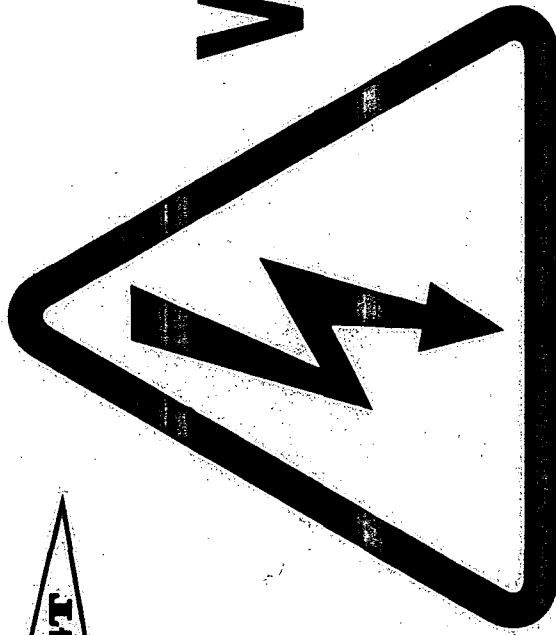
3.0 TELEMETRY

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JPR Ref:- (A19695.001)

Revision 0

March 26, 1999



WARNING!

***Turn off and lock the isolating switch
before working on the machine.***

• 592 05 02 •

**Position the sign
so that it is easily visible at the
connection to the power supply.**

Flygt 592 05 02

Svep Reklam, Emmaboda

3417L/LB

1.0 PUMPS

SUPPLIER:

ITT FLYGT LTD
14A DEVLAN STREET
MANSFIELD QLD 4122

PH : (07) 3849 7477
FAX: (07) 3849 7633

MODEL

SERIAL NO: 9880020 & 9880022
MOTOR KW RATING: 25KW
MOTOR SPEED: 1455RPM
FULL LOAD CURRENT: 40A
VOLTAGE: 415V



~~3126/3140/3152/~~
~~3170/3201/3300~~

INSTALLATION, CARE AND MAINTENANCE



ITT Flygt

An **ITT Industries** company

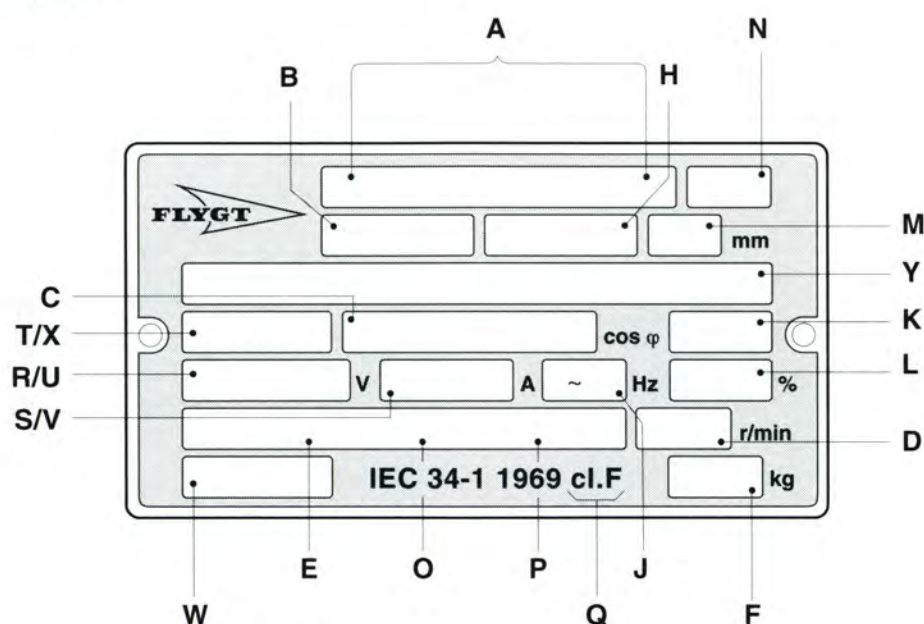
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DATA PLATE INTERPRETATION

General data plate



A	Product No.	N	Factory code
B	Serial No.	O	* Gear ratio
C	Shaft power	P	* Direction of rotation: L=left, R=right
D	Rated speed	Q	Temperature class
E	* Propeller speed	R/U	Rated voltage
F	Weight	S/V	Rated current
H	Curve code, first digit = Number of poles	T/X	Stator connection
J	Number of phases, type of current, frequency	W	Special order No.
K	Power factor	Y	Motor No.
L	Operating duty, cont./int.		
M	Impeller/propeller diam.		
			* For mixers

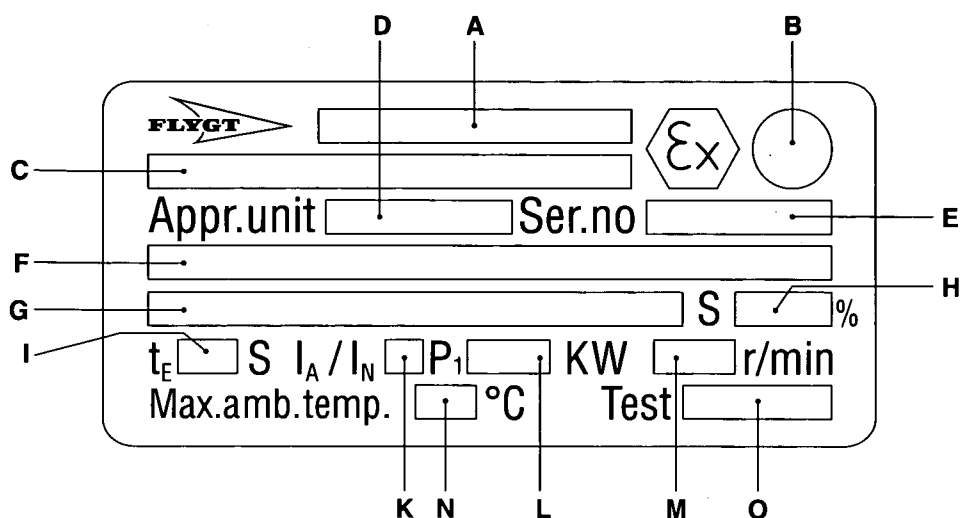
The pictures in this manual may differ somewhat from the delivered pump depending on the hydraulic end configuration.

DATA PLATE INTERPRETATION

Approval plates

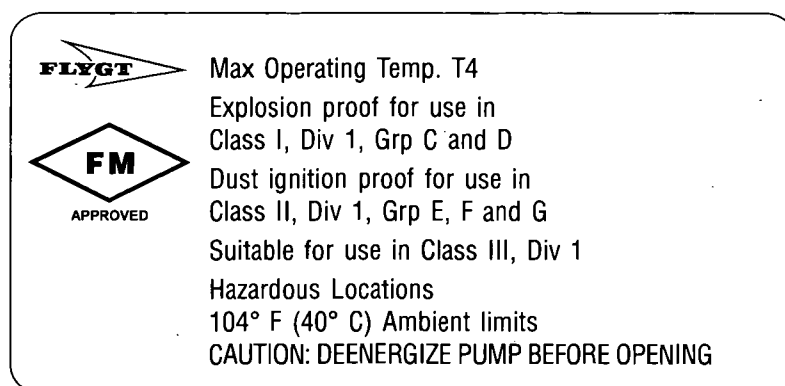
These approval plates apply to an explosion-proof submersible Flygt pump. The plates are used together with the general data plate on the pump.

EN: European Norm
EN 50014, EN 50018, EEx dII T4



A	Approval	I	Stall time
B	For Class I approval	K	Starting current/Rated current
C	Approval no.	L	Input power
D	Approved drive unit	M	Speed
E	Serial no.	N	Max. ambient temp.
F, G	Additional information	O	Controller
H	Operating duty, cont./int.		

FM: Factory Mutual
Class I Div. I Grp C and D
Class II and III Div. I Grp E, F and G



PRODUCT DESCRIPTION

Introduction

Thank you for buying a submersible Flygt pump. In this Installation, Care and Maintenance manual you will find general information on how to install and service the 3126, 3140, 3152, 3170, 3201 or 3300 pump to give it a long and reliable life. In the Parts List you will find all the specific technical data for your pump.

Application

This Installation, Care and Maintenance manual applies to a submersible Flygt pump. If you have bought an Ex-approved pump (please see approval plate on your pump or Parts List) special handling instructions apply as described in this document.

Depending on the hydraulic end, the pump is intended to be used for:

- pumping of waste water
- pumping of light liquid manure and urine
- pumping of sludge
- pumping of ground water
- pumping of sewage if the solids need to be cut into small pieces.

The pumps must not be used in highly corrosive liquids. See pH limits below.

The pump is available for permanent installation in a sump or portable installation with hose connection and stand.

In some applications, the pump is also available for a dry stationary installation on a base stand directly connected to the inlet and outlet lines.

For further information on applications, contact your nearest Flygt representative.

Specific technical data

For specific technical data regarding your pump, please see Parts List.

General technical data

Liquid temperature: max. 40°C (104°F). If the pump is not equipped with cooling jacket, the pump can be operated at full load only if at least half the stator housing is submerged.

The pump can be equipped for operation at temperatures up to 90°C (195°F). At increased temperatures, the pump must be completely submerged when operated at full load.

Higher temperatures than 40°C (104°F) are not permitted for Ex-approved pumps.

Liquid density: max. 1100 kg/m³ (9.2 lb per US gal.)

The pH of the pumped liquid: 6—13 (for cast iron pumps).

The pH of the pumped liquid: 3—14 (for stainless steel pumps).

Depth of immersion: max. 20 m (65 ft).



- In some installations and at certain operating points on the performance curve, the noise level of 70 dB or the noise level specified for the actual pump may be exceeded.
- Only Ex-approved pumps may be used in an explosive or flammable environment.

Warranty claim

Flygt pumps are high quality products with expected reliable operation and long life. However, should the need arise for a warranty claim, please contact your Flygt representative.

GENERAL DESIGN OF A FLYGT PUMP

Design

The pump is a submersible, electric motor-driven product.

1. Impeller

The pump is available with a wide range of impellers for different applications and capacities.

2. Shaft seals

The pump has two mechanical face seals – one inner and one outer, with an intermediate oil housing.

3. Shaft

The shaft is delivered with the rotor as an integral part. Shaft material: stainless steel or carbon steel.

4. Bearings

The support bearing of the rotor consists of a single-row roller bearing.

The main bearing of the rotor consists of a two-row angular contact ball bearing.

5. Oil housing

The oil lubricates and cools the seals and acts as a buffer between the pump housing and the electric motor.

6. Cooling

The stator is cooled by either the surrounding media or by forced circulation in a cooling jacket.

7. Motor

Squirrel-cage 1-phase or 3-phase induction motor for 50 Hz or 60 Hz.

The motor can be started by direct on-line or star-delta starting.

The motor can be run continuously or intermittently with a maximum of 15 evenly spaced starts per hour.

Flygt motors are tested in accordance with IEC 34-1, 1969.

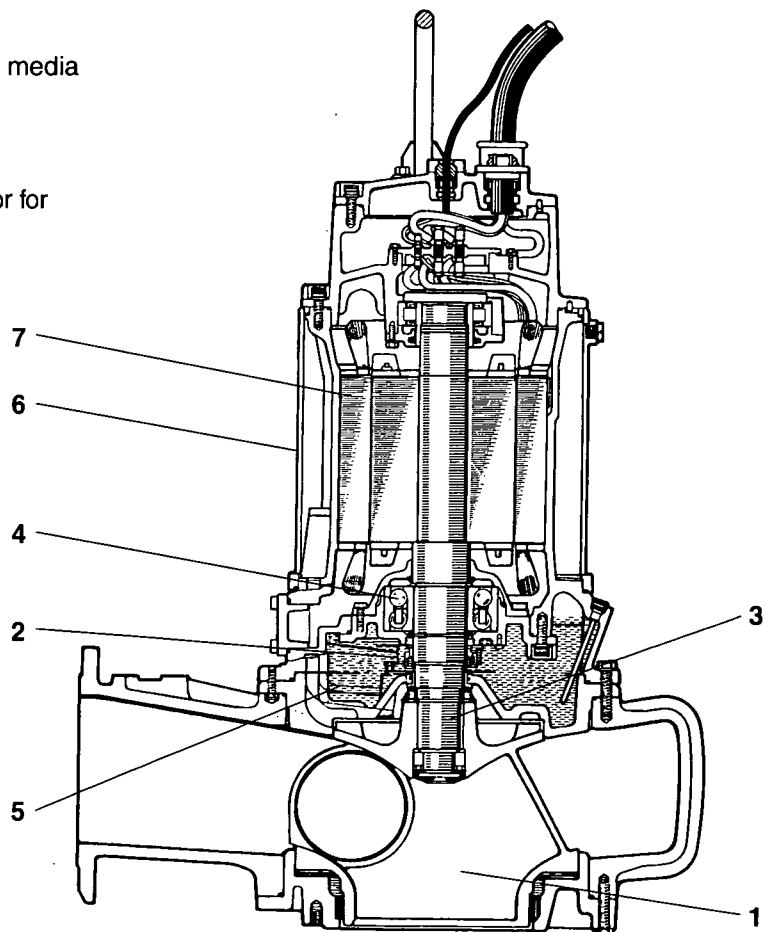
The stator is insulated in accordance with class F (155°C, 310°F). The motor is designed to deliver its rated output at $\pm 5\%$ variation from the rated voltage. Without overheating the motor, $\pm 10\%$ variation from the rated voltage can be accepted provided that the motor does not run continuously at full load. The motor is designed to operate at a voltage imbalance of up to 2% between the phases.

Monitoring equipment

The stator incorporates thermal contacts connected in series.

The pump can be equipped with sensors for sensing water in the oil* and/or stator housing.

*Not applicable to Ex-approved pumps.



INSTALLATION

Handling equipment

Lifting equipment is required for handling the pump.



- **Stay clear of suspended loads.**
- **Always lift the pump by its lifting handle - never by the motor cable or the hose.**

The minimum height between the lifting hook and the floor shall be sufficient to lift the pump out of the sump.

The lifting equipment shall be able to hoist the pump straight up and down in the sump, preferably without the need for resetting the lifting hook.

Oversize lifting equipment could cause damage if the pump should stick when being lifted.

Make sure that the lifting equipment is securely anchored.

General recommendations

To ensure proper installation, please see the dimensions on the dimensional drawing in the Parts List.

NOTE! The end of the cable must not be submerged. It must be above flood level, as water may penetrate through the cable into the junction box or the motor.

Check that the lifting handle and chain are in good condition.

For automatic operation of the pump (level control), it is recommended that the level regulators be used at low voltage. The data sheet delivered with the regulators gives the permissible voltage. Local rules may specify otherwise.

Clean out all debris from the sump before the pump is lowered down and the station is started.



Special rules apply to installation in explosive atmosphere. Intrinsically safe circuits are normally required (Ex i) for the automatic level control system by level regulators.

Safety precautions

In order to minimize the risk of accidents in connection with the service and installation work, the following rules should be followed:

1. Never work alone. Use a lifting harness, safety line and a respirator as required. Do not ignore the risk of drowning!
2. Make sure there are no poisonous gases within the work area.
3. Check the explosion risk before welding or using electric hand tools.
4. Do not ignore health hazards. Observe strict cleanliness.
5. Bear in mind the risk of electrical accidents.
6. Make sure that the lifting equipment is in good condition.
7. Provide a suitable barrier around the work area, e.g a guard rail.
8. Make sure you have a clear path of retreat!
9. Use safety helmet, safety goggles and protective shoes.
10. All personnel who work with sewage systems must be vaccinated against diseases to which they may be exposed.
11. A first-aid kit must be close at hand.
12. Note that special rules apply to installation in explosive atmosphere.

Follow all other health and safety rules and local codes and ordinances.

ELECTRICAL CONNECTIONS



- Before starting work on the pump, make sure that the pump and the control panel are isolated from the power supply and cannot be energized.
- If the pump is equipped with automatic level control, there is a risk of sudden restart.
- All electrical equipment must be earthed. This applies to both pump equipment and any monitoring equipment.

Failure to heed this warning may cause a lethal accident. Make sure that the earth lead is correctly connected by testing it.



NOTE for Ex version

- Electrical connections on the explosion-proof motor must be made by authorized personnel.
Flygt disclaims all responsibility for work done by untrained, unauthorized personnel.
- The pump may be used only in accordance with the approved motor data stated on the pump's plates.
- Thermal contacts must be connected to protection circuit intended for that purpose according to the approval of the product.

All electrical work shall be carried out under the supervision of an authorized electrician.

Local codes and regulations shall be complied with.

Check on the data plate which voltage supply is valid for your pump.

Check that the main voltage and frequency agree with the specifications on the pump data plate.

If the pump can be connected to different voltages, the connected voltage is specified by a yellow sticker.

Connect the motor cable to the starter equipment as illustrated in the wiring diagrams.

Conductors that are not in use must be isolated.

The cable should be replaced if the outer sheath is damaged. Contact a Flygt service shop.

Make sure that the cable does not have any sharp bends and is not pinched.

Under no circumstances may the starter equipment be installed in the sump.

NOTE! For safety reasons, the earth conductor should be approx. 50 mm (2.0") longer than the phase conductors. If the motor cable is jerked loose by mistake, the earth conductor should be the last conductor to come loose from its terminal. This applies to both ends of the cable.

Thermal contacts are incorporated in the stator. The thermal contacts can be connected to max 250 V, breaking current max 4 A. Flygt recommends that they be connected to 24 V over separate fuses to protect the other automatic equipment.

NOTE! If the pump optionally is equipped with thermistors in the stator winding, make sure that the thermistors are never exposed to voltages higher than 2.5 V. If the voltage exceeds this value, e.g. when the control circuit is being checked, the thermistors will be destroyed.

Make sure that the pump is correctly earthed (grounded).

When using a variable-frequency-drive (VFD) special rules have to be followed to avoid clogging and overheating. Contact your Flygt representative and ask your VFD-supplier for electrical limitations.

ELECTRICAL CONNECTIONS

Remember that the starting current in direct on-line starting can be up to six times higher than the rated current. Make sure that the fuses or circuit breakers are of the proper rating.

The Parts List gives rated current. Fuse rating and cable shall be selected in accordance with local rules and regulations. Note that with long cables, the voltage drop in the cable must be taken into consideration, since the motor's rated voltage is the voltage that is measured at the terminal board in the pump.

The overload protection (motor protection breaker) for direct on-line starting shall be set to the motor rated current as given on the data plate.

Check the phase sequence in the mains with the phase sequence indicator.

If intermittent operation is prescribed (see Data Plate), the pump shall be provided with control equipment that provides such operation.

Monitoring equipment

A plate in the junction box shows if the pump is equipped with sensors.

CLS-30 is a leakage sensor for sensing water in the oil housing and initiates an alarm when the oil contains 30% water. Oil change is recommended after the alarm. If the sensor initiates an alarm shortly after the oil is changed, contact your nearest Flygt representative. The CLS sensor is installed in the bearing housing and goes down into the oil housing. The sensor is not applicable to Ex-approved pumps.



**CLS sensor body made of glass.
Handle with care.**

The **FLS** sensor consists of a small float switch for sensing water in the stator housing. Its design makes it suitable for pumps in vertical installations. The FLS sensor is installed in the bottom of the stator housing.

The two sensors, CLS and FLS, can be used in the same pump. They are connected in parallel. Follow the instructions for monitoring equipment.

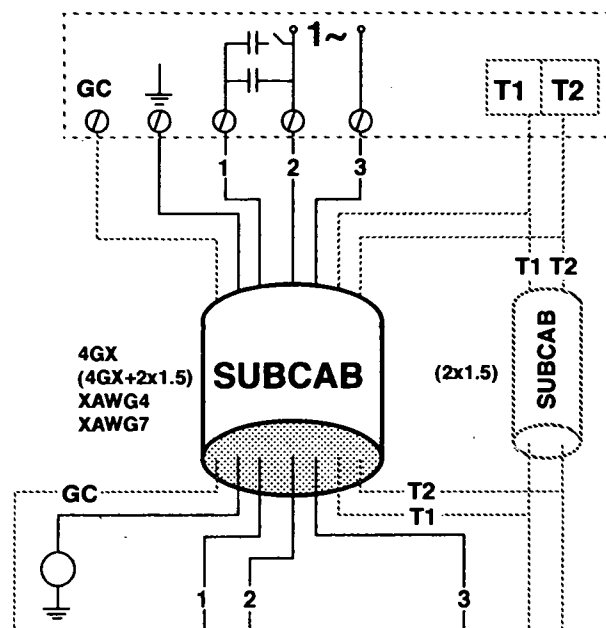
The **MiniCas II** is a monitoring relay to which CLS and/or FLS are connected.

Check:

- signals and tripping function.
- that relays, lamps, fuses and connections are intact.

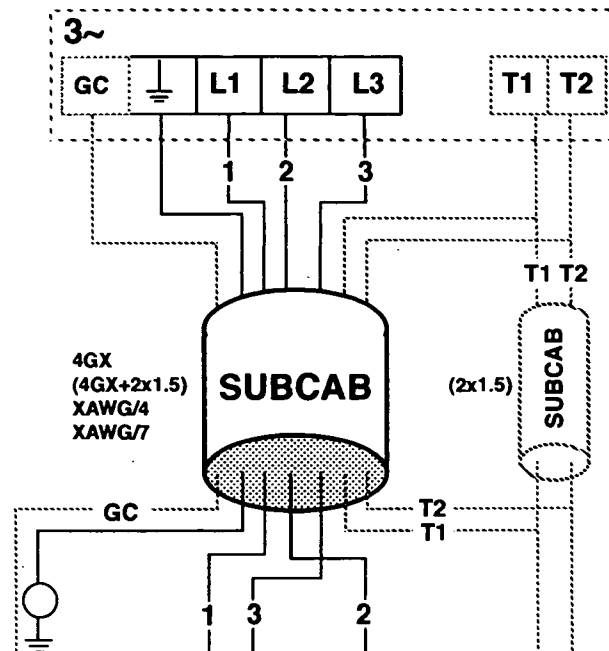
Replace defective equipment.

CABLE CHART



Single-phase

Conductors	Connection starter
SUBCAB/SUBCAB AWG*	
Brown (Red*)	1
Black (Black*)	2
Blue (White*)	3
Yellow/green	Earth
Yellow*	GC**
Black T1/orange*	T1
Black T2/Blue*	T2



3-phase, direct-on-line starting

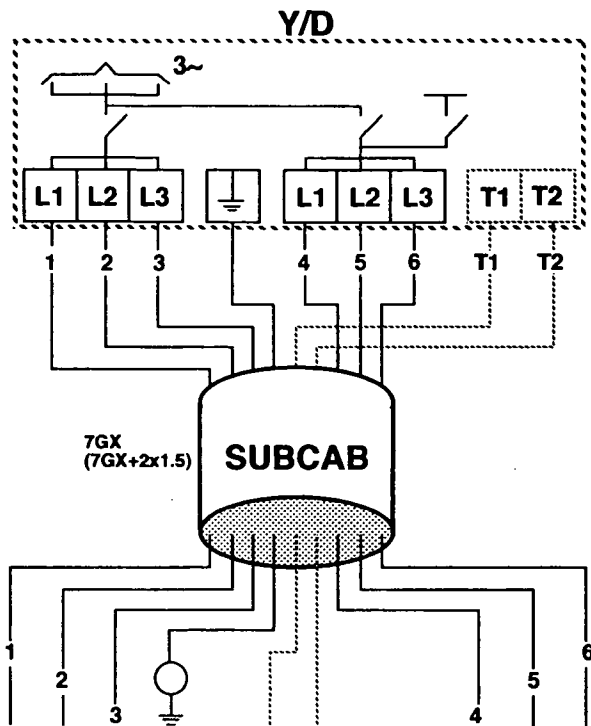
Conductors	Connection starter
SUBCAB/SUBCAB AWG*	
Brown (Red*)	1
Blue (White*)	2
Black (Black*)	3
Yellow/green	Earth
Yellow*	GC**
Black T1/orange*	T1
Black T2/Blue*	T2

* Terminal for connection of thermal contacts in the motor and monitoring equipment.

** GC = Ground Check

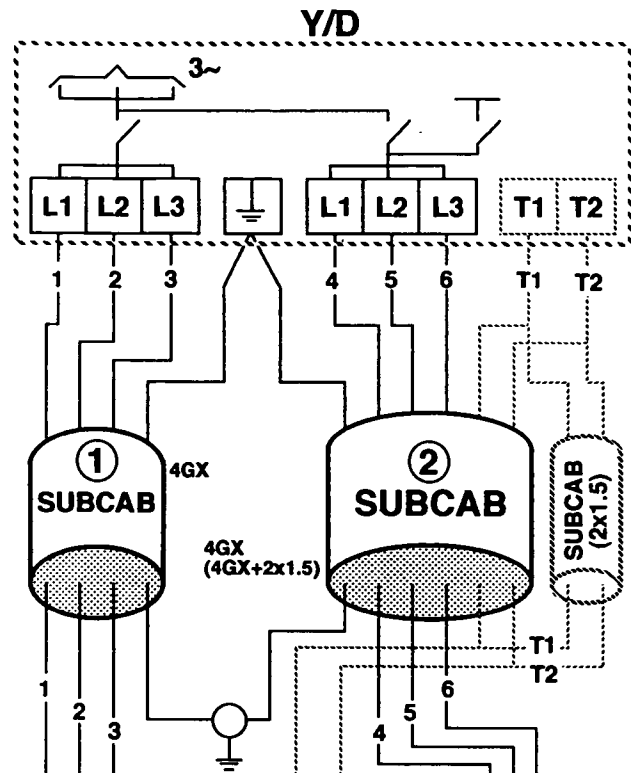
SUBCAB is a registered trademark of ITT Flygt AB for electrical cables.

CABLE CHART



3-phase, star-delta starting

Conductors	Connection starter
SUBCAB	
Black 1	1
Black 2	2
Black 3	3
Black 4	4
Black 5	5
Black 6	6
Yellow/green	Earth
Black T1	T1
Black T2	T2



3-phase, star-delta starting

Conductors	Connection starter
SUBCAB 1+2	
Brown	1/4
Blue	2/5
Black	3/6
Yellow/green	Earth
Black T1	T1
Black T2	T2

SUBCAB is a registered trademark of ITT Flygt AB for electrical cables.

TRANSPORTATION AND STORAGE

The pump can be transported and stored in a vertical or horizontal position.



- **Always lift the pump by its lifting handle – never by the motor cable or the hose.**
- **Make sure that the pump cannot roll or fall over and injure people or damage property.**

The pump is frostproof as long as it is operating or is immersed in the liquid. If the pump is raised when the temperature is below freezing, the impeller may freeze.

The pump shall be run for a short period after being raised in order to discharge all remaining water.

A frozen impeller can be thawed by allowing the pump to stand immersed in the liquid for a short period before it is started. Never use a naked flame to thaw the pump.

For longer periods of storage, the pump must be protected against moisture and heat. The impeller should be rotated occasionally (for example every other month) to prevent the seals from sticking together.

After a long period of storage, the pump should be inspected before it is taken into operation. Pay special attention to the seals and the cable entry.

Follow the instructions under the heading "Before starting".

OPERATION

Before starting



- Before starting work on the pump, make sure that the pump is isolated from the power supply and cannot be energized.
- Make sure that the pump cannot roll or fall over and injure people or damage property.

Check that the visible parts on the pump and installation are undamaged and in good condition.

Check the oil level in the oil housing.

Remove the fuses or open the circuit breaker and check that the impeller can be rotated freely.

Check that the monitoring equipment (if any) works.

Check the direction of rotation. The impeller shall rotate clockwise, as viewed from above. When started, the pump will jerk in the opposite direction to the direction in which the impeller rotates. See the figure.

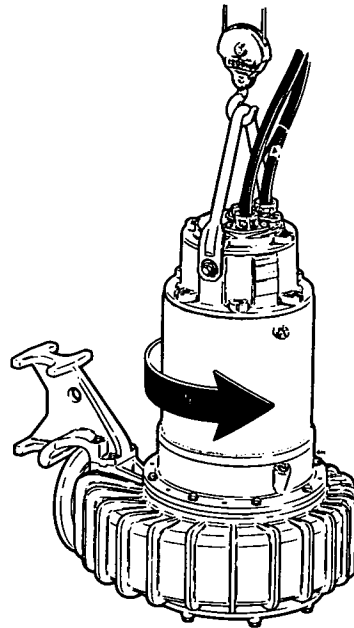
In the case of dry installation, check the direction of rotation through the inlet elbow access cover.

Transpose two phase leads if the impeller rotates in the wrong direction (3 ~).



In some installations the pump surface and the surrounding liquid may be hot. Bear in mind the risk of burn injuries.

Starting jerk



Watch out for the starting jerk, which can be powerful.

CARE AND MAINTENANCE



Before starting work on the pump, make sure that the pump is isolated from the power supply and cannot be energized.

This applies to the control circuit as well.



NOTE for Ex version

All work on the explosion-proof motor section must be performed by personnel authorized by Flygt.

Flygt disclaims all responsibility for work done by untrained, unauthorized personnel.



Make sure that the pump cannot roll or fall over and injure people or damage property.

The following points are important in connection with work on the pump:

- Make sure that the pump has been thoroughly cleaned.
- Beware of the risk of infection.
- Follow local safety regulations.

The pump is designed for use in liquids which can be hazardous to health. In order to prevent injury to the eyes and skin, observe the following points when working on the pump:

- Always wear goggles and rubber gloves.
- Rinse the pump thoroughly with clean water before starting work.
- Rinse the components in water after dismantling.
- The oil housing may be under pressure. Hold a rag over the oil screw to prevent splatter.

Proceed as follows if hazardous chemicals have splashed into your eyes:

- Rinse your eyes immediately in running water for 15 minutes. Hold your eyelids apart with your fingers.
- Contact an eye specialist.

On your skin:

- Remove contaminated clothes.
- Wash your skin with soap and water.
- Seek medical attention, if required.

Inspection

Regular inspection and preventive maintenance ensure more reliable operation.

The pump should be inspected at least once a year, but more frequently under severe operating conditions.

Under normal operating conditions, the pump should have a major overhaul in a service shop at least every third year for permanent installation and every year for portable pumps. This requires special tools and should be done by an authorized service shop.

If the seals have been replaced an inspection of the oil is recommended after one week of operation.

NOTE! Regular check of the condition of the lifting handle and chain is important.

Inspection of hot water applications

Pumps in hot water applications shall undergo inspection or overhaul at a service shop as follows, depending on the time they have been submerged in the hot water:

Temp.	Mode of operation	Inspection	Shop overhaul
≤70°C (160°F)	Continuous	1000 hours	4000 hours
≤70°C (160°F)	Intermittent	twice a year	once a year
≤90°C (195°F)	Cont./Int.	6 times a year	twice a year

OIL CHANGE

A check of the condition of the oil can show whether there has been leakage. Note! Air/oil mixture can be confused with water/oil mixture.

Insert a tube (or hose) into the oil hole. Cover the top end of the tube and take up a little oil from the bottom.

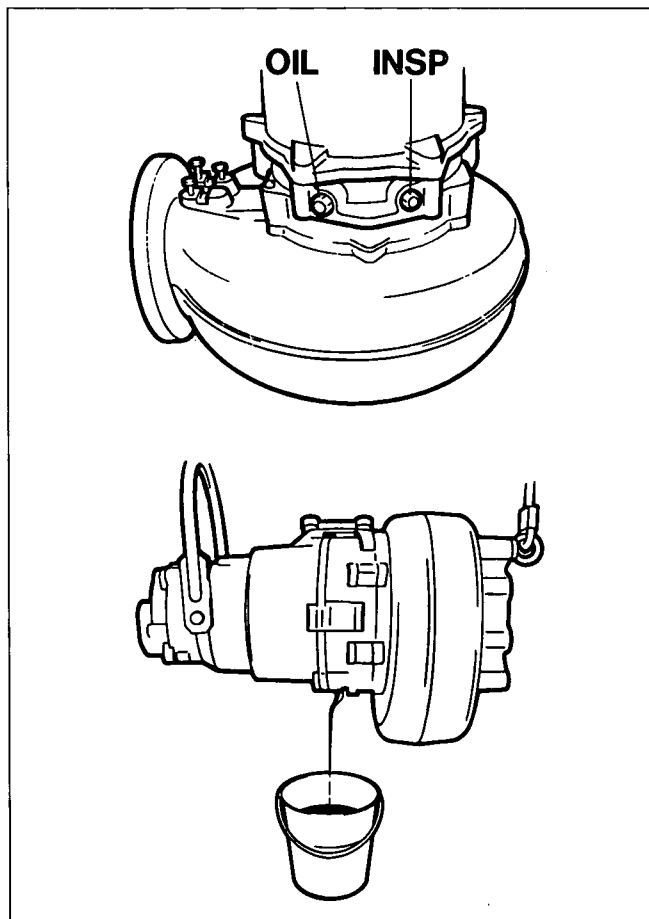
Change the oil if it contains too much water, i.e. if it is heavily emulsified (cream-like), or if the oil housing contains free water. Check again one week after changing the oil through the inspection screw (INSP).



The oil housing may be under pressure. Hold a rag over the oil screw to prevent splatter.

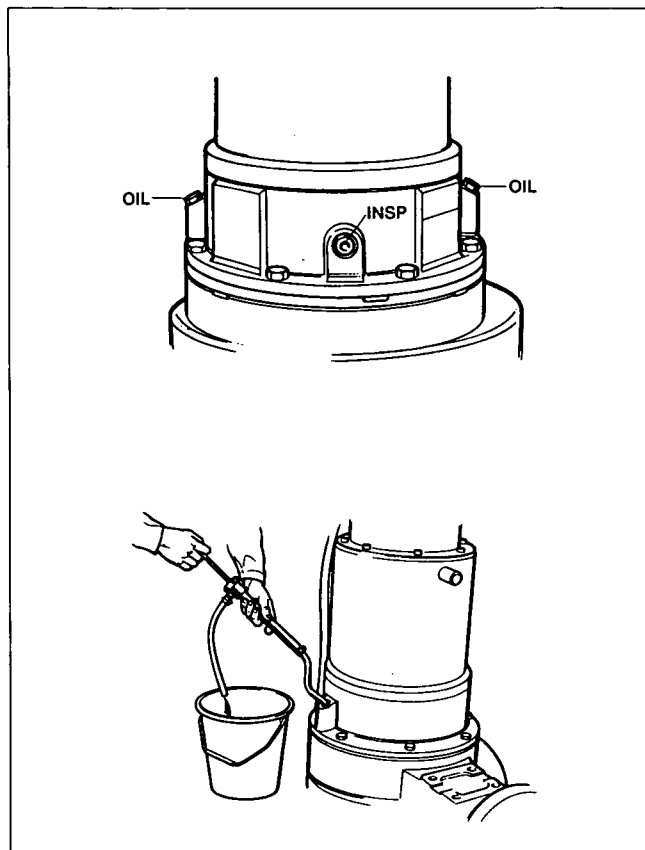
3126 / 3140 / 3152

1. Suspend the pump horizontally from an overhead crane.
2. Unscrew the oil housing screw marked "oil out". Emptying the oil must be done through the "oil out" hole. Turn the pump so that the oil hole faces downwards. It is easier to drain the oil if the oil hole screw "oil in" is also removed.



3170 / 3201 / 3300

1. Unscrew the oil housing screw marked "oil out". Emptying the oil must be done through the "oil out" hole.
2. Pump out the oil. Using the oil drainage pump 83 95 42 or an equivalent pump. Make sure that the suction tube goes all the way down to the oil housing bottom.



3126 / 3140 / 3152 / 3170 / 3201 / 3300

3. Install the "oil out" screw and fill with oil through the other hole. It is important that the oil be added through the hole marked "oil in" since the oil housing must contain some air for pressure equalization. A paraffin oil with viscosity close to ISO VG15 (e.g. Mobile Whiterex 309) is recommended. The pump is delivered from the factory with this type of oil. In applications where poisonous properties are of less concern, a mineral oil with viscosity up to ISO VG32 can be used.

Please see Parts List for the correct volume and tightening torque.

4. Always replace the O-rings under the oil housing screws with new ones.

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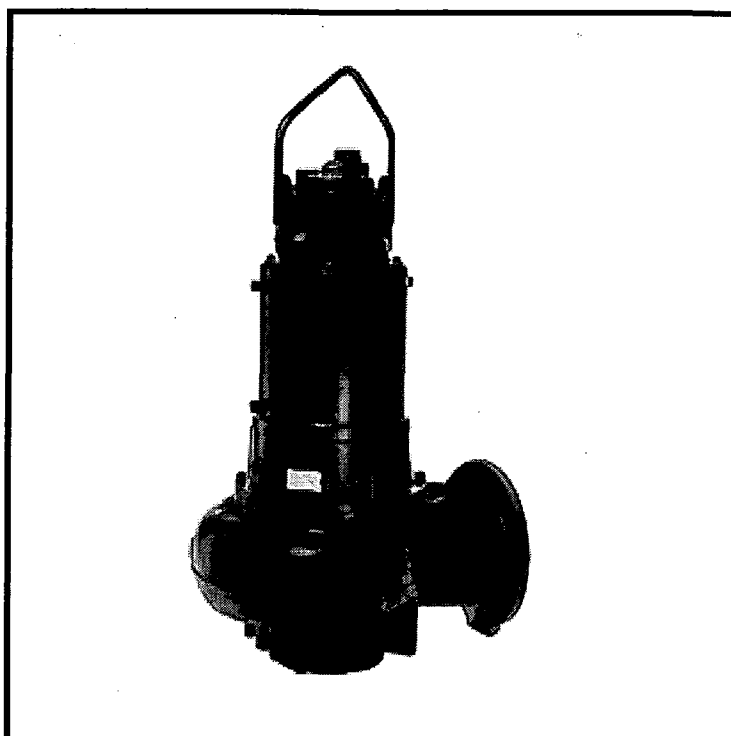
An **ITT Industries** company



FLYGT SUBMERSIBLE PUMP

PARTS LIST CP 3170 HT

SERIAL NO 3170.180 9880022



FLYGT-REPRESENTATIVE:
ITT FLYGT LTD.
P O BOX 1425
LEVEL 4 THE OCTAGON 99 PHILLIP STR

PARRMAATTA NSW 2124
AUSTRALIA
TELEPHONE NO: 2-92020600

ITT Flygt

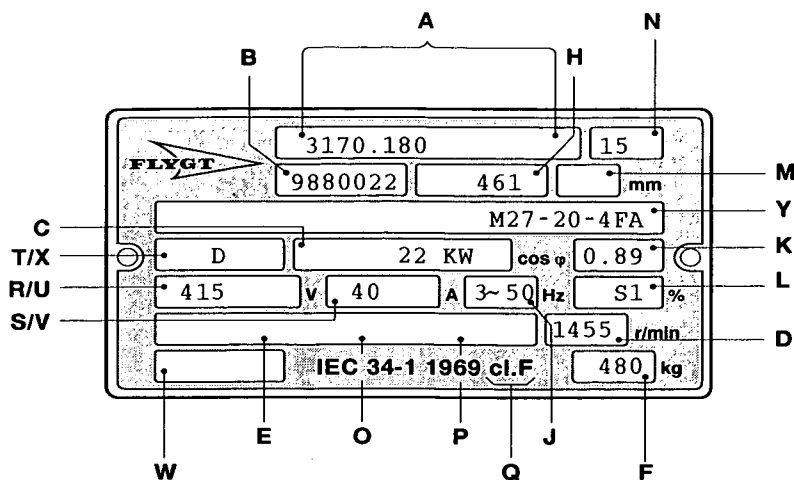
An ITT Industries company

DATAPLATE

FLYGT CP 3170 HT

DATE: 1998-11-26

SERIAL NO: 3170.180 9880022



Data plate interpretation:

- A Product No
- B Serial No.
- C Shaft power
- D Rated speed
- E* Propeller speed
- F Weight
- H Curve code, first digit = Number of poles
- J Number of phases, type of current, frequency
- K Power factor
- L Operating duty, cont./int.
- M Impeller/propeller diam.
- N Factory code
- O* Gear ratio
- P* Direction of rotation: L=left, R=right
- Q Temperature class
- R/U Rated voltage
- S/V Rated current
- T/X Stator connection
- W Special order No.
- Y Motor No.

* For mixers

1 kg = 2,20 pound
1 Lit = 0,26 US gallon

Recommended spare parts:

A= Parts for inspection.

B= Parts for major overhauls.

For service:

90 20 54 grease

In Flygts collection there is a complete set of tools available for repair and maintenance, as well as standard hand tools, but also special tools for e.g. seal change and hydraulic-parts handling.

Please contact Flygt-representativ for more information.

PARTS LIST

FLYGT CP 3170 HT

SERIAL NO 3170.180 9880022

Item no	Part no	Rec	Denomination	Quantity
1	396 42 00		Lifting handle compl	1
2	84 34 05	B	Hexagon head screw M16X50-A2-70	2
3	306 00 02	B	Sleeve	2
4	82 35 23		Washer 16-A2-A 140	2
6	83 38 91	B	Disc spring B-40X20,4X1,5-1	2
7	83 45 59		Cable tie 200X2,4 PA 6/6 -55+105	1
8	274 52 00		Export plate	1
8	438 37 00		Data plate	2
9	404 12 00		Instruction plate	1
9	426 71 00		Connection plate	1
9	426 75 00		Connection plate	1
9	550 24 00		Connection plate	1
10	82 20 88		Drive screw 4X5-A2-70	6
23	94 20 57	B	Motor cable SUBC 4G10+2X1,5 MM2	20.5 m
24	394 77 11		Cable entry unit	1
24.1	81 73 63	B	Slotted screw	2
24.3	82 23 55	B	Hexagon nut	2
26	81 41 55		Hexagon head screw M12X30-A2-70	2
28	82 40 79	AB	Washer 28.5X52X2-A2-70	2
29	84 35 54	AB	Seal sleeve (26) -28 MM	1
32	392 00 15		Entrance cover	1
33	82 74 93	AB	O-ring 199.3X5.7-NBR	1
35	82 00 69		Socket head screw M12X30-A2-70	4
37	443 29 00		Connection housing	1
38	82 75 01	B	O-ring 279,3X5,7 NBR	1
40	82 00 71		Socket head screw M12X40-A2-70	8
42	384 62 00		Bracket	2
43	426 82 00		Terminal board unit	1
44	82 74 81	B	O-ring 139,5X3,0 NBR	1
45	81 41 06		Hexagon head screw M8X25-A2-70	4
46	82 35 16		Washer 8-A2-A 140	4
49	83 42 29	B	End sleeve 4.0MM2; L=10MM	6
49	83 42 35	B	End sleeve 10.0MM2; L=12MM	4
49	83 42 36	B	End sleeve 0.75MM2; L=6MM	2
49	83 42 38	B	End sleeve 1.5MM2; L=7MM	2

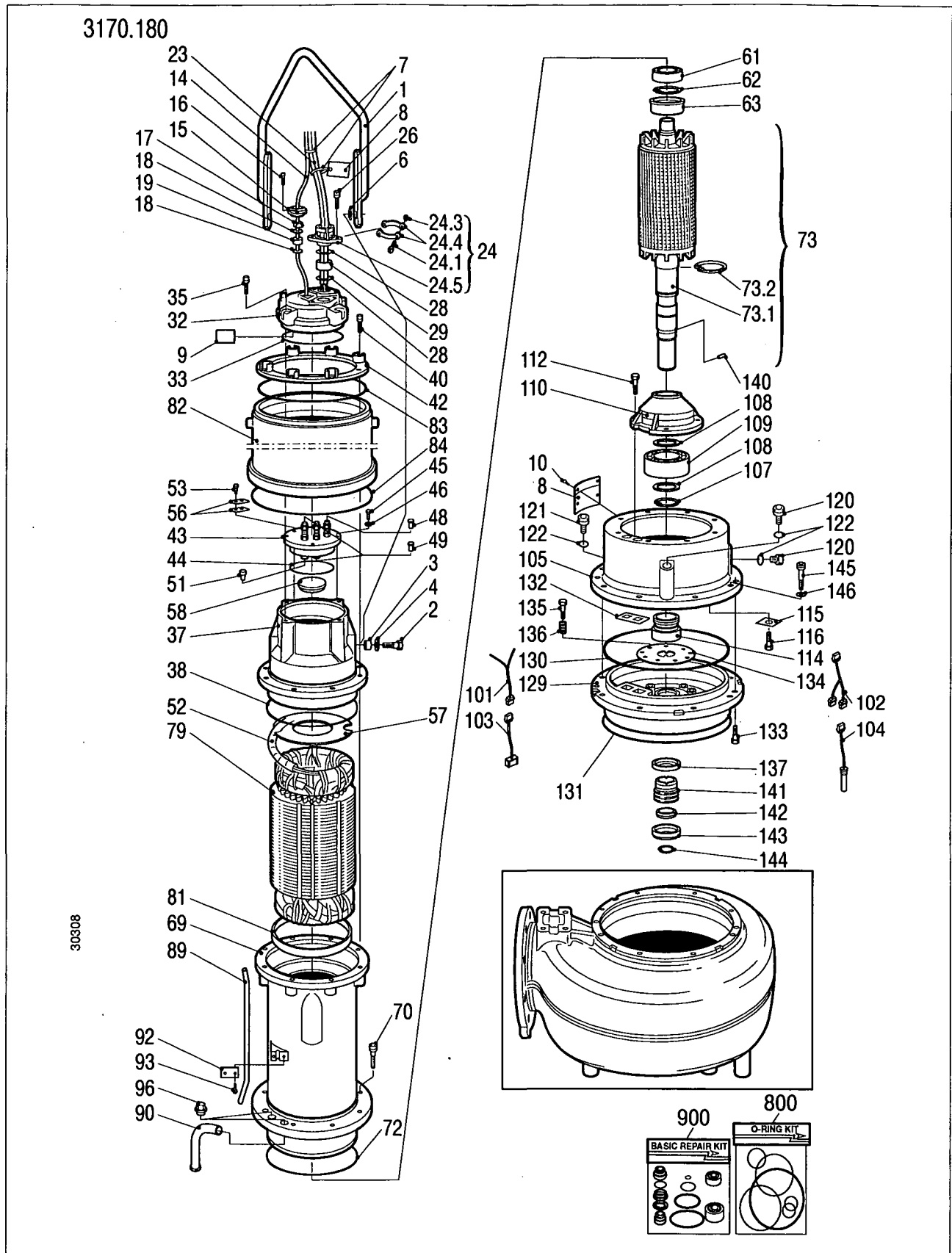
PARTS LIST

Item no	Part no	Rec	Denomination	Quantity
52	94 05 17	B	Insulating hose pvc	0.1 m
53	81 41 04		Hexagon head screw M8X20-A2-70	2
56	426 78 00	B	Earthing plate	2
57	384 76 00		Insulating plate	1
58	319 09 01	B	Cover	1
61	84 53 76	B	Roller bearing	1
62	82 62 24	B	Retaining ring SGH 90	1
63	563 93 00	B	Protective washer	1
69	384 82 02		Stator housing	1
70	82 00 71		Socket head screw M12X40-A2-70	8
72	82 75 01	B	O-ring 279,3X5,7 NBR	1
73	384 52 04		Shaft unit	1
79	530 36 44		Stator 27-20-4f	1
82	384 83 04		Outer casing	1
83	82 75 05	B	O-ring 339,3X5,7 NBR	1
84	82 78 80	B	O-ring 375,0X8,4-1 NBR	1
89	279 76 02		Pipe	1
90	384 60 00		Pipe bend	1
92	374 81 03		Plate	1
93	81 73 42		Slotted screw M4X12-A4-70	2
105	503 16 04		Bearing holder	1
107	82 59 18	B	Retaining ring SGA 65	1
108	82 44 23		Supporting washer 65X85X3.5	2
109	83 36 98	B	Ball bearing 3313 C3 GLAPP 65X140X58,7	1
110	405 08 04		Bearing cover	1
112	81 41 34		Hexagon head bolt M10X40-A2-70	4
114	288 10 03	B	Mechanical seal	1
120	428 22 01	B	Inspection screw	2
121	82 70 34	B	Hexagon plug	1
122	82 73 90	AB	O-ring 19.2X3.0 NBR	2
122	82 73 90	AB	O-ring 19.2X3.0 NBR	1
122	82 73 90	AB	O-ring 19.2X3.0 NBR	1
122	82 77 30	AB	O-ring 28,17X3,53-1 NBR	1
122	82 77 30	AB	O-ring 28,17X3,53-1 NBR	2
129	620 77 00		Oil housing bottom	1
130	82 75 08	B	O-ring 399,3X5,7 NBR	1
131	82 75 09	AB	O-ring 419,3X5,7 NBR	1
132	392 15 00	B	Gasket	1
133	82 00 53		Socket head screw M10X35-A2-70	2
134	319 20 01		Washer	1
135	306 73 00		Hexagon screw	6

PARTS LIST

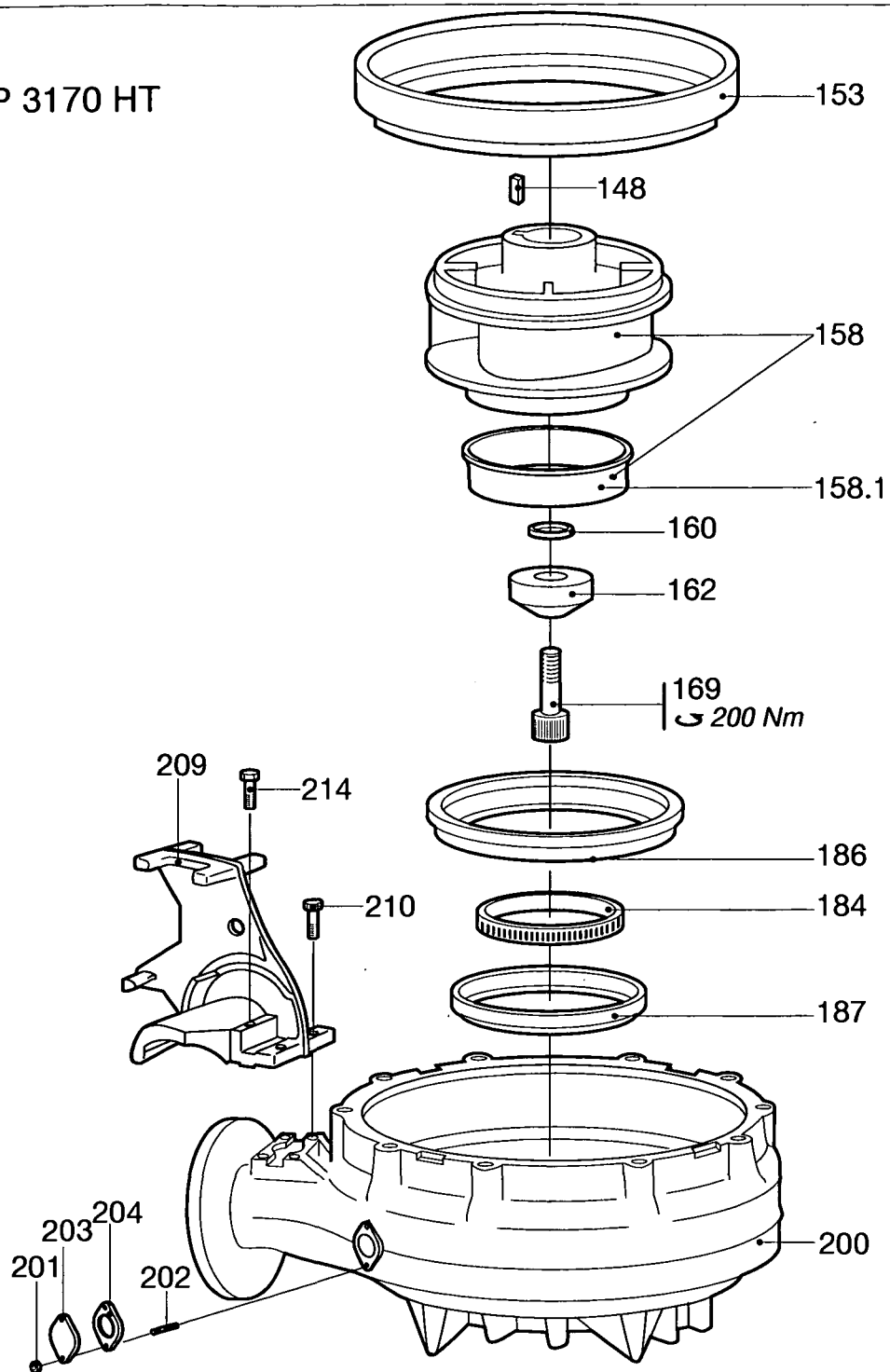
Item no	Part no	Rec	Denomination	Quantity
136	302 21 00		Compression spring	6
137	382 83 00	B	Wear protection	1
140	80 23 05	B	Parallel pin CP-H8-4X10-1650	1
141	384 03 07	B	Mechanical seal	1
145	82 01 09		Socket head screw M16X60-A2-70	8
146	82 35 23		Washer 16-A2-A 140	8
148	80 67 71	B	Parallel key 14H7X9H11X70	1
158	384 26 01	B	Impeller unit	1
158.1	345 25 05	AB	Wear ring	1
160	384 79 00	B	Gasket	1
162	540 75 00	B	Washer	1
169	82 01 09		Socket head screw M16X60-A2-70	1
184	314 88 02	AB	Ring	1
186	543 98 01		Ring	1
187	537 63 00		Ring	1
200	535 30 00		Pump housing	1
209	305 79 00		Guiding claw	1
210	84 34 37		Hexagon head bolt M20X110-A2-70	2
214	84 34 30		Hexagon head screw M20X60-A2-70	2
800	80 32 71		O-rings kit 3170.180 >40 DGR	1
800	80 32 79		O-rings kit 3170/3201.090/091/120/180	1
900	601 89 22		Basic repair kit 3170.090,180,3201.091,1	1
900	601 89 32		Basic repair kit 3170.090,180+3201.091,1	1
	90 17 52		Paraffin oil MOBIL OIL WHITEREX 309	7.5 l
	90 20 54		Bearing grease ESSO UNIREX N3	0.06 kg
...
...
...
...

EXPLODED VIEW



HYDRAULIC PARTS

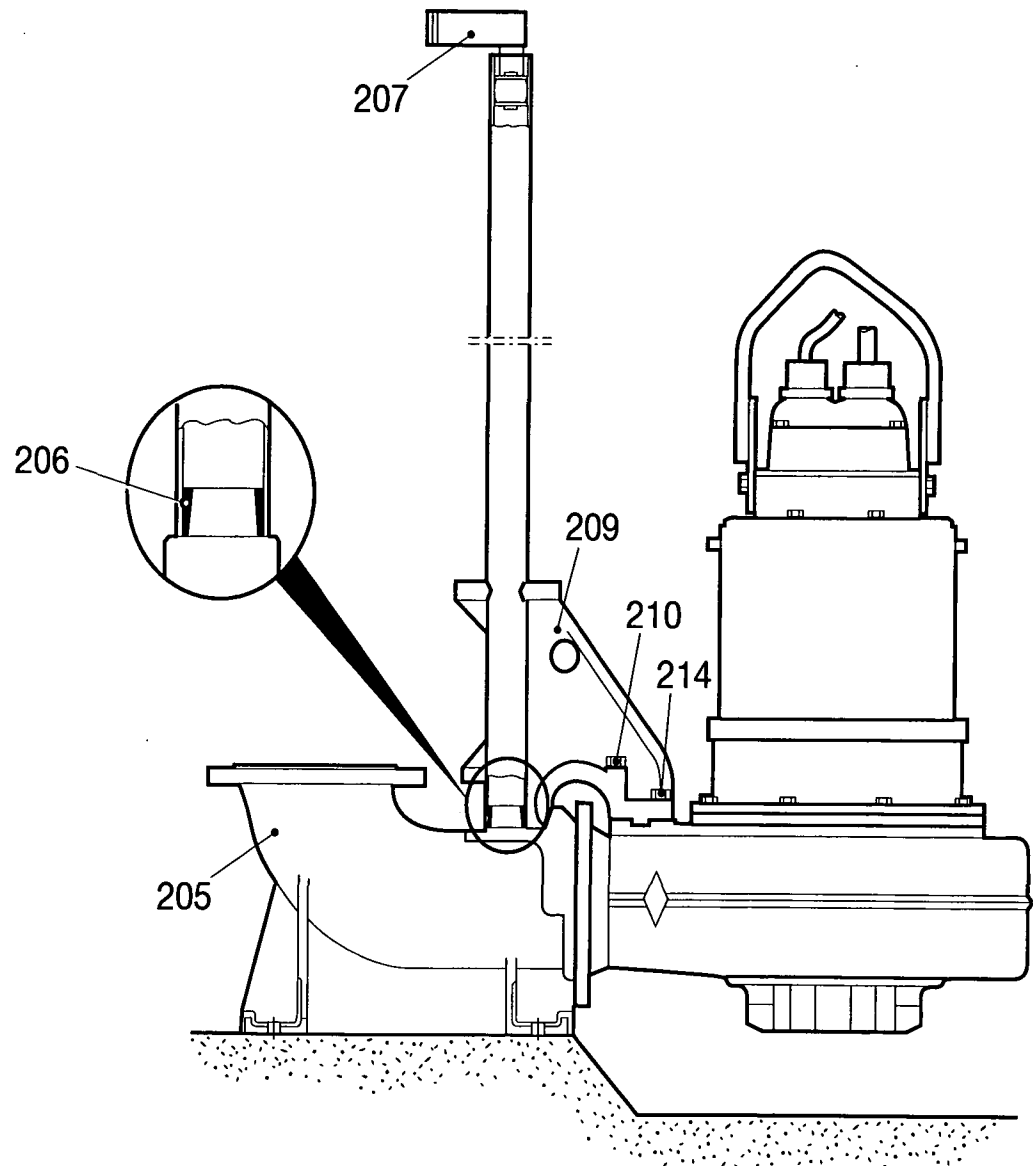
CP 3170 HT



30341

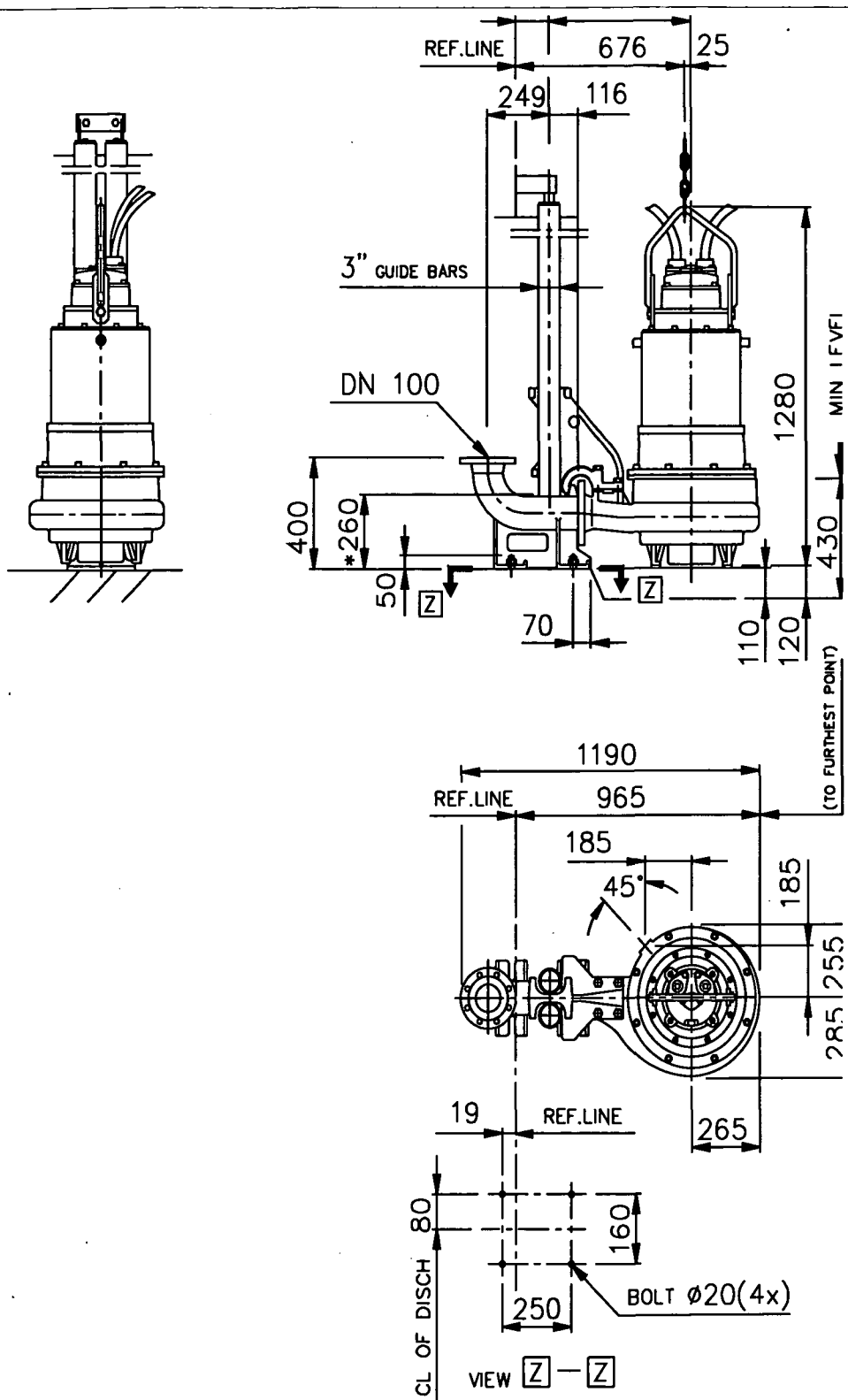
CONNECTION

CP 3170.090/180



30379

DIMENSIONAL DRAWING

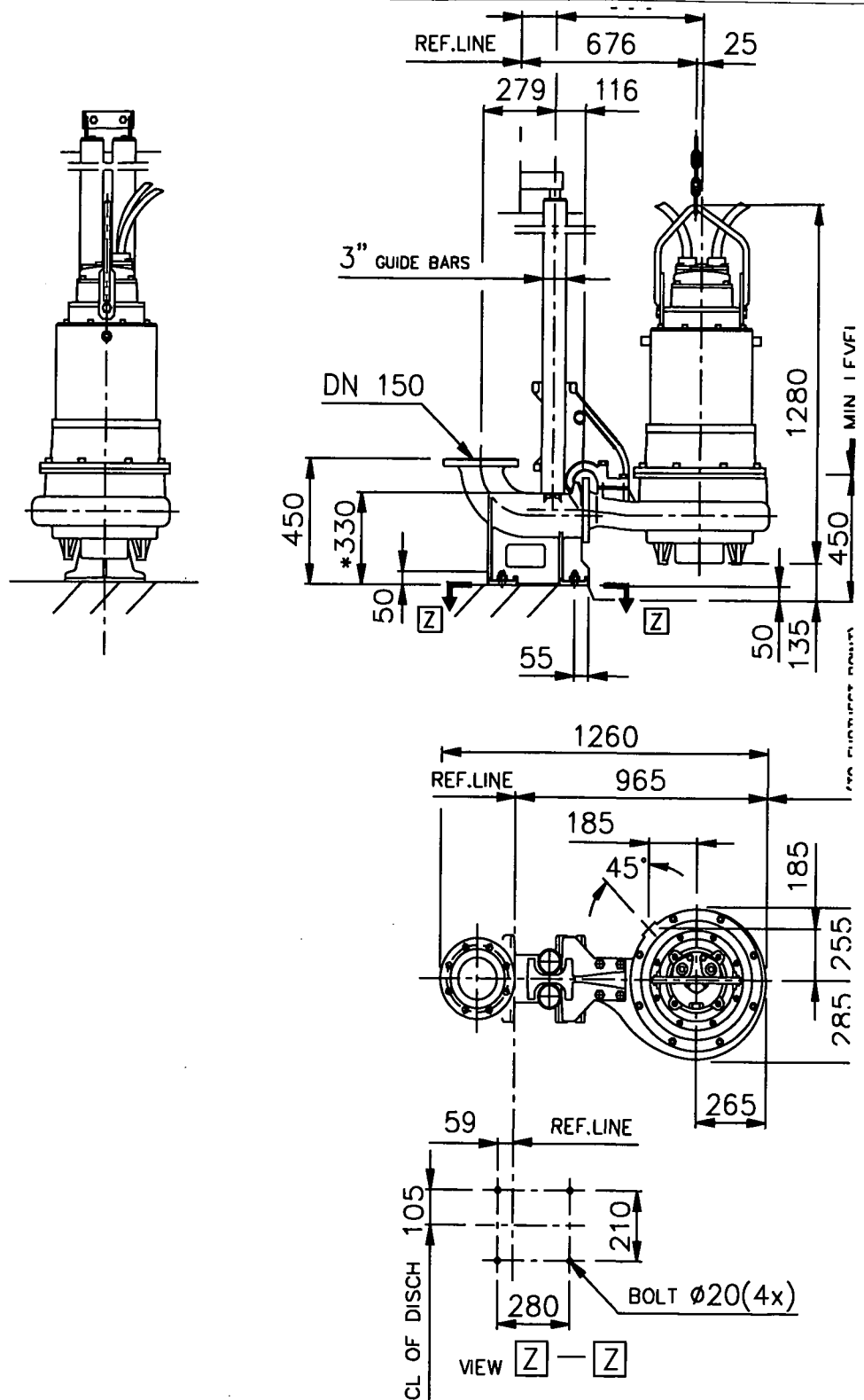


* DIMENSION TO ENDS OF GUIDE BARS

5446900C

DIMENSIONAL DRAWING

5446800D



* DIMENSION TO ENDS OF GUIDE BARS

2.0 TEST SHEETS

JPR Ref:- (A19695.001)

Revision 0

March 26, 1999

23/08/99 13:28 ITT FLYGT → FLYGT GLD

NO. 758 D03



TEST REPORT

TEST NO 4937
 REVISION A

PRODUCT

Serial No. 3170.180	9880020	Performance curve No. 53- 461-00-0050	Motor module/type 138	Voltage (V) 415
Base module 050	Impeller No. 384 26 01	Gear type	Gear ratio	Imp.diam/Blade angle
				Water temp °C 16

TEST RESULTS

Pump total head H (m)	Volume rate of flow Q (l/s)	Motor input power P (kW)	Voltage U (V)	Current I (A)	Overall efficiency η (%)
38.86	0.0	15.09	418	25.8	0.00
38.78	8.1	16.32	418	27.5	20.06
35.20	17.4	18.45	417	30.1	32.56
31.24	26.7	22.13	417	35.0	43.52
25.86	48.3	25.06	418	38.9	48.88
16.56	73.8	26.71	417	41.4	44.89

**BRISBANE CITY COUNCIL
 MACQUARIE PARK ESTATE PUMP STATION**

Accepted after ISO2548C	Test facility FAUS Australia	Test date 1	Time 99-08-19 12:48	Chief tester RAY
----------------------------	------------------------------------	----------------	------------------------	---------------------

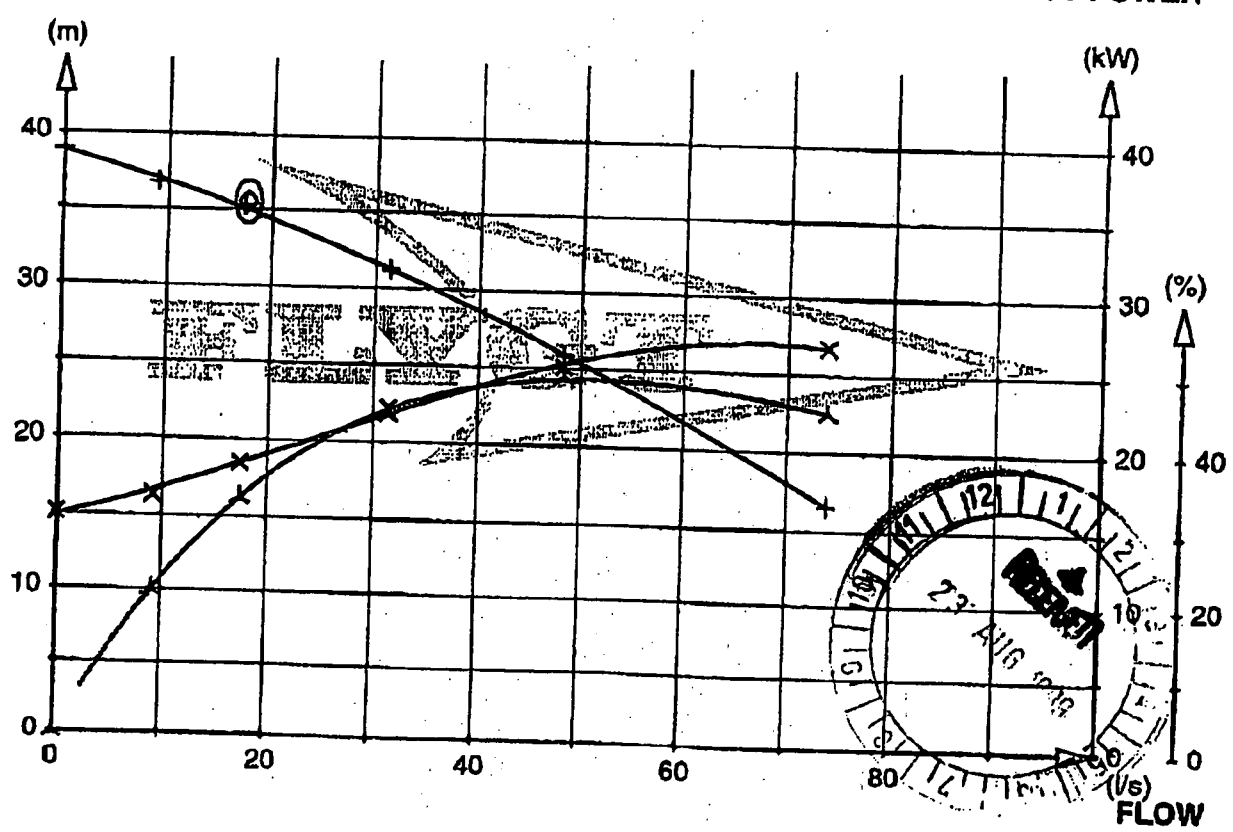
J & P RICHARDSON INDUSTRIES

PLOTTED TEST RESULTS

Measured point: + = Q/H
 X = Q/P
 Duty point: ◇ = Q/H
 □ = Q/P
 Δ = Q/ETA overall
 Calculated point: λ = Q/ETA overall
 4

TOTAL HEAD

INPUT POWER



23/08/99 13:28 ITT FLYGT → FLYGT QLD

NO. 758 D02

FLYGT

TEST REPORT

TEST NO 4938
 REVISION A

PRODUCT

Serial No. 3170.180	9880022	Performance curve No. 53-461-00-0050	Motor module type 138	Voltage (V) 415
Base module 050	Impeller No. 384 26 01	Gear type	Gear ratio	Imp. diam/Blade angle
				Water temp °C 16

TEST RESULTS

Pump total head H (m)	Volume rate of flow Q (l/s)	Motor input power P (kW)	Voltage U (V)	Current I (A)	Overall efficiency η (%)
39.59	0.0	14.87	419	25.7	0.00
36.61	11.3	17.17	419	28.4	23.56
34.95	17.7	18.78	419	30.6	32.40
33.07	25.0	20.79	419	33.2	39.39
26.38	46.7	24.94	419	38.9	48.41
16.65	73.6	26.97	419	41.7	44.54

BRISBANE CITY COUNCIL
MACQUARIE PARK PUMP STATION

Accepted after ISO2548C	Test facility FAUS Australia	Test date 1	Time 99-08-19 12:11	Chief tester RAY <i>[Signature]</i>
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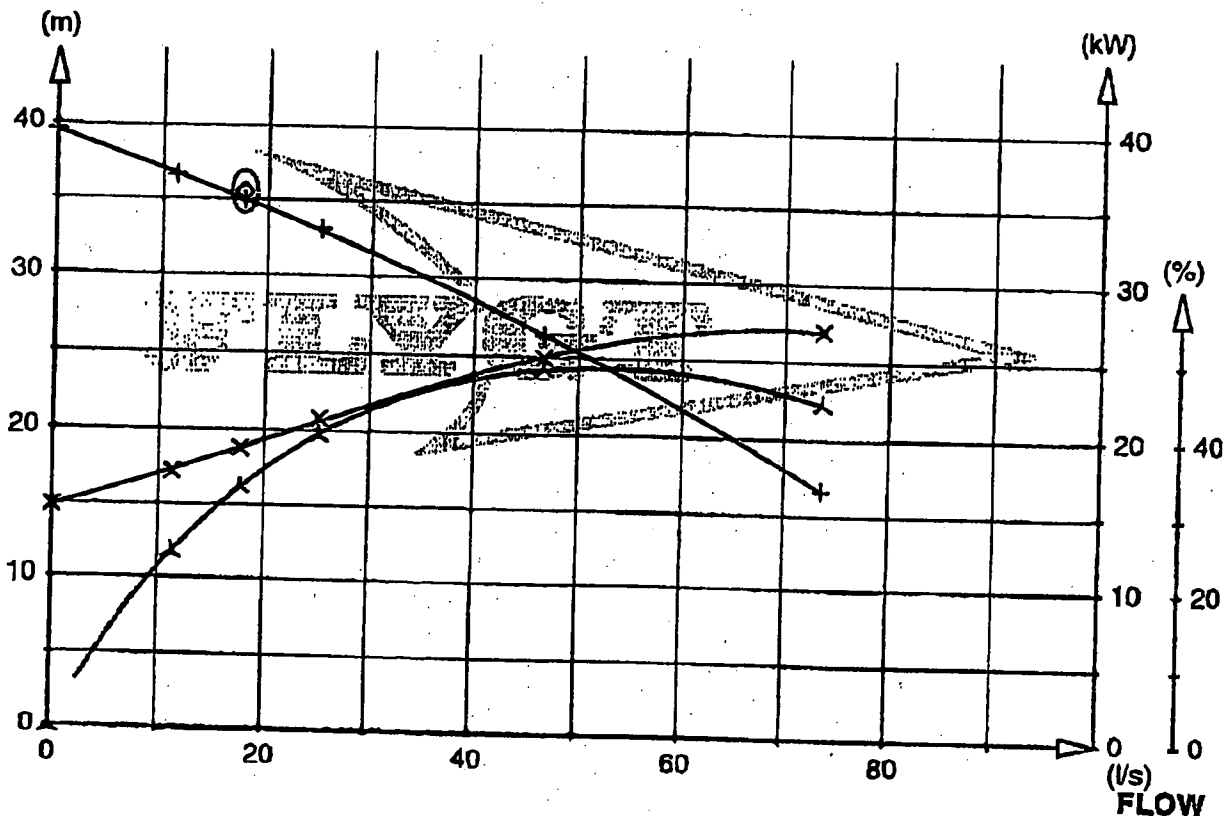
J & P RICHARDSON INDUSTRIES

PLOTTED TEST RESULTS

Measured point: + = Q/H
 X = Q/P
 Duty point: ◇ = Q/H
 □ = Q/P
 Calculated point: △ = Q/ETA overall
 4

TOTAL HEAD

INPUT POWER



23/08/99 13:28 ITT FLYGT → FLYGT QLD

NO. 758 001

BRISBANE CITY COUNCIL ITT MACQUARIE

PARK PUMP STATION.

ADDITIONAL TEST REPORT

ITT Flygt Limited
A.C.N. 000 632 022
Unit 31 Slough Estate
Halker Street Silverwater 2128
P.O. Box 6767, Silverwater 2128
Phone (02) 202 0600
Fax (02) 648 4701

PUMP TYPE: 3170-180	DATE: 20-8-99	CUSTOMER: J & P Richardson
CONTRACT No.:	PROJECT:	ORDER No.: P0463
TESTING OFFICER: <i>R. Sheper</i>	WITNESS 1:	WITNESS 2:
PUMP 1 SERIAL No.: 9880022	TEST No.: 4938	REVISION: A
INSULATION: 7000 @ 1000 Volt	WATER IN OIL: OK	RESISTANCE TEST: 6n
PUMP 2 SERIAL No.: 9880020	TEST No.: 4937	REVISION:
INSULATION: 7000 @ 1000 Volt.	WATER IN OIL: O.K.	RESISTANCE TEST: 6n
PUMP 3 SERIAL No.:	TEST No.:	REVISION:
INSULATION:	WATER IN OIL:	RESISTANCE TEST:
PUMP 4 SERIAL No.:	TEST No.:	REVISION:
INSULATION:	WATER IN OIL:	RESISTANCE TEST:
PUMP 5 SERIAL No.:	TEST No.:	REVISION:
INSULATION:	WATER IN OIL:	RESISTANCE TEST:



Head Office in Sydney.
Branches in Adelaide, Brisbane, Melbourne, Mackay, Mt Isa and Perth.

2.1 PLATYPUS LEVEL TRANSMITTERS

JPR Ref:- (A19695.001)

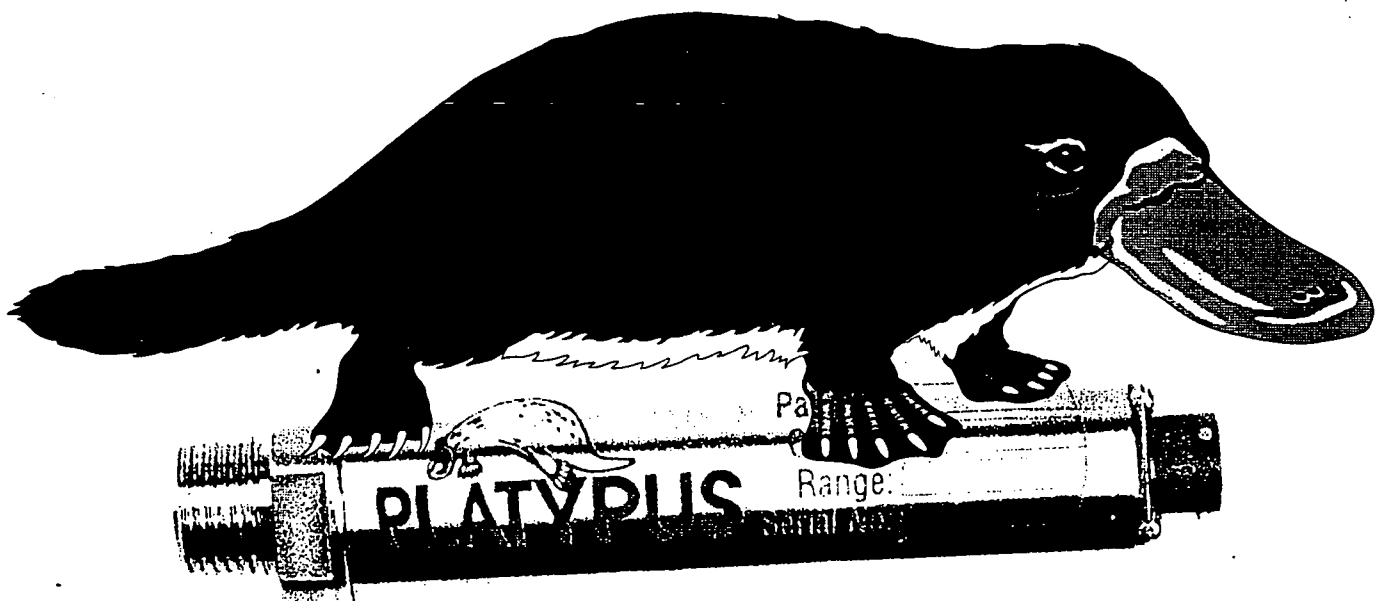
Revision 0

March 26, 1999



PLATYPUS

LEVEL TRANSMITTER



OWNERS MANUAL

SG4-6-8/98-8

WARRANTY

All goods which are The Company's own or The Company's principals manufacture are guaranteed against faulty workmanship, materials or design for a period of twelve (12) months from the date of dispatch after which all liability on the part of The Company ceases. The Company's liability for any loss, injury or damage attributable thereto shall be limited to making good by replacement or repair of any defect which appears therein under proper use provided that The Company is permitted to inspect the defect before replacement, the defective parts being returned free into The Company's store. Any unauthorised repairs or alterations to the equipment shall invalidate this warranty. In the case of goods not of the manufacture of The Company or its principals, The Company undertakes that it will, if requested in writing by the purchaser, make all reasonable endeavour in assisting the purchaser to obtain from the manufacturer the benefit of any guarantee or warranty which the manufacturer may have expressly given as to the quality or fitness for any purpose of the goods, except as may otherwise be provided for by law. The fulfilment of this undertaking shall constitute The Company's sole liability in respect of any faulty goods not of the manufacture of The Company or its principals. The Company shall not be liable for any loss of profits or any other consequential loss or damage suffered by the purchaser in consequence of any defect in materials or workmanship of the goods (whether of the manufacture of The Company or its principals or other-wise) or the failure of the goods to perform in accordance with any performance figure stated.

This warranty on instruments manufactured and/or sold by Electro Chemical Engineering, or any service provided by us, is expressly in lieu of all other warranties expressed or implied. No warranty is made of merchantability or fitness for any particular purpose. Where manufacturers warranty, as specified in the literature, exceeds the stated warranty, the manufacturers warranty can be claimed by return to the manufacturer at the buyers expense. No agent is authorised to assume any liability for it or to make any written or oral warranties or obligations beyond those set forth herein, unless endorsed, in writing, and signed by an officer of Electro Chemical Engineering Pty.Limited.

This warranty does not exclude any condition or warranty implied by the Trade Practices Act 1974 or separate State Laws and is in addition to any other right that the original purchaser or any subsequent purchasers may have at law.

This warranty shall be rendered null and void when, in the judgement of qualified Electro Chemical Engineering personnel, the equipment has been subjected to abnormal or abusive use or lack of proper care or maintenance by the buyer, or when it has been determined that environmental conditions have exceeded those specified by the manufacturer.*

SPECIAL CONDITIONS

*Electrochemical sensors eg.. pH electrodes will be 100% tested before dispatch and will only subsequently, be replaced if they contain visible physical defects. or statistical life data is supplied with full details of the application,

*A pressure transducer will be replaced only if it is clearly shown to fail due to a defect of manufacture. No warranty will be applicable to units subject to overpressure demonstrated by open circuit bridge, plastic deformation of the sensor or excessive zero shift.

Head Office:

ECEFast - 2 Thomas Street Hawthorn Victoria 3122

Ph: (03) 9819 2222 Fax: (03) 9819 2538

Sydney:

ECEFast - 90 Calder Road Rydalmere New South Wales 2116

Ph: (02) 9684 2499 Fax (02) 9684 2118

Brisbane:

ECEFast - 170 Hyde Road Yeronga Queensland 4104

Ph: (07) 3848 3833 Fax: (07) 3848 3498

SG4-6-8/98-8

Page 2



everything in control

Mechanical Considerations

The PLATYPUS uses a gauge (referenced to atmospheric pressure) type sensor. This requires that the cable end be terminated so that it is open to the atmosphere but protected from moisture ingress. All the PLATYPUS cabling options (including the Standard Nylon Tubing, 6 core vented cable and Military Plug) provide this atmospheric reference for the sensor. When the unit is installed in locations such as pumping stations or tanks inside buildings this is generally easy to achieve. For installations in exposed locations such as reservoirs and locations where there is a high ambient humidity we recommend terminating the cable in a enclosure such as the PL-TERM-SG/TX-E. This provides a entry cable gland for the PLATYPUS cable and another gland for system cabling to exit. There is also a vent that allows atmospheric reference to be maintained but controls water ingress, together with silica gel desiccant inside the enclosure to absorb any moisture that does penetrate.

The standard nylon tubing type cable that is supplied with the PLATYPUS comes with a stainless steel support wire that should be used to mechanically support the PLATYPUS in position. Where cable length is under 5m and the PLATYPUS is not mounted in a position where it is subject to turbulence it is permissible to dispense with the support wire and support the PLATYPUS using the nylon tubing. **UNDER NO CIRCUMSTANCES SHOULD THE INSTRUMENT CABLE DRAWN THROUGH THE TUBING, OR THE 6 CORE VENTED CABLE BE USED TO SUPPORT THE UNIT!**

Manifold mounted units should be protected from pressure spikes such as water hammers, and from freezing of the liquid in the pipe (both these events will damage the diaphragm of the sensor). Another point to note is that any air trapped on installation should be bled off.

The diaphragm of the sensor is extremely delicate and should not be pressed with any object (fingers and screwdrivers included) as these will cause permanent damage to the sensor. We have found that a large proportion of PLATYPUS sensors sent for repair have no faults other than a dented diaphragm suffered during a "test". For trouble shooting procedures please refer to that section of this manual. A pressure spike that can damage the sensor can also be generated by dropping the sensor into a tank or reservoir, the sensor should be lowered into position.

All the components of the PLATYPUS body are constructed of 316 stainless steel and are highly resistant to corrosion. High concentrations of chlorine can cause corrosion of stainless steel so care must also be taken in not locating the unit close to chlorine dosing points.

Electrical Considerations:

The PLATYPUS uses a strain gauge type pressure sensor that is supplied either with 4 wire strain gauge output or fitted with a internal 4-20mA loop powered transmitter, the PLATYPUS-TX.

4 Wire Output (PLATYPUS, PLATYPUS-LP)

The 4 wire strain gauge output version can be used with either an external strain gauge transmitter such as the PL-TX-DIN which provides a loop powered 4-20mA output, or with a strain gauge input indicator/alarm unit such as the PL-IND-7A or GF-2300A-3A. The PLATYPUS-LP Lightning Protected strain gauge version has the LP pcb fitted inside the housing and this is transparent to any transmitter or indicator. Internal lightning protection is only available with the strain gauge version of the PLATYPUS.

These units are supplied calibrated with their transmitter or indicator but the calibration can be altered in the field if required. (see field calibration with PL-TX-DIN page 5)

Units that are to be installed in lightning prone areas should also have some form of surge protection on the 4-20mA loop. The PL-TX-DIN transmitter includes a loop surge protector but if this transmitter is not used then a device such as the PLATYPUS-ELP should be used. On long cable runs loop surge protection should be used on both ends of the loop.

Internal 4-20mA Transmitter (PLATYPUS-TX)

The PLATYPUS-TX has a 4-20mA loop powered transmitter fitted internally. It is recommended for sensors where the cable length exceeds 20m or where using an external transmitter is unsuitable. This output interfaces directly with telemetry and process control systems. Indicator/Alarm units such as the GF-201-2A can power and monitor the output of the sensor without the need for a separate DC power supply.

The calibration depth must be specified at the time of order and this cannot be changed in the field. If the calibration needs to be changed the unit must be returned to ECEFast where it can be done for a small fee.

If the unit is to be installed in a lightning prone area loop surge protection should be installed as described above, as close as practical to the sensor.

The internal transmitter is reverse polarity protected.

Quick Installation Guide**Mechanical:**

- Terminate cable in a suitable enclosure such as the PL-TERM-SG/TX-E, open to atmosphere but protected from water ingress.
- For submersible versions use stainless steel support wire to hold sensor.
- If manifold mounting protect against pressure spikes (eg water hammer) and water freezing in pipes.
- DON'T TOUCH DIAPHRAGM!
- Lower the PLATYPUS into position, DO NOT DROP IN.
- Do not mount next to chlorine dosing points.

Electrical:

- See wiring diagrams for electrical connections.
- The cable should be located away from any power wiring or electrically noisy areas.
- The cable shielding should be connected to a good earth.
- Sites prone to lightning strikes should use the lightning protected sensors and a surge protector at each end of the 4-20mA loop to the transmitter such as the PLATYPUS-ELP. The PL-TX-DIN includes an integral 4-20mA surge protector that requires the male spade connector on the side of the unit to be connected to a good earth.
- Check the output of the sensor (if TX version) or transmitter (if SG or LP version) immediately after installation.

Configuration Description Build Number:

All PLATYPUS sensors have a build number engraved in the body that describes the physical and electrical configuration of the unit.

PL-2XXXXX-XX-XX

SG Strain Gauge Output

LP Internal Lightning Protected Strain Gauge

TX Internal 4-20mA transmitter

SCW Standard Cable (Nylon tube) with SS support wire

PF Pipe mount with flying lead

PM Pipe mount with Military Plug

-XX Cable Length in metres

-XX Calibration depth in m Water Gauge

Field Calibration (PL-SG and PL-LP) with PL-TX-DIN Transmitter

1. Setting The Dip Switches On The PL-TX-DIN For Gross Range Change Selection

The output of the pressure sensor used in the PLATYPUS is nominally 100mV for full scale output.

The full scales ranges of the sensors used are:

- 1 bar (10m WG) for sensors up to 10m WG
- 2 bar (20m WG) for sensors between 10m-20m WG
- 7 bar (70m WG) for sensors between 20m-70m WG

To calculate the mV output of a sensor at a specific depth:

$$\text{mV Output} = 100\text{mV} \times (\text{Depth}) / (\text{Full Scale Depth of sensor})$$

Then simply select the range DIP switch on the PL-TX-DIN that this output falls into.

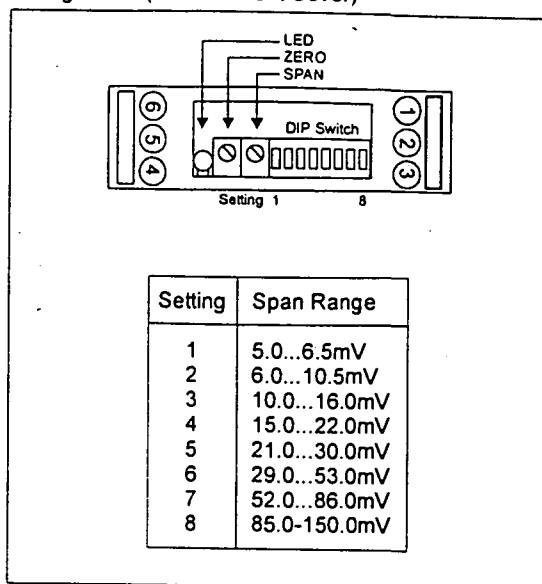
E.g.: A PLATYPUS sensor was supplied by ECEFast with a PL-TX-DIN calibrated to 8m WG. It is now desired to use the unit in a water tank with a max. 4m depth.

The unit was originally scaled to under 10m WG so has a 1 bar sensor installed so the Full Scale Depth of the sensor is 10m.

The mV output at 4m = $100\text{mV} \times (4\text{m}) / (10\text{m}) = 40\text{mV}$.

This falls into the range covered by DIP switch No:6 on the PL-TX-DIN. Set this switch to the ON position, all other switches OFF.

Configuration (Remove front Cover)



2. Adjusting the Zero and Span Pots on the PL-TX-DIN

Connect the Sensor to the PL-TX-DIN transmitter and put a mA meter in series with the output.

With the sensor out of the tank adjust the Zero pot so that the output of the PL-TX-DIN is 4mA.

Lower the sensor into the tank to a known depth and adjust the span so that the output is the correct proportion of the full scale range required.

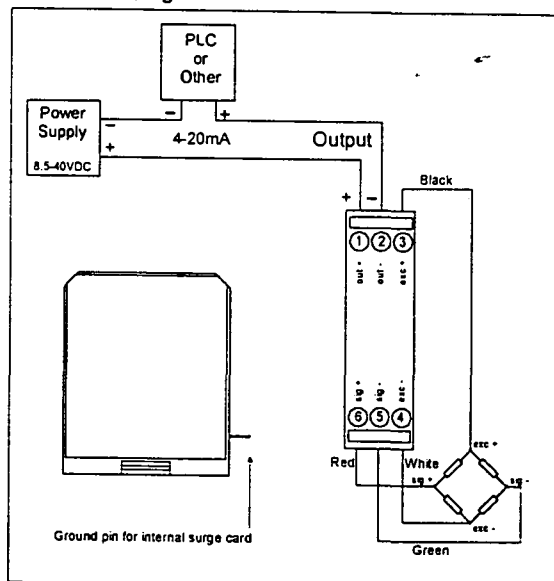
$$\text{mA Output} = 4\text{mA} + (\text{Known Depth}) / (\text{max Depth}) \times 16$$

E.g. The PLATYPUS sensor is lowered gently to a known depth of 3m and the max depth is 4m

$$\text{MA Output} = 4\text{mA} + (3\text{m}/4\text{m}) \times 16 = 16\text{mA}$$

The zero and span adjustment can be repeated if required.

Connection Diagram



Trouble Shooting

At the first sign of a problem with a PLATYPUS sensor it should be removed from service immediately. Leaving it connected and submerged will inevitably increase the cost of the repair.

1) By far the most common cause of sensor failure is moisture down the cable. A simple test for this is to measure the resistance between any of the output wires and the body of the PLATYPUS with a multi meter (Using a Megger WILL damage the sensor) this should be greater than 20M ohms. If the resistance is less than this then it is certain that there has been moisture penetration down the cable. The unit will need to be returned to ECEFast with its transmitter (if a strain gauge version) for repair.

2) For strain gauge versions the bridge resistance can also be measured. Remove the 4 wires from the transmitter (or indicator) and measure the resistance between the Black and White wires (excitation side of bridge), this should be about 3-4k Ohms. Now measure the resistance between the Red and Green wires (output side of bridge), this should be about 5k Ohms. These readings vary from sensor to sensor but use these values as a guide.

problem lies elsewhere. Things to check are:

- All connections to transmitter.
- Power supply
- Measure current flowing in 4-20mA loop. This should be 4mA with the sensor connected but not installed.

The tests and checks above will enable you to identify the component at fault. If the PLATYPUS or its transmitter need to be returned to ECEFast for repair the matching sensor + transmitter pair should be returned together where possible.

Specifications

PLATYPUS-LP Internal Lightning Protection

- Sensing element : Strain gauge type pressure sensor.
- Ranges Available 1, 2, 7, 17 bar
- Accuracy 0.2% FSO
- FSO at 1mA excitation 100mV (min 70, max 130)
- Over-pressure 2 X sensor rating
- Non-sacrificial multistage lightning protection tested to IEC 1000-4-5
- Housing dimensions 32mmØ X 140mm
- Housing and diaphragm material 316 SS
- O-Ring material Nitrile (Viton available on request)
- Process connection 1/2" BSP, cable connection 1/4" BSP or Bendix 6 pin socket
- Maximum immersion depth 100m water

PLATYPUS-TX Internal Transmitter

- Supply Voltage 10-40VDC
- Output 4-20mA loop powered
- Input range 4mV-115mV
- Gross range changes link selectable. Zero and Span pots 20% adjustment.
- Accuracy 0.2% FSO
- Operating temperature range 0-70 °C

PL-TX-DIN External Transmitter

- Supply Voltage 8.5-40VDC
- Output 4-20mA loop powered with integral surge protection tested to AS1768 Category B
- Accuracy <0.3% FSO
- Operating temperature range 0-70 °C
- Input range 5-150mV dip switch selectable

Standard Cable

- 4 core instrument wire drawn down 8mmØ rigid nylon tube with SS support wire. 10m long.

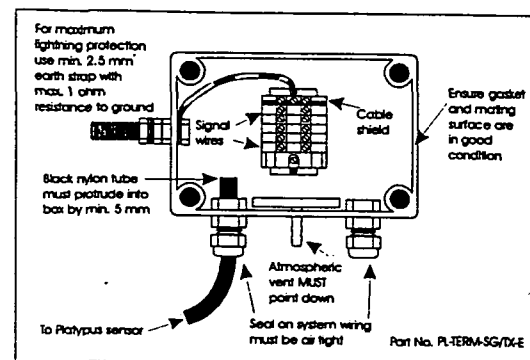
Cable Options

- Rigid nylon tube with/without support wire to max length of 50m
- 6 core polypropylene vented cable with/without support wire to max length of 500m.
- Non immersible PVC cable used in pipe mount.
- Bendix 6 pin military plug.

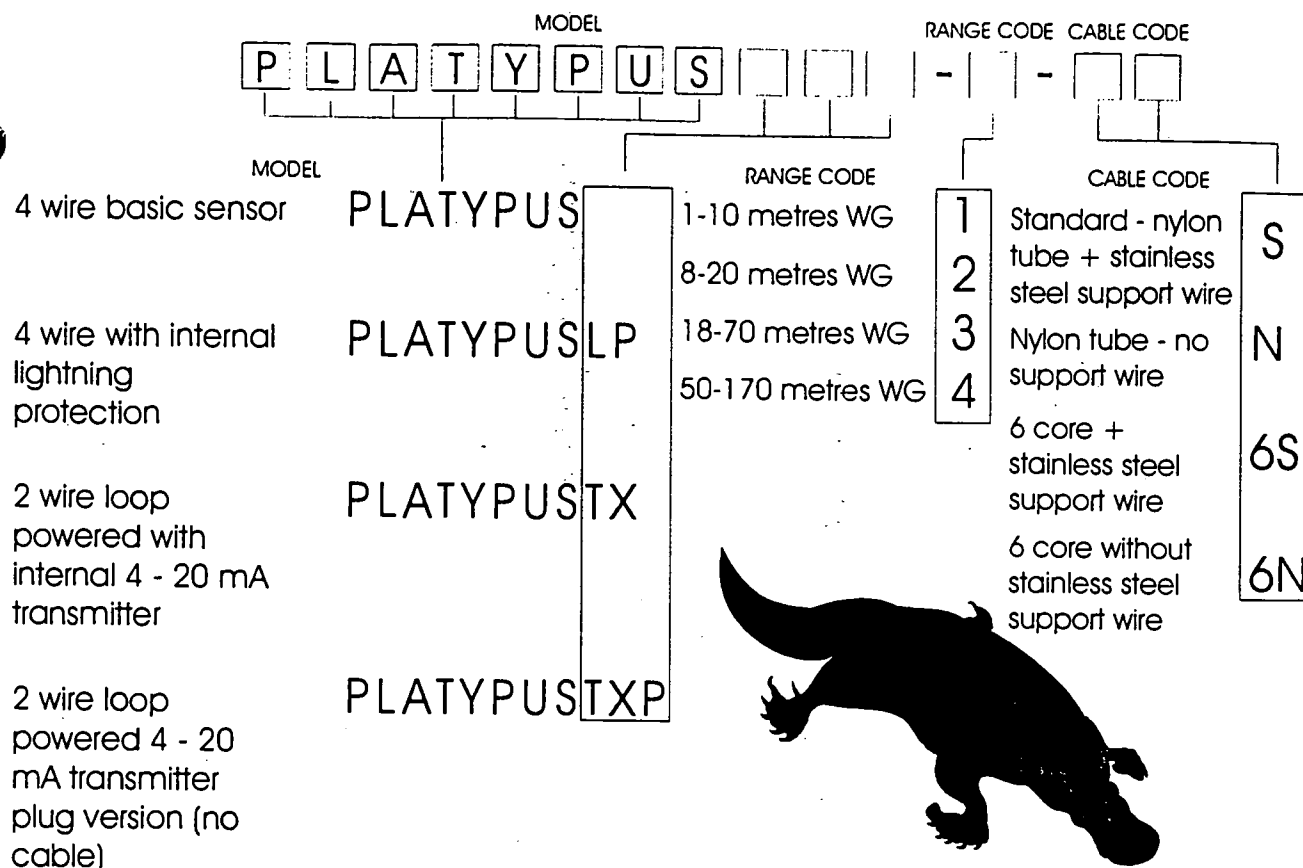
Standard Vented Terminal Box – Part No. PL-TERM-SG/TX-E

- IP65 enclosure
- Fitted cable glands
- Atmospheric reference
- DIN rail terminals
- Contains desiccant to protect sensor

This robust terminal box is designed to match the Platypus range of sensors and fulfills the function of protecting the top of the cable from water entry and providing convenient termination of the cables, as well as venting the sensor to atmosphere effectively.



Platypus Level Sensor Ordering Code



e.g. An internal TX version with 2 Bar sensor & nylon tube with support wire would be PLATYPUSTX-2-S

Note: Exact calibration range must be specified in metres WG

Cable Considerations

A 10M cable is included on all models except TXP whether nylon tube or vented 6 core cable is chosen. Only order extra lengths above 10M.

NYLON TUBE

Additional lengths above 10M can be supplied up to a maximum length of 50M, in 5M increments, using P/N PL-CABLE-05. Add /S if support wire is required. e.g. for 30M cable with SS support wire order Platypus + 4 of PL-CABLE-05/S. (PL-CABLE-05 = 1 X 5 M increment)

VENTED 6 CORE

If a Platypus is ordered with this cable, there is no maximum length. Cable is available in 1m increments. For additional lengths above 10M use P/N TW-CU24F-PV6L add /S if support wire is required.

Interface Devices

PL-TX-DIN

2 wire DIN rail mount transmitter with loop power & lightning protection

PL-INDA-7AL

Panel mounting indicator. 7 alarms. 4 wire only.

PL-TX-LON

LON network module. Up to 64 points over 2000M. TX version only

GF-2308-2A

8 channel panel mounting indicator. 2 wire only.

PL-TX-FIELD

Weather proof ready to mount transmitter. 4 wire version only.

PLATYPUS-ELP

DIN rail loop lightning protection. 2 wire only.

GF-2300A-3A

Panel mounting indicator with 3 alarms. 2 and 4 wire.

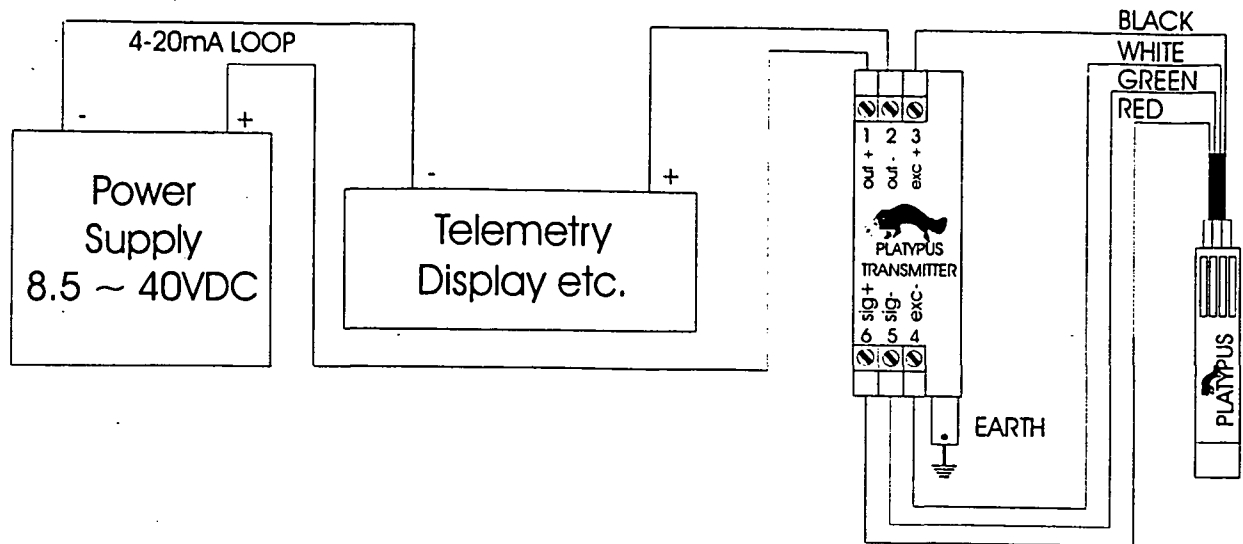
PL-TERM-SG/TX-E

Vented terminal box. 2 and 4 wire.

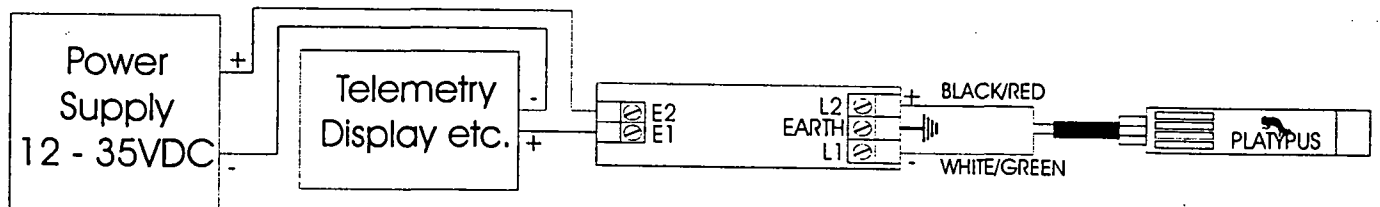


Ph 1800 811 818

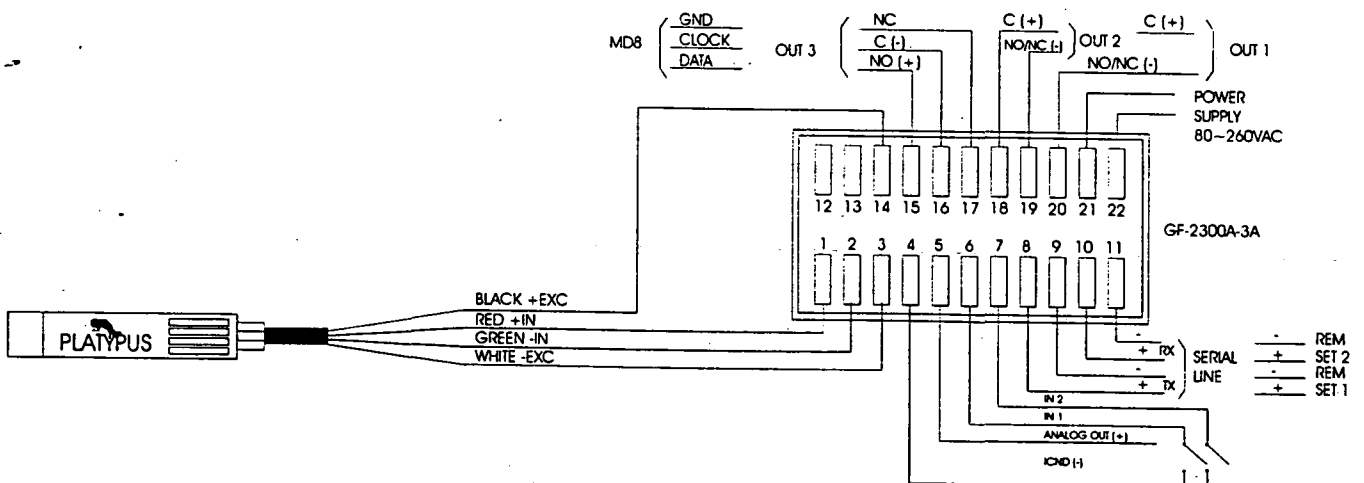
4 wire sensor with remote transmitter (PL-TX-DIN)



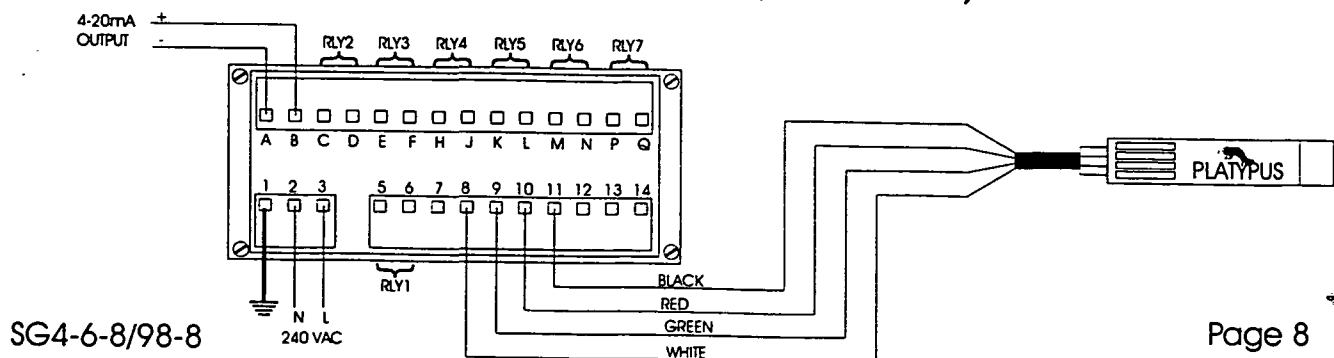
2 wire transmitter with remote DIN lightning loop protector (PLATYPUS-ELP)



4 wire sensor and panel meter with 32 point linearisation (GF-2300A-3A)



4 wire sensor with 7 alarm panelmeter (PL-IND-7AL)











SG4-6-8/98-8

Page 8

PLATYPUS QUALITY CHECK LIST







Date 1/9/98 Part Number PLATYPUS-3-S
 Sensor Serial Number 737-061R Works Order 11368A
 Transmitter Serial Number — (if applicable)

Stage	Case Isolation 20 megohm	Overall visual + Gland tension	Calibration to m W.G.	24 hour immers ion under power
Completed				
Approved				

F80-2-2/97-1

PLATYPUS QUALITY CHECK LIST

Date 2/12/98 Part Number PL-2SGSCW-10-?
 Sensor Serial Number Works Order 12567A
 Transmitter Serial Number (if applicable)

Stage	Case Isolation 20 megohm	Overall visual + Gland tension	Calibration to m W.G.	24 hour immers ion under power
Completed				
Approved				

F80-2-2/97-1

2.2 VEGA PRESSURE TRANSMITTERS

JPR Ref:- (A19695.001)

Revision 0

March 26, 1999

Prüfzertifikat

VEGA**für Druckmeßumformer**

Test certificate for pressure transmitters



VEGA bestätigt, daß die zu Qualitätsprüfungen des Erzeugnisses eingesetzten Meßmittel
gültig kalibriert und auf nationale Standards rückführbar sind.
VEGA confirms, that all instruments used to assure the quality of our products are
calibrated and traceable to national standards

VEGA Grieshaber KG, Am Hohenstein 113, 77761 Schiltach, Tel. 0 78 36/50-0, Fax. 0 78 36/50 201

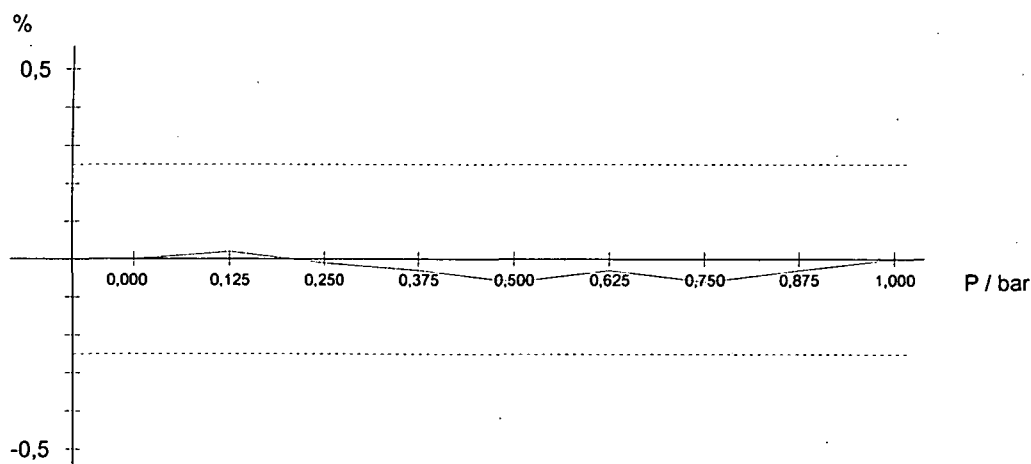
Druckmeßumformer / Pressure transmitter:	D77	Kundennummer / Customer ID	44741
Meßbereich / Measuring range:	0 bis/to 1,0 bar rel.	Auftragsnummer / Order number	831519
Seriennummer / Series no.:	11134699	Auftragsposition / Order position	1
Zulassungen / Approvals:	OHNE		

Kennwerte / Characteristics:	0,000 bis/to 1,000 bar rel.
	3,996 bis/to 19,992 mA

Kennliniencharakteristik / Output characteristics:

max. zul. Abweichung bezogen auf Meßbereich: < 0,25 %
/ Dev. in linearity rel. to measuring range

Ref.-Druck / Ref. pressure [bar]:	0,000	0,125	0,250	0,375	0,500	0,625	0,750	0,875	1,000
Soll-Ausgang / Ideal output [mA]:	3,996	5,999	7,998	9,997	11,996	13,996	15,996	17,995	19,992
Ist-Ausgang / Real output [mA]:	3,996	6,001	7,997	9,992	11,987	13,991	15,986	17,990	19,992
Abweichung / Accuracy [%]:	0,00	0,02	-0,01	-0,03	-0,06	-0,03	-0,06	-0,03	0,00

**Temperatureinfluß / Temperature influence:**

Temperaturfehler bei 0 bar rel.
/ Temperature accuracy at 0 bar rel.

Bezogen auf den Meßbereich / Related to the measuring range

Bezugstemperatur 20 °C / Ref. temperature 20 °C

Temperatur [°C] / Temperature	0	20	40	60	80
Ist-Ausgang [mA] / Real output	3,971	3,996	4,015	3,985	3,974
Abweichung [%] / Accuracy	-0,18	0,00	0,14	-0,08	-0,16

Datum / Date: 08.09.1998

Unterschrift / Signature:

Prüfzertifikat

VEGA**für Druckmeßumformer**

Test certificate for pressure transmitters



VEGA bestätigt, daß die zu Qualitätsprüfungen des Erzeugnisses eingesetzten Meßmittel
gültig kalibriert und auf nationale Standards rückführbar sind.

VEGA confirms, that all instruments used to assure the quality of our products are
calibrated and traceable to national standards

VEGA Grieshaber KG, Am Hohenstein 113, 77761 Schiltach, Tel. 0 78 36/50-0, Fax. 0 78 36/50 201

Druckmeßumformer / Pressure transmitter:	D77	Kundennummer / Customer ID	44741
Meßbereich / Measuring range:	0 bis/to 1,0 bar rel.	Auftragsnummer / Order number	831519
Seriennummer / Series no.:	11134667	Auftragsposition / Order position	1
Zulassungen / Approvals:	OHNE		

Kennwerte / Characteristics:	0,000 bis/to 1,000 bar rel.
	4,000 bis/to 19,992 mA

Kennliniencharakteristik / Output characteristics:									
max. zul. Abweichung bezogen auf Meßbereich:									
< 0,25 %									
/ Dev. in linearity rel. to measuring range									
Ref.-Druck / Ref. pressure [bar]:	0,000	0,125	0,250	0,375	0,500	0,625	0,750	0,875	1,000
Soll-Ausgang / Ideal output [mA]:	4,000	6,004	8,003	10,002	12,001	13,999	15,998	17,997	19,992
Ist-Ausgang / Real output [mA]:	4,000	6,002	8,004	10,006	12,008	14,000	16,001	18,003	19,992
Abweichung / Accuracy [%]:	0,00	-0,01	0,01	0,03	0,04	0,00	0,02	0,04	0,00

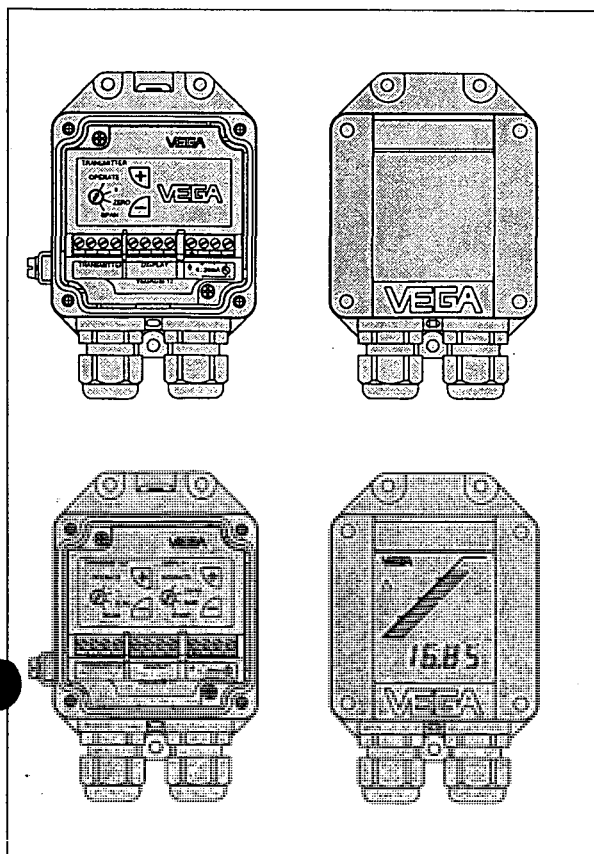
Temperatureinfluß / Temperature influence:					
Temperaturfehler bei 0 bar rel.					
/ Temperature accuracy at 0 bar rel.					
Bezogen auf den Meßbereich / Related to the measuring range					
Bezugstemperatur 20 °C / Ref. temperature 20 °C					
Temperatur [°C] / Temperature	0	20	40	60	80
Ist-Ausgang [mA] / Real output	3,992	4,000	3,996	3,990	3,993
Abweichung [%] / Accuracy	-0,05	0,00	-0,03	-0,07	-0,04

Datum / Date: 08.09.1998

Unterschrift / Signature:

Operating Instruction

VEGADIS 12



Contents

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1 Product description	
1.1 Function and configuration	3
1.2 Types and versions	3
1.3 Type plate and order code	4
1.4 Approvals	4
1.5 Technical data and dimensions	5
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3 Electrical connection	
3.1 Wiring instructions	9
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5 Diagnosis	
5.1 Maintenance	14
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Safety information

The described module must only be inserted and operated as described in this operating instruction. Please note that other action can cause damage for which VEGA does not take responsibility.

1 Product description

1.1 Function and configuration

VEGADIS 12 is an external connection housing with integral adjustment. It is connected to a hydrostatic pressure transmitters D80 ... D 87 or D77 via the VEGA-special cable with breather capillaries or a three-wire standard line. VEGADIS 12 is looped into the supply and signal circuit of the pressure transmitter and does not require a separate external energy. The pressure transmitter must be equipped as follows:

- electronics E, G or H or
- direct cable outlet or
- terminal insert for external adjustment (can be equipped later).

VEGADIS 12 has the following function:

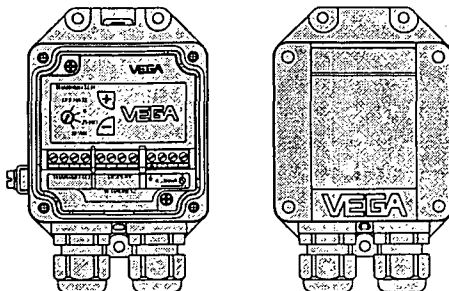
- adjustment of zero, span and t_1
- atmospheric pressure compensation for the pressure transmitter
- indication of measured value (optional).

VEGADIS 12 is provided as a standard feature with an adjustment module for the pressure transmitter. The optional indication is located in the housing cover and is provided with a bargraph and a digital indication. In this version additional adjustment modules for indication scaling are integrated.

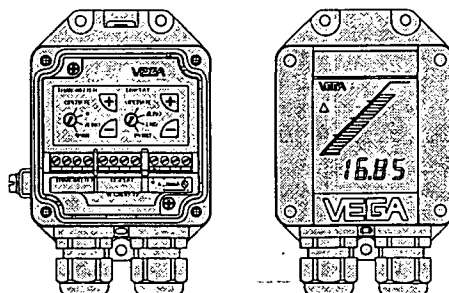
We applied for approval for hazardous areas acc. to CENELEC EEx ia IIC.

1.2 Types and versions

VEGADIS 12 without indication

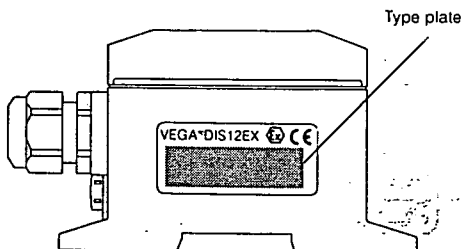


VEGADIS 12 with indication



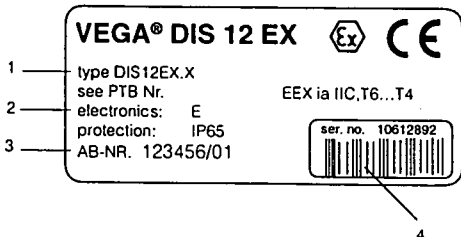
1.3 Type plate and order code

Check before mounting and electrical connection that the instrument is suitable. Hence note the type plate which is located as follows:



The type plate contains important data required for mounting and connection. The configuration and contents of the type plate are described in the following example.

Configuration of the type plate:



- 1 Master data of the order no.
- 2 Data of the electronics
E = with indication and scaling
- 3 No. of the order confirmation
- 4 Series number

Configuration of the master data of the order number:

type DIS12EX.X

Approval acc. to
CENELEC EEx ia IIC
External housing
VEGADIS 12

Determine the data of your VEGADIS 12 as shown above by means of the order code in this instruction or in the VEGA-pricelist.

1.4 Approvals

When the pressure transmitter or the external housing is used in hazardous areas, approved versions must be used.

For these applications note the appropriate legal documents (test report, test certificates and conformity certificates). These are supplied with the appropriate instrument.

Survey on applied approvals

CENELEC EEx ia IIC	BVS-Zone 10 StEx	GL (German Lloyd)
•	•	•

Product description

1.5 Technical data and dimensions**Standard data****Materials and weight**

Housing	high resistance plastic PBT (Polyester)
Earth terminals	StSt 1.4305
Window of the indication	glass
Breather facility	PTFE-filter element ¹⁾
Weight	appr. 0,5 kg

Operating and indicating elements

Operating elements	2 keys, 1 rotating switch
Operating elements with indication	2 x 2 keys, 2 x 1 rotating switch
Indication (option)	LC-multi-function display
	- bargraph (20 segments)
	- digital value (4-digit)
	- tendency indicator for raising and falling values

Connection

Cable entry	2 x Pg 13,5 (for cable-ø 5 ... 10 mm)
Screw terminals	for cross-section area of conductor to 2,5 mm ²

Operating circuit

Connection to	pressure transmitter D80 ... D87, D77 with
	- electronics E, G or H or
	- direct cable outlet or
	- terminal insert for external adjustment (can be equipped later)
Connection line	VEGA-special cable with breather capillaries or 3-wire standard line
Line length	max. 200 m

¹⁾ air permeable and humidity blocking

Supply and signal circuit (analog transmission, 4 ... 20 mA)

Supply voltage for pressure transmitter
in conjunction with VEGADIS 12

- without indication

12 ... 36 V DC

- with indication

17 ... 36 V DC

Max. input current

150 mA

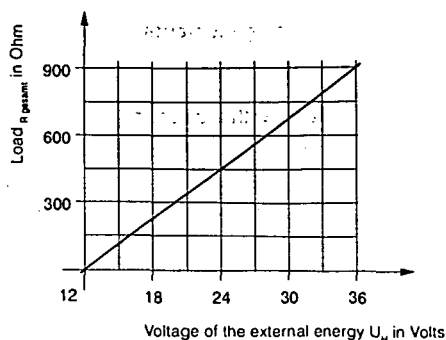
Range for current signal

3,5 ... 22 mA

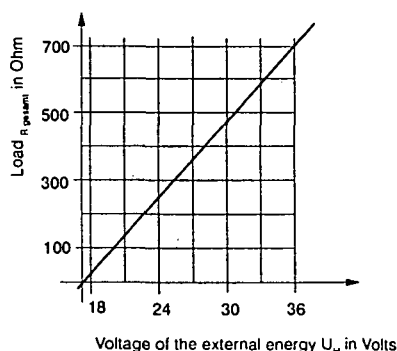
Max. permissible load

dependent on supply voltage
(see load diagram)

Load diagram without indication



Load diagram with indication



Protective measures

Housing	IP 65
Protection class	III
Overvoltage category	III

CE-protective measures

VEGADIS 12 or VEGADIS 12 Ex external housings meet the protective regulations of EMVG (89/336/EEG) and NSR (73/23/EEG). The conformity has been judged acc. to the following standards:

EMVG	Emission	EN 50 081
	Susceptibility	EN 50 082
NSR		EN 61 010

NAMUR-regulations

The NAMUR-regulations NE21, May 1993 have been met.

Ambient conditions

Ambient temperature	
- VEGADIS 12	-40°C ... +85°C
- VEGADIS 12 with indication	-10°C ... +70°C
Storage and transport temperature	-40°C ... +85°C

Ex-technical data, CENELEC



(applied for approval)

Classification

Classification	EEx ia IIC T6, T5, T4
----------------	-----------------------

Intrinsically safe input VEGADIS 12 Ex

Classification	EEx ia IIC
Internal effective capacitance	C_{int} negligible
Internal effective inductance	L_{int} negligible

Intrinsically safe indicating circuit

Classification	EEx ia IIC
Max. values	
- supply voltage	$U_o = 7,8 \text{ V}$
- current	$I_o = 260 \text{ mA}$
- power	$P_o = 507 \text{ mW}$
Max. permissible outer capacitance	$L_o = 960 \text{ nF}$
Max. permissible outer inductance	$I_o = 0,78 \text{ mH}$
Characteristics	linear
only for connection	of the indication

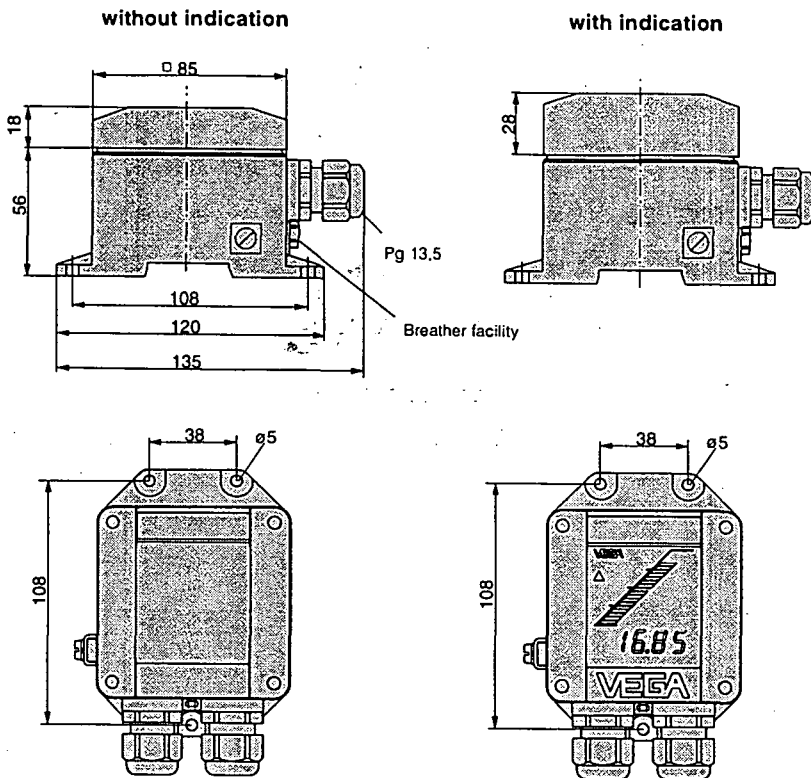
Intrinsically safe supply and signal circuit

Classification	EEx ia IIC
Max. values	
- supply voltage	$U_o = 60 \text{ V}$
- current	$I_K = 150 \text{ mA}$
- power	$P = 841 \text{ mW}$
Internal effective capacitance	$C_{int} < 300 \text{ pF}$
Internal effective inductance	$L_{int} < 0,1 \text{ mH}$

Ambient conditions

Ambient temperature	Temperature class	Ignition temperature
-40°C ... +50°C	T6	85 °C
-40°C ... +65°C	T5	100°C
-40°C ... +70°C	T4	135°C

VEGADIS 12



2 Mounting

VEGADIS 12 can be mounted in the following ways:

- on carrier rail 35 x 7,5 acc. to EN 50 022
- on mounting sheet or to the wall.

With vertical wall mounting the cable entries must point downwards to avoid humidity ingress.

If VEGADIS 12 is additionally used for atmospheric pressure compensation for the pressure transmitter, note the following:

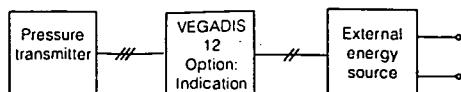
- the breather facility must not be polluted.

3 Electrical connection

3.1 Wiring instructions

VEGADIS 12 is looped into the supply and signal circuit of the pressure transmitter and does not require a separate external energy.

Block diagram



The electronics in the pressure transmitter are made in two-wire technology and requires a supply voltage of 12 ... 36 V DC, 17 ... 36 V DC with indication. Supply voltage and current signal are led via the same two-wire connection cable to the terminals. The third line between pressure transmitter and VEGADIS 12 is used for transmission of the adjustment data.

The external energy is provided via a separate supply unit:

- power supply unit, e.g. VEGASTAB 690
- processing unit with integral DC voltage source (e.g. active DCS-input)

Note that the external energy source is reliably separated from the mains circuits acc. to DIN VDE 0106, part 101. The above mentioned VEGA-instruments meet these requirements and protection class III is therefore guaranteed.

The external energy source must deliver a terminal voltage of at least 12 V or 17 V to the transmitter. The actual terminal voltage on the transmitter depends on the following factors:

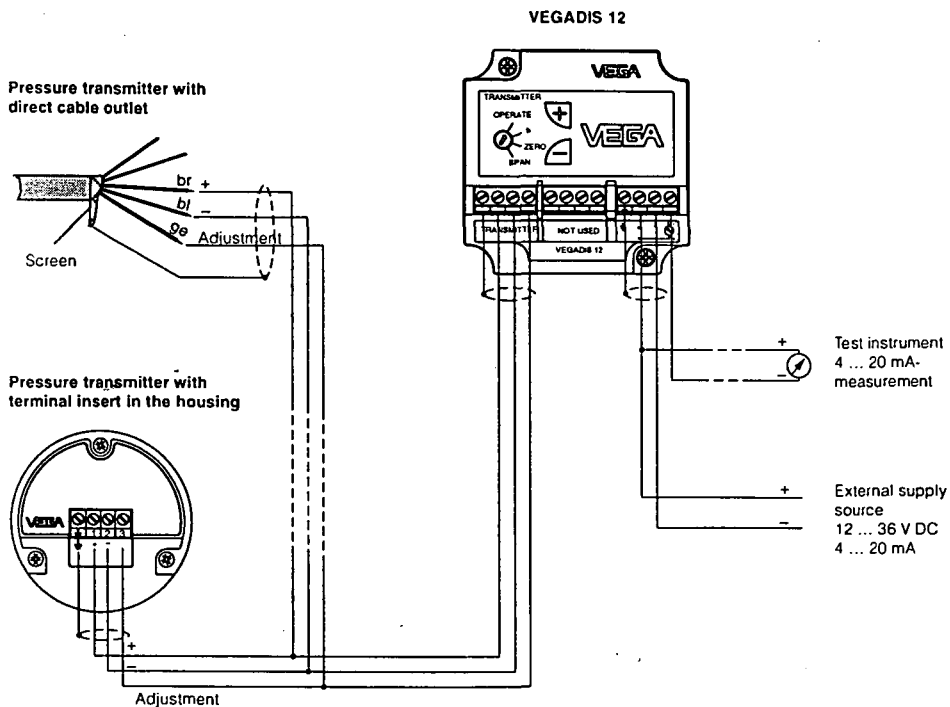
- output voltage U_H of the external energy source under nominal load.
- load resistors of the instruments in the circuit.

For electrical connection the following instructions must be generally observed:

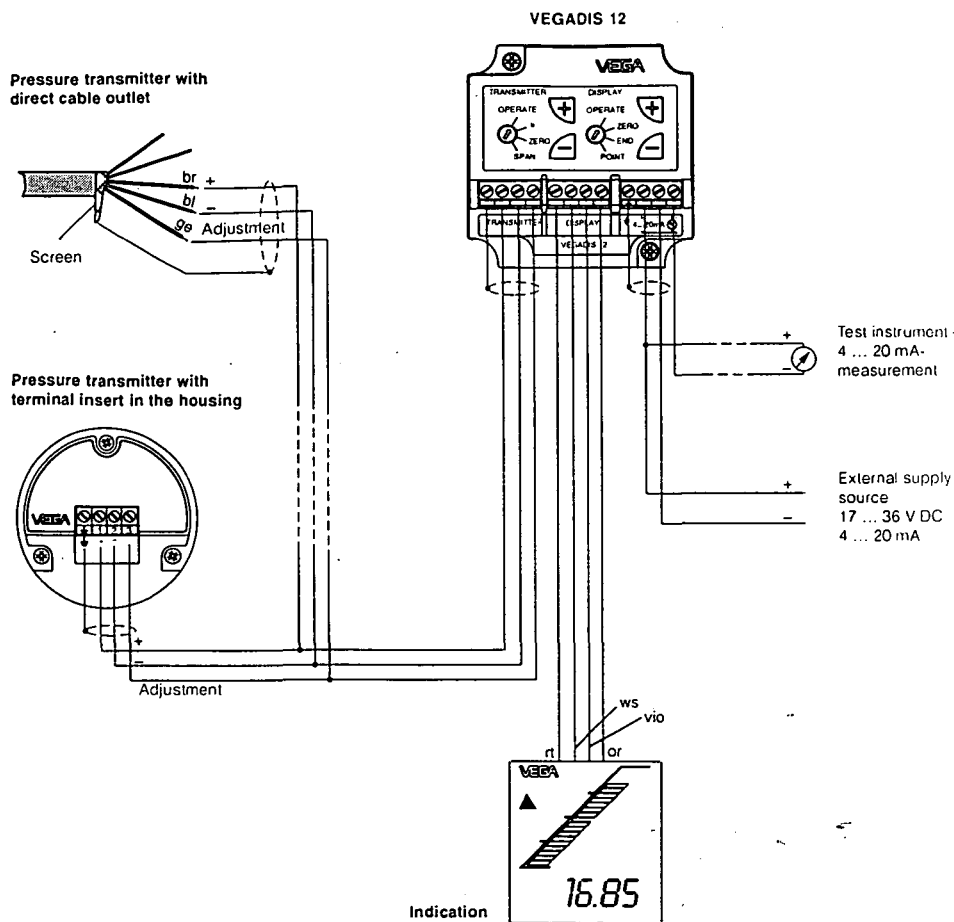
- The connection must be made acc. to the national standards (e.g. in Germany acc. to the appropriate VDE-regulations).
- The terminal voltage must not exceed 36 V to avoid damage to the electronics.
- The electrical connection has a reverse battery protection.
- The wiring between pressure transmitter and VEGADIS 12 as well as between VEGADIS 12 and power supply can be made with standard three or two-wire cable.
- If strong electromagnetic interference is expected, we recommend use of screened cable. The screening must be earthed at one sensor end.

3.2 Wiring plan

VEGADIS 12 without indication

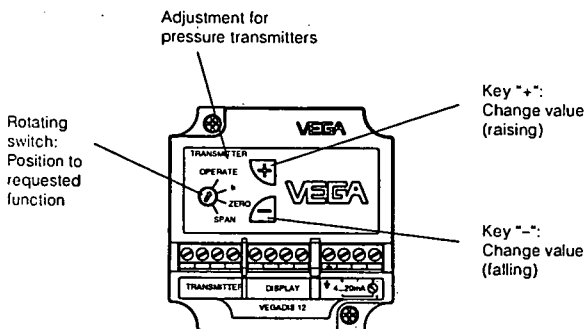


VEGADIS 12 with indication



4 Set-up

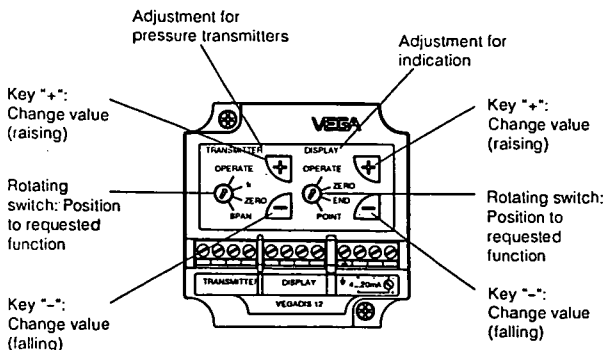
4.1 Adjustment elements



Adjustment system (transmitter)

- Select the function with the rotating switch.
- With keys + and – change the signal current to the desired values or adjust the suitable integration time.
- Then turn the rotating switch to "OPERATE" position. The adjusted values are transferred to the EEPROM-memory and remain even in the case of voltage failure.

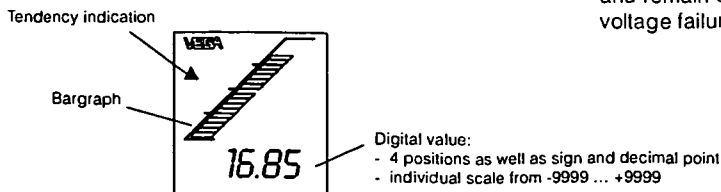
4.2 Operating and indicating elements (version with indication)



Adjustment system (transmitter) (see paragraph 4.1)

Adjustment system (display)

- Select the function with the rotating switch.
- With keys + and – change the digital indication to the desired values or adjust the suitable decimal point.
- Then turn the rotating switch to "OPERATE" position. The adjusted values are transferred to the EEPROM-memory and remain even in the case of voltage failure.



4.3 Adjustment of transmitter

Adjustment

For adjustment of zero and span first connect terminal 10 and 12 to a current meter. The measured value is identical with the output current.

1 Adjust zero

(vessel empty)

- Set rotating switch to zero.
- Adjust a current of 4 mA by pushing the keys + or -.

Adjustment range of zero:

-20 % ... +95 % of the nominal meas. range
(corresponds to a turn up to +95 %).

2 Adjust span

(max. vessel level)

- Set the rotating switch to span.
- Adjust a current of 20 mA by pushing the keys + or -.

Adjustment range of measuring range final value:

3,3 % ... 120 % of nominal meas. range (corresponds to turn down 1 : 30)

Instructions for adjustment:

- A change of zero does not influence the adjusted span.
- It is possible to adjust currents for part fillings, e.g. 8 mA for 25 % and 16 mA for 75 %. The electronics then calculates automatically the current values for 0 % and 100 % (only possible with a $\Delta \geq 3,3 \%$).
- The modification of the current values is first made in 10 μ A-steps, after pushing for appr. 10 sec. in appr. 300 μ A-steps.
- When the current values react on this adjustment with a time delay, there can be two reasons:
 - the last adjustment was carried out with a level, strongly deviating from the actual level,
 - an integration time had been adjusted.

Integration time

For damping of level fluctuations an integration time t_i of 0 ... 5 secs. can be adjusted.

Procedure:

- Set rotating switch to t_i .
- By pushing the - key 10 times ensure that the integration time is set to 0 sec.
- For each 0,5 secs. of the desired integration time push the + key once.

The integration time is the time required by the current output signal to reach 90% of the actual level after a fluctuating level change.

4.4 Scaling of the indication

The indication provides the current values 4 ... 20 mA as a bargraph and as digital value.

Bargraph

No segment of the bargraph appears at 4 mA, all segments appear with 20 mA. This coordination is fixed.

Digital value

The digital value can be individually scaled via the adjustment module between -9999 ... +9999.

1 Adjust zero

- Set the rotating switch to zero.
- Adjust the requested value, e.g. 0 by pushing the keys + or -.

2 Adjust end

- Set the rotating switch to End.
- Adjust the requested value, e.g. 1000 by pushing the keys + or -.

3 Adjust decimal point (point)

- Set the rotating switch to Point.
- Adjust the requested values, e.g. 8888 (no decimal point) by pushing the keys + or -.

5 Diagnosis

5.1 Maintenance

VEGADIS 12 is maintenance free.

5.2 Error removal

In case of failure please check:

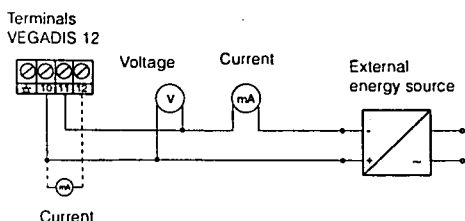
- the atmospheric pressure compensation (only with low pressure ranges),
- the electrical connections and components.

Check atmospheric pressure compensation

First open the cover of the housing. The indicated measured value must not change. However if the indicated measured value changes, the compensation of the atmospheric pressure is not ensured (wrong measured value). Therefore check:

- the breather facility on the housing
- the capillaries in the special cable.

Check electrical components



Instructions for Ex-applications

Deviating from the previous co-ordination, terminals 10 and 12 are here used for short-term connection to a certified active floating (max. value: 470 mW) or an individual passive floating measuring instrument. For connection the regulations for intrinsically safe circuits (measuring instrument, supply and signal circuit) have to be noted.

Voltage

- Check the terminal voltage on VEGADIS 12 (must be at least 12 V DC or 17 V DC with indication).

Current

Current value	Condition
3,8 ... 20,6 mA	standard range for output current
0 mA	signal line interrupted
< 3,6 mA	adjustment, electronics or pressure sensor element defect
> 21,6 mA	fail-safe, short-circuit in the signal line, adjustment, electronics or pressure sensor element defect

6 Instrument modification

6.1 Equip terminal insert

If your pressure transmitter is not equipped with the suitable terminal insert for connection of VEGADIS 12, the terminal insert must be fitted:

- remove available terminal insert
- insert new terminal insert
- set-up pressure transmitter

Remove available terminal insert

- Disconnect pressure transmitter from the power supply.
- Unscrew cover of the connection housing or loosen the screws on the cover of the external housing.
- Remove cover.
- Loosen connection lines on the terminal insert.
- Loosen the three screws on the terminal insert.
- Remove terminal insert and separate plug connection.

Insert new terminal insert

- Provide plug connection to the terminal insert (must snap in).
- Insert the terminal insert into the housing and fasten via the three screws.
- Return the connection lines to the terminals and connect to VEGADIS 12.
- Screw the cover.
- Connect VEGADIS 12 again to the power supply.

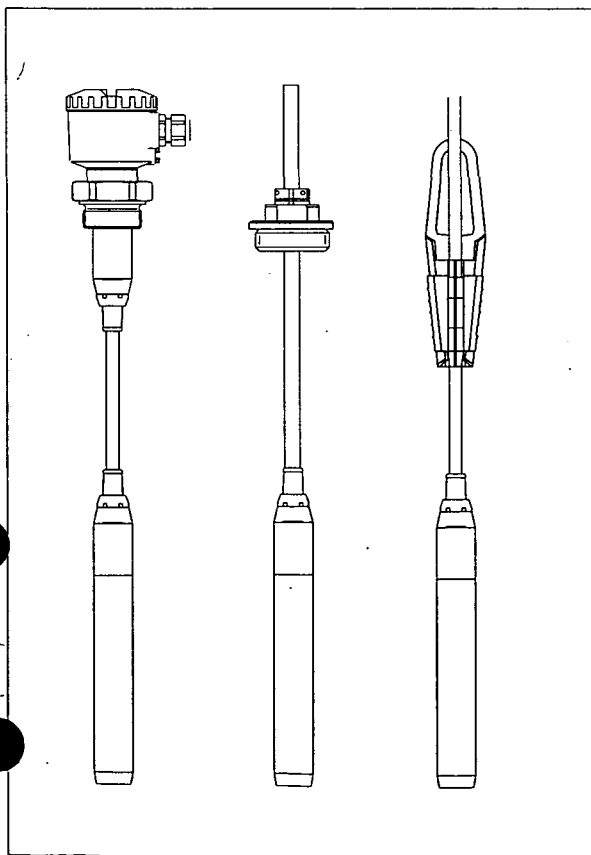
Set-up the pressure transmitter

see section 4 of this instruction.

VEGA Grieshaber KG**Am Hohenstein 113****D-77761 Schiltach****Phone (0 78 36) 50 - 0****Fax (0 78 36) 50 - 201****Fax (0 78 36) 50 - 203**

Operating Instruction

Hydrostatic pressure transmitters D76 and D77



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Safety information

The described module must only be installed and operated as described in this operating instruction. Please note that other action can cause damage for which VEGA does not take responsibility.

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1 Product description

1.1 Function and configuration

Pressure transmitters D76 and D77 are efficient, modular instrument series for hydrostatic level measurement. As pressure sensor element, the dry metallic-capacitive or the dry ceramic-capacitive meas. cell CERTEC® is used.

The hydrostatic pressure of the medium effects via a metal or ceramic diaphragm a capacitance change. This capacitance change is detected by an ASIC (Application specific integrated circuit) and converted by the integral oscillator with microcontroller into a pressure proportional signal. The exact, digital meas. data processing with max. resolution ensures excellent technical data:

The sensor is powered by a separate VEGA-signal conditioning instrument (analogue), a stabilized power supply unit or a DCS (active). After the adjustment a standardized 4 ... 20 mA-current signal is available.

To increase the reliability, important electronics components are automatically tested on their function and internal parameters like sensor value, temperature and operating voltage are checked.

The pressure transmitters with ceramic CERTEC®-meas. cell offer the advantage of a continuous selfmonitoring: Meas. and reference capacitance of the meas. cell are in a defined relation over the whole meas. range. Each deviation of these data is a reliable indicator for a failure of the meas. cell. If within these routines, errors or failures are detected, the fault signal is triggered via the 4 ... 20 mA-output (current jump to 3,6 mA or 21,6 mA). If a VEGA-signal conditioning instrument is connected, this instrument goes to failure.

Output signal

An analogue level or pressure proportional signal current is used as output signal:

- 5 ... 19 mA not standardized (in conjunction with VEGA-signal conditioning instrument)
- 4 ... 20 mA standardized

Adjustment

The sensors can be provided with and without integral adjustment functions:

- without adjustment (version A, adjustment from the signal conditioning instrument)
- without adjustment (version C)
- with integral adjustment (version D)
- with adjustment from the external indicating instrument (version E)

1.2 Types and versions

Pressure transmitter D76

Meas. cell: dry, ceramic-capacitive

Diaphragm: ceramic

Series: suspension version with ø 32 mm

Standard application: all kind of level measurement in vessels or basins as well as in water and sewage water applications

Pressure transmitter D77

Meas. cell: dry, metallic-capacitive

Diaphragm: stst (Duratherm 600)

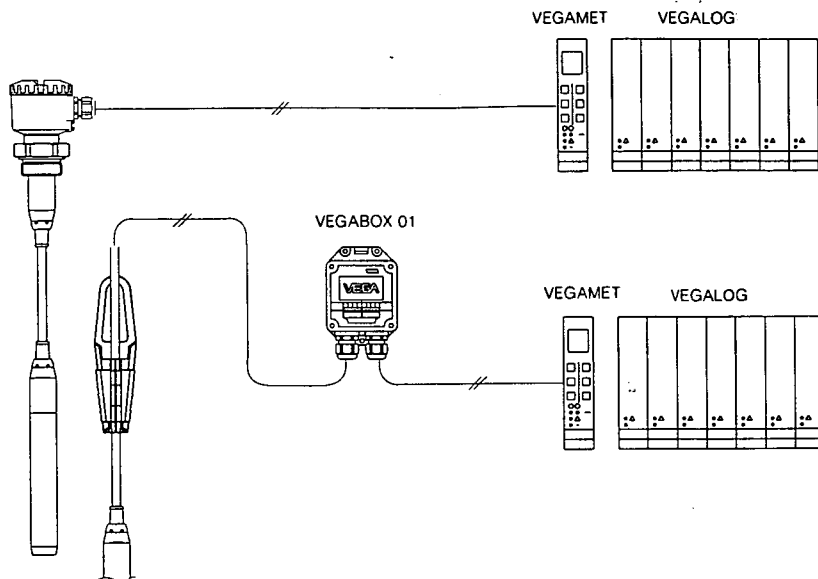
Series: suspension version with ø 32 mm

Standard application: especially economical level measurement for water and sewage water applications

1.3 Electronics version without adjustment

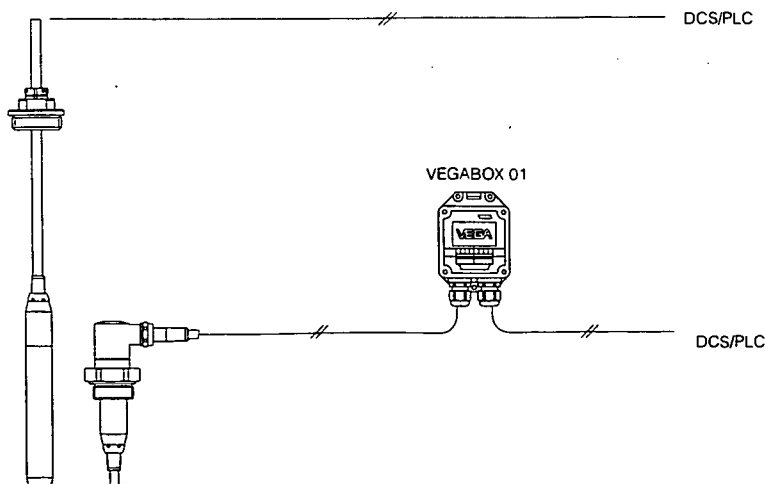
Electronics version A:

Pressure transmitter for connection to VEGA-signal conditioning instruments



Electronics version C:

Pressure transmitter 4 ... 20 mA

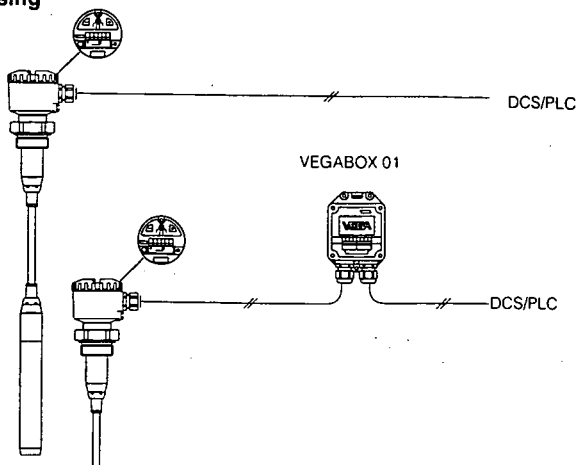


1.4 Electronics version with integral adjustment in connection housing

Electronics version D:

Pressure transmitter 4 ... 20 mA adjustable

Adjustment in connection housing

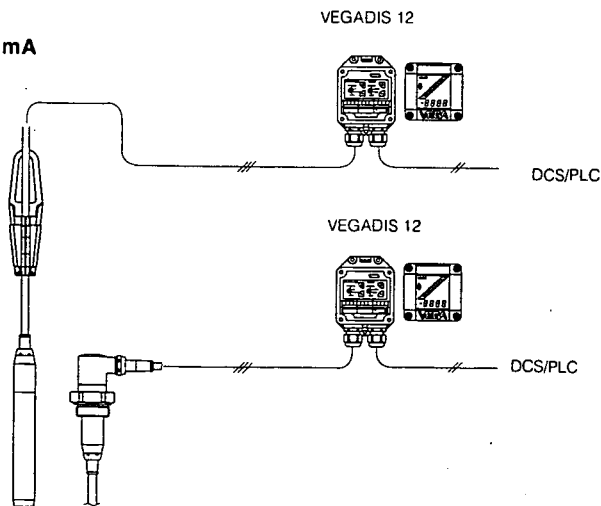


1.5 Electronics for connection to VEGADIS 12

Electronics version E:

Pressure transmitter 4 ... 20 mA

Adjustment in VEGADIS 12



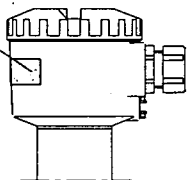
1.6 Type plate

Type plate

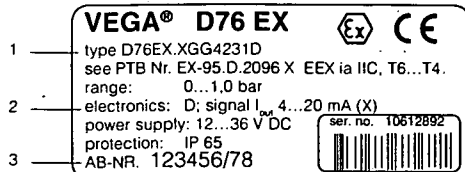
Please check before mounting and electrical connection if you use the suitable instrument. Note the type plate which is located as follows:

Pressure transmitter with connection housing

Type plate

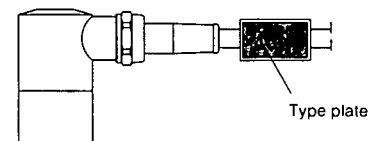


Configuration of the type plate (example Ex-sensor)



- 1 Master data of the order number
- 2 Data of the electronics
- 3 No. of the order confirmation
- 4 Series number

Pressure transmitter with direct cable outlet



The type plate contains important data which are required for mounting and connection. The configuration and the parts of the type plate are explained in the following example.

2 Technical data

2.1 Data

Supply and signal circuit (analogue transmission, 4 ... 20 mA)

Electronics version A, C and D

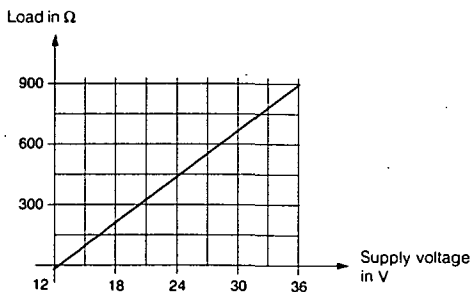
Supply voltage	12 ... 36 V DC
Residual ripple of the supply voltage	no influence at $U_{ss} \leq 1 \text{ V}$
Output signal	
- terminal insert	analogue transmission (not standardized) 4 ... 20 mA (factory setting)
- adjustment insert	4 ... 20 mA (adjustable)
Current limitation	approx. 23 mA
Fault signal	> 21,6 mA
Integration time	0 ... 10 s (adjustment time of 10 % ... 90 % of meas. range final value)
Average delay time	150 ms
Connection line	2-wire
Max. permissible load	dependent on the supply voltage see following load diagram

Supply and signal circuit (analogue transmission, 4 ... 20 mA),

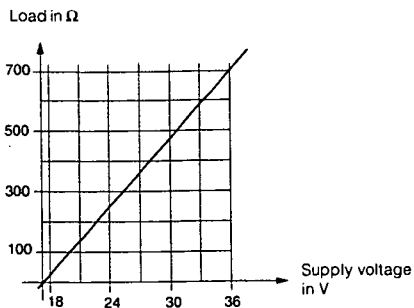
Additional data for electronics version E

Supply voltage for pressure transmitter in conjunction with VEGADIS 12	
- without indication	12 ... 36 V DC
- with indication	17 ... 36 V DC
Max. input current	150 mA
Range of the current signal	3,5 ... 22 mA
Max. permissible load	dependent on the supply voltage (see load diagram)

Load diagram without indication



Load diagram
in conjunction with VEGADIS 12



Integral overvoltage protection (option)

Nominal response DC voltage

- protective diode

40 V

- gas separator

350 V

Nominal discharge current

- gas separator

20 kA

Meas. ranges

Nominal meas. range	Gauge pressure resistance D76 / D77	Low pressure resistance	Pressure transmitter	
			D76	D77
Gauge pressure				
0 ... 0,1 bar	10 bar / 2,5 bar	-0,1 bar	•	–
0 ... 0,2 bar	15 bar / 5 bar	-0,2 bar	•	–
0 ... 0,4 bar	20 bar / 10 bar	-0,4 bar	•	•
0 ... 1,0 bar	25 bar / 25 bar	-1,0 bar	•	•
0 ... 2,5 bar	35 bar / 25 bar	-1,0 bar	•	•
0 ... 5,0 bar	45 bar / 25 bar	-1,0 bar	•	•
0 ... 10,0 bar	60 bar / 25 bar	-1,0 bar	•	•
0 ... 20,0 bar	90 bar / 25 bar	-1,0 bar	•	•

Zero

-20 % ... +95 % adjustable of nominal range

Span

3,3 % ... 120 % adjustable of nominal range

Turn up

up to +95 %

Turn down

up to 1 : 30

Recommended turn down

$\leq 1 : 5$

Accuracy class

0,25

Adjustment and indicating elements

Pressure transmitter	
- terminal insert	without adjustment elements
- adjustment insert	2 keys, 1 rotating switch
VEGADIS 12	
- adjustment insert	2 keys, 1 rotating switch
- adjustment insert (with indication)	2 x 2 keys, 2 rotating switches
- indication	LC-display with
	- bargraph (20 segments)
	- digital value (4-digits)
	- tendency indicator for raising or falling values

Meas. accuracy (similar to DIN 16 086, DIN V 19 259-1 and IEC 770)

Deviation

Reference conditions acc. to IEC 770 e.g.	
- temperature	18°C ... 30°C
- humidity	45 % ... 75 %
- air pressure	860 kPa ... 1060 kPa
Determination of characteristics	limit point adjustment acc. to DIN 16 086
Characteristics	linear
Deviation in characteristics ¹⁾	< 0,25 % with accuracy class 0,25
Hysteresis (repeatability) ¹⁾	< 0,02 % ceramic meas. cell
	< 0,05 % metal meas. cell

Influence of the ambient temperature in general

Average temperature coefficient of the zero signal ¹⁾	< 0,15 %/10 K with accuracy class 0,25
--	--

Longterm stability

Longterm drift of the zero signal ²⁾	
- ceramic meas. cell	< 0,1 %/year
- metal meas. cell	< 0,25 %/year
Vibration resistance	mechanical vibrations with 4 g and 5 ... 100 Hz, tested acc. to the regulations of German Lloyd, GL-characteristics 2

Other influences

Calibration position	upright, diaphragm points downwards
Influence of the installation position	
- ceramic meas. cell	< 0,2 mbar
- metal meas. cell	< 5,0 mbar

¹⁾ relating to the nominal meas. range and in the compensated temperature range of 0°C ... +80°C, reference temperature 20°C (see influence of the ambient temperature).

²⁾ Acc. to IEC 770 relating to the max. span. The possible longterm drift reduces with lower span.

Product description

Operating and ambient conditions**Temperatures**

Ambient temperature	-40°C ... +60°C
Storage and transport temperature	-40°C ... +60°C
Medium temperature	-40°C ... +60°C

Protective measures ¹⁾

Transmitter	IP 68
Housing	IP 65 or IP 67, IP 68 (by fixed connected PE-cable, cable length min. 5 m)
VEGADIS 12	IP 65, IP 67
Protection class	III
Overvoltage category	III

Ex-technical data**Ex-data of the sensors D76 Ex, D77 Ex**

Flame proofing	ia (in conjunction with a safety barrier or a separator)
Classification	EEx ia IIC T6, T5, T4
Temperature class	ambient temperature ²⁾
- T6	-40°C ... +40°C
- T5	-40°C ... +55°C
- T4	-40°C ... +85°C
Ex-approved in category or zone	
- EC-type approval (ATEX)	Zone 1 (II 2G)
- conformity certificate	Zone 1

Ex-data of the external connection housing VEGADIS 12 Ex

Classification	EEx ia IIC T6, T5, T4
Temperature class	ambient temperature
- T6	-40°C ... +45°C
- T5	-40°C ... +55°C
- T4	-40°C ... +85°C

¹⁾ To keep the housing protection IP 65 or IP 67 the use of a suitable seal in the PG is necessary. If the supplied seal does not fit, the customer has to provide a suitable seal.

²⁾ in the range of the oscillator

General data

Connection lines

Cable entry	
- sensor	2 x M20x1,5 (for cable-ø 5...9mm or 9...12mm)
- external housing VEGABOX 01	Pg 13,5 (for cable-ø 5...9 mm or 9...12 mm)
- external housing VEGADIS 12	Pg 13,5 (for cable-ø 5...9 mm or 9...12 mm)
Screw terminals	
- terminal, adjustment insert	for cross-section areas of conductor up to 2,5 mm²
- external connection housing	for cross-section areas of conductor up to 2,5 mm²

Materials, wetted parts

Pressure transmitter D76	
- transmitter	stst 1.4571
- diaphragm	ceramic (99,5 % Oxydec ceramic)
- suspension cable	PE
- cable bushing	CSM
- meas. cell seal	Viton
- transmitter protection	PE-plastic coating
	stst 1.4571-protective cover
Pressure transmitter D77	
- transmitter	stst 1.4571
- diaphragm	Duratherm 600
- suspension cable	PE
- cable bushing	CSM
- transmitter protection	PE-plastic coating
	stst 1.4571-protective cover

Materials, wetted parts

Pressure transmitter D76, D77	
- housing	Alu (sea water resistant) and PE-powder-coated, stst 1.4571
- straining clamp	St galvanized
- closing screw	stst 1.4305

Weight

Basic weight without housing	
- D76	approx. 2,2 kg
- D77	approx. 2,2 kg
VEGABOX 01, VEGADIS 12	approx. 400 g
Suspension cable or hose	approx. 0,1 kg/m
Connection tube	approx. 1,0 kg/m

CE-conformity CE

Pressure transmitters D76 and D77 meet the protective regulations of EMVG (89/336/EWG) and NSR (73/23/EWG). The conformity has been judged acc. to the following standards:		
EMVG	Emission	EN 50 081 - 1: 1992
	Susceptibility	EN 50 082 - 2: 1995
NSR		EN 61 010: 1993

NAMUR-regulations

The NAMUR-regulations NE21, May 1993 had been met.

2.2 Approvals

Ex-approvals

For the use of pressure transmitters in Ex and StEx-areas, the instruments must be suitable and approved for these explosion zones and application areas. For the use on ships special type approvals are available. The suitability is checked by the approval authorities and certified by approval documents. Note the attached approval documents when using a sensor in Ex-areas.

Pressure transmitters D7. Ex are approved for Ex zone 1.

Pressure transmitters D7. Ex0 are approved for Ex-zone 0 and must be powered by an intrinsically safe circuit for operation in Ex-areas. Safety barrier and separator provide intrinsically safe (ia) circuits.

Following a choice of instruments with which pressure transmitters work reliably.

Sensors with analogue current output

Separator and signal conditioning instrument:

- VEGADIS 371 Ex

Separator:

- Stahl 9303/15/22/11
- Knick WG21 A7 (opt. 470, 336)
- CEAG GHG 124 3111 C1206

Safety barrier (supply min. 18 V)

- Stahl 9001/01/280/085/10
- Stahl 9001/01/280/110/10
- Stahl 9001/01/280/165/10
- CEAG GHG 11 1 9140 V0728

Sensors with digital output signal

- require for operation in Ex-areas zone 0 the Ex-separator VEGATRENN 548 V Ex or an Ex0-approved signal conditioning instrument VEGAMET 514 V or 515 V.

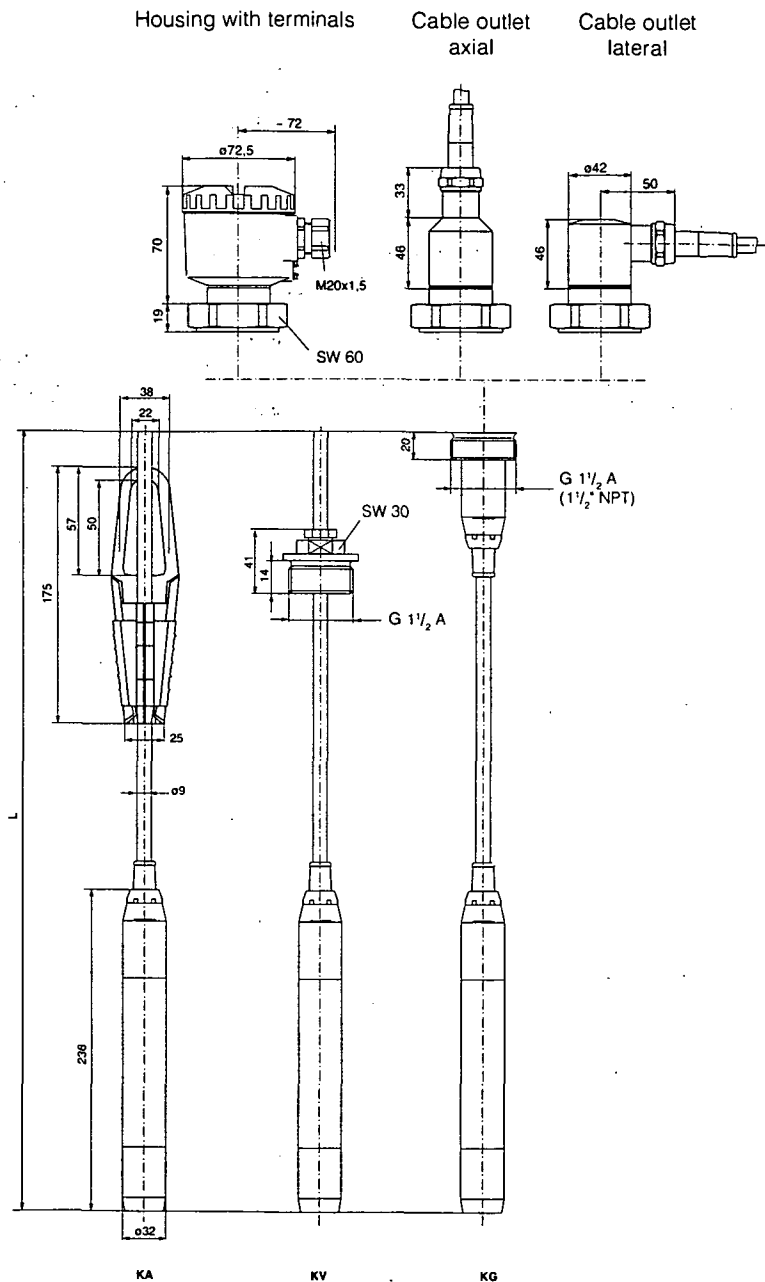
Test and approval authorities

The pressure transmitters are tested and approved by the following monitoring, test and approval authorities:

- **PTB**
(Physikalisch Technische Bundesanstalt - Physical Technical Test Authority)
- **FM**
(Factory Mutual Research)
- **ABS**
(American Bureau of Shipping)
- **LRS**
(Lloyds Register of Shipping)
- **GL**
(German Lloyd)
- **CSA**
(Canadian Standards Association)

2.3 Dimensions

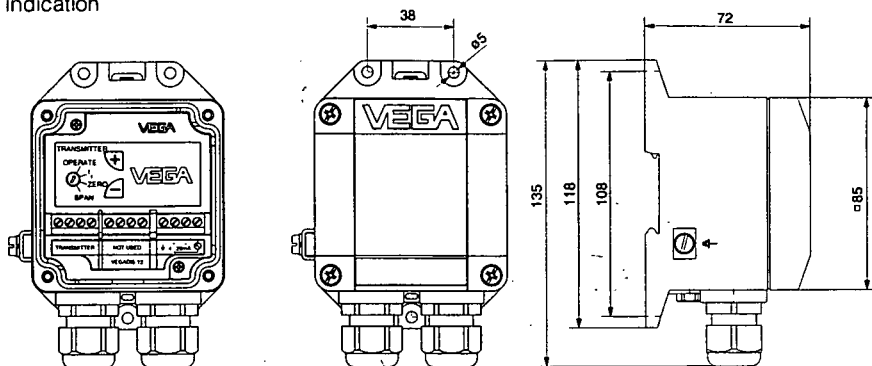
Pressure transmitter D76 and D77



L: Suspension cable
length acc. to order

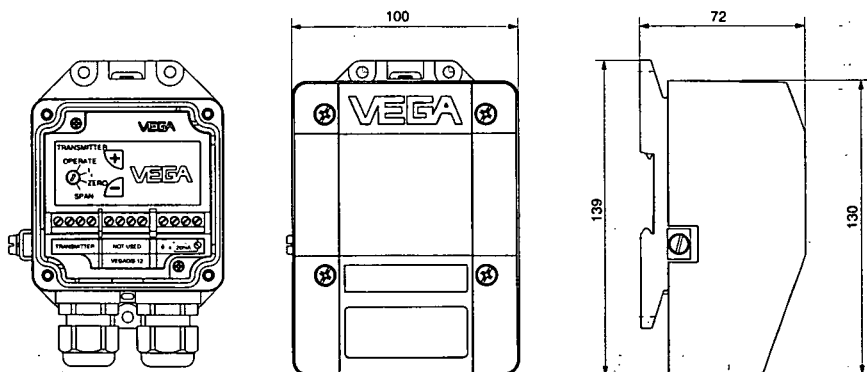
VEGADIS 12 (external connection housing with integral adjustment)

without indication

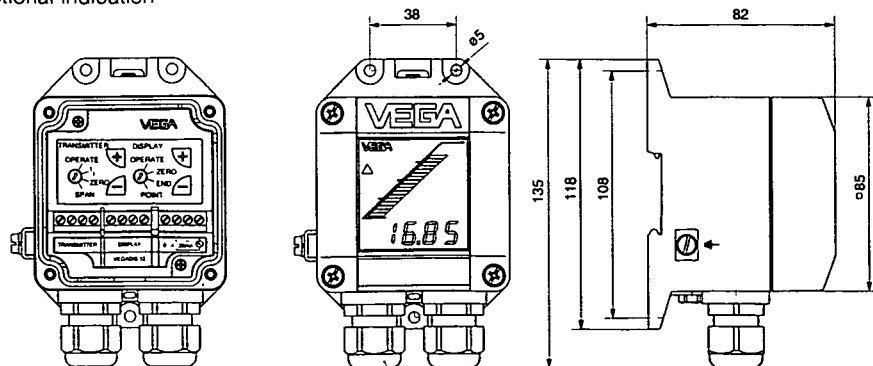


Pg 13.5 (cable- ϕ 5 ... 9 mm or 9 ... 12 mm)

with optional protective cover

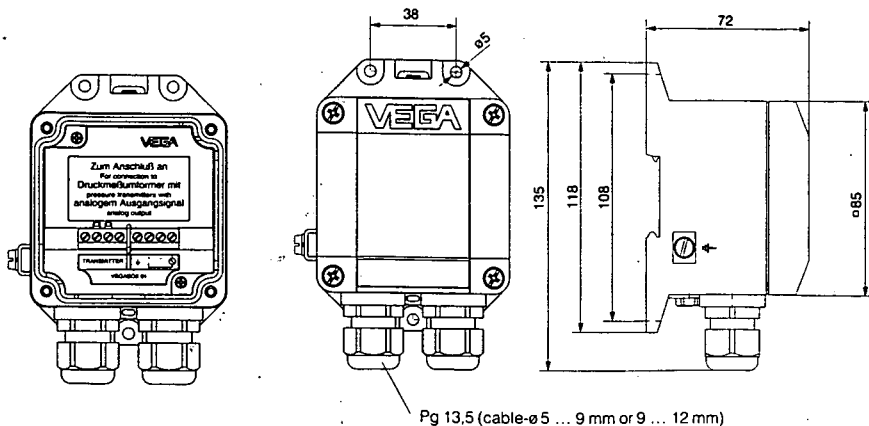


with optional indication

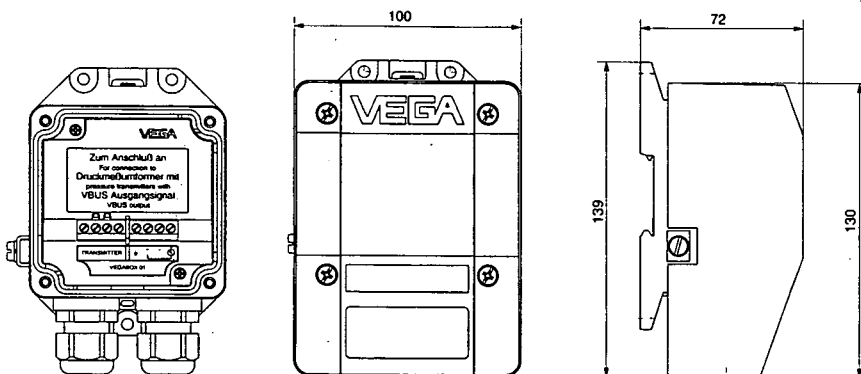


Pg 13.5 (cable- ϕ 5 ... 9 mm or 9 ... 12 mm)

VEGABOX 01 (connection housing with breather facility)



with optional protective cover



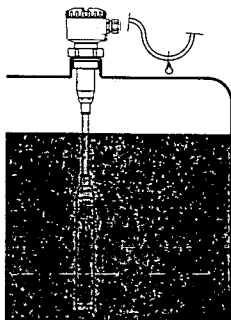
3 Mounting

3.1 Mounting instructions

Cable entry

Pressure transmitters can be mounted in any individual installation position. However to avoid humidity penetration, the cable entry must point downwards. The connection housing is hence rotational by 340° ($\pm 170^\circ$) and locked with a small screw below the cable entry or the pressure compensation filter against overwinding. Therefore do not remove this screw.

Loop the connection line to the sensor housing downwards so that rain and condensation water can drain off. This is mainly valid for mounting outside, in humid areas (e.g. due to cleaning processes) or on cooled or heated vessels.



Humidity

Process connection seal

For mounting it is absolutely necessary to use a process connection seal. This seal is supplied with the pressure transmitter or must be provided by the customer (see appropriate table in chapter "2.3 Dimensions").

3.2 Compensation of the atmospheric pressure

On instruments for gauge pressure measurement, the atmospheric pressure is compensated in different ways dependent on the version of the pressure transmitter.

Pressure transmitter with housing

- via an integral breather facility below the cable entry (PTFE-insert ¹⁾), protection IP 65
- via the capillaries of the special cable ²⁾ used with the pressure transmitter, protection IP 67

Pressure transmitter with direct cable outlet

- via the capillaries of the connected special cable ²⁾, protection IP 68

We recommend to loop the special cable into the external housing VEGABOX 01 (accessory) and to carry out the pressure compensation via the integral breather facility.

External housing VEGABOX 01

Note the following instructions:

- generally there must be the same atmospheric pressure on the external housing VEGABOX 01 than on the pressure transmitter
- the pressure compensation must be made in dry environment
- in case of vertical wall mounting, the cable entries must point downwards to avoid humidity ingress.

¹⁾ air permeable and humidity blocking

²⁾ cable length min. 5 m

4 Electrical connection

4.1 Connection instructions

The electronics in the pressure transmitters requires a supply voltage of 12 ... 36 V DC and is designed in two-wire technology, i.e. supply voltage (DC voltage) and meas. signal are transmitted via the same two-wire connection cable.

The supply voltage is provided via a power supply unit, e.g.:

- power supply unit VEGASTAB 690
- processing unit with integral DC voltage source (e.g. active DCS-input)
- VEGAMET, VEGALOG or VEGADIS 371

Note that the supply voltage is reliably separated from the mains circuits acc. to DIN VDE 0106, part 101. VEGA-instruments meet this requirement and protection class III is ensured.

The terminal voltage on the transmitter depends on the following factors:

- output voltage U_n of the voltage supply under nominal load.
- electrical resistors of the connected instruments in the circuit.

For electrical connection generally note the following instructions:

- the connection must be made acc. to the national installation standards (e.g. in Germany acc. to the VDE-regulations)
- the terminal voltage must not exceed 36 V, to avoid damage of the electronics
- the electrical connection has no polarisation protection
- the pressure transmitter can be connected with standard two-wire cable
- if strong electromagnetic interferences have to be expected, we recommend to use screened cable. The screening must be earthed on one sensor end
- if overvoltages have to be expected, we recommend the pressure transmitters with integral overvoltage protection or the installation of VEGA-overvoltage arresters
- a seal suitable for the cable must be used in the Pg.

Safety instructions for Ex-applications

Generally disconnect voltage before you start work. Always switch off the power supply before you start any connection work on the sensors. You protect yourself and the instruments.

Skilled staff

Instruments used in Ex-areas must only be connected by skilled staff. The skilled staff must note and understand the installation regulations and the attached type approvals and conformity certificates.

In hazardous areas the necessary regulations in the type approvals and conformity certificates of the sensors and the safety barrier or separator must be noted (e.g. DIN VDE 0165). Sensors used in Ex-areas must only be operated on intrinsically safe circuits. The permissible electrical values are stated in the type approval or conformity certificate.

Intrinsically safe circuits with more than one active instrument (delivering electrical energy) must not be switched together. In this case note the special installation regulations (DIN VDE 0165).

Pressure transmitters in certain versions are provided with a warning label informing about measures which must be met to avoid danger of electrostatic discharge. Note the contents of the warning label.

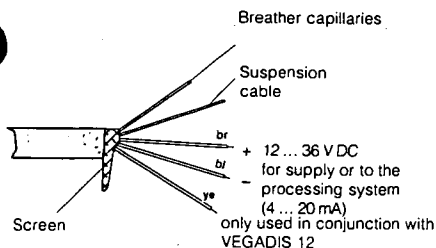
Connection cable

Note that the connection cables must be specified for the operating temperatures expected in your systems. The cable must have an outer diameter of 5 ... 9 mm. The seal effect of the cable entry will otherwise not be ensured.

Cables for intrinsically safe circuits must be marked blue and must not be used for other circuits.

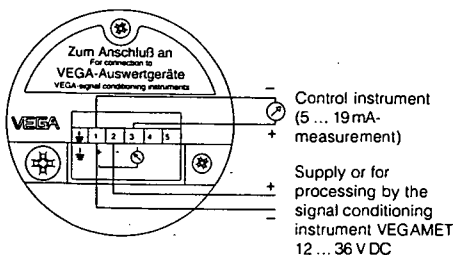
4.2 Terminal coordination

Direct cable outlet



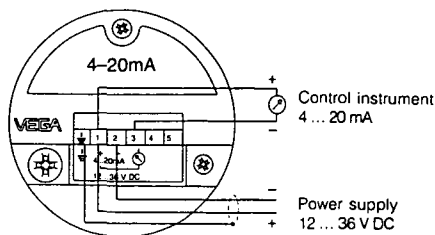
Electronics version A

5 ... 19 mA-output signal for connection to VEGA-signal conditioning instruments



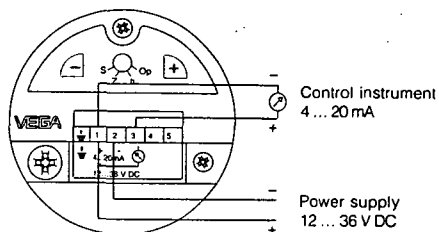
Electronics version C

4 ... 20 mA-output signal



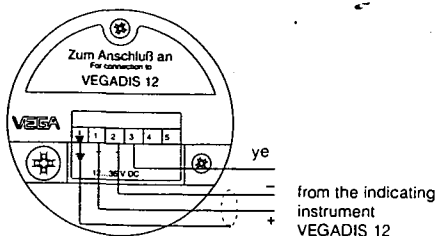
Electronics version D

4 ... 20 mA-output signal with integral adjustment



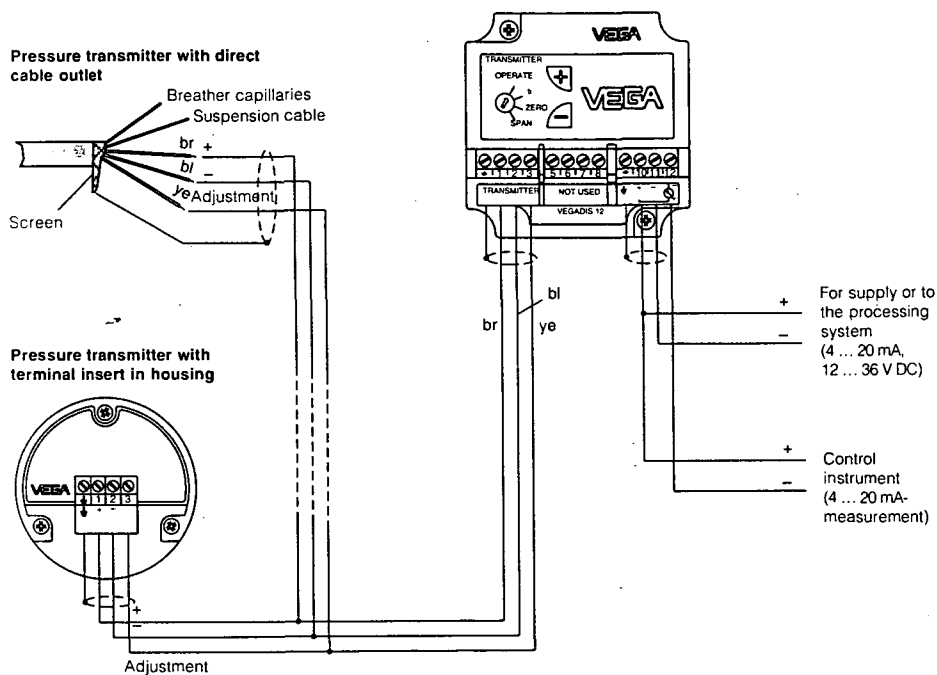
Electronics version E

4 ... 20 mA-output signal adjustable from the external indicating instrument VEGADIS 12



Terminal coordination

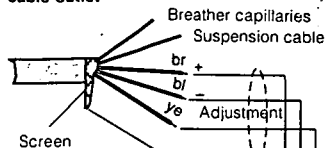
- ≡ Earth, cable screen
- 1 Power supply [+]
- 2 Power supply [-]
- 3 Control instrument [-] / VEGADIS 12
- 4 not coordinated
- 5 not coordinated

4.3 Connection to VEGADIS 12 without indication**Adjustment insert in external connection housing**

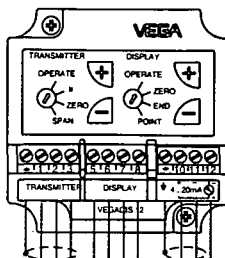
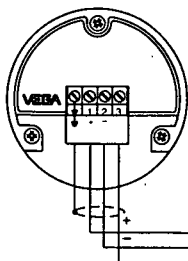
4.4 Connection to VEGADIS 12 with indication

Adjustment insert in external connection housing

Pressure transmitter with direct cable outlet

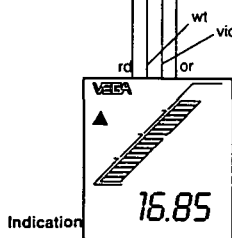


Pressure transmitter with terminal insert in housing

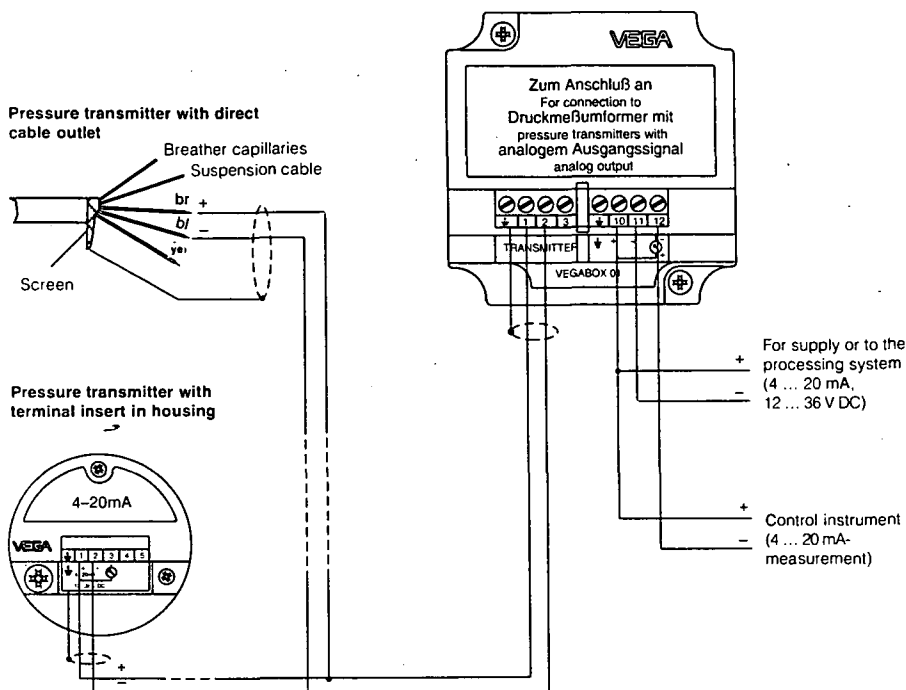


For supply or to the processing system
(4 ... 20 mA, 12 ... 36 V DC)

Control instrument
(4 ... 20 mA-measurement)



4.5 Connection to VEGABOX 01



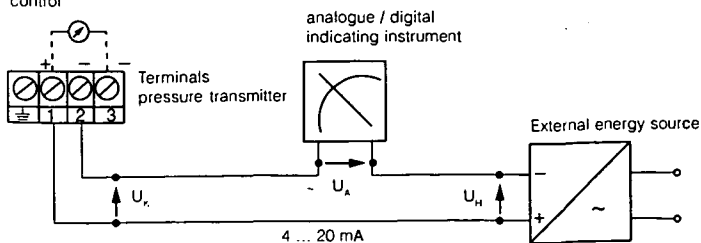
4.6 Connection examples

The following connection examples are valid for direct connection to the terminals of the pressure transmitter. When connecting the external connection housing, the connection to the appropriate terminals of the housing is made.

Oscillator powered via mains

The processing is made via an indicating instrument.

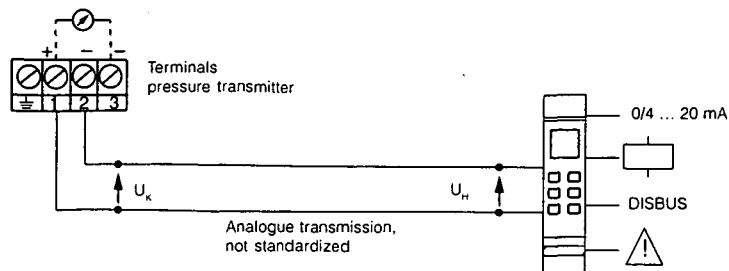
Ohmmeter for local
control



Oscillator powered by a VEGA-signal conditioning instrument

Standard circuit for not standardized output.

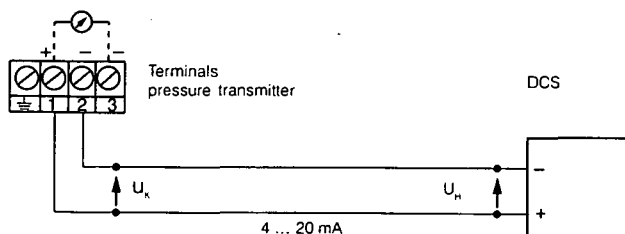
Ohmmeter for local control



Oscillator powered by a DCS with active input circuit

Processing via DCS.

Ohmmeter for local control



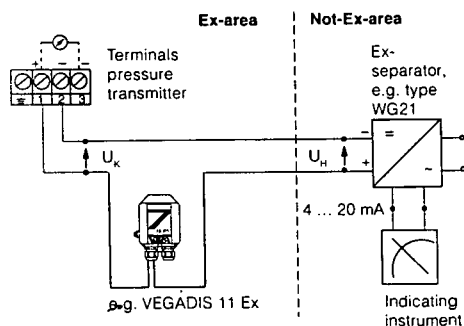
Note:

An Ohmmeter for local control of the output current can be connected to terminals 1 and 3. This measurement can be made during operation without interrupting the supply line.

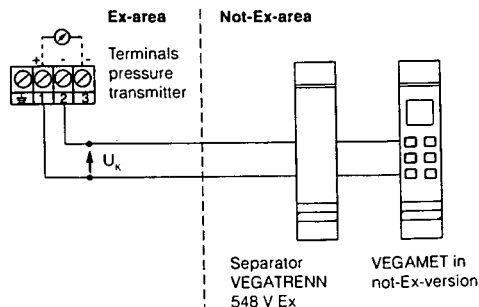
On sensors in HART®-version a HART®-handheld can be connected to the signal line for adjustment. The resistance of the signal circuit must be then at least 250Ω . If necessary a resistor must be connected to the signal circuit for adjustment.

4.7 Connection examples for Ex-applications

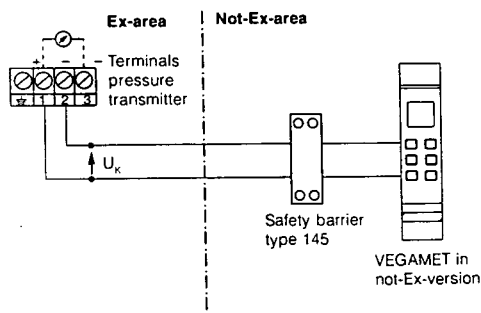
Supply via Ex-separator, e.g. VEGA type WG21



Supply via a VBUS-signal conditioning instrument with separator VEGATRENN 548 V Ex



Supply via a VEGA not-Ex-signal conditioning instrument with safety barrier type 145



Note:

- Only carry out adjustment with connected safety barrier. Reason: the current requirement of approx. 300 μ A is hence considered.

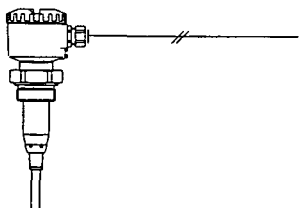
5 Set-up

After each connection to the supply voltage, the electronics carries out a selfcheck for approx. 5 secs. The current in the signal circuit takes for this period a value of > 21,6 mA.

5.1 Sensor without adjustment

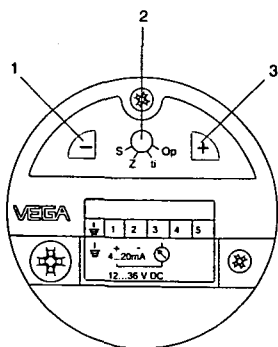
Sensors with electronics version A and C have no adjustment possibility and are fixed adjusted to the stated meas. range.

5.2 Adjustment with adjustment insert in sensor



Sensors with electronics version D are equipped with a two-key adjustment insert.

- 1 Reduce value
- 2 Rotating switch
- 3 Increase value



With the rotating switch you choose four switch positions:

- Z - Zero (zero adjustment)
- ti - Time (integration time)
- Op - Operate (operating condition)

Procedure

- With the rotating switch you choose the required function.
- With the [+] and [-]-key you modify the signal current to the requested value or adjust the suitable integration time.
- Afterwards set the rotating switch to position "OPERATE". The adjusted values are transmitted into the EEPROM-memory and remain there even in case of voltage loss.

Adjustment

For adjustment of zero and span, connect first of all terminals 1 and 3 to an ohmmeter. The measured value is identical with the output current.

First of all adjust zero (empty vessel)

- Set the rotating switch to "zero". Empty the vessel.
- Adjust a current of 4 mA by pushing the [+] and [-]-key.

The adjustment range of zero can be in the range of -20 % ... +95 % of the nominal meas. range (corresponds to a turn up of up to +95 %).

Then adjust the span (full vessel)

- Set the rotating switch to "span". Completely fill the vessel.
- Adjust a current of 20 mA by pushing the [+] and [-]-key.

The adjustment range of the span can be chosen within the range of 3,3 % ... 120 % of the nominal meas. range (corresponds to a turn down 1 : 30).

Notes to the adjustment:

- A modification of the span does not influence the adjusted span.
- It is also possible to adjust currents for part fillings, e.g. 8 mA for 25 % and 16 mA for 75 %. The electronics calculates then automatically the current values for 0 % and 100 % (only possible when both values differ by $\geq 3,3$ %).
- If the current values react on the pushing of the keys with a time delay, this can have two reasons:
 - the last adjustment had been carried out with a level which considerably deviates from the actual level
 - a higher integration time was adjusted.

Integration time

An integration time t_i of 0 ... 10 secs. can be adjusted to damp level fluctuations.

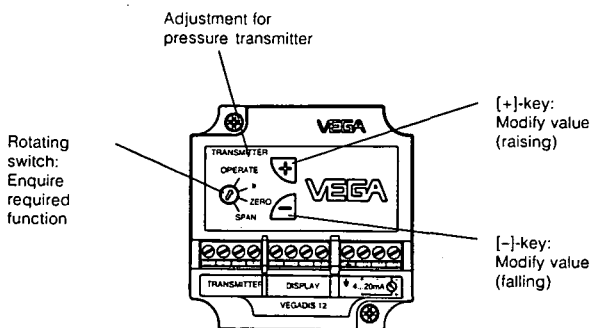
Adjust integration time

- Set rotating switch to "ti".
- By pushing the [-]-key 10-times ensure first of all, that the integration time is adjusted to 0 sec.
- For every 1 sec. requested integration time, push the [+] -key once.

The integration time is the time required by the current output signal to reach 90 % of the actual height after an erratic level change.

5.2 Adjustment in external connection housing VEGADIS 12

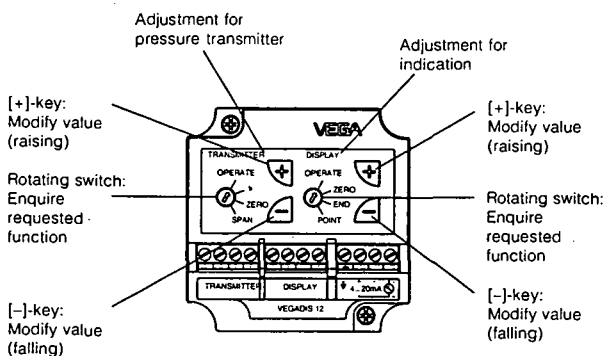
without indication



Adjustment of the pressure transmitter

- Choose the requested function with the rotating switch.
- With the [+] and [-]key you modify the signal current to the requested values or adjust the suitable integration time.
- Afterwards set the rotating switch to position "OPERATE". The adjusted values are transmitted to the EEPROM-memory and remain there even in case of voltage loss.

with indication

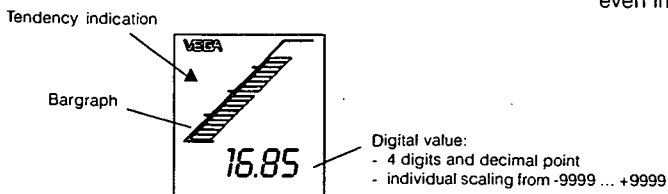


Adjustment of the pressure transmitter

(see above)

Adjustment of the indication

- Choose the requested function with the rotating switch.
- With the [+] and [-]key you modify the digital indication to the requested values or adjust the suitable decimal point.
- Afterwards set the rotating switch to position "OPERATE". The adjusted values are transmitted to the EEPROM-memory and remain there even in case of voltage loss.



Adjustment of the pressure transmitter

Adjustment

For adjustment of zero and span connect first of all terminals 10 and 12 to an ohmmeter. The measured value is identical to the output current.

1 Adjust zero (empty vessel)

- Set the rotating switch to "zero".
- Adjust a current of 4 mA by pushing the [+] and [-]-key.

Adjustment range of zero:
-20 % ... +95 % of nominal meas. range
(corresponds to a turn up of up to +95 %).

2 Adjust span (max. level)

- Set the rotating switch to "span".
- Adjust a current of 20 mA by pushing the [+] and [-]-key.

Adjustment range of the span:
3,3 % ... 120 % of the nominal meas. range
(corresponds to a turn down 1 : 30)

Notes to the adjustment:

- A modification of the span does not influence the adjusted span.
- It is also possible to adjust currents for part fillings, e.g. 8 mA for 25 % and 16 mA for 75 %. The electronics calculates then automatically the current values for 0 % and 100 % (only possible when both values differ by $\Delta \geq 3,3$ %).
- The modification of the current values is first of all made in 10 μ A-steps, after approx. 10 secs. pushing in approx. 300 μ A-steps.
- If the current values react on the pushing of the keys with a time delay, this can have two reasons:
 - the last adjustment had been carried out with a level which considerably deviates from the actual level
 - an integration time was adjusted.

Integration time

An integration time t_i of 0 ... 10 secs. can be adjusted to damp level fluctuations.

Adjust integration time

- Set rotating switch to "ti".
- By pushing the [-]-key 10-times ensure first of all, that the integration time is adjusted to 0 sec.
- For every 1 sec. requested integration time, push the [+] -key once.

The integration time is the time required by the current output signal to reach 90 % of the actual height after an erratic level change.

Scaling of the indication

The indication provides the current values 4 ... 20 mA as bargraph and digital value.

Bargraph

At 4 mA no segment of the bargraph appears, at 20 mA all segments appear. This coordination is fixed.

Digital value

The digital value is individually scalable via the adjustment insert between -9999 ... +9999.

1 Adjust zero

- Set the rotating switch to "zero".
- By pushing the [+] and [-]-key adjust the requested value, e.g. 0.

2 Adjust end

- Set the rotating switch to "End".
- By pushing the [+] and [-]-key adjust the requested value, e.g. 1000.

3 Adjust decimal point (point)

- Set the rotating switch to "Point".
- By pushing the [+] and [-]-key adjust the requested value, e.g. 8888 (no decimal point).

6 Diagnosis

6.1 Maintenance

Series 70 pressure transmitters are generally maintenance free.

In very polluted products, such as e.g. sewage water we recommend to clean the diaphragm from time to time with a hair brush. However the diaphragm must not be damaged!

Should the removal of the pressure transmitter (e.g. due to cleaning of the vessel) be necessary, we recommend the use of a new seal when installing the pressure transmitter again. VEGA-original seals should be used exclusively (see chapter "2.3 Dimensions").

6.2 Failure removal

Due to the continuous self-monitoring, series 70 pressure transmitters offer maximum reliability. If nevertheless failures occur, check before removing the pressure transmitter:

- the atmospheric pressure compensation (only with gauge pressure measuring ranges),
- the electrical connections.

Check atmospheric pressure compensation

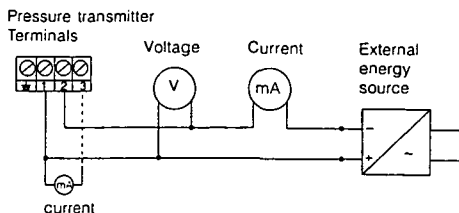
First of all open the cover of the housing where the atmospheric breather facility¹⁾ is located. The indicated measured value must not change. If the indicated value changes, the compensation of the atmospheric pressure does not function correctly which influences the measured value. Check the complete instrument:

- on the pressure compensation facility on the housing
- on VEGADIS 12 or VEGABOX 01
- the capillaries in the special cable.

Note:

On the pressure compensation facility there must always be the same atmospheric pressure like in the open vessel.

Check electrical connections



Check voltage

- The terminal voltage on the pressure transmitter must be at least 12 V DC.
- The terminal voltage on VEGADIS 12 must be at least 12 V DC or 17 V DC with indication.
- The supply voltage for the pressure transmitter by a signal conditioning instrument VEGAMET must be approx. 18 V DC (with VBUS 25 V DC).

Check current

- Initial current with uncovered diaphragm of the pressure transmitter: approx. 4 mA (5 mA when operated on a VEGA-signal conditioning instrument)
- Current during operation: 4 ... 20 mA (5 ... 19 mA when operated on a VEGA-signal conditioning instrument)
- Meas. line interrupted or sensor defect: 0 ... 3 mA
- Exceeding or decreasing of the specific meas. range: 3 mA
- Pressure transmitter defect or shortcircuit: Current > 23 mA

Note for Ex-applications



Deviating from above coordination, terminals 1 and 3 (on VEGADIS 12 terminals 10 and 12) are only used for shortterm connection to a certified active floating meas. instrument (max. value: 470 mW) or an individual passive floating ohmmeter. For connection the regulations for wiring of intrinsically safe circuits (meas. instrument, supply and signal circuit) must be noted.

¹⁾ Consisting of a plastic screw insert with integral filter element.

7 Instrument modification

7.1 Refit adjustment insert

Such a refitting can be e.g. necessary when you want to adapt a pressure transmitter with factory setting to modified conditions of the measurement.

For refitting note the following procedure:

- remove available terminal insert
- mount new adjustment insert
- set-up pressure transmitter acc. to chapter "5 Set-up" of this instruction

Remove available terminal insert

- 1 Separate pressure transmitter from power supply.
- 2 Unscrew cover of the connection housing or loosen the screws on the cover of the external housing.
- 3 Remove cover.
- 4 Loosen connection lines on the terminal insert.
- 5 Loosen the three screws of the terminal insert.
- 6 Remove terminal insert and separate plug connection (bent locking nose carefully to the housing centre).

Mount new adjustment insert

- 7 Provide plug connection to the adjustment insert (must snap-in).
- 8 Insert the adjustment insert into the housing and fasten with the three screws.
- 9 Fasten the connection lines with the terminals.
- 10 Screw socket.
- 11 Connect pressure transmitter to power supply.



VEGA Grieshaber KG
Am Hohenstein 113
D-77761 Schiltach
Phone (0 78 36) 50 - 0
Fax (0 78 36) 50 - 201
e-mail vega@vega-g.de



3.0 TELEMETRY

JPR Ref:- (A19695.001)

Revision 0

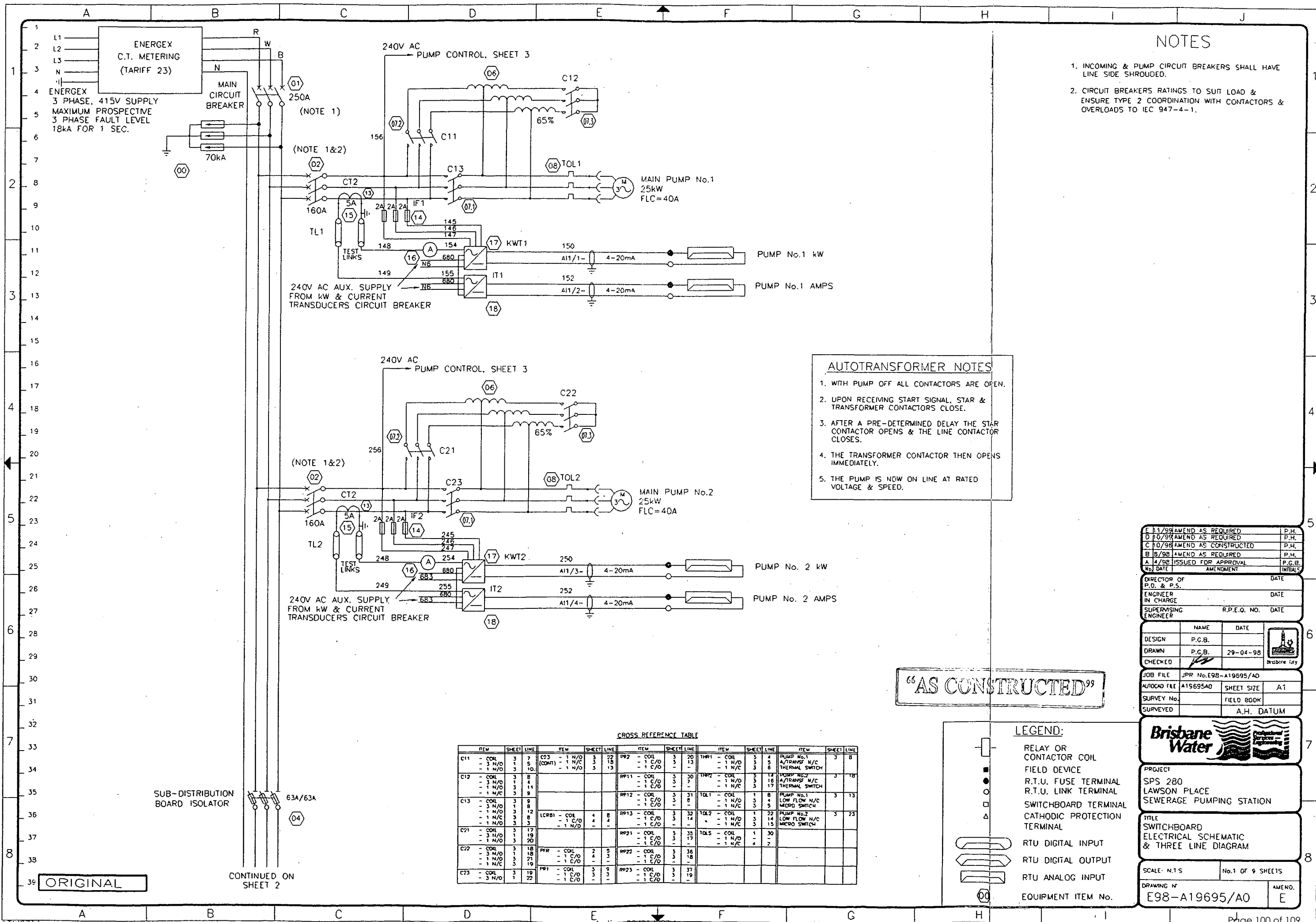
January 21, 1999

4.0 "AS CONSTRUCTED DRAWINGS"

JPR Ref:- (A19695.001)

Revision 0

January 21, 1999

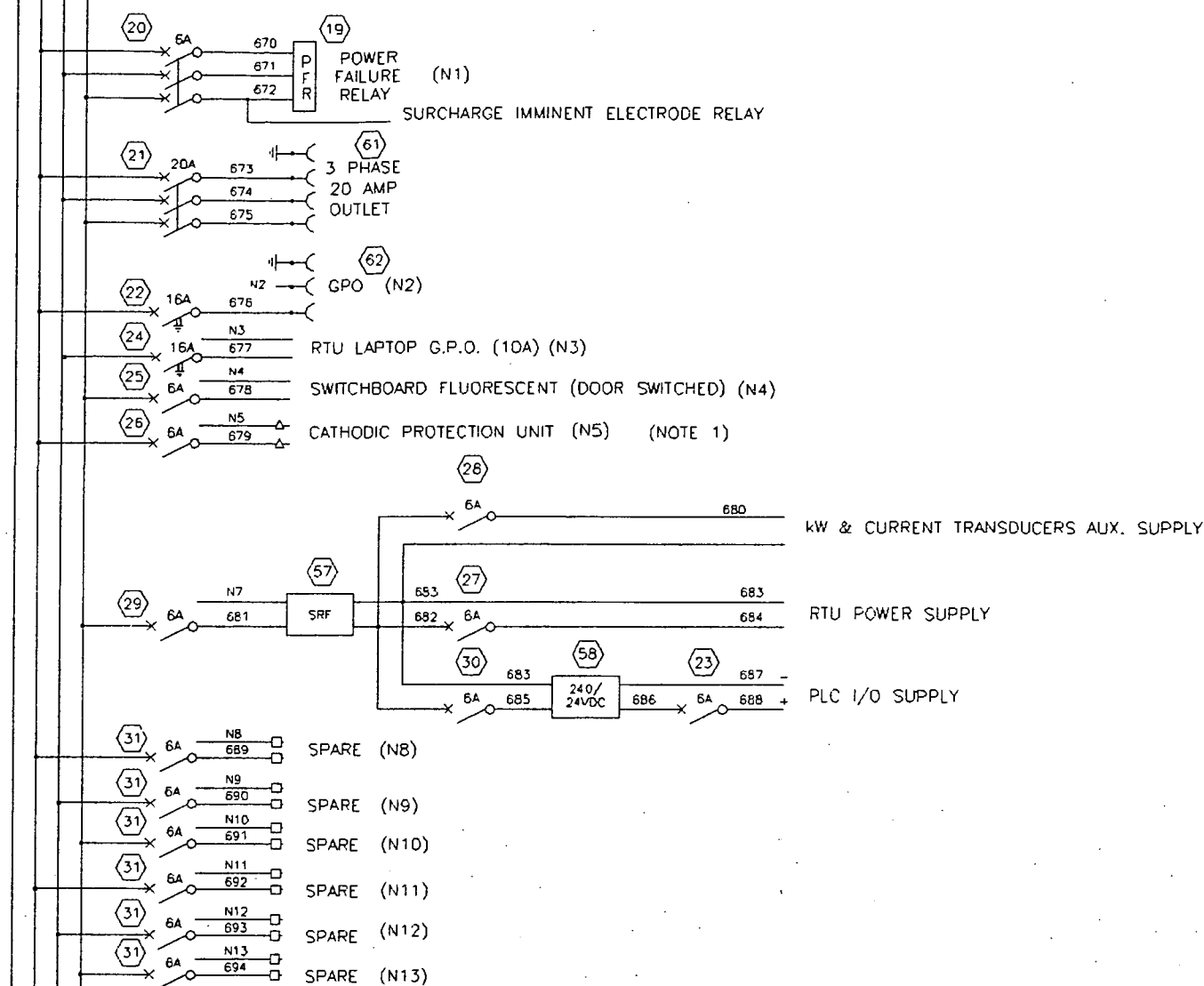


NOTES

1. CATHODIC PROTECTION - FUTURE.
THIS UNIT TO BE SUPPLIED BY OTHERS.
A 240VAC CABLE TO BE INSTALLED TO
PROPOSED CATHODIC PROTECTION AREA
TERMINAL STRIP FOR CONNECTION BY OTHERS

CONTINUED FROM
SHEET 1

N R W B



CROSS REFERENCE TABLE

ITEM	SHEET	LINE	ITEM	SHEET	LINE	ITEM	SHEET	LINE	ITEM	SHEET	LINE	ITEM	SHEET	LINE
C11 - COIL	3	7	C23 - 1 N/O	3	22	PR2 - COIL	3	20	THR1 - COIL	3	4	PUMP No.1	3	8
- 3 N/O	1	5	(CONT) - 1 N/C	3	13	- 1 C/O	3	15	- 1 N/O	3	5	A/TRANSF N/C	3	15
- 1 N/O	3	10	- 1 N/O	3	13	- 1 C/O	3	15	- 1 N/C	3	6	THERMAL SWITCH	3	15
C12 - COIL	3	8				RP11 - COIL	3	30	THR2 - COIL	3	14	PUMP No.2	3	16
- 3 N/O	1	4				- 1 C/O	3	7	- 1 N/O	3	16	A/TRANSF N/C	3	16
- 1 N/O	3	11				- 1 C/O	3	7	- 1 N/C	3	17	THERMAL SWITCH	3	16
- 1 N/C	3	9				RP12 - COIL	3	31	TOL1 - COIL	1	8	PUMP No.1	3	13
C13 - COIL	3	9				- 1 C/O	3	8	- 1 N/O	3	4	LOW FLOW N/C	3	13
- 3 N/O	1	8				- 1 C/O	3	8	- 1 N/C	3	5	MICRO SWITCH	3	13
- 1 N/O	3	12				RP13 - COIL	3	32	TOL2 - COIL	1	22	PUMP No.2	3	23
- 1 N/C	3	8				- 1 C/O	3	14	- 1 N/O	3	14	LOW FLOW N/C	3	23
- 1 N/O	3	3				- 1 C/O	3	14	- 1 N/C	3	15	MICRO SWITCH	3	23
C21 - COIL	3	17				RP21 - COIL	3	35	TOL5 - COIL	1	30			
- 3 N/O	1	19				- 1 C/O	3	17	- 1 N/O	3	1			
- 1 N/O	3	20				- 1 C/O	3	17	- 1 N/C	3	2			
C22 - COIL	3	18				PR2 - COIL	3	36						
- 3 N/O	1	18				- 1 C/O	3	18						
- 1 N/O	3	21				- 1 C/O	3	18						
- 1 N/C	3	19				PR1 - COIL	3	3						
C23 - COIL	3	19				- 1 C/O	3	3						
- 3 N/O	1	22				- 1 C/O	3	3						

"AS CONSTRUCTED"

LEGEND:

RELAY OR
CONTACTOR COIL
FIELD DEVICE
R.T.U. FUSE TERMINAL
R.T.U. LINK TERMINAL
SWITCHBOARD TERMINAL
CATHODIC PROTECTION
TERMINAL

RTU DIGITAL INPUT

RTU DIGITAL OUTPUT

RTU ANALOG INPUT

EQUIPMENT ITEM No.



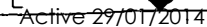
PROJECT
SPS 280
LAWSON PLACE
SEWERAGE PUMPING STATION

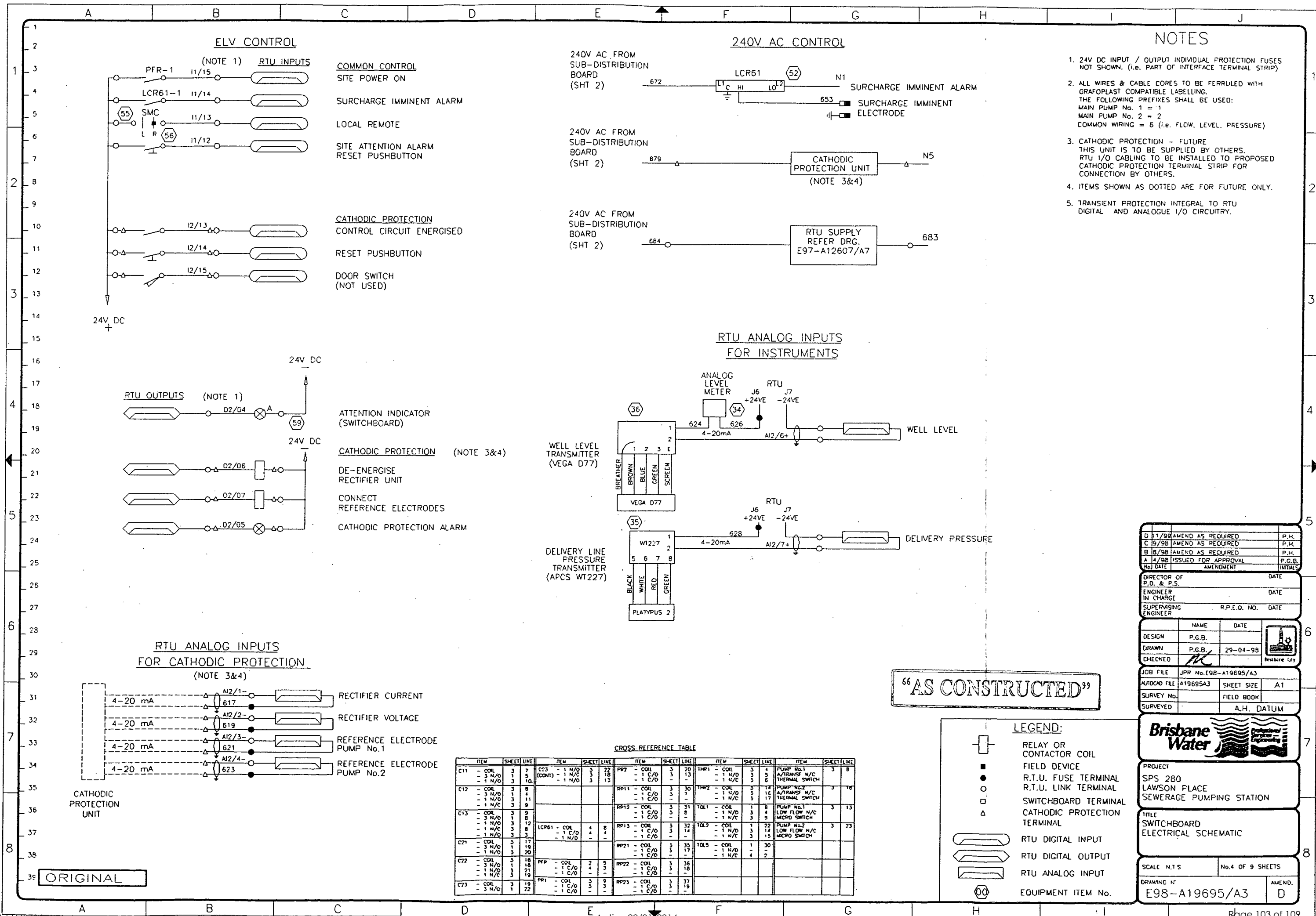
TITLE
SWITCHBOARD
ELECTRICAL SCHEMATIC
& THREE LINE DIAGRAM

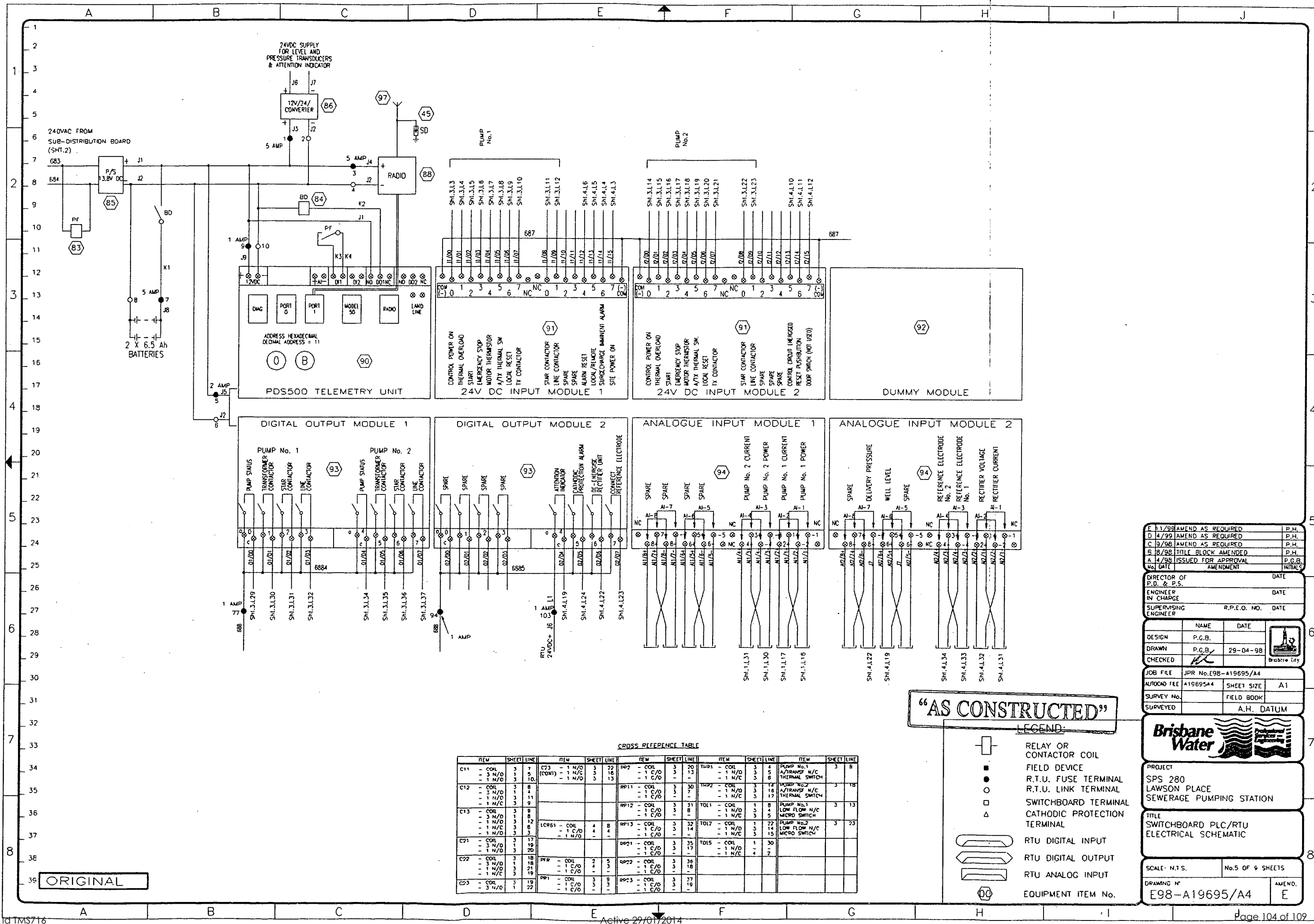
SCALE: N.T.S. No.2 of 9 SHEETS

DRAWING No. E98-A19695/A1 AMEND. C

ORIGINAL







E 11/98	AMEND AS REQUIRED	P.H.
D 4/99	AMEND AS REQUIRED	P.H.
C 9/98	AMEND AS REQUIRED	P.H.
B 8/98	TITLE BLOCK AMENDED	P.H.
A 4/98	ISSUED FOR APPROVAL	P.G.B.
No DATE	AMENDMENT	INITIALS

DIRECTOR OF P.D. & P.S.	DATE
ENGINEER IN CHARGE	DATE
SUPERVISING ENGINEER	R.P.E.O. NO. DATE

DESIGN	NAME	DATE
DRAWN	P.G.B.	29-04-98
CHECKED	P.G.B.	

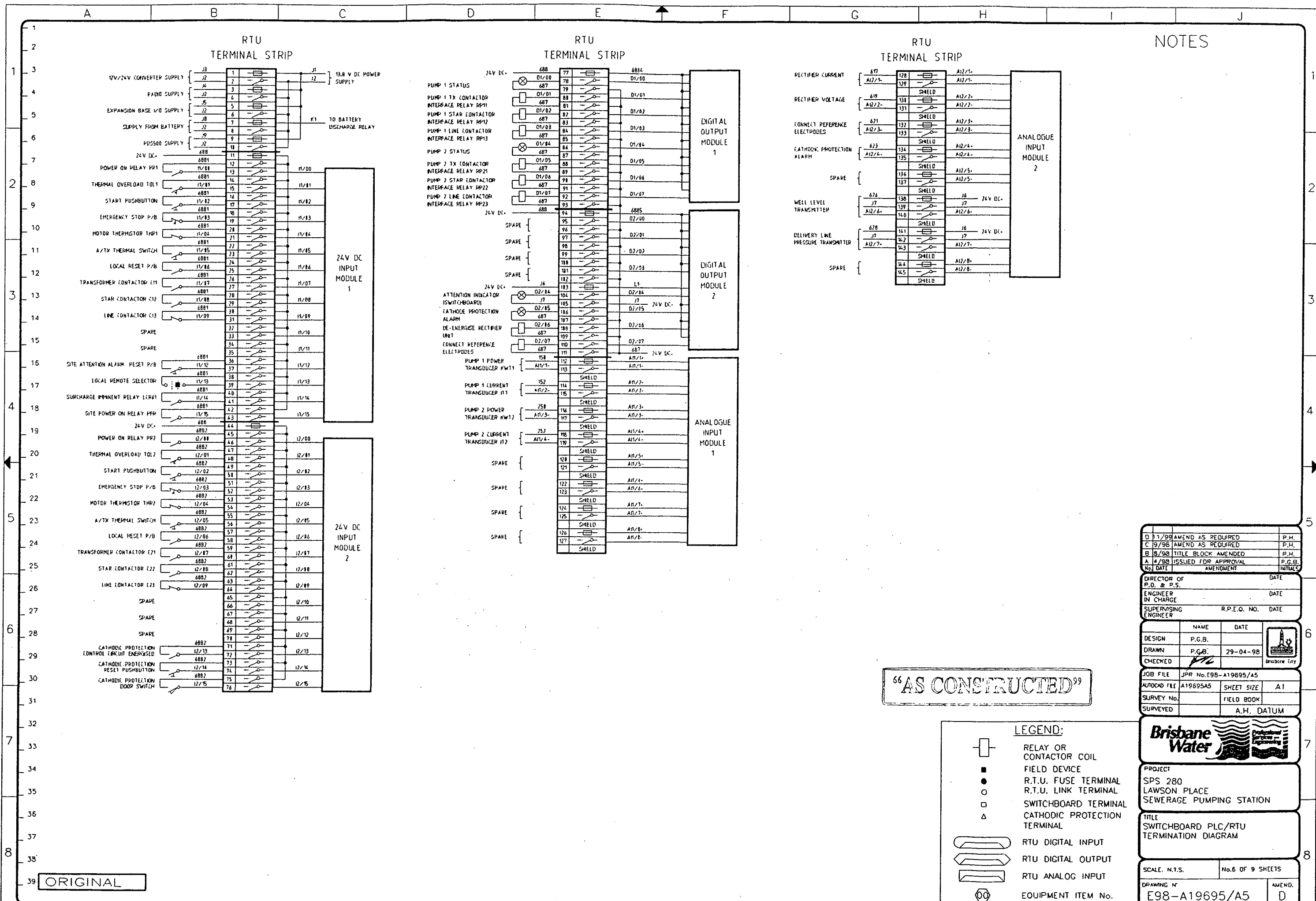
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AUTOCAD FILE	A19695A4
SHEET SIZE	A1
SURVEY No.	FIELD BOOK
SURVEYED	A.H. DATUM



PROJECT
SPS 280
LAWSON PLACE
SEWERAGE PUMPING STATION

TITLE
SWITCHBOARD PLC/RTU
ELECTRICAL SCHEMATIC

SCALE: N.T.S.	No.5 OF 9 SHEETS
DRAWING No.	AMEND.
E98-A19695/A4	E



SWITCHBOARD EQUIPMENT AND LABEL SCHEDULE

NOTES

ITEM	QTY	MAKE & NUMBER	DESCRIPTION	LABEL	ITEM	QTY	MAKE & NUMBER	DESCRIPTION	LABEL
3	00	3	NOVARIS SD1-40N	LIGHTNING ARRESTORS	45	1	POLYPHASE CORP. IS-50NY-C2 (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	RADIO COAX SURGE PROTECTION	
01	1	TERASAKI XS-400CJ/250 WITH XFHA34 HANDLE	MAIN CIRCUIT BREAKER	MAIN SWITCH	46	2	SPRECHER & SCHUH D5P-P43DLO WITH Bo 9s-13-24V-2W	MAIN PUMP No.1 & No.2 STATUS INDICATION LAMP	PUMP STATUS
02	2	TERASAKI XH-250NJ/250 WITH XFHA23 HANDLE	MAIN PUMP No.1 & No.2 CIRCUIT BREAKERS	PUMP No.1 / No.2	47	2	SPRECHER & SCHUH D5P-F33LX10	MAIN PUMP No.1 & No.2 START PUSHBUTTON	START
04	1	NHP DESA63G1 WITH 3 X GEC TIS63L CARTRIDGES	SUB DISTRIBUTION BOARD ISOLATOR	SUB-DIST BOARD ISOLATOR	48	2	SPRECHER & SCHUH D5P-MTS343LX02	MAIN PUMP No.1 & No.2 STOP PUSHBUTTON	EMERGENCY STOP
05	1	TERASAKI ICL121 BUSBAR WITH 2 X KLEC ENDCAPS	SUB DISTRIBUTION BOARD BUSBAR		49	2	SPRECHER & SCHUH D5P-F63LX10	MAIN PUMP No.1 & No.2 RESET PUSHBUTTON	LOCAL RESET
06	2	SEAFORD SF3C 55KW WITH 3 N/C MICROTHERMS	MAIN PUMP No.1 & No.2 AUTO TRANSFORMERS	PUMP No.1 / No.2	52	1	MULTITRODE MTR-2 WITH 0.2/1-10M PROBE	SURCHARGE ALARM RELAY	LCR61
07.1	2	SPRECHER & SCHUH CA6-14DE-20-24VAC WITH CWE4-VS2	MAIN PUMP No.1 & No.2 LINE CONTACTORS	C13/C23	55	1	KRAUS & NAIMER CGB-A220-FT2-604 HEADING STATION CONTROL, LABEL LOCAL-REMOTE	STATION CONTROL MODE SELECTOR	
07.2	2	SPRECHER & SCHUH CA6-14DE-20-24VAC	MAIN PUMP No.1 & No.2 TX CONTACTORS	C11/C21	56	1	SPRECHER & SCHUH D5P-F63LX10	SITE ATTENTION ALARM RESET PUSHBUTTON	ALARM RESET
07.3	2	SPRECHER & SCHUH CA3-37N-11-24VAC WITH CA3-P-S31	MAIN PUMP No.1 & No.2 STAR CONTACTORS	C12/C22	57	1	CRITEC DSF-10A-275V	SURGE REDUCTION FILTER	SRF
08	2	SPRECHER & SCHUH CEF1-11-240V	MAIN PUMP No.1 & No.2 THERMAL OVERLOADS	TOL1/TOL2	58	1	COLOURMEW S-100 240/24VDC	24VDC POWER SUPPLY	24VDC SUPPLY
13	2	IME TAI 200 120/5	MAIN PUMP INSTRUMENT CURRENT TRANSFORMERS	PUMP No.1 / No.2	59	1	SPRECHER & SCHUH D5P-P53DLO WITH Bo 9s-13-24V-2W	SWITCHBOARD ATTENTION ALARM	ATTENTION ALARM
14	6	GEC SC20H WITH 6 X NS2 CARTRIDGES	MAIN PUMP INSTRUMENT FUSES	PUMP No.1 / No.2	61	1	CLIPSAL 56C420	THREE PHASE OUTLET	415VAC
15	4	KLIPON SAKT2/35 TERMINALS (010602)	CURRENT TRANSFORMER TEST LINKS		62	2	CLIPSAL 15	SINGLE PHASE OUTLET & RTU SINGLE PHASE OUTLET	SUPPLY
16	2	IME R072E-ACT 5A5X 0-120A	MAIN PUMP No.1 & No.2 AMMETERS	PUMP No.1 / No.2	63	2	CLIPSAL 2000SMK SURFACE MOUNTING BLOCK CLIPSAL BP165D12 WITH 2 X BP165F FEET	NEUTRAL LINKS	NEUTRAL
17	2	CROMPTON 256-TWLW 415V 120/5A 240V 50Hz 86.25KW 4-20mA	MAIN PUMP No.1 & No.2 KILOWATT TRANSDUCERS	KWT1/2	64	2	CLIPSAL BP165D12	EARTH LINKS	EARTH
18	2	CROMPTON 253-TALW 5A 240V 50Hz 4-20mA	MAIN PUMP No.1 & No.2 CURRENT TRANSDUCER	PI1/2	65	50	KLIPON SAK4/35 (044366) KLIPON AP(1.5) (011796)	SWITCHBOARD TERMINALS	
19	1	NHP DWR2-440V	PHASE FAILURE RELAY	PFR	66	26	KLIPON ASK (047456) KLIPON AP(1.5) (038036) KLIPON FUSE 1A (043070)	R.T.U. FUSE TERMINAL	
20	1	TERASAKI DIN-T10306C	PHASE FAILURE RELAY CIRCUIT BREAKER	REFER LEGEND CARD	67	120	KLIPON SAK11/35 (010562) KLIPON TW(3) (024292)	R.T.U. LINK TERMINALS	
21	1	TERASAKI DIN-T10320C	THREE PHASE 20A OUTLET CIRCUIT BREAKER	REFER LEGEND CARD	69	3	CLIPSAL L5P	EARTH BARS	EARTH
22	1	TERASAKI DSMCB1630	SINGLE PHASE GPO CIRCUIT BREAKER	REFER LEGEND CARD	70	2	CLIPSAL 31-94013-172 DECONNECTOR CLIPSAL 31-9000-027 ADAPTOR CLIPSAL 31-91013-172 PLUG	MAIN PUMP No.1 & No.2 DECONNECTORS	
23	1	TERASAKI DIN-T10106C	24VDC CIRCUIT BREAKER	24VDC	83	1	TELEMECANIQUE RXN-41G12P7 WITH RXZ-1G BASE	RTU POWER FAIL RELAY	PF
24	1	TERASAKI DSMCB1630	RTU LAPTOP GPO CIRCUIT BREAKER	REFER LEGEND CARD	84	1	TELEMECANIQUE RXN-41G12-12VDC WITH RXZ-1G BASE	RTU BATTERY DISCHARGE RELAY	BD
25	1	TERASAKI DIN-T10106C	SWITCHBOARD FLUORESCENT LIGHT CIRCUIT BREAKER	REFER LEGEND CARD	85	1	POWERBOX P50E-15 (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	RTU POWER SUPPLY 13.8VDC	
26	1	TERASAKI DIN-T10106C	CATHODIC PROTECTION UNIT CIRCUIT BREAKER	REFER LEGEND CARD	86	1	POWERBOX VIA254SC12 (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	RTU 12V/24VDC CONVERTER	
27	1	TERASAKI DIN-T10106C	RTU POWER SUPPLY CIRCUIT BREAKER	RTU POWER SUPPLY	88	1	TRIO TR9000R/L (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	RADIO	
28	1	TERASAKI DIN-T10106C	KW & CURRENT TRANSDUCER AUX CIRCUIT BREAKER	REFER LEGEND CARD	89	4	HUNTER WATERTECH SYMAX BOOSEBU1 (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	EXPANSION BASE	
29	1	TERASAKI DIN-T10106C	FILTERED SUPPLY CIRCUIT BREAKER	REFER LEGEND CARD	90	1	HUNTER WATERTECH POSS00 (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	TELEMETRY UNIT	
30	1	TERASAKI DIN-T10106C	240/24VDC SUPPLY CIRCUIT BREAKER	240/24VDC SUPPLY	91	2	SYMAX 8005DN116 (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	DIGITAL INPUT MODULE	
31	6	TERASAKI DIN-T10106C	SPARE 240VAC CIRCUIT BREAKER	REFER LEGEND CARD	92	1	SYMAX 8005DMU1 (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	DUMMY MODULE	
32	3	BURGESS OS3	SWITCHBOARD DOOR SWITCHES		93	2	SYMAX 8005RT108 (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	DIGITAL OUTPUT MODULE	
33	2	LANSON LBB113	13W SWITCHBOARD FLUORESCENT LIGHT	WELL LEVEL	94	2	HUNTER WATERTECH POSBA1 (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	ANALOGUE INPUT MODULE	
34	1	CROMPTON 243-01AG WITH SUPPLEMENTARY RED POINTER 4-20mA INPUT SCALE 0-100%	DELIVERY PRESSURE TRANSMITTER	DELIVERY PRESSURE TRANSMITTER	97	1	HUNTER WATERTECH ANTENNA COMPLETE WITH ACCESSORIES (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	ANTENNA	
35	1	PLATYPLUS 2 WITH 10m CABLE RANGE 0-60m HEAD WITH APC5-W1227	WELL LEVEL TRANSMITTER	WELL LEVEL TRANSMITTER					
36	1	VEGA D77XK44X210C3E1L WITH 10m CABLE RANGE 0-1.0 BAR	MAIN PUMP No.1 & No.2 CONTROL CIRCUIT BREAKER	PUMP No.1 & No.2 CONTROL					
37	2	TERASAKI DIN-T10106C	MAIN PUMP No.1 & No.2 HOUR RUN METER	PUMP No.1 / No.2					
38	2	IME R048.0 240VAC	MAIN PUMP No.1 & No.2 THERMISTOR RELAY	THR1/2					
39	2	SPRECHER & SCHUH RT3-A-240VAC	CONTROL CIRCUIT POWER ON RELAY	PR1/2					
40	2	TELEMECANIQUE RXN-41G12P7 WITH RXZ-1G BASE	MAIN PUMP No.1 & No.2 TX CONTACTOR CONTROL RELAY	RP11/21					
41	2	TELEMECANIQUE RXN-41G12BD WITH RXZ-1G BASE	MAIN PUMP No.1 & No.2 STAR CONTACTOR CONTROL RELAY	RP12/22					
42	2	TELEMECANIQUE RXN-41G12BD WITH RXZ-1G BASE	MAIN PUMP No.1 & No.2 LINE CONTACTOR CONTROL RELAY	RP13/23					
43	2	TELEMECANIQUE RXN-41G12BD WITH RXZ-1G BASE							
44	2	TELEMECANIQUE RXN-41G12BD WITH RXZ-1G BASE							

"AS CONSTRUCTED"

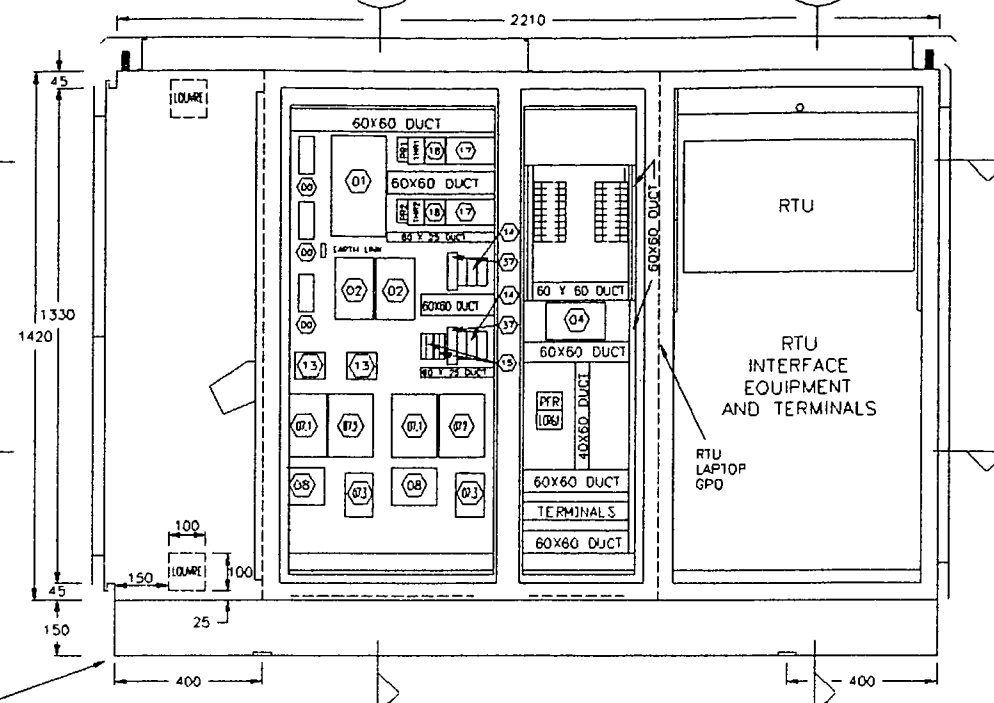
LEGEND:

- RELAY OR CONTACTOR COIL
- FIELD DEVICE
- R.T.U. FUSE TERMINAL
- R.T.U. LINK TERMINAL
- SWITCHBOARD TERMINAL
- CATHODIC PROTECTION TERMINAL
- RTU DIGITAL INPUT
- RTU DIGITAL OUTPUT
- RTU ANALOG INPUT
- EQUIPMENT ITEM No.

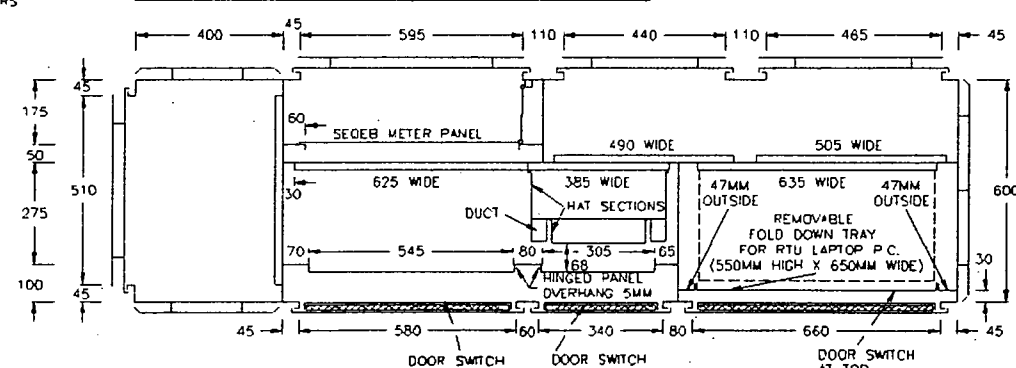
C 11/99 AMEND AS REQUIRED		P.H.
B 8/98 TITLE BLOCK AMENDED		P.H.
A 5/98 ISSUED FOR APPROVAL		P.G.B.
DATE	AMENDMENT	INITIALS
DIRECTOR OF P.O. & P.S. DATE		
ENGINEER IN CHARGE DATE		
SUPERVISING ENGINEER R.P.E.O. NO. DATE		
DESIGN	NAME	DATE
DRAWN	P.G.B.	05-05-98
CHECKED	1/2	Brisbane City
JOB FILE JPR No.E98-A19695/A6		
AUTOCAD FILE A19695A6	SHEET SIZE	A1
SURVEY No.	FIELD BOOK	
SURVEYED A.H. DATUM		
Brisbane Water		
PROJECT SPS 280 LAWSON PLACE SEWERAGE PUMPING STATION		
TITLE SWITCHBOARD EQUIPMENT & LABEL SCHEDULE		
SCALE: N.T.S.	No.7 OF 9 SHEETS	
DRAWING No. E98-A19695/A6	AMEND. C	

NOTES

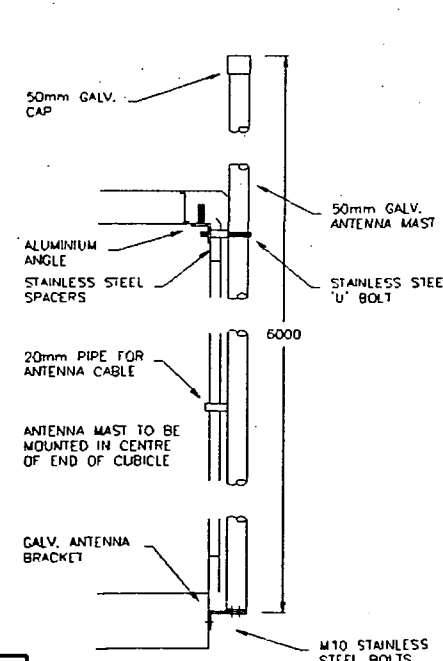
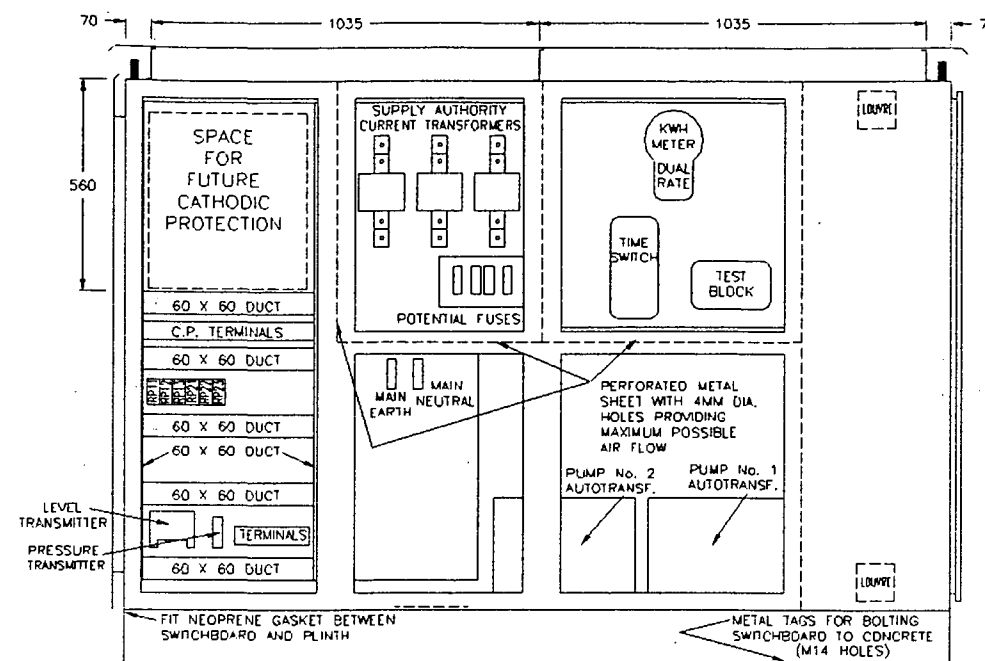
1. AUTOTRANSFORMERS TO BE MOUNTED ON AN ANGLE IRON FRAME TO SUPPORT WEIGHT AND ALLOW ADEQUATE VENTILATION THE BASE OF THE CUBICLE TO BE REINFORCED TO ACCOMMODATE THE WEIGHT OF THE AUTOTRANSFORMERS
2. A MINIMUM 50MM AIR GAP TO BE PROVIDED AT TOP AND BOTTOM OF EQUIPMENT CHASSIS TO ALLOW AIR MOVEMENT
3. EXTEND DIN RAIL FULL WIDTH OF EQUIPMENT CHASSIS FIELD INTERFACE TERMINAL DIN RAIL ALLOW 20% ADDITIONAL LENGTH
4. DOORS SHALL BE HELD OPEN BY DOOR STAYS
5. DOOR LOCKS SHALL BE SELECTRIX SEMIFLUSH SWING HANDLES WITH B.C.C. LOCKS (SECURITY KEYED RC496 'A')
6. FOLD DOWN RTU TRAY TO BE REMOVABLE TO ALLOW EQUIPMENT CHASSIS INSTALLATION AND REMOVAL
7. GLAND PLATES TO BE 6MM THICK BAKELITE
8. SEGREGATION OF SECEB METER & OTHER COMPARTMENTS TO BE OBTAINED USING PERFORATED 3MM THICK ALUMINIUM SHEET TO ALLOW MAXIMUM POSSIBLE AIR FLOW
9. DOOR INSULATION TO BE 25MM THICK FIBERGLASS THERMAL INSULATION
10. THE SUNSHIELD TO BE 3MM THICK ALUMINIUM SHEET, 30MM LONG ALUMINIUM STANDOFFS TO BE MOUNTABLE FROM INSIDE THE CUBICLE BUT WELDED TO THE SUNSHIELD. THE TOP SUNSHIELD TO BE SUPPORTED BY ALUMINIUM "Z" SECTIONS WELDED TO THE TOP OF THE CUBICLE AND BOLTED TO THE SUNSHIELD
11. EQUIPMENT TO BE MOUNTED NO LOWER THAN 200MM ABOVE CUBICLE FLOOR



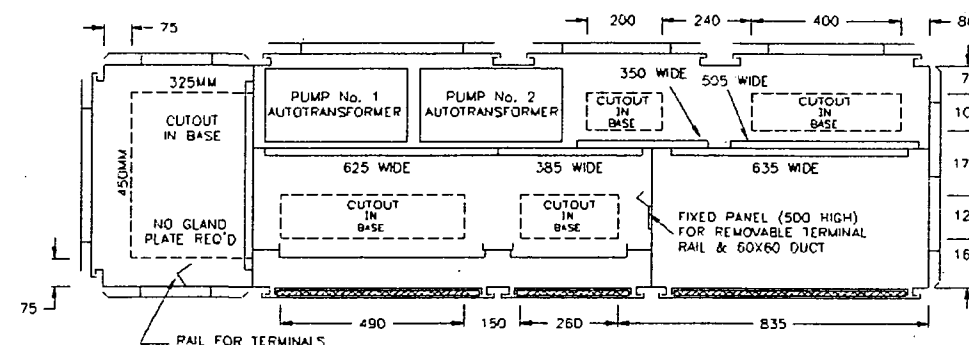
FRONT ELEVATION (WITHOUT DOORS)



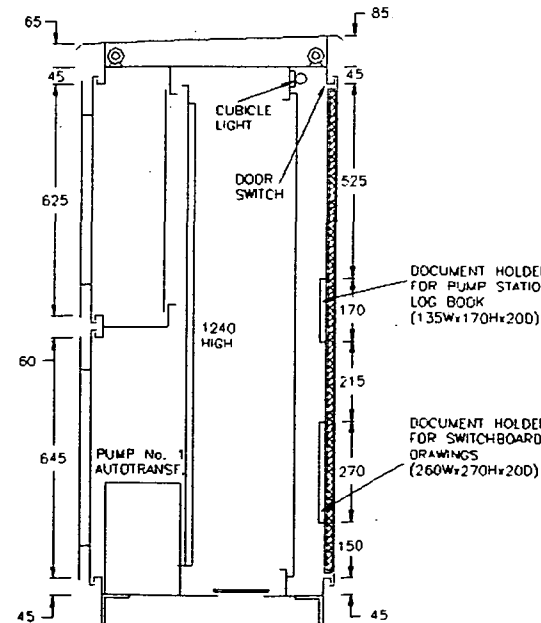
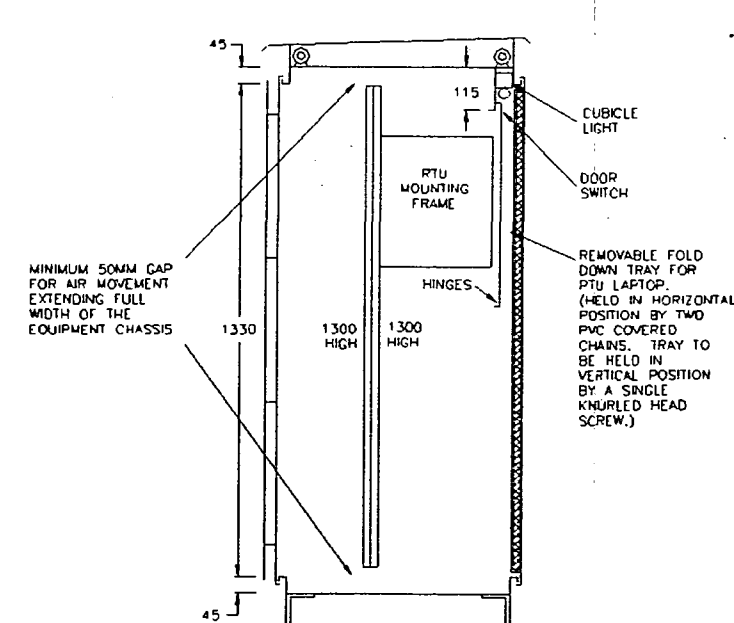
SECTION "A" (WITHOUT EQUIPMENT)

END VIEW
(WITHOUT DOORS)

REAR ELEVATION (WITHOUT DOORS)



SECTION "B" (WITHOUT EQUIPMENT)

SECTION "C"
(WITHOUT EQUIPMENT)SECTION "D"
(WITHOUT EQUIPMENT)

"AS CONSTRUCTED"

C 11/98	AMEND AS REQUIRED	P.H.
B 8/98	TITLE BLOCK AMENDED	P.H.
A 5/98	ISSUED FOR APPROVAL	P.G.B.
No. DATE	AMENDMENT	INITIALS
DIRECTOR OF P.O. & P.S.	DATE	
ENGINEER IN CHARGE	DATE	
SUPERVISING ENGINEER	R.P.E.O. NO.	DATE
DESIGN	NAME	DATE
DRAWN	P.G.B.	01-05-98
CHECKED		
JOB FILE	JPR No. E98-A19695/A7	
ALROD FILE	A19695A7	SHEET SIZE A1
SURVEY No.		FIELD BOOK
SURVEYED		A.H. DATUM

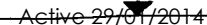


PROJECT
SPS 280
LAWSON PLACE
SEWERAGE PUMPING STATION

TITLE
SWITCHBOARD
CUBICLE CONSTRUCTION
& GENERAL ARRANGEMENT

SCALE: N.T.S. No. 8 OF 9 SHEETS

DRAWING N° E98-A19695/A7 AMEND. C



"AS CONSTRUCTED"

8

- 8

