

# **BIO CONSOLE**

## **ADI 1035**

### GEBRUIKSAANWIJZING

1. Basis Bio Console
2. Gastoevoer
3. Temperatuurregeling
4. Roersnelheidsregeling
5. Niveauregeling
6. Pompen
7. Schakelaarstanden
8. Tekeningen



Nederlands Meetinstituut

# Declaration of Conformity

Product description : Bio Console  
Manufacturer : Applikon Dependable Instruments B.V.  
Brand : Applikon  
Type : ADI 1035  
Serial number(s) : P19196/2  
Number of tested products : 1

This declaration of conformity is issued based on testing a series produced sample of the above-mentioned product(s) in conformity with the following standard:

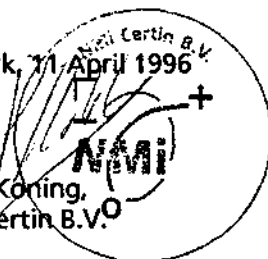
Standard : EN 50081-1 (1992),  
EN 50082-1 (1992), EN 50082-2 (1995),  
EN 61000-3-2 (1995), EN 61000-3-3 (1995),  
EN 50082-2 (1995): Table A.4  
Issue : Positive

The measuring results are available at NMI with project number: 10047984

This declaration of conformity is granted under project number: 10047984

Name applicant : Applikon Dependable Instruments B.V.  
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Niekerk, 11 April 1996  
T.E.T. Koning,  
NMI Certin B.V.



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## SYMBOLLEN

De volgende symbolen worden gebruikt op de instrumentatie en in de documentatie:



Let op; kijk in de gebruiksaanwijzing.



Let op; kans op elektrische schok.



Belangrijke opmerking; lees de instructies zorgvuldig.

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## HOOFDSTUK 1

### BASIS BIO CONSOLE

#### 1.1 INLEIDING:

De ADI 1035 Bio Console is een aandrijvings-console voor gebruik in combinatie met een ADI 1030 Bio Controller.

Het ondersteunt de regeling van gassen (met rotameters), regelingen van roersnelheid, niveau, temperatuur (met heet en koud water of met een verwarmingsmantel) en het toevoegen van vloeistoffen met pompen. Tevens wordt de koelwatervoorziening voor de koeler in het reactordeksel ondersteund.

Door een zeer compact ontwerp stelt de ADI 1035 Bio Console u in staat om een "bio-proces" te voeren op een minimale tafelruimte (de ADI 1030 Shelf-Top Bio Controller past precies bovenop de ADI 1035 Bio Console).

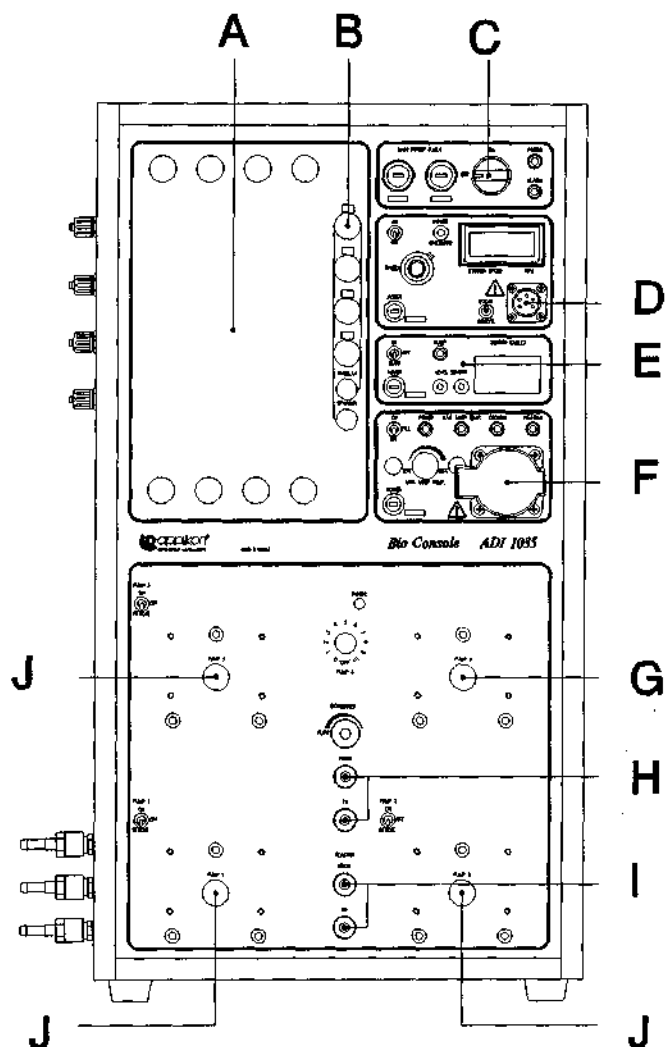


Let op:

De ADI 1035 Bio Console mag uitsluitend worden gebruikt als een aandrijvings-console voor regelaars bij een biotechnologisch proces!

Op de volgende pagina's ziet u voor- en achteraanzicht van de ADI 1035 Bio Console en staan er instructies vermeld ten aanzien van de installatie en aansluitingen.

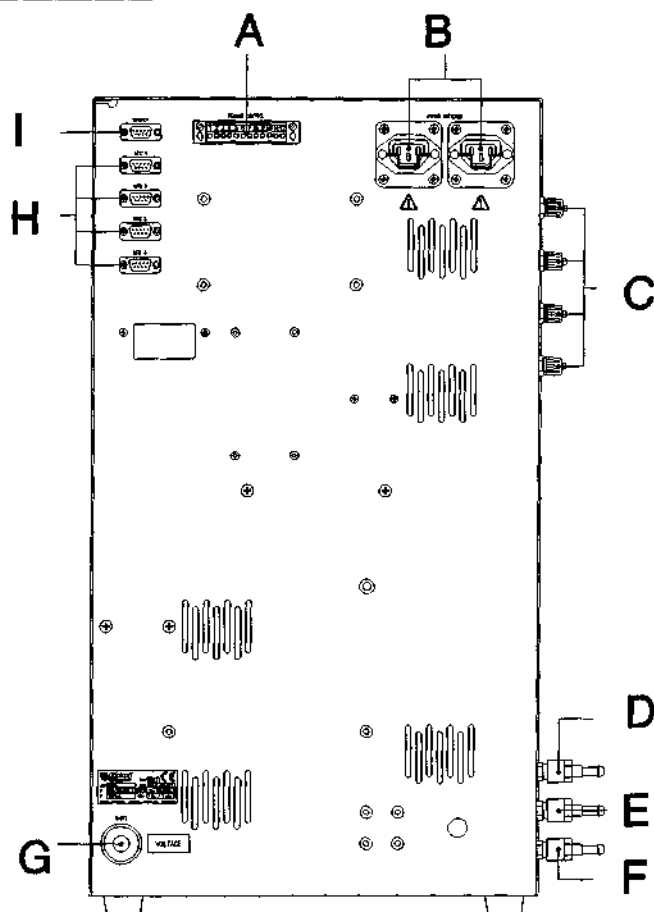
## 1.2 VOORAANZICHT:



A = Plaats voor gastoevoervoorziening  
C = Voedingsgedeelte  
E = Niveauregeling  
G = Plaats voor pomp met instelbare snelheid  
I = Reactor-aansluitingen

B = Plaats voor gaselectieblok  
D = Roersnelheidsregeling  
F = Temperatuurregeling  
H = Koeler-aansluitingen  
J = Pompplaats met vaste snelh.

### 1.3 ACHTERAANZICHT:



A = Aansluiting voor afstandsbediening  
C = Gas-aansluitingen  
E = Ontluchting  
G = Netkabel  
I = Roersnelheidsregeling conn.

B = Voeding voor de ADI 1030  
D = Water-aansluiting  
F = Afvoer  
H = Mass-flow-control conn.

N.B.:

D Mass Flow Control aansluitingen MFC1 tot en met MFC4 (H) zijn voor toekomstig gebruik.



Let op: De geschakelde voeding "B" is bedoeld voor de voeding van de ADI 1030 Bio Controller. In het geval dat deze aansluiting wordt gebruikt voor de voeding van andere instrumentatie, is de maximale totale belasting (beide aansluitingen) 250 W.

## 1.4 INSTALLATIE:

### NETVOEDING:

De ADI 1035 Bio Console is inzetbaar in het gehele netvoedingsbereik van 110 tot 240V~ (wel moet het apparaat ingesteld zijn voor de juiste spanning):

Z310351010 : Bio Console ADI 1035 110 - 240 Vac.

Controleer het gekozen voltage (zie de gele voltage-sticker naast de netvoedingskabel); indien het gekozen voltage niet juist is, waarschuw dan uw service-dienst.

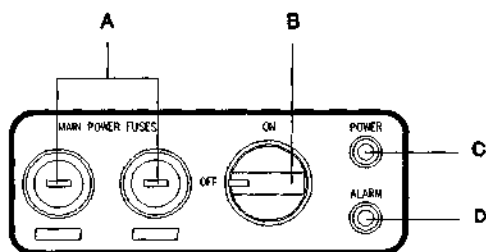


### LET OP! KANS OP ELEKTRISCHE SCHOK!

Sluit de netvoedingskabel als volgt op het lichtnet aan:

- bruin = fase,
- blauw = nul,
- groen/geel = aarde.

Voedingsgedeelte van de ADI 1035



A = Hoofdvoedingszekeringen

B = Aan/uit-schakelaar

C = Aan/uit indicator

D = Centrale alarm indicator

### ZEKERINGSWAARDE:

220 - 240 V~: T 8A,

110 - 120 V~: T 16A.

De toegepaste zekeringen moeten voldoen aan IEC 127!

De ADI 1035 Bio Console kan nu worden ingeschakeld met de "Power On/Off" schakelaar.

De "Alarm" LED kan worden gebruikt als algemene alarm indicatie voor sensor-waarden (alarmen op de ADI 1030 moeten worden toegewezen aan uitgang 3; niveau-detectie-schakeling moet "aan" zijn (zie hoofdstuk 7: schakelaarstanden)).

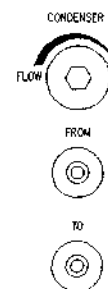
## GASTOEVOER:

Indien een of meerdere rotameters zijn geplaatst, dient de overeenkomstige gastoevoer te worden aangesloten op de daarvoor bestemde schotkoppeling aan de linkerzijde van de ADI 1035 Bio Console; zie hoofdstuk 2: Gastoevoer.

## WATERTOEOVOER:

Indien het waterbad, de koudwaterklep of de koeler toegepast worden, dient kraanwater met een gereduceerde druk (30-50 kPa, 0.3-0.5 bar, 4-7 psi) aangesloten te worden aan de linker zijkant van de ADI 1035 Bio Console; zie hoofdstuk 3: Temperatuurregeling.

Centraal in het pompgedeelte zit een naaldventiel waarmee de koelwaterstroom naar de koeler op het reactordeksel geregeld kan worden. Daaronder zitten twee snelkoppelingen voor slangaansluitingen van en naar de koeler; de koppeling naar de koeler bevat een terugslagklep waardoor de koeler niet leegloopt wanneer deze aansluiting wordt losgemaakt.



Onder de aansluitingen voor de koeler zitten twee wateraansluitingen voor de reactormantel (van en naar de mantel); ook hier zit in de koppeling naar de reactor een terugslagklep waardoor de snelkoppeling losgemaakt kan worden zonder dat de reactormantel leegloopt.



**AANSLUITING VAN DE ADI 1035 AAN DE ADI 1030 CONTROLLER:**

Wanneer de ADI 1030 Bio Controller wordt gebruikt in combinatie met de ADI 1035 Bio Console, dan **MOET** de ADI 1030 worden gevoed vanuit de ADI 1035; hierdoor kan het gehele systeem afgeschakeld worden door de aan/uit-schakelaar van de ADI 1035. De volgende kabels zijn beschikbaar:

- Z510303200 Netvoedingskabel voor het processordeel van de ADI 1030,
- Z510303210 Netvoedingskabel voor de uitgangsmodule van de ADI 1030,
- Z510303220 Regelkabel (regelingssignaal vanuit de ADI 1030 naar de ADI 1035).



**LET OP! INDIEN DE PROCESREGELAAR (BIJ-VOORBEELD DE ADI 1030) NIET GEVOED WORDT VANUIT DE ADI 1035, MOET DE VOEDING VANUIT DE REGELAAR AAN DE ADI 1035 WORDEN AANGEBODEN. KIJK IN HOOFDSTUK 7.2 VOOR INSTRUCTIES T.A.V. AANSLUITING EN SCHAKELAAR-STAND!**

De voedingskabels passen in de stekkerbussen aan de achterkant van de ADI 1035. De status van de ADI 1035 aandrijvers wordt bepaald door de uitgangssignalen van de ADI 1030 Bio Controller; de regelkabel moet worden gebruikt voor de aansluiting tussen de uitgangs-module van de ADI 1030 en de aansluiting voor afstandsbediening op de ADI 1035 (achterzijde).

De regelkabel moet op de volgende manier op de ADI 1030 Bio Controller worden aangesloten (zie tabel op de volgende pagina):



**LET OP! KANS OP ELEKTRISCHE SCHOK! SCHAKEL DE VOEDING VAN DE ADI 1035 / 1030 COMBINATIE AF ALVORENS ENIGE AANSLUITING TE MAKEN!**

| ADI 1030 Uitgangsnr. | ADI 1030 Klem | Draadkleur | ADI 1035 Aandrijver |
|----------------------|---------------|------------|---------------------|
| Uitgang 1            | X1-1          | WH (wit)   | Pomp 1              |
| Uitgang 2            | X1-4          | BR (bruin) | Pomp 2              |
| Uitgang 3            | X1-7          | GN (groen) | Pomp 3 of Alarm     |
| Uitgang 4            | X1-10         | YE (geel)  | Rotameterklep 1     |
| Uitgang 5            | X1-13         | GR (grijs) | Rotameterklep 2     |
| Uitgang 6            | X1-16         | PK (paars) | Rotameterklep 3     |
| Uitgang 7            | X1-19         | BL (blauw) | Rotameterklep 4     |
| Uitgang 8            | X1-22         | RD (rood)  | Verwarming          |
| Uitgang 9            | X1-25         | BK (zwart) | Koeling             |

N.B.:

Uitgang 3 van de ADI 1030 Bio Controller kan worden gebruikt om pomp 3 van de ADI 1035 te regelen (in dit geval mag er geen niveau-regeling geplaatst zijn in de ADI 1035) of als centrale alarm-indicator (LED) in het voedingsgedeelte van de ADI 1035 (wanneer er wel een niveau-regeling geplaatst is in de ADI 1035). Zie ook hoofdstuk 5 (niveau-regeling) en hoofdstuk 7 (schakelaarstanden).

## EXTERNE AANSLUITINGEN:

Gastoevoer-schotkoppelingen: slang: ID 4 mm  
max. druk: 200 kPa (2 bar, 29 psi)

Watertoevoer: slang: ID 6 mm  
max. druk: 50 kPa (0.5 bar, 7 psi)  
min. druk: 30 kPa (0.3 bar, 4 psi)

Koeleraansluitingen: slang: ID 6 mm

Reactormantelaansluitingen: slang: ID 6 mm

## OMGEVINGSCONDITIONES:

De ADI 1035 Bio Console kan worden gebruikt op lokaties met de volgende omgevingscondities:

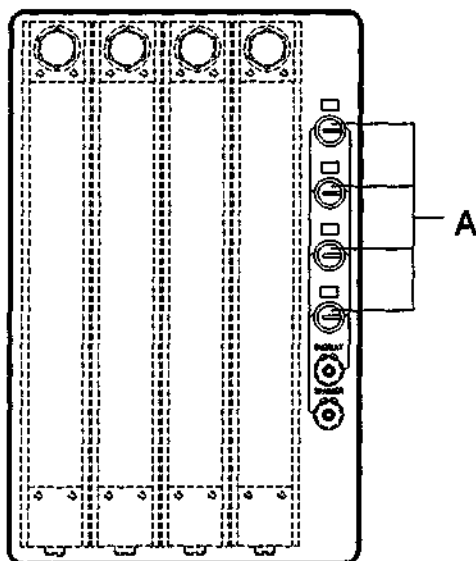
- Gebruik binnenshuis,
- Hoogte: tot 2000 meter boven zeeniveau,
- Omgevingstemperatuur: 4°C - 45°C,
- Maximum relatieve vochtigheid: 80% voor temperaturen tot 31°C, lineair afnemend tot 50% bij 45°C,
- Voedingsspanning: 115/230 Vac (+15%/-20%), 50/60 Hz,
- Transciënte overvoltages volgens INSTALLATIE CATEGORIE II,
- VERVUILINGSGRAAD 2 volgens IEC 664.

## HOOFDSTUK 2

### GASTOEVOER

#### 2.1 HET GASTOEVOERGEDEELTE:

Het ADI 1035 Gastoevoergedeelte ondersteunt de toepassing van vier rotameters en een gaselectieblok:



A = Gaselectiekleppen

Het optionele gaselectieblok bevat vier gaselectiekleppen. Met deze kleppen wordt het type gastoevoer ("sparging" of "overlay") gekozen.

N.B.:

- De bovenste gasinlaatkoppeling komt overeen met de linker rotameter en de bovenste klep van het gaselectieblok.

Ordernummer van het gaselectieblok:

Z311302020

Ordernummer van een gasuitlaatkoppeling:

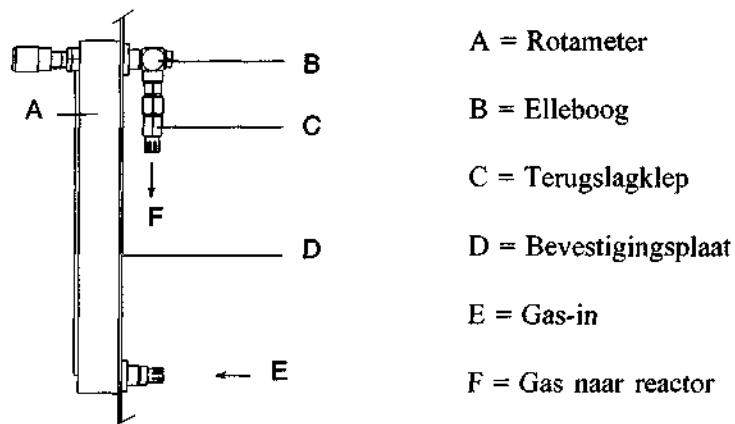
Z311302060

Op de volgende pagina staan de rotameters vermeld.

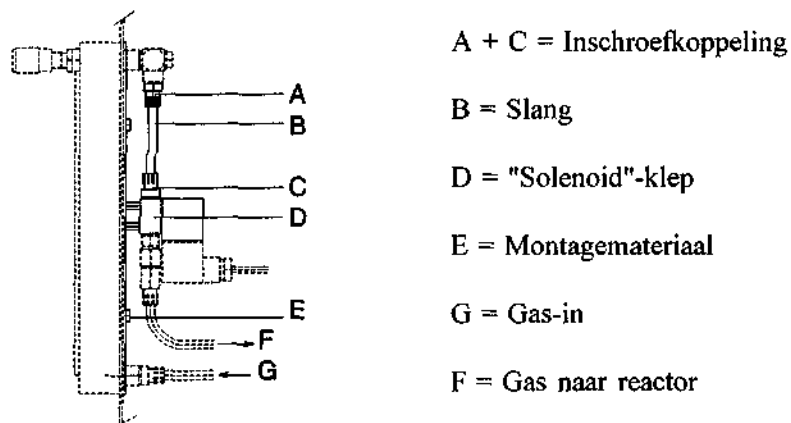
## Beschikbare rotameters:

|            |                                     |
|------------|-------------------------------------|
| Z3RM000005 | Rotameter assembly 2.5 - 25 ml/min, |
| Z3RM000010 | Rotameter assembly 5.0 - 50 ml/min, |
| Z3RM000020 | Rotameter assembly 9.0 - 90 ml/min, |
| Z3RM000030 | Rotameter assembly 27 - 270 ml/min, |
| Z3RM000040 | Rotameter assembly 50 - 500 ml/min, |
| Z3RM000050 | Rotameter assembly 0.1 - 1.0 l/min, |
| Z3RM000060 | Rotameter assembly 0.5 - 5.0 l/min, |
| Z3RM000070 | Rotameter assembly 1.0 - 10 l/min,  |
| Z3RM000080 | Rotameter assembly 2.3 -23 l/min.   |

Rotameters kunnen worden toegepast met of zonder klep:



## Rotameter



## Rotameter met klep-module

De klep-module is leverbaar in twee verschillende versies:

- Z311302040 Valve Module for Rotameter Ass., 220 - 240 Vac,  
Z311302045 Valve Module for Rotameter Ass., 110 - 120 Vac.



LET OP:

INDIEN ZUURSTOF WORDT TOEGEPAST ALS EEN  
VAN DE GASSEN, DAN DIENEN VOOR  
INSCHAKELING VAN DE NETSPANNING DE  
KOPPELINGEN EN SLANGEN OP LEKKEN TE  
WORDEN GETEST!

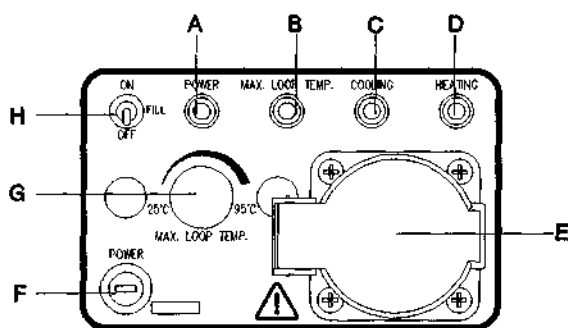
N.b.:

- De rotameterkleppen kunnen worden geschakeld door de digitale uitgangen 4 t/m 7 van de ADI 1030 Bio Controller; zie hoofdstuk 1.4 van deze gebruiksaanwijzing: Installatie.

## HOOFDSTUK 3

### TEMPERATUURREGELING

#### 3.1 TEMPERATUURREGELINGSGEDEELTE:



- A = Netvoedings-indicatie
- B = Max. temperatuur-indicatie
- C = Koeling-indicatie
- D = Verwarmings-indicatie
- E = Stopcontact voor verwarming
- F = Voedingszekering
- G = Max. temperatuurs-instelling
- H = Aan / uit / vul-schakelaar

#### ZEKERINGSWAARDE:

220 - 240 V~: T 3.15A,  
110 - 120 V~: T 6.3A.

De toegepaste zekeringen moeten voldoen aan IEC 127!

Het temperatuurregelingsgedeelte verzorgt verwarmen en koelen door middel van verschillende principes:

In de Basis Lay-Out is het aansturingssignaal voor verwarmen (uitgang 8 van de ADI 1030) doorgeschakeld naar het stopcontact in het temperatuurregelingsgedeelte. Hierop kan een verwarmingsmantel worden aangesloten (temperatuurregeling met slechts een aansturing).



**LET OP! KANS OP ELEKTRISCHE SCHOK. ZODRA AANSTURING WORDT INGESCHAKELD, WORDT DE NETSPANNING DIRECT DOORGESCHAKELD NAAR HET STOPCONTACT!**  
**MAXIMAAL VERMOGEN = 400 W.**

N.B.:

- In dit geval worden de indicaties voor de maximum temperatuur van het waterbad en het koelen niet gebruikt.
- Met de aan/uit-schakelaar in de middelste (Vul) stand is de temperatuurregeling operationeel.

Met een extra koudwaterklep in de ADI 1035 kan een dubbele temperatuurregeling tot stand worden gebracht (verwarmen en koelen). Het aandrijvingssignaal voor koelen (uitgang 9 van de ADI 1030) wordt doorgeschakeld naar deze koudwaterklep.

N.B.:

- In dit geval is de indicatie voor de maximum temperatuur van het waterbad niet in gebruik.
- Met de aan/uit-schakelaar in de middelste (Vul) stand is de temperatuurregeling operationeel.

Een andere manier van dubbele temperatuurregeling is de toepassing de waterbad-module voor de ADI 1035. Op deze manier wordt de temperatuur geregeld door heet of koud water rond te pompen.

N.B.:

- In dit geval is het stopcontact voorop niet in gebruik.

In geval het waterbad of de koudwaterklep wordt toegepast of koud water nodig is voor de koeler op het reactordeksel, dient leidingwater met gereduceerde druk te worden aangesloten (bovenste koperen koppeling aan de linkerkant van de ADI 1035); inlaatdruk: 30 - 50 kPa (0.3 - 0.5 bar, 4 - 7 psi). Een waterdruk-reduceerventiel is leverbaar.

De onderste koperen koppeling wordt gebruikt om water af te voeren, de middelste koppeling is voor de ontfluchting (lucht uit het circulatie-systeem).

Hieronder staat de order-informatie van alle toepasbare modules vermeld:

|            |                                                         |
|------------|---------------------------------------------------------|
| Z310180030 | Thermo-circulator module 220 - 240 Vac, ADI 1035,       |
| Z310180040 | Thermo-circulator module 110 - 120 Vac, ADI 1035.       |
| Z310180060 | Cold water valve module 220 - 240 Vac, ADI 1035,        |
| Z310180070 | Cold water valve module 110 - 120 Vac, ADI 1035.        |
| Z310180050 | Water pressure reducer for ADI 1018.                    |
| Z311020022 | Silicone heating blanket, 2 liter reactor, 230 Vac,     |
| Z311020030 | Silicone heating blanket, 3 liter reactor, 230 Vac,     |
| Z311020050 | Silicone heating blanket, 5 liter reactor, 230 Vac,     |
| Z311020070 | Silicone heating blanket, 7 liter reactor, 230 Vac,     |
| Z311020150 | Silicone heating blanket, 15/20 liter reactor, 230 Vac. |

N.B.:

- Indien geen temperatuurregeling wordt toegepast, kan de wateraansluiting worden gebruikt voor watertoevoer naar de koeler op het reactordeksel (zie ook 1.4).

### 3.2 KOUDWATERKLEP:

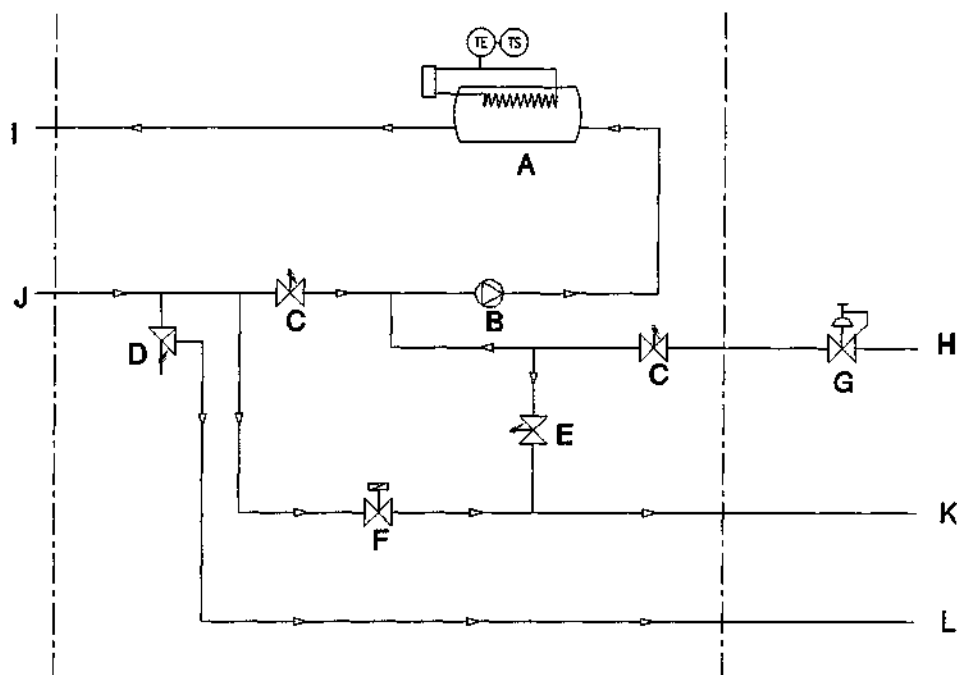
De koudwaterklep kan worden gebruikt voor het koelen van de reactor; in dit geval stuurt de regelaar (de ADI 1030 Bio Controller) deze klep direct aan. Zodra de reactor te warm wordt, wordt de netspanning direct doorgeschakeld waardoor de klep wordt geopend.

Toelaatbare druk voor de koudwaterklep: zie voorgaand hoofdstuk (3.1).

Bij gebruik van deze klep heeft de vulpositie van de aan / uit-schakelaar geen functie en is de instellingsknop voor de maximum-temperatuur van het waterbad afwezig; de temperatuurregeling is echter wel actief!

### 3.3 WATERBAD-MODULE:

#### SCHEMATISCHE LAY-OUT:



A = Warmtewisselaar  
C = Terugslagklep  
E = Veiligheidsklep  
G = Drukreduceer  
I = Naar Reactor  
K = Afvoer

B = Circulatie Pomp  
D = Ontluchtingsventiel  
F = 2-Wegklep  
H = Waterinlaat  
J = Vanuit Reactor  
L = Ontluchting

N.B.:

- De aansluitingen "To -" en "From Condenser" worden niet getoond in deze lay-out.
- De warmtewisselaar bevat een Thermo Element en een Thermo Schakelaar die het Thermo Element uitschakelt zodra de maximaal toegestane temperatuur van het waterbad wordt bereikt.



**LET OP: WANNEER HET WATERBAD LEEG WORDT AANGEZET, ZULLEN DE KERAMISCHE LAGERS VAN DE CIRCULATIEPOMP BESCHADIGEN.**

Zodra de netvoeding wordt ingeschakeld met de aan/vul/uit-schakelaar (middelste of bovenste positie) wordt de circulatiepomp gestart.

De temperatuurregelaar (ADI 1030 Bio Controller) kan het verwarmingselement of de koeling aansturen; ingeval van koeling wordt de afvoerklep geopend, waardoor warm water kan wegstromen en koel leidingwater in het circulatiesysteem wordt toegelaten.

De ontluchtingsklep is een gasdoorlaatbare klep, waardoor lucht in het circulatie-systeem wordt afgevoerd.

De veiligheidsklep is in het circulatie-systeem opgenomen om te hoge drukken te voorkomen; bij een interne druk van ongeveer 100 kPa (1 bar, 14 psi) gaat deze klep open (circulatiewater gaat naar de afvoer) totdat de druk weer is afgenomen.

### GEBRUIK VAN HET WATERBAD:

De waterbad-module voor de ADI 1035 kan in werking worden gesteld door de onderstaande stappenlijst te volgen:

- Sluit het ADI 1035 waterbad aan op de warmtewisselaar in de reactor of op de mantel van de reactor d.m.v. slang met ID 6 mm (gebruik slangenklemmen om het losschieten van slangen te voorkomen). De "To Reactor" koppeling bevat een terugslagklep; de "From Reactor" koppeling is van binnen open.
- Sluit slangen (ID = 6 mm) aan op de afvoer- en ontluchtingskoppelingen om op deze manier water en lucht naar een open afvoer te leiden.
- Sluit leidingwater met gereduceerde druk (max. inlaatdruk van 500 kPa (= 0.5 bar, 7 psi)) aan op de waterinlaat; gebruik hiervoor slang ID = 6 mm.  
Water stroomt nu het circulatie-systeem in; lucht verlaat het waterbad door de ontluchting.
- Sluit de netkabel aan op het netvoedingsstopcontact.
- Het vullen van het waterbad wordt versneld door de aan/vul/uit-schakelaar van het waterbad in de middelste (Fill) stand te zetten; de 2-wegklep wordt nu geopend en zodra het waterbad gevuld is, stroomt het water naar de afvoer. Zodra dit het geval is, kan de aan/uit/vul-schakelaar aan of uit worden gezet. Alle achtergebleven luchtballen zullen worden afgevoerd door de ontluchtingsklep.  
Indien de circulatiepomp herrie maakt, dan zit er veel lucht in de pomp; schakel voor ca. 15 seconden terug naar de vulstand.  
Regel de maximum waterbadtemperatuur "Max. Loop Temperature" zo in, dat er geen lokale "hot-spots" in de reactor kunnen voorkomen. Het omlaag brengen van de maximale waterbadtemperatuur vermindert natuurlijk de maximale warmteoverdracht van het waterbad.

**N.B.:**

De interne maximale waterbadtemperatuur = ca. 95°C; de maximale temperatuur van het water in het rondpompsysteem = ca. 80°C.

Het ADI 1035 waterbad is nu klaar om in gebruik te worden genomen.

**ONDERHOUD:**

Indien de waterbadtemperatuur hoog is ingesteld (>80°C) en koelwater regelmatig in het systeem wordt toegelaten, kan het verwarmingselement door kalkaanslag vervuilen waardoor de warmteoverdracht afneemt. Indien dit het geval is, dient de ADI 1018 te worden teruggestuurd voor service. Raadpleeg uw service-dienst.

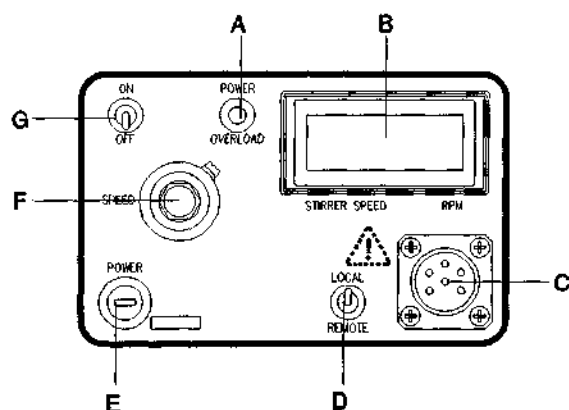
## HOOFDSTUK 4

### ROERSNELHEIDSREGELING

#### 4.1 MOTORREGELING:

De ADI 1035 Bio Console kan worden uitgerust met twee verschillende typen motorregelingen; de een voor de roermotoren P100, P140 en P310, de andere voor de roermotor P1000.

Motorregelingsgedeelte:



- A = Spannings/"overload" ind.
- B = Snelheidswaardeweergave (r.p.m.)
- C = Roermotoraansluiting
- D = Hand/afstands-schakelaar
- E = Motorzekering
- F = Regelaarzekering
- G = Potmeter roersnelheid
- H = Aan/uit-schakelaar



Let op:

- Volgens wetgeving van de Europese Gemeenschap is de roermotor een machine met mogelijk aanrakingsgevaar. Kijk in de gebruiksaanwijzing van de roermotor voor veiligheidsinstructies, zekeringwaarden, functionaliteit en gebruik.
- In het geval de roermotorregeling voor de P1000 motor is geïnstalleerd, mag de motorkabel niet worden verwijderd terwijl de voedingsspanning (H) is ingeschakeld; de spanning op de connectoren kan de 60V (gelijkspanning) overschrijden!

Met de aan/uit tuimelschakelaar kan de motorregeling worden aan/uitgezet; de "power/overload" indicator is groen zodra de voeding is ingeschakeld, in geval het maximum leverbare koppel wordt bereikt verkleurt de indicator naar rood. Het "liquid cristal display" geeft het actuele aantal toeren per minuut aan.

De "Local/Remote" tuimelschakelaar wordt gebruikt om van handbediening over te schakelen op afstandsbediening:

- "Local" = roersnelheid wordt met de hand ingesteld (potmeter op voorzijde),
- "Remote" = roersnelheid wordt geregeld door een extern 4 - 20 mA signaal (bijv. vanuit de ADI 1030 Bio Controller).

De kabelaansluiting voor de roermotor is op de voorzijde geplaatst; de aansluiting voor afstandsbediening door de ADI 1030 Bio Controller zit aan de achterkant (9 pins sub-D connector).

Orderinformatie voor toepasbare modules en motoren:

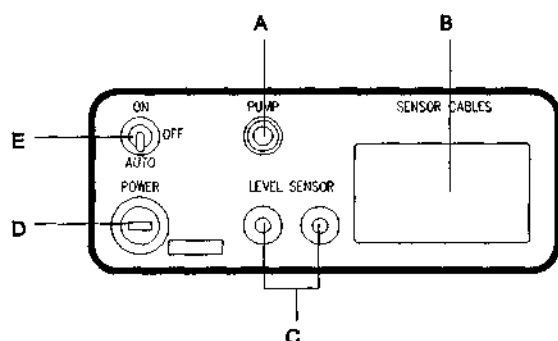
|            |                                                                                             |
|------------|---------------------------------------------------------------------------------------------|
| Z510354000 | Stirrer speed controller P100 - P310 ADI 1035,                                              |
| Z510354040 | Stirrer speed controller P1000 ADI 1035,                                                    |
| Z5100002M0 | Stirrer motor assembly P100,                                                                |
| Z5100002M1 | Stirrer motor assembly P140,                                                                |
| Z5100002M3 | Stirrer motor assembly P310,                                                                |
| Z5100P1000 | Stirrer motor assembly P1000,                                                               |
| Z510000001 | Stirrer motor assembly P100 I=6,                                                            |
| Z510000002 | Stirrer motor assembly P140 I=2,                                                            |
| Z5100P1005 | Stirrer motor assembly P1000 I=5,                                                           |
| Z510121C02 | Cable for P100 - P1000 ADI 1035,                                                            |
| Z510120900 | Control cable motor speed short (ADI 1030),                                                 |
| Z510120000 | Recalibration of stirrer speed controller (gewenst calibratiebereik moet worden opgegeven). |

## HOOFDSTUK 5

### NIVEAUREGELING

De niveauregelingsmodule van de ADI 1035 Bio Console kan worden gebruikt om een pomp te activeren zodra er vloeistof-contact gemaakt wordt met de niveau-sensor; deze optie kan zowel worden gebruikt als anti-schuim- als niveauregeling.

Niveauregelingsgedeelte:



A = LED indicatie voor pomp 3

B = Doorvoer voor sensor kabels

C = Aansluiting niveau-sensor

D = Voedingszekering

E = Aan/uit/auto-schakelaar

#### ZEKERINGWAARDE:

220 - 240 V~: T 1A,

110 - 120 V~: T 2A.

De toegepaste zekeringen moeten voldoen aan IEC 127!

Met de tuimelschakelaar in de:

"on" positie is pomp 3 altijd aan,

"off" positie is pomp 3 altijd uit,

"auto" positie is pomp 3 aan wanneer er vloeistofcontact is aan de niveau-sensor.

De LED indicator geeft de status van pomp 3 aan.



Let op:

Indien de niveauregelingsmodule is geplaatst, dan kan uitgang 3 van de ADI 1030 worden gebruikt als centrale alarm indicatie (LED op het voedingsgedeelte van de ADI 1035); zie ook hoofdstuk 7 (schakelaarstanden). Indien geen niveauregelingsmodule geplaatst is, kan pomp 3 voor andere doeleinden worden gebruikt (handmatig of met afstandsbediening).

Orderinformatie voor toe te passen modules:

Z510203095 Level control module ADI 1035, 220 - 240 Vac,  
Z510203096 Level control module ADI 1035, 110 - 120 Vac,  
Z71513AF02 Cable for level sensor.





Let op:

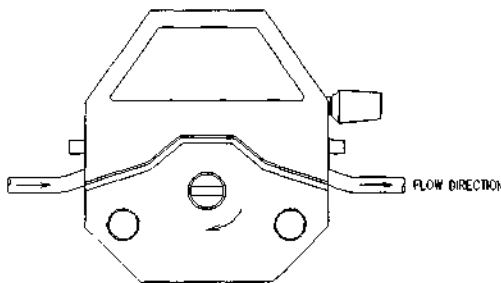
Volgens wetgeving van de Europese Gemeenschap is een pompaandrijving een machine met potentieel gevaar. Pas bij deze aandrijvingen uitsluitend de pompkoppen en slangen toe die hieronder worden vermeld!

Gebruik de slangenpompaandrijvingen niet voor andere doeleinden dan het verplaatsen van vloeistoffen (of gassen).

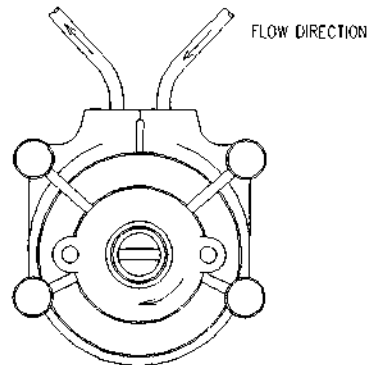
Schakel de voeding van de pompaandrijving af alvorens slangen of pompkoppen te vervangen.

Gebruik van beschadigde slangen kan tot gevolg hebben dat vloeistof in de aandrijving lekt! Controleer de kwaliteit van de slang in de pompkop voor de start van elk fermentatieproces.

De volgende twee typen pompkoppen kunnen op de aandrijvingen worden gebruikt:



Masterflex Easy-Load pompkop



Standaard Masterflex pompkop

De pompaandrijving met variabele snelheid heeft een interne zekering.

Zekeringwaarde: 250 V~ T 0,8A.

De toegepaste zekeringen moeten voldoen aan IEC 127!

Orderinformatie betreffende de toepasbare pompkoppen en slangen vindt u op de volgende pagina:

---

|            |                                                             |
|------------|-------------------------------------------------------------|
| Z311500010 | Fixed speed drive 5 rpm, 220 - 240 Vac, ADI 1035,           |
| Z311500011 | Fixed speed drive 6 rpm, 110 - 120 Vac, ADI 1035,           |
| Z311500020 | Fixed speed drive 17 rpm, 220 - 240 Vac, ADI 1035,          |
| Z311500021 | Fixed speed drive 20 rpm, 110 - 120 Vac, ADI 1035,          |
| Z311600010 | Variable speed drive 10 - 120 rpm, 220 - 240 Vac, ADI 1035, |
| Z311600011 | Variable speed drive 10 - 120 rpm, 110 - 120 Vac, ADI 1035, |
| Z311500005 | Blind plate for unused pump position,                       |
| Z375180000 | Easy-load pump head for thin wall tubing,                   |
| Z375180200 | Easy-load pump head for thick wall tubing,                  |
| Z370132000 | Standard pump head 7013-20,                                 |
| Z370142000 | Standard pump head 7014-20,                                 |
| Z370152000 | Standard pump head 7015-20,                                 |
| Z370162000 | Standard pump head 7016-20,                                 |
| Z370182000 | Standard pump head 7018-20.                                 |

Beschikbaar slangmateriaal:

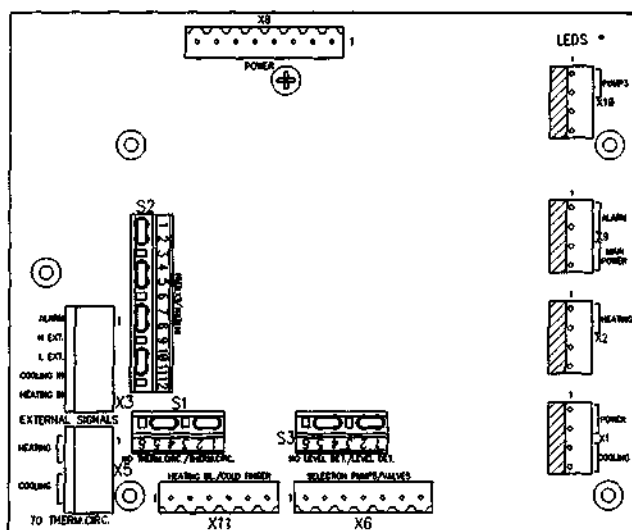
- Norprene Food (zeer lange levensduur en chemisch inert),
- Siliconen,
- Pharmed.

## HOOFDSTUK 7

### DOORVERBINDINGEN

Naast de inbouw instructies op de Documentatie-tekeningen (zie hoofdstuk 8 van de Engelse versie van deze gebruiksaanwijzing) moeten de doorverbindingen op het ADI 1035 controller board (gelegen net onder de scheidingsplaat) overeenkomen met de gekozen configuratie:

- S1: wel of geen waterbad
- S2: Intern / Extern (voeding van de aandrijvingssignalen)
- S3: wel of geen niveauregeling



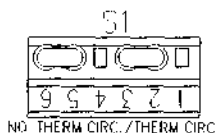
"Central Control Board"

Standaard doorverbindingen:

- S1: Geen waterbad
- S2: Interne voeding van aandrijvingssignalen
- S3: Geen niveauregeling

## 7.1 WATERBAD:

In geval de waterbad-module Z31018003/40 is geplaatst, moeten de draadbruggen op S1 als volgt worden geplaatst:



Connector X27 dient te worden verwijderd van X2 op het "Central Control Board" en geplaatst worden op connector X2 op het "Controller Board" van het waterbad.

Connector X28 dient te worden verwijderd van X1 op het "Central Control Board" en geplaatst worden op connector X1 op het "Controller Board" van het waterbad.

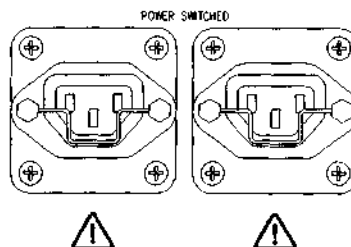
Het verwarmings-uitgangssignaal van de temperatuurregeling moet worden aangeboden op pin 8 van de "Remote Control Connector".

Het koelings-uitgangssignaal van de temperatuurregeling moet worden aangeboden op pin 9 van de "Remote Control Connector".

Zie ook 7.4.

## 7.2 VOEDING VAN DE REGELAAR:

Indien de netvoedingskabels van de regelaar (de ADI 1030 Bio Controller) aangesloten worden op de **MAINS SUPPLY CONNECTORS FOR ADI 1030**, hoeft aan de draadbruggen in S2 niets gedaan te worden.



Indien de netvoedingskabels van de regelaar (de ADI 1030 Bio Controller) niet zijn aangesloten op de **MAINS SUPPLY CONNECTORS FOR ADI 1030**, maar op een eigen voeding, moeten de draadbruggen in S2 als volgt geplaatst te zijn:

Tevens moet deze voeding van de regelaar ook worden aangeboden op de "REMOTE CONTROL CONNECTOR" aan de achterzijde van de ADI 1035 (fase = pin-11, nul = pin-12). Zie ook 7.4.

De geschakelde voeding kan een totaal vermogen leveren van 250 W.



### 7.3 NIVEAUREGELAAR:

In geval de niveauregelaar is geplaatst (op X14, binnen-achterzijde) moeten de draadbruggen op S3 als volgt te worden geplaatst:



Aandrijver voor niveau-detectie: pomp 3 (pompschakelaar moet in de stand "Remote" staan).

In dit geval kan pin 3 van de "Remote Control Connector" (achterop de ADI 1035) worden gebruikt als centrale alarm voor de regelaar (LED indicatie op het voedingsgedeelte van de ADI 1035).

Indien schakelaar S3 in de stand "No Level Detector" staat, kan pomp 3 gebruikt worden voor handmatige bediening of afstandsbediening.

### 7.4 REMOTE CONTROL CONNECTOR:

De 12-pins aansluiting voor afstandsbediening aan de achterzijde van de ADI 1035 Bio Console heeft de volgende lay-out:



| Aansluitings Pinno. | Functie             |
|---------------------|---------------------|
| 1                   | Pomp 1              |
| 2                   | Pomp 2              |
| 3                   | Pomp 3 of Alarm     |
| 4                   | Rotameterklep 1     |
| 5                   | Rotameterklep 2     |
| 6                   | Rotameterklep 3     |
| 7                   | Rotameterklep 4     |
| 8                   | Verwarmings-element |
| 9                   | Koel-element        |
| 10                  | Alarm               |
| 11                  | Externe Fase        |
| 12                  | Externe Nul         |

## HOOFDSTUK 8

### TEKENINGEN

De volgende tekeningen zijn opgenomen in de Engelse versie van deze gebruiksaanwijzing:

|                 |                                              |
|-----------------|----------------------------------------------|
| D1035-3 .12.101 | Bio console basic 110 - 240V ADI 1035        |
| D1035-1 .12.002 | Rotameter assembly                           |
| D1035-1a.12.020 | Valve module for rotameter                   |
| D1035-1 .12.202 | Basic gas selection block                    |
| D1035-1a.12.206 | Gas outlet bulkhead connector set            |
| D1018-2b.12.003 | Thermo circulator module 110 - 220V ADI 1035 |
| D1035-1c.12.106 | Cold water valve 110/220V ADI 1035           |
| D1035-1a.12.400 | Stirrer speed contr. P100 - 310 ADI 1035     |
| D1035-1a.12.404 | Stirrer speed contr. P1000 ADI 1035          |
| D1035-1c.12.110 | Fixed speed drive 5/20 rpm ADI 1035          |
| D1035-1b.12.220 | Var. speed drive 10 - 120 rpm ADI 1035       |
| D1035-1 .12.000 | Blind plate for pump position ADI 1035       |

# **BIO CONSOLE**

## **ADI 1035**

### INSTRUMENT MANUAL

1. Basic unit
2. Gas supply
3. Temperature control
4. Stirrer speed control
5. Level control
6. Pumps
7. Switch settings
8. Drawings

## SYMBOLS

The following symbols are used on equipment and documentation:



Caution; refer to this user manual.



Caution; electrical shock hazard.



Important note; read the instructions carefully.

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---

## EU DECLARATION OF CONFORMITY



The company Applikon Dependable Instruments B.V., Schiedam, The Netherlands, hereby certifies that the instrument:

### **ADI 1035 BIO CONSOLE**

meets the requirements of the EU Directives 89/336/EEC (Electromagnetic Compatibility) and 73/23/EEC (Low Voltage).

#### **SOURCE OF THE SPECIFICATIONS:**

89/336/EEC:

EN 50081-1 (1992) EMC Generic emission standard. Residential, commercial and light industry.

EN 61000-3-2 (1995) EMC Limits for harmonic current emissions (equipment input current  $\leq 16$ A per phase).

EN 61000-3-3 (1995) EMC Limits concerning voltage fluctuations and flicker for equipment having an input current up to and including 16 A per phase.

EN 50082-1 (1992) EMC Generic immunity standard. Residential, commercial and light industry.

EN 50082-2 (1995) EMC Generic immunity standard. Industrial environment (including table A.4).

73/23/EEC

EN 61010 Safety requirements for electrical equipment for measurement, control and laboratory use.

ing J. van Burg, President.

23.10.96

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# CHAPTER 1

## BIO CONSOLE BASIC UNIT

### 1.1 INTRODUCTION:

The ADI 1035 Bio Console is an actuator console that can be used in combination with an ADI 1030 Bio Controller.

It supports gas flow regulation (with rotameters), stirrer speed control, level control, temperature control (with hot and cold water or heating blanket) and liquid addition with pumps. It also supports tuning the flow of cooling medium to the condenser.

Because of its compact design, the ADI 1035 Bio Console allows you to run a bioprocess on a minimum amount of bench space (the ADI 1030 Shelf-Top Bio Controller is designed to be placed on top of the ADI 1035 Bio Console).

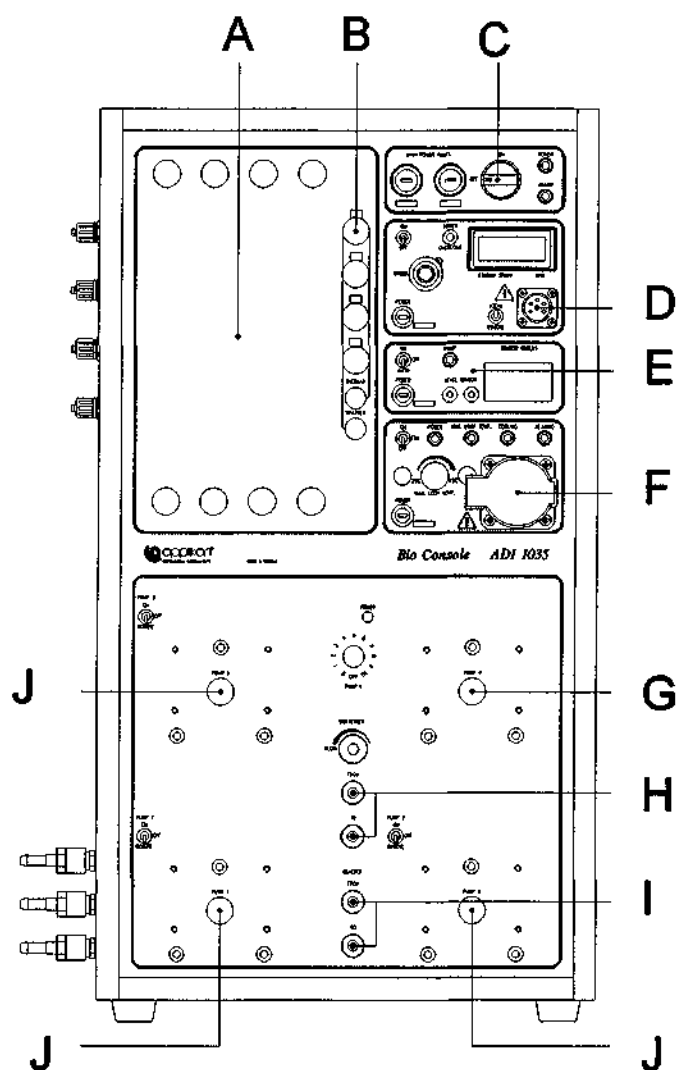


**Caution:**

The ADI 1035 Bio Console is designed as an actuator console for bio process control and must not be used for other purposes!

On the next pages, the front and rear view are presented and the installation instructions and external connections are described.

## 1.2 FRONT VIEW:



A = Gas supply unit

C = Power section

E = Level control

G = Variable speed pump drive

I = Reactor connections

B = Gas selection block

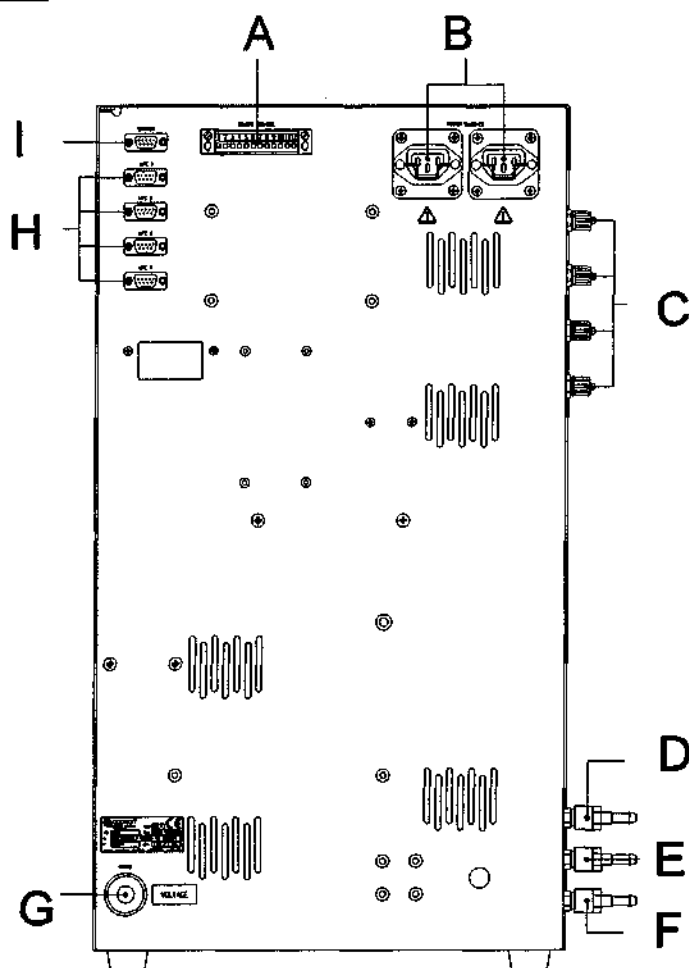
D = Stirrer speed control

F = Temperature control

H = Condenser connections

J = Fixed speed pump drive

## 1.3 REAR VIEW:



A = Remote control connector

C = Gas inlet connections

E = Drain

G = Mains inlet cable

I = Stirrer speed control connector

B = Power socket for ADI 1030

D = Water inlet connection

F = Air vent

H = Mass flow control connectors

Note:

The Mass Flow Control Connectors MFC1 through MFC4 (H) are for future use.



Caution: The switched power supply "B" (2 Euro-outlets) is ment for the ADI 1030 Bio Controller supply. In case these sockets are used for the power supply of other hardware, the total maximum load for both sockets = 250 VA.

## 1.4 INSTALLATION:

### MAINS SUPPLY:

The ADI 1035 Bio Console is available in a universal voltage version:  
Z310351010 : Bio Console ADI 1035 110 - 240 Vac.

Verify the selected voltage (see voltage sticker at the main supply cable gland); if this selection is not correct, contact your service office.

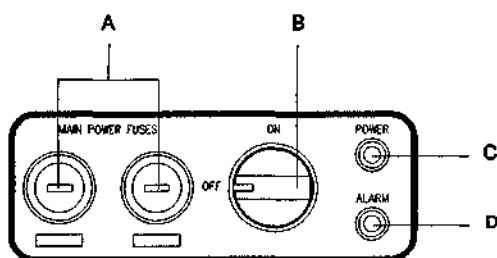


### CAUTION! ELECTRICAL SHOCK HAZARD!

Connect the main supply cable to the line voltage:

- brown = live wire,
- blue = neutral wire,
- green/yellow = earth wire.

### Power Section of the ADI 1035



A = Main power fuses

B = Power on/off switch

C = Power-on indicator

D = Central alarm indicator

Main fuse rating:      220 - 240 V:    T 8A,  
                                 110 - 120 V:    T 16A.

Applied fuses must comply with IEC 127!

The ADI 1035 Bio Console can now be switched on/off with the "Power On/Off" switch.

The "Alarm" LED can be used for a general alarm status indication of sensor values (alarms on ADI 1030 must be configured to output 3; level detector switch setting must be positive (see chapter 7: switch settings)).

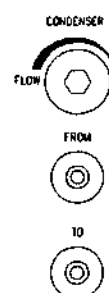
## GAS SUPPLY:

If one or more gas flow regulators (rotameters) are installed, the corresponding gas supplies must be connected to the blue bulkhead connectors at the left hand side of the ADI 1035 Bio Console; see chapter 2: Gas Supply.

## WATER SUPPLY:

If the thermo-circulator module, cold water valve or condenser is installed, reduced water supply (30-50 kPa, 0.3-0.5 bar, 4-7 psi) must be connected at the left hand side of the ADI 1035 Bio Console; see chapter 3: Temperature Control.

In the center of the pump section, a tuning valve is located for cooling water to the condenser at the head plate of the bioreactor. The bulkhead connectors for water to and from the condenser are quick-connectors; the nipple to the condenser also contains a check-valve so the condenser will not be drained when the nipple is disconnected.



Below the condenser bulkhead connectors, two bulkhead connectors can be found for water to and from the reactor; these are also quick-connectors, where the nipple to the reactor contains a check-valve to prevent draining of the reactor-jacket (or heat exchanger) when the nipple is disconnected.



## CONNECTION OF THE ADI 1035 TO THE ADI 1030 BIO CONTROLLER:

When the ADI 1030 Bio Controller is used in combination with the ADI 1035 Bio Console, the Mains Power for the ADI 1030 **SHOULD** be supplied through the ADI 1035; as a result, the complete system can be switched off by the Main Power switch of the ADI 1035. Use the following cables:

- Z510303200 Cable power supply micro processor part of ADI 1030,
- Z510303210 Cable power supply output module of ADI 1030,
- Z510303220 Control cable (controller output from ADI 1030 to ADI 1035).



**CAUTION! ELECTRICAL SHOCK HAZARD. WHEN THE CONTROLLING DEVICE (ADI 1030 OR ANY OTHER) DOES NOT OPERATE ON THE MAINS FROM THE ADI 1035, REFER TO CHAPTER 7.2 FOR PROPER SWITCH SETTING AND REMOTE CONNECTION!**

The power cables fit in the switched-power sockets at the rear side of the ADI 1035. The status of the ADI 1035 actuators depend on the outputs of the ADI 1030 Bio Controller; the control cable should be used for connection between the ADI 1030 Output Module and the Remote Control connector of the ADI 1035 (rear side).

The control cable must be connected to the ADI 1030 Bio Controller in the following way (see next page):



**CAUTION! ELECTRICAL SHOCK HAZARD. MAKE SURE THAT THE POWER OF THE ADI 1035 / 1030 IS SWITCHED OFF BEFORE MAKING ANY CONNECTIONS!**

### Note:

The ADI 1030 Bio Controller comes with ferrite beads (in two sizes). The larger one must be connected on the control cable near the ADI 1030!

| ADI 1030 Output Nbr. | ADI 1030 Terminal | Wire Color  | ADI 1035 Actuator |
|----------------------|-------------------|-------------|-------------------|
| Output 1             | X1-1              | WH (white)  | Pump 1            |
| Output 2             | X1-4              | BR (brown)  | Pump 2            |
| Output 3             | X1-7              | GN (green)  | Pump 3 or Alarm   |
| Output 4             | X1-10             | YE (yellow) | Rotameter Valve 1 |
| Output 5             | X1-13             | GR (grey)   | Rotameter Valve 2 |
| Output 6             | X1-16             | PK (pink)   | Rotameter Valve 3 |
| Output 7             | X1-19             | BL (blue)   | Rotameter Valve 4 |
| Output 8             | X1-22             | RD (red)    | Heating Element   |
| Output 9             | X1-25             | BK (black)  | Cooling Element   |

**Note:**

Output 3 from the ADI 1030 Bio Controller can be used to control pump 3 in the ADI 1035 (only when no level control module is installed in the ADI 1035) or as a central alarm output to the Alarm LED in the power section of the ADI 1035 (only when the level control module is installed in the ADI 1035). Also refer to chapter 5 (level control) and chapter 7 (switch settings).

**EXTERNAL CONNECTIONS:**

Gas inlet bulkhead connectors:

tubing: ID 4 mm  
max. pressure: 200 kPa (2 bar, 29 psi)

Water inlet:

tubing: ID 6 mm  
max. pressure: 50 kPa (0.5 bar, 7 psi)  
min. pressure: 30 kPa (0.3 bar, 4 psi)

To/from condenser:

tubing: ID 6 mm

To/from reactor:

tubing: ID 6 mm

## ENVIRONMENTAL CONDITIONS:

The ADI 1035 Bio Console may be used at locations with the following environmental conditions:

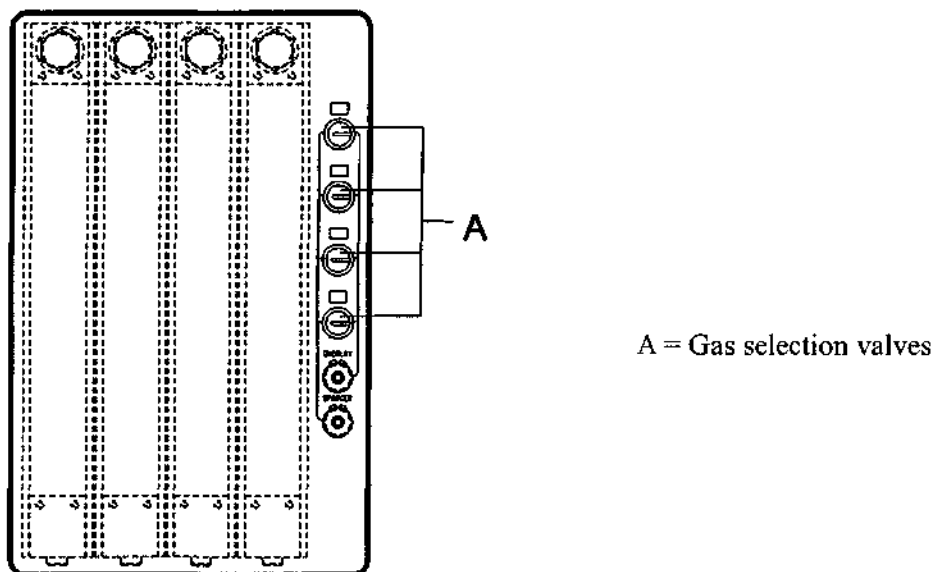
- Indoor use,
- Altitude: up to 2000 m,
- Temperature: 4°C to 45°C,
- Maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 45°C,
- Mains supply voltage: 115/230 Vac (+15%/-20%), 50/60Hz,
- Transient overvoltages according to INSTALLATION CATEGORIES II,
- POLLUTION DEGREE 2 in accordance with IEC 664,
- P-max = 1600 VA.

## CHAPTER 2

# GAS SUPPLY

### 2.1 THE GAS SUPPLY UNIT:

The ADI 1035 Gas Supply Unit supports four rotameter assemblies and a gas selection block:



The optional gas selection block contains four gas selection valves. With the gas selection valves, the application ("sparging" or "overlay") of the gas is selected.

Note:

- The upper gas inlet connector corresponds with the left hand rotameter assembly and the upper gas selection valve/bulkhead connector for gas outlet.

Ordering number of the gas selection block: Z311302020

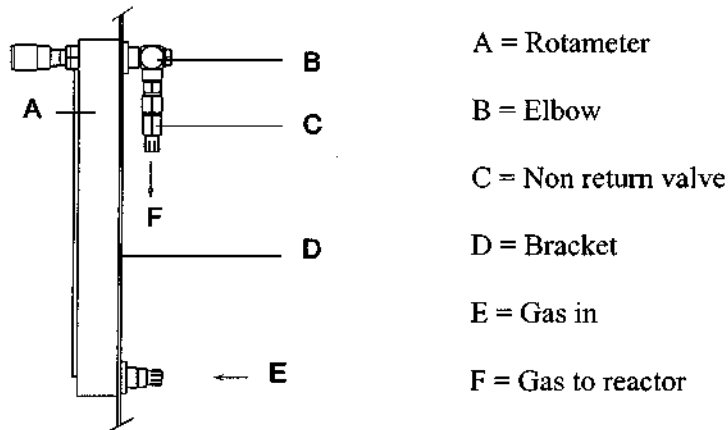
Ordering number of gas outlet bulkhead connectors: Z311302060

On next page, the available rotameter assemblies are listed.

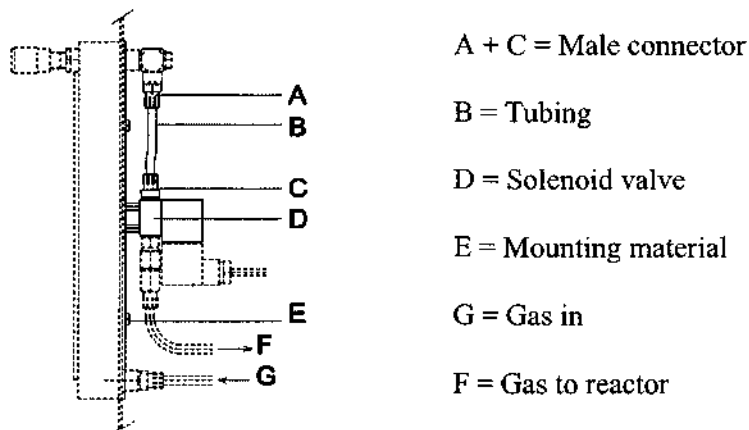
Available rotameter assemblies:

|            |                                     |
|------------|-------------------------------------|
| Z3RM000005 | Rotameter assembly 2.5 - 25 ml/min, |
| Z3RM000010 | Rotameter assembly 5.0 - 50 ml/min, |
| Z3RM000020 | Rotameter assembly 9.0 - 90 ml/min, |
| Z3RM000030 | Rotameter assembly 27 - 270 ml/min, |
| Z3RM000040 | Rotameter assembly 50 - 500 ml/min, |
| Z3RM000050 | Rotameter assembly 0.1 - 1.0 l/min, |
| Z3RM000060 | Rotameter assembly 0.5 - 5.0 l/min, |
| Z3RM000070 | Rotameter assembly 1.0 - 10 l/min,  |
| Z3RM000080 | Rotameter assembly 2.3 - 23 l/min.  |

Rotameter assemblies can be applied with or without a Valve Module:



Rotameter Assembly



Rotameter Assembly with Valve Module

The Valve Modules are available in two versions:

- Z311302040 Valve Module for Rotameter Ass., 220 - 240 Vac,
- Z311302045 Valve Module for Rotameter Ass., 110 - 120 Vac.



**CAUTION:**  
IF OXYGEN IS ONE OF THE SUPPLIED GASSES,  
VERIFY THAT THE CONNECTIONS AND TUBING  
INSIDE THE ADI 1035 ARE FREE OF LEAKS!

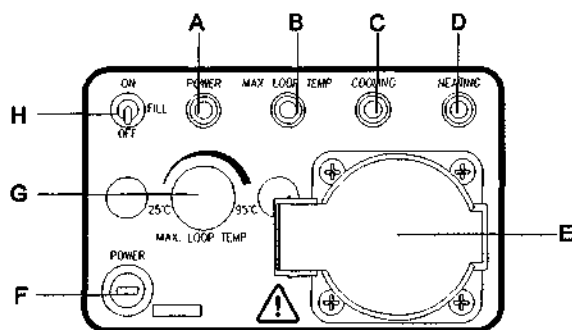
Note:

- The rotameter valves can be switched by outputs 4 through 7 of the ADI 1030 Bio Controller; see chapter 1.4 of this manual: Installation.

## CHAPTER 3

# TEMPERATURE CONTROL

### 3.1 TEMPERATURE CONTROL SECTION:



- A = Power-on indication
- B = Max. loop temp. indication
- C = Cooling indication
- D = Heating indication
- E = Socket for heating blanket
- F = Power fuse
- G = Max. loop temp. adjustment
- H = Power on/off and fill switch

#### FUSE RATING:

220 - 240 Vac: T 3.15A,

110 - 120 Vac: T 6.3A.

Applied fuses must comply with IEC 127!

The temperature control section supports heating/cooling in several ways:

In the Basic Lay-Out, an actuator output signal for heating (output 8 from ADI 1030) is connected to the wall socket in the temperature control section. Heating blankets can be applied for heating the bioreactor (single actuator temperature control).



**CAUTION! ELECTRICAL SHOCK HAZARD. WHEN THE HEATING ACTUATOR IS SWITCHED ON, MAIN VOLTAGE IS DIRECTLY CONNECTED TO THE SOCKET!**

**MAXIMUM LOAD = 400 VA.**

#### Note:

- In this case, the Max. Loop Temperature adjustment/indication and cooling indication are not in use.
- With the power switch in the middle (Fill) position, the temperature control module is in operation.

With an additional Cold Water Valve that can be installed in the ADI 1035, dual actuator temperature control can be obtained (heating and cooling). The actuator output signal for cooling (output 9 from ADI 1030) is directed to the Cold Water Valve.

Note:

- In this case, the Max. Loop Temperature adjustment/indication is not in use.
- With the power switch in the middle (Fill) position, the temperature control module is in operation.

An other way for dual temperature control is installing the Thermo Circulator Module for the ADI 1035. In this way the temperature is controlled by circulating heating/cooling water.

Note:

- In this case, the wall socket is not in use.

In case the thermo-circulator module or the cold water valve is used or cooling water is required for the condenser, tap water supply must be connected (upper brass bulkhead connector at left hand side of ADI 1035); inlet pressure: 30 - 50 kPa (0.3 - 0.5 bar, 4 - 7 psi). A water pressure reducer is available as an option (see drawing D1018-1a.12.005, art. nbr. Z310180050).

The lower brass bulkhead connector is used for drain purposes, the middle bulkhead connector is used as vent (air from the circulation system).

Below, the ordering information for all applicable hardware is listed:

|            |                                                         |
|------------|---------------------------------------------------------|
| Z310180030 | Thermo-circulator module 230 Vac, ADI 1035,             |
| Z310180040 | Thermo-circulator module 110 - 120 Vac, ADI 1035.       |
| Z310180060 | Cold water valve module 230 Vac, ADI 1035,              |
| Z310180070 | Cold water valve module 110 - 120 Vac, ADI 1035.        |
| Z310180050 | Water pressure reducer for ADI 1018.                    |
| Z311020022 | Silicone heating blanket, 2 liter reactor, 230 Vac,     |
| Z311020030 | Silicone heating blanket, 3 liter reactor, 230 Vac,     |
| Z311020050 | Silicone heating blanket, 5 liter reactor, 230 Vac,     |
| Z311020070 | Silicone heating blanket, 7 liter reactor, 230 Vac,     |
| Z311020150 | Silicone heating blanket, 15/20 liter reactor, 230 Vac. |

Note:

- When no temperature control actuators are installed, the water-inlet connection can still be used for condenser-cooling; connect ID 6 mm tubing to the "To -" and "From Condenser" tubing (see also chapter 1.4: water supply).

### 3.2 COLD WATER VALVE:

When a Cold Water Valve is installed, it can be used as a cooling actuator.

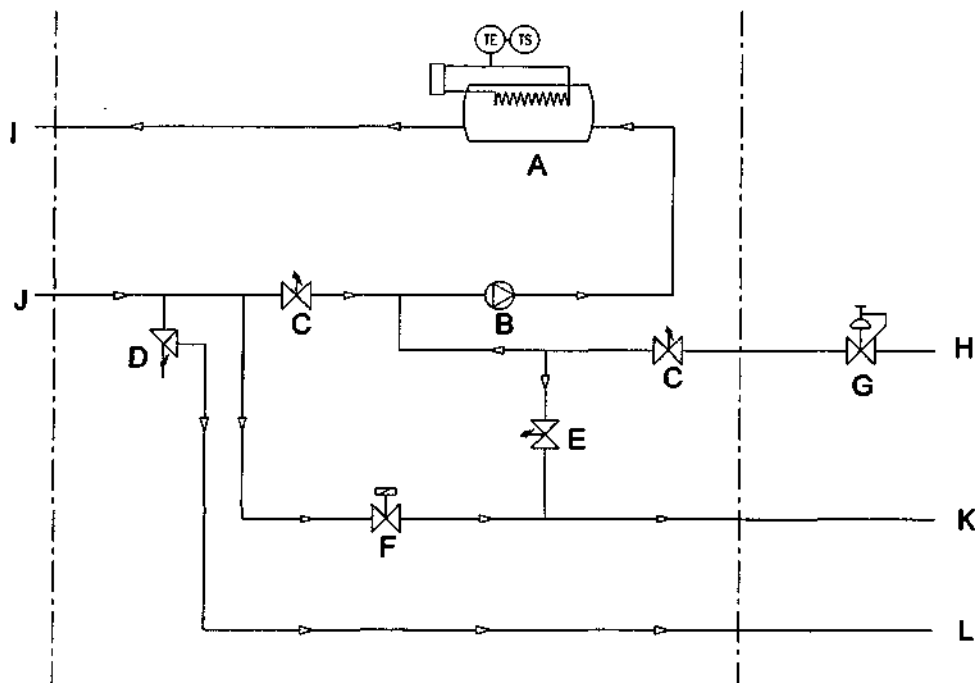
In this case, the controlling device (e.g. the ADI 1030 Bio Controller) directly activates this cooling valve; when the reactor temperature exceeds setpoint, a 115/230Vac signal will open the Cold Water Valve for cooling.

Pressure range of cooling water: see previous chapter (3.1).

Using this option, the middle (Fill) position of the power switch has no function (temperature module is in operation!) and the Max. Loop Temp. adjustment is not present.

### 3.3 THERMO CIRCULATOR MODULE:

#### SCHEMATIC LAY-OUT:



A = Heat Exchanger  
C = Non Return Valve  
E = Safety Valve  
G = Pressure Reducer  
I = To Reactor  
K = Drain

B = Circulator Pump  
D = Vent Valve  
F = 2-Way Valve  
H = Water In  
J = From Reactor  
L = Vent

#### Note:

- The connections "To -" and "From Condenser" are not shown in this lay-out.
- The Heat Exchanger contains a Thermo Element and a Thermo Switch that will switch off the Thermo Element when the Maximum Loop Temperature is reached.

**CAUTION: THE CERAMIC BEARING OF THE CIRCULATOR PUMP WILL BE DAMAGED WHEN IT IS RUN DRY.**

The Circulator Pump is activated as soon as the power is switched on (lever in upper position).

The controlling device (e.g. an ADI 1030 Bio Controller) can activate the heating actuator (thermo element) or the cooling actuator (2-way valve is opened: circulation water flows to the drain and cooling water is introduced into the system).

The vent valve is a gas permeatic valve that will remove air/gas bubbles from the circulation system.

The safety valve is a relief valve that opens at an internal pressure of approx. 100 kPa (1 bar, 14 psi); in this case, the circulation water flows to the drain until the pressure is reduced.

### USING THE THERMO CIRCULATOR:

The Thermo Circulator Module for the ADI 1035 can be put in operation by following the steps that are listed below:

- Connect the ADI 1035 Thermo Circulation System to the heat exchanger or jacket of the reactor using ID 6 mm tubing (use hose clamps to secure the tubing). The "To Reactor" tube-nipple contains a non-return valve; the "From Reactor" tube-nipple is a straight union.
- Connect tubing (ID = 6 mm) to the Drain and Air Vent connector in order to lead any water or air to an open drain.
- Connect the Mains cable to the wall socket.
- Connect the water supply with max. inlet pressure of 500 kPa (= 0.5 bar, 7 psi) to the water inlet using ID = 6 mm tubing (use hose clamps to secure the tubing).  
Water is now introduced into the circulation system; air leaves the system through the Vent Valve.
- The filling speed of the circulation system is increased by putting the Power-On switch in the middle (Fill) position; as a result, the 2-way valve is opened and water will eventually flow to the drain. When the circulation system is sufficiently filled, put the Power switch again in the lower (Off) position.
- When the circulation system is filled, put the Power switch in the upper (On) position. As a result, the circulation pump is started. Any remaining air bubbles will leave the system through the Vent Valve.

If the circulation pump is noisy, it means that there are still air bubbles present in the pump; return to the filling mode for approx. 15 seconds.

Adjust the Max. Loop Temperature in such a way, that no "hot-spots" can occur in the reactor. Decreasing the Max. Loop Temperature setting will of course reduce the heating capacity of the Thermo Circulator.

**Note:**

The internal maximum loop temperature is approx. 95°C; the external maximum loop temperature is approximately 80°C.

The ADI 1035 Thermo Circulator is now ready to be put in operation.

### MAINTENANCE:

In case the maximum loop temperature is adjusted to a high value ( $> 80^{\circ}\text{C}$ ) and cooling water is frequently introduced into the system, lime scale accumulation may occur in the heating element resulting in reduced heat transfer.

This lime scale sediment can be removed by circulating an EDTA solution ( $\text{pH} = 10$ ) through the system, using the following procedure:

- switch off the Thermo Circulator by switching the "on/off/fill" switch in the "off" position and use hose clamps to close the tubes to and from the jacket / heat exchanger of the reactor.
- in case of a jacketed reactor:
  - remove the upper hose connector from the jacket
  - move the reactor in such a way that the lower hose connector is positioned above a sink or bucket and remove the lower hose connector in order to drain the jacket
- in case of a heat exchanger:
  - remove both hose connectors from the heat exchanger
- insert both disconnected hoses in a flask (beaker) containing a 0.1 Molar EDTA solution ( $\text{pH} = 10$ ) (for further details, see the recipe below) and remove both hose clamps.
- start circulation of the EDTA solution by switching the "on/off/fill" switch in the "on" position; keep circulation going for several hours (depending on the amount of lime scale deposit).
- switch the "on/off/fill" switch to the "off" position. Insert the hose "from reactor" in a flask (beaker) with at least 1 liter of tap water. Direct the hose "to reactor" to the sink (drain or bucket) and switch the "on/off/fill" switch again to the "on" position. Rinse the Thermo Circulator with tap water. Make sure that the pump is switched off again before it runs dry.
- use the hose clamps again to close both hoses; rinse the outside of both hoses with tap water to remove any left EDTA solution from its surface. The Thermo Circulator now again can be put to normal operation.

Recipe for a 0.1 Molar EDTA (ethylene diamino tetra acetic acid) solution with a pH of 10:

- Dissolve 8 gram NaOH in a small amount of water (solution will be very hot!)
- make it up to 1 liter
- add 37.2 gram of EDTA (di-sodium salt), stir until all solids are dissolved
- the solution is now ready to be used



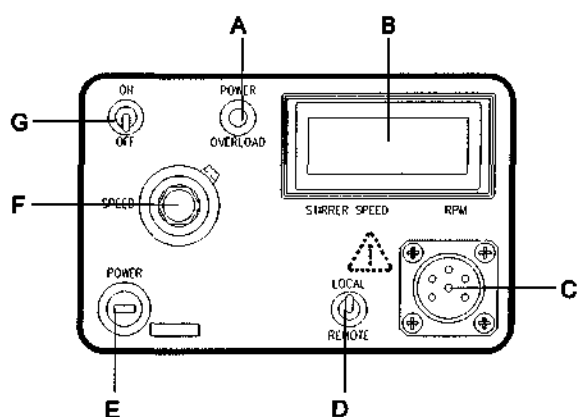
**WARNING:** The EDTA solution is alkaline (pH = 10). Contact of this solution with skin, especially mucous membrane or eyes, must be avoided. If such contact occurs, the affected area must be thoroughly rinsed with water.

## CHAPTER 4

# STIRRER SPEED CONTROL

### 4.1 STIRRER SPEED CONTROL:

The ADI 1035 Bio Console can be equipped with two different stirrer speed controllers; one for the stirrer motors P100, P140 and P310, the other for the stirrer motor P1000.  
Stirrer speed control section:



- A = Power / overload indication
- B = Display stirrer speed (r.p.m.)
- C = Stirrer motor connection
- D = Local / remote switch
- E = Fuse for controller
  - P100-310: T 1.6A/115Vac - T 0.8A/230Vac
  - P1000: T 6.3A/115Vac - T 3.15A/230Vac
- F = Potentiometer manual speed
- G = Power on / off switch



#### Caution:

- According to the European Community legislation on machinery, the stirrer motor is a machine with potential hazard. Refer to the stirrer motor user manual for safety instructions, fuse rating and functionality.
- In case the stirrer speed controller for the P1000 motor is installed, the stirrer cable must not be disconnected while the power (H) is switched on; the voltage at the connectors may exceed 60Vdc so precaution must be taken to avoid risk of electric shock!

The "On/Off" tumbler switch is used to switch the stirrer speed controller on/off; the "power/overload" indicator will be green in case the power is switched on, in overload situations (maximum torque is reached) the indicator will become red.

The liquid cristal display presents the current revolutions per minute.

The "Local/Remote" tumbler switch is used for the selection of the stirrer speed controller function:

- "Local" = stirrer speed is set manually (potentiometer at front panel),
- "Remote" = stirrer speed is controlled by a remote 4 - 20 mA signal (e.g. from the ADI 1030 Bio Controller).

The cable connection for the stirrer motor is located at the front panel; the cable connection for remote control by the ADI 1030 Bio Controller is located at the rear (sub-D connector).

Ordering information for applicable hardware:

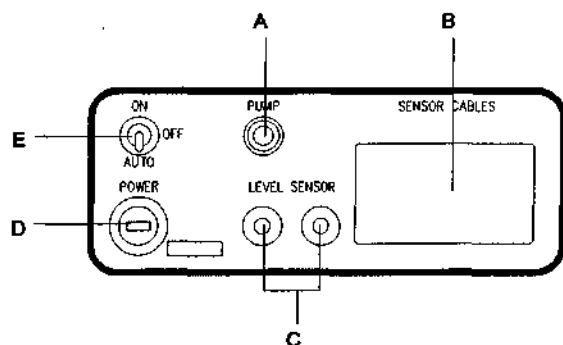
|            |                                                                                           |
|------------|-------------------------------------------------------------------------------------------|
| Z510320030 | Stirrer controller module P100 - P310,                                                    |
| Z510320040 | Stirrer controller module P1000,                                                          |
| Z5100002M0 | Stirrer motor assembly P100,                                                              |
| Z5100002M1 | Stirrer motor assembly P140,                                                              |
| Z5100002M3 | Stirrer motor assembly P310,                                                              |
| Z5100P1000 | Stirrer motor assembly P1000,                                                             |
| Z510000001 | Stirrer motor assembly P100 I=6,                                                          |
| Z510000002 | Stirrer motor assembly P140 I=2,                                                          |
| Z5100P1005 | Stirrer motor assembly P1000 I=5,                                                         |
| Z510121C02 | Cable for P100 - P1000 ADI 1035,                                                          |
| Z510120900 | Control cable motor speed short (ADI 1030),                                               |
| Z510120000 | Recalibration of stirrer speed controller (required calibration range must be specified). |

## CHAPTER 5

### LEVEL CONTROL

The Level Control option of the ADI 1035 Bio Console can be used to activate a pump on liquid contact with the level sensor; this option is used for both foam control and level control.

Level control section:



A = LED indication for pump 3

B = Tunnel for sensor cables

C = Level sensor connection

D = Power fuse

E = On / off / auto switch

#### FUSE RATING:

230 Vac: T 1A,

110 -120 Vac: T 2A.

Applied fuses must comply with IEC 127!

With the tumbler switch in the: "on" position, pump 3 is activated continuously,  
"off" position, pump 3 is stopped,  
"auto" position, pump 3 is activated when level contact is detected.

The LED indicator shows the pump activity.



#### Remark:

When the level control module is installed, output 3 of the ADI 1030 can be used for general alarm indication (LED at the power section of the ADI 1035); also refer to chapter 7 (switch settings).

When no level control module is installed, pump 3 can be used for other purposes (manual or remote control).

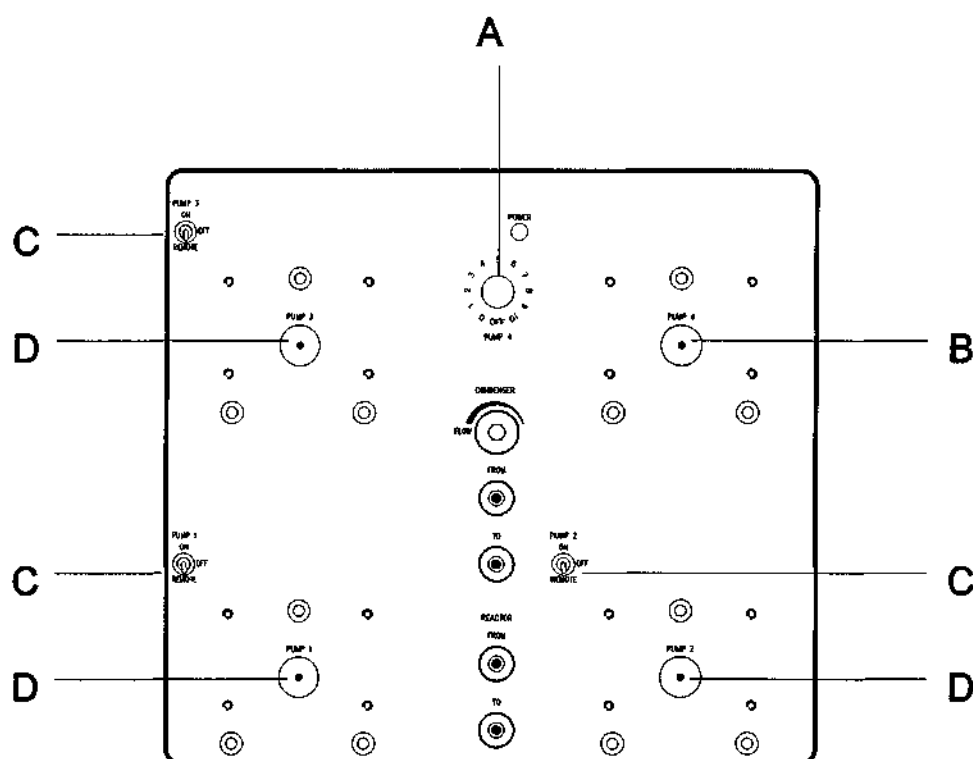
Ordering information for applicable hardware:

Z510203095    Level control module ADI 1035, 220 - 240 Vac,  
Z510203096    Level control module ADI 1035, 110 - 120 Vac,  
Z71513AF02    Cable for level sensor.

## CHAPTER 6

## PUMPS

**The Pump Section contains four positions for pumps:**



- A = Potentiometer for variable speed adjustment  
B = Position for variable speed drive  
C = On / off / remote switch for fixed speed drive 1, 2 and 3  
D = Position for fixed speed drive 1, 2 and 3

At pump positions 1, 2 and 3, fixed speed pump drives can be installed for manual or remote control operation (in case the level control module is installed, pump 3 is used for level control); each pump can be switched on/off/remote with a tumbler/toggle switch. At pump position 4, a variable speed pump drive can be installed for stand alone operation.

**Caution:**

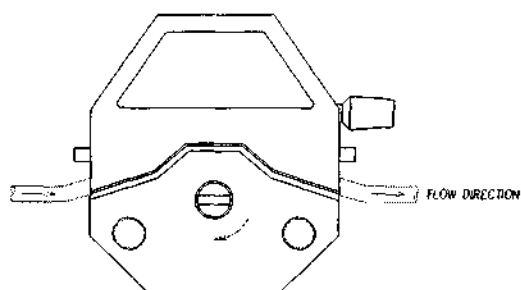
According to the European Community legislation on machinery, a pump drive is a machine with potential hazard. Only apply these drives with the pump heads and tubing that are described in this chapter!

Do not use the tubing pump drives for other purposes than displacement of fluids (or gas).

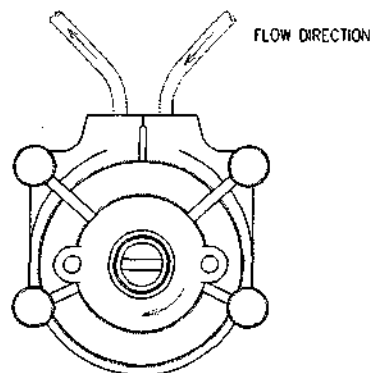
Switch off the power of the pump drive before replacing any tubes or pump heads!

Application of damaged tubes may result in fluid leaking into the pump drive! Verify the tube quality inside the pump head before every fermentation run.

The following two types of pump heads can be used on the available drives:



Masterflex Easy-Load pump head



Standard Masterflex pump head

The variable speed pump drive has an internal fuse.

Fuse rating: 250 Vac T 0.8A.

Applied fuses must comply with IEC 127!

For ordering information of applicable hardware, see next page:

---

|            |                                                             |
|------------|-------------------------------------------------------------|
| Z311500010 | Fixed speed drive 5 rpm, 230 Vac, ADI 1035,                 |
| Z311500011 | Fixed speed drive 6 rpm, 110 - 120 Vac, ADI 1035,           |
| Z311500020 | Fixed speed drive 17 rpm, 230 Vac, ADI 1035,                |
| Z311500021 | Fixed speed drive 20 rpm, 110 - 120 Vac, ADI 1035,          |
|            |                                                             |
| Z311600010 | Variable speed drive 10 - 120 rpm, 230 Vac, ADI 1035,       |
| Z311600011 | Variable speed drive 10 - 120 rpm, 110 - 120 Vac, ADI 1035, |
|            |                                                             |
| Z311500005 | Blind plate for unused pump position,                       |
|            |                                                             |
| Z375180000 | Easy-load pump head for thin wall tubing,                   |
| Z375180200 | Easy-load pump head for thick wall tubing,                  |
|            |                                                             |
| Z370132000 | Standard pump head 7013-20,                                 |
| Z370142000 | Standard pump head 7014-20,                                 |
| Z370152000 | Standard pump head 7015-20,                                 |
| Z370162000 | Standard pump head 7016-20,                                 |
| Z370182000 | Standard pump head 7018-20.                                 |

## Available tubing material:

Two types of tubing can be used for hydraulic and gaseous connections:

Silicone tubing: inert and transparent material

Norprene Food tubing: physically inert material, especially useful for tubing pumps (long lifetime) and aeration purposes (less gas permeable than silicone)

|            |                                                                                                                           |
|------------|---------------------------------------------------------------------------------------------------------------------------|
| Z364111300 | Silicone tubing, 7.5 m, ID = 0.8 mm, for hose barb of 1.6 mm (1/16")<br>(thin-wall tubing, used in pump head 7013)        |
| Z364111400 | Silicone tubing, 7.5 m, ID = 1.6 mm, for hose barb of 1.6 mm (1/16")<br>(thin-wall tubing, used in pump head 7014)        |
| Z364111500 | Silicone tubing, 7.5 m, ID = 4.8 mm, for hose barb of 4.8 mm (3/16")<br>(thick-wall tubing, used in pump head 7015)       |
| Z364111600 | Silicone tubing, 7.5 m, ID = 3.1 mm, for hose barb of 3.2 mm (1/8")<br>(thin-wall tubing, used in pump head 7016)         |
| Z364111800 | Silicone tubing, 7.5 m, ID = 7.9 mm, for hose barb of 9.5 mm (3/8")<br>(thin-wall tubing, used in pump head 7018)         |
| Z364021300 | Norprene food tubing, 7.5 m, ID = 0.8 mm, for hose barb of 1.6 mm (1/16")<br>(thin-wall tubing, used in pump head 7013))  |
| Z364021400 | Norprene food tubing, 7.5 m, ID = 1.6 mm, for hose barb of 1.6 mm (1/16")<br>(thin-wall tubing, used in pump head 7014))  |
| Z364021500 | Norprene food tubing, 7.5 m, ID = 4.8 mm, for hose barb of 4.8 mm (3/16")<br>(thick-wall tubing, used in pump head 7015)) |
| Z364021600 | Norprene food tubing, 7.5 m, ID = 3.1 mm, for hose barb of 3.2 mm (1/8")<br>(thin-wall tubing, used in pump head 7016))   |
| Z364021800 | Norprene food tubing, 7.5 m, ID = 7.9 mm, for hose barb of 9.5 mm (3/8")<br>(thin-wall tubing, used in pump head 7018)    |

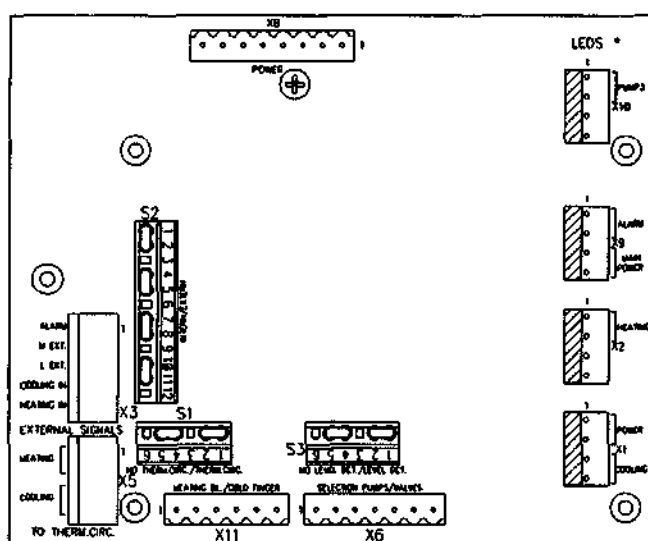
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## CHAPTER 7

### JUMPERS

Additional to the assembling information that is listed on the supplied drawings (see chapter 8 of the English copy of this user manual), S1, S2 and S3 on the ADI 1035 Control Board (located just below the Separation Plate) must be properly jumpered:

- S1: No-Therm. Circ. / Therm. Circ.
- S2: Internal / External (mains of control signals)
- S3: No-Level Detector / Level Detector



ADI 1035 Control Board

Default setting of the board:

- S1: No-Therm. Circ.
- S2: Internal
- S3: No Level Detector

## 7.1 THERMO CIRCULATOR:

In case the Thermo Circulator Module Z31018003/40 is installed, S1 must be jumpered like:



Connector X27 must be removed from X2 on Central Control Board and be connected to X2 on the Controller Board of the Thermo Circulator.

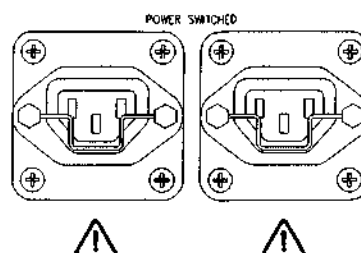
Connector X28 must be removed from X1 on Central Control Board and be connected to X1 on the Controller Board of the Thermo Circulator.

The external Heating Control signal must be supplied at the Remote Control Connector pin 8. The external Cooling Control signal must be supplied at the Remote Control Connector pin 9.

See also 7.4.

## 7.2 MAINS SUPPLY CONTROLLING DEVICE:

If the power supply cable(s) of the controlling device (e.g. the ADI 1030 Bio Controller) are connected to the **MAINS SUPPLY CONNECTORS FOR ADI 1030**, S2 must be jumpered as default.



### Caution:

If the power supply cable(s) of the controlling device (e.g. the ADI 1030 Bio Controller) are not connected to the **MAINS SUPPLY CONNECTORS FOR ADI 1030** but have their own power source, S2 must be jumpered like:

The external mains must be connected to the remote control connector at the rear of the ADI 1035 (live = pin-11, neutral = pin-12). Refer to 7.4.

The switched power sockets have a total maximum load of 250 W.



### 7.3 LEVEL DETECTOR:

In case a Level Detector is installed (on X14, inner rear side), S3 must be jumpered like:



Actuator for level detection: pump 3 (pump status must be: remote operation).

In this case, pin 3 of the remote control connector (rear of ADI 1035) can be used for general alarm indication of the controller (LED indication at the power section of the ADI 1035).

If "No Level Detector" is selected, pump 3 can either be used by manual or remote control.

### 7.4 REMOTE CONTROL CONNECTOR:

The 12-pins remote control connector at the rear of the ADI 1035 Bio Console has the following lay-out:



| Remote Control Pin-nbr. | Function          |
|-------------------------|-------------------|
| 1                       | Pump 1            |
| 2                       | Pump 2            |
| 3                       | Pump 3 or Alarm   |
| 4                       | Rotameter Valve 1 |
| 5                       | Rotameter Valve 2 |
| 6                       | Rotameter Valve 3 |
| 7                       | Rotameter Valve 4 |
| 8                       | Heating Element   |
| 9                       | Cooling Element   |
| 10                      | Alarm             |
| 11                      | External Live     |
| 12                      | External Neutral  |

**Note:**

In case the ADI 1030 Bio Controller is used to generate the remote control signals, the standard control cable must be equipped with a ferrite bead (connected around the cable). Location of the ferrite bead: near the ADI 1030. The ferrite bead comes with the ADI 1030.

## CHAPTER 8

## DRAWINGS

The following drawings are enclosed:

|                 |                                              |
|-----------------|----------------------------------------------|
| D1035-3d.12.101 | Bio console basic 110 - 240V ADI 1035        |
| D1035-1b.12.002 | Rotameter assembly                           |
| D1035-1c.12.020 | Valve for rotameter                          |
| D1035-1 .12.202 | Basic gas selection block                    |
| D1035-1a.12.206 | Gas outlet bulkhead connector set            |
| D1018-2c.12.003 | Thermo circulator module 110 - 220V ADI 1035 |
| D1018-1a.12.005 | Water Press. Reducer for ADI 1018            |
| D1035-1c.12.106 | Cold water valve 115/230V ADI 1035           |
| D1020-1b.12.309 | Level Control 110 - 240V ADI 1035            |
| D1035-1e.12.110 | Fixed speed drive 5/20 rpm ADI 1035          |
| D1035-1d.12.220 | Var. speed drive 10 - 120 rpm ADI 1035       |
| D1035-1 .12.000 | Blind plate for pump position ADI 1035       |

GAS  
SUPPLY  
UNIT

GAS  
SELECTION

POWER  
SECTION

REMOTE CONTROL  
CONNECTOR

MAINS SUPPLY CONNECTORS  
FOR AD1030

STIRRER SPEED  
CONTROL  
CONNECTOR

MASS FLOW  
CONTROL  
CONNECTORS

STIRRER  
SPEED  
CONTROL

LEVEL  
CONTROL

TEMPERATURE  
CONTROL

GAS  
INLET  
CONNECTIONS  
Pmax: 2bar

WATER  
INLET  
Pmax: 0.5bar

DRAIN

AIR VENT

PUMP POSITION  
FIXED SPEED

PUMP POSITION  
VARIABLE SPEED

TUBING  
CONNECTIONS  
CONDENSER

TUBING  
CONNECTIONS  
REACTOR

MAINS  
INLET  
CABLE

PUMP POSITION  
FIXED SPEED

PUMP POSITION  
FIXED SPEED

FRONT VIEW

REAR VIEW

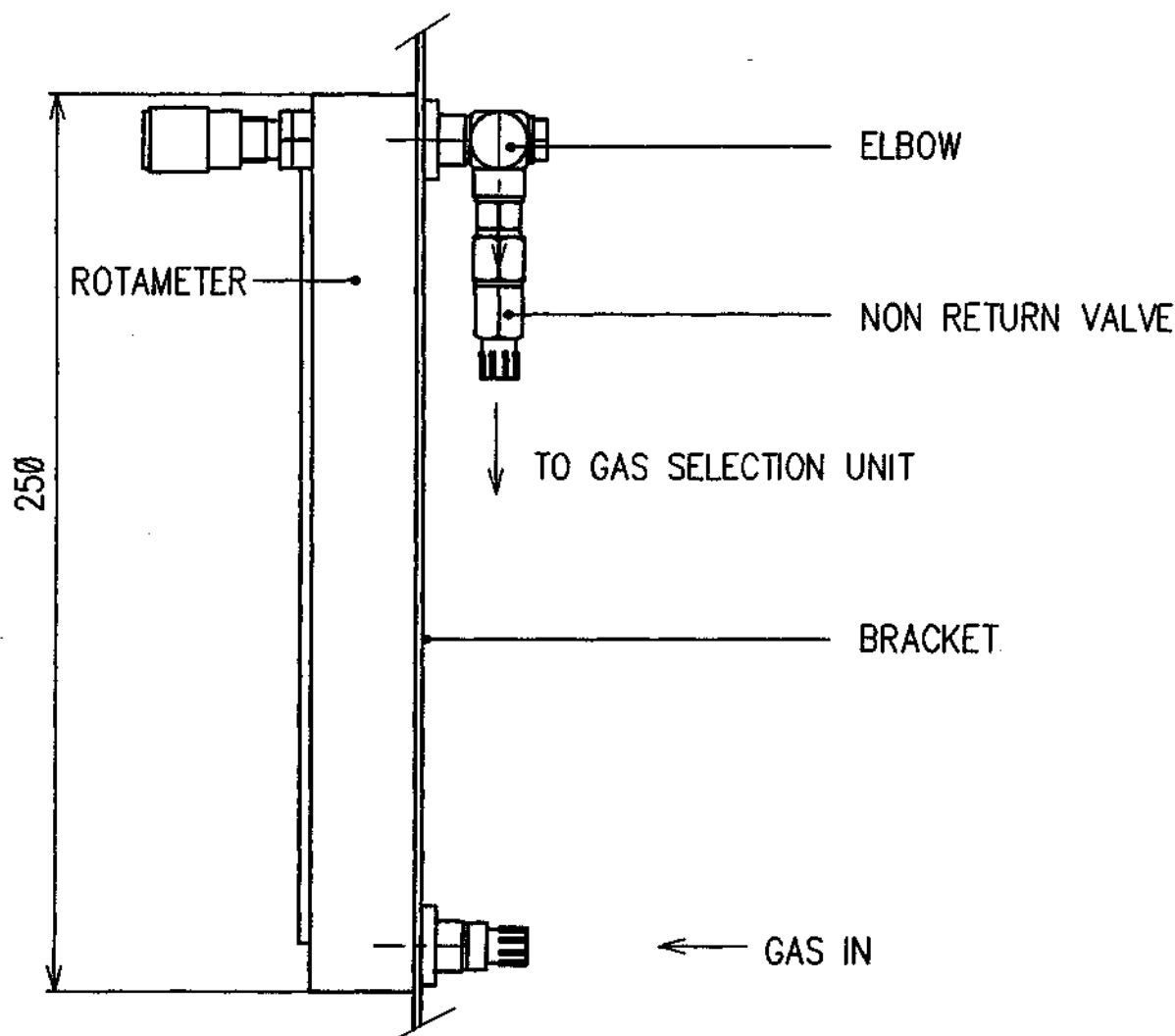
DIMENSIONS W x H x D : 400 mm x 630 mm x 370 mm

PROJECTION : DRAWING NAME : BIO CONSOLE BASIC 110-240V AD1035



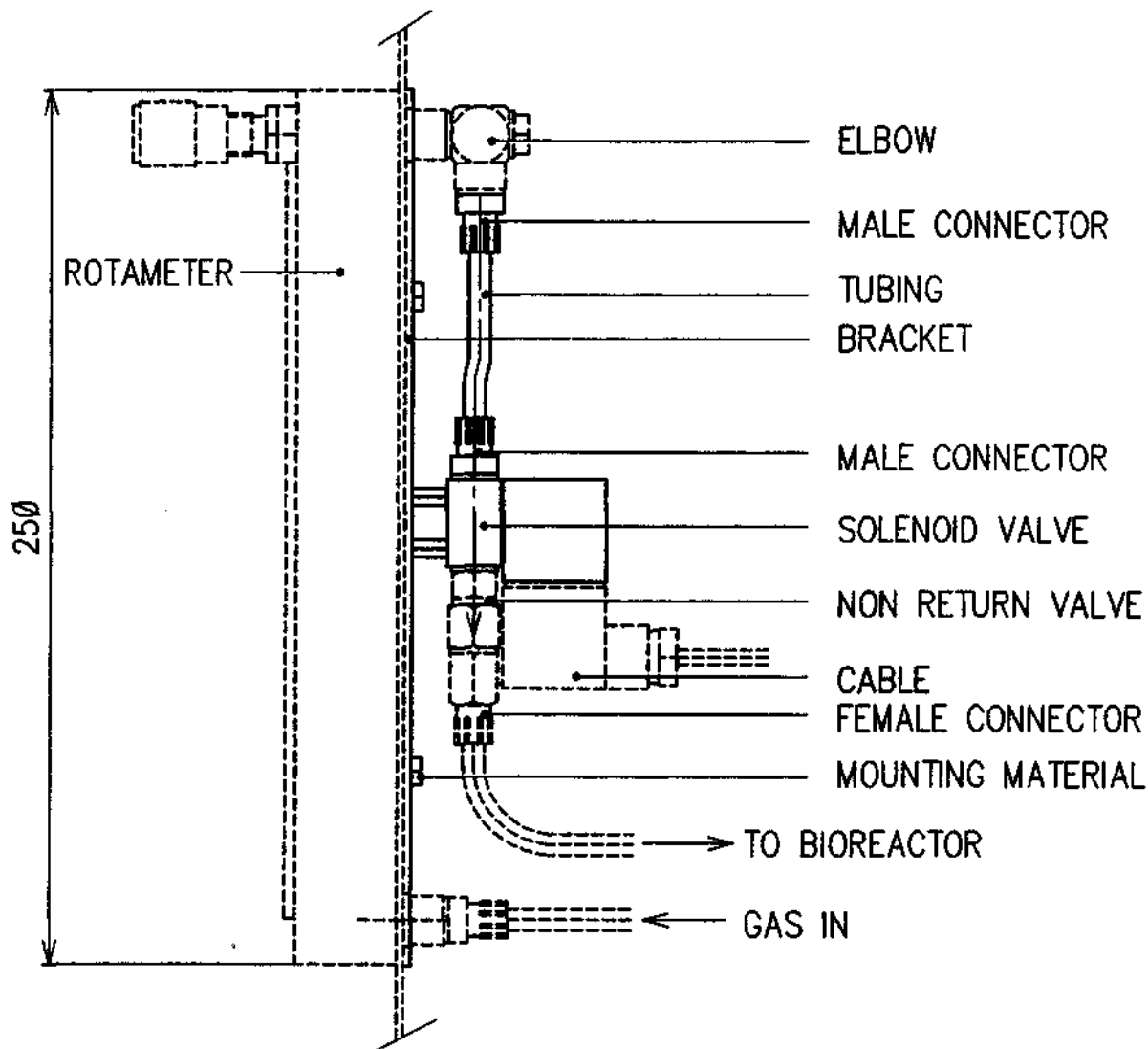
DEPENDABLE INSTRUMENTS

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No part of this drawing may be copied or reproduced in any form or by any means or transferred to any third party without the prior written consent of Applikon Dependable Instruments B.V.  
AD1 B.V. P.O. BOX 140 3180 AC SCHIEDAM HOLLAND (078)-280355 FAX (078)-437848  
PART NBR: Z310351010  
SCALE: NO SCALE  
DESIGNED: 10 JUN. 1997  
CHECKED: 10 JUN 1997  
DNR: DKO  
HMO  
APR: [Signature]  
DIMENSIONS ARE IN mm  
SHEET: 1 OF 1  
SIZE: A3



|                                      |            |
|--------------------------------------|------------|
| Rotameter ass. app. 2.5 - 25 ml/min. | Z3RM000005 |
| Rotameter ass. app. 5 - 50 ml/min.   | Z3RM000010 |
| Rotameter ass. app. 9 - 90 ml/min.   | Z3RM000020 |
| Rotameter ass. app. 27 - 270 ml/min. | Z3RM000030 |
| Rotameter ass. app. 50 - 500 ml/min. | Z3RM000040 |
| Rotameter ass. app. 0.1 - 1.1 l/min. | Z3RM000050 |
| Rotameter ass. app. 0.5 - 5 l/min.   | Z3RM000060 |
| Rotameter ass. app. 1.0 - 10 l/min.  | Z3RM000070 |
| Rotameter ass. app. 2.3 - 23 l/min.  | Z3RM000080 |
| Rotameter ass. app. 4.3 - 43 l/min.  | Z3RM000090 |
| Rotameter ass. app. 6.0 - 60 l/min.  | Z3RM000100 |

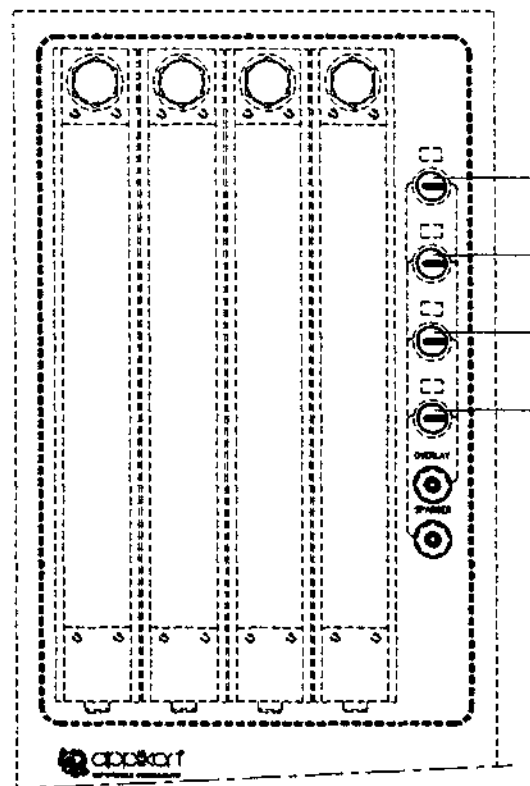
|                                                                                                                                                                                                                                            |       |                                   |                 |               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------|-----------------|---------------|
| b                                                                                                                                                                                                                                          | PVe   |                                   | 12 sep. 1996    | 12 sep.96 MVo |
| REV.                                                                                                                                                                                                                                       | DRAWN | REVISION                          | REVISION DATE   | CHECKED       |
| PROJECTION :                                                                                                                                                                                                                               |       | DRAWING NAME : ROTAMETER ASSEMBLY |                 |               |
| <b>applikon®</b><br>DEPENDABLE INSTRUMENTS                                                                                                                                                                                                 |       | PART NBR.:                        | SEE ABOVE       |               |
|                                                                                                                                                                                                                                            |       | SCALE :                           | 1 : 2           |               |
|                                                                                                                                                                                                                                            |       | DESIGNED :                        | 09 mar. 1992    | MVo           |
|                                                                                                                                                                                                                                            |       | CHECKED :                         | 09 mar. 1992    | MVo           |
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|                                                                                                                                                                                                                                            |       | APPR.                             |                 | SHEET: 1 OF 1 |
| A.D.I. B.V.  P.O. BOX 149 3100 AC SCHIEDAM HOLLAND  (31)10-4621855  FAX (31)10-4379648                                                                                                                                                     |       | DIMENSIONS ARE IN mm              | SIZE : A4       |               |



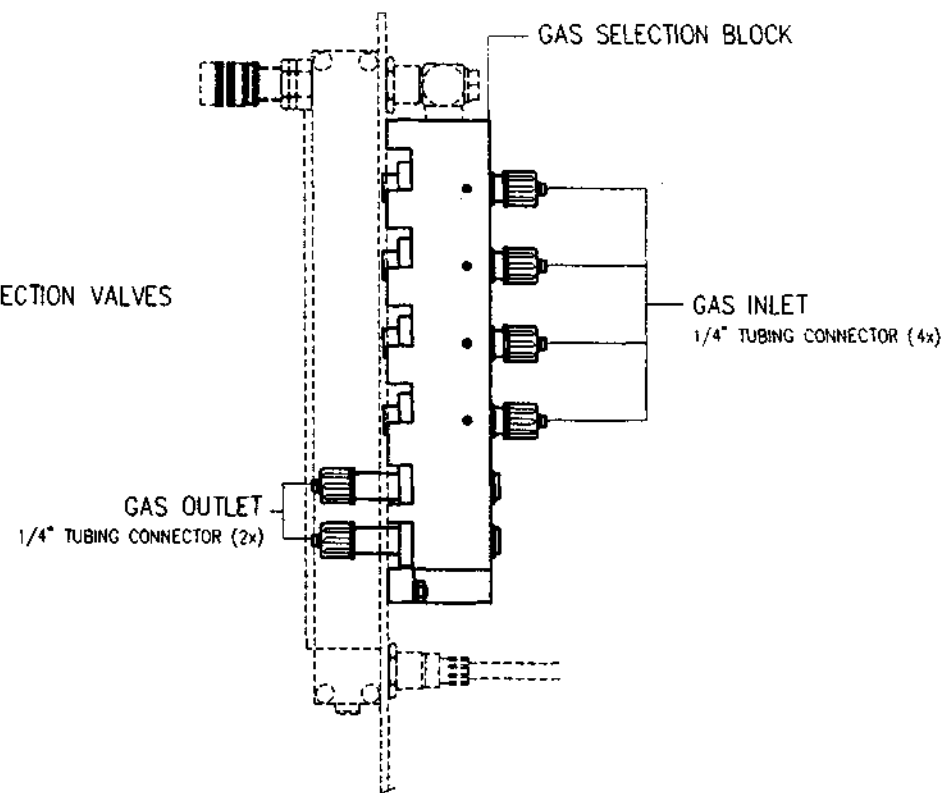
PLACE NON RETURN VALVE AND FEMALE CONNECTOR  
BELOW THE SOLENOID VALVE

|                                    |            |
|------------------------------------|------------|
| Valve rotameter Ø-23 l/min. 230Vac | Z311302040 |
| Valve rotameter Ø-23 l/min. 115Vac | Z311302045 |

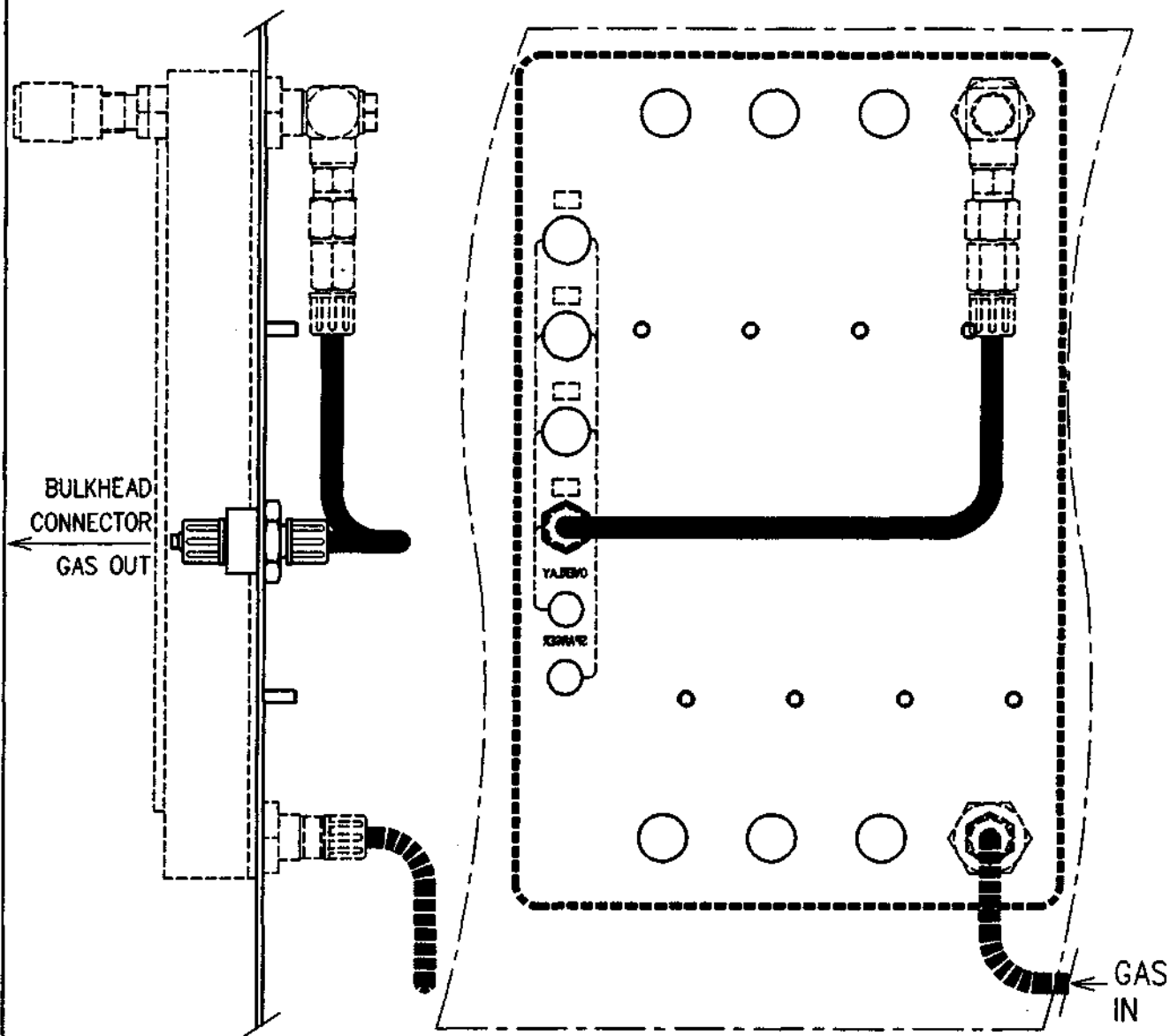
|                                                                                                                                                                                                                                            |       |                                    |                                |                      |        |               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------|--------------------------------|----------------------|--------|---------------|
| c                                                                                                                                                                                                                                          | PVe   |                                    | 12 sep. 1996                   | 12 sep.96 MVo        |        |               |
| REV.                                                                                                                                                                                                                                       | DRAWN | REVISION                           | REVISION DATE                  | CHECKED              |        |               |
| PROJECTION :                                                                                                                                                                                                                               |       | DRAWING NAME : VALVE FOR ROTAMETER |                                |                      |        |               |
|  <b>applikon®</b><br>DEPENDABLE INSTRUMENTS                                                                                                              |       | PART NBR.:                         | DRAWING NBR. : D1035-1c.12.020 |                      |        |               |
|                                                                                                                                                                                                                                            |       | SCALE :                            | 1 : 2                          |                      |        |               |
|                                                                                                                                                                                                                                            |       | DESIGNED :                         | 20 may 1992                    | MVo                  | APPR.: | SHEET: 1 OF 1 |
|                                                                                                                                                                                                                                            |       | CHECKED :                          | 20 may 1992                    | MVo                  |        |               |
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| A.D.I. B.V. P.O. BOX 149 3100 AC SCHEDAM HOLLAND (31)10-4621855 FAX (31)10-4379648                                                                                                                                                         |       |                                    |                                | SIZE : A4            |        |               |



GAS SELECTION VALVES

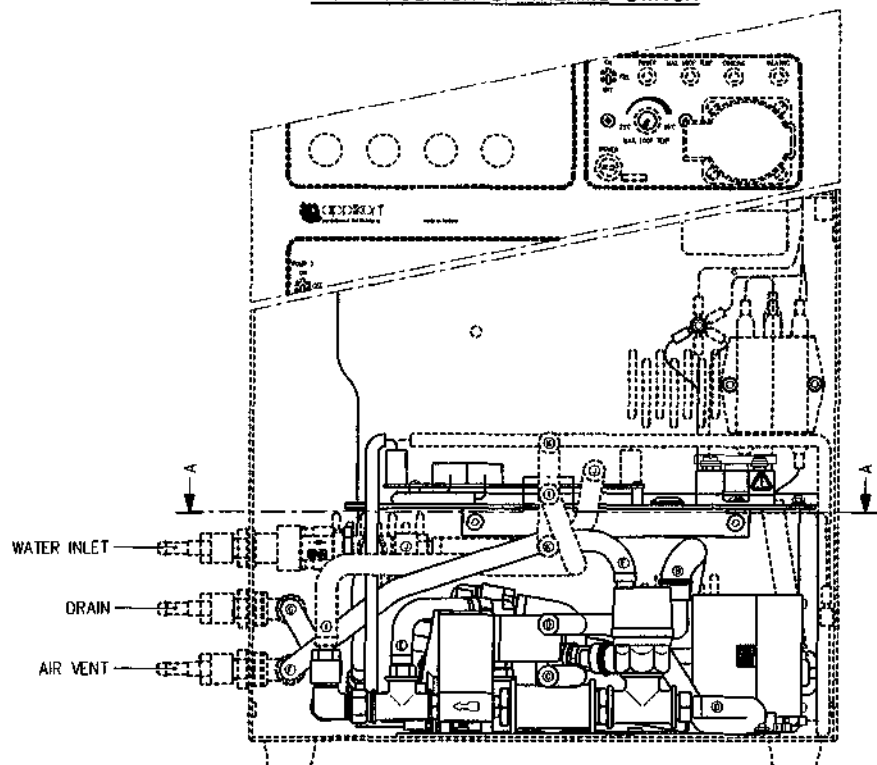


| POS.                                                                                                                                                                                                                                                                  | QTY | DESCRIPTION | MATERIAL OR TYPE                                                         | REMARKS                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------|
| BASIC GAS SELECTION BLOCK                                                                                                                                                                                                                                             |     |             |                                                                          | PROJ.  CHECKED                                                            |
| <b>applikon</b><br>DEPENDABLE INSTRUMENTS                                                                                                                                                                                                                             |     |             | PART NO.: 2311302020<br>SCALE:<br>DESIGN: PV<br>DATE: 16 12 1992<br>MOD: | DRAWING NO.: D1035-1 .12.202<br>SHEET 1 OF 1<br>DIMENSIONS IN mm FORM: A3 |
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| APPLIKON DEPENDABLE INSTRUMENTS BV SCHIEDAM-HOLLAND  P.O.B. 149  010 - 462 18 55  FAX 010 - 437 95 48                                                                                                                                                                 |     |             |                                                                          |                                                                           |



|                                                                                                                                                                                                                                            |       |                                                                                                                                        |              |                         |                                                                                       |               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------|---------------------------------------------------------------------------------------|---------------|
| a                                                                                                                                                                                                                                          | PVe   | PARTS LIST CHANGED.                                                                                                                    |              | 20 jun. 1994            | 21 jun.94 MVo                                                                         |               |
| REV.                                                                                                                                                                                                                                       | DRAWN | REVISION                                                                                                                               |              | REVISION DATE           | CHECKED                                                                               |               |
| PROJECTION :                                                                                                                                                                                                                               |       | DRAWING NAME :<br> GAS OUTLET BULKHEAD CONNECTOR SET |              |                         |                                                                                       |               |
|  applikon®<br>DEPENDABLE INSTRUMENTS                                                                                                                     |       | PART NBR.:                                                                                                                             | Z311302060   | DRAWING                 | D1035-1a.12.206                                                                       |               |
|                                                                                                                                                                                                                                            |       | SCALE :                                                                                                                                | 1 : 2        | NBR. :                  |                                                                                       |               |
|                                                                                                                                                                                                                                            |       | DESIGNED :                                                                                                                             | 21 jan. 1993 | PVe                     | APPR: MVo                                                                             | SHEET: 1 OF 1 |
|                                                                                                                                                                                                                                            |       | CHECKED :                                                                                                                              | 22 jan. 1993 | MVo                     |  |               |
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| A.D.I. B.V.                                                                                                                                                                                                                                |       | P.O. BOX 149 3100 AC SCHEDAM HOLLAND                                                                                                   |              | (31)10-4621855          | FAX (31)10-4379648                                                                    |               |
|                                                                                                                                                                                                                                            |       |                                                                                                                                        |              | SIZE :                  | A4                                                                                    |               |

SECTION B-B  
WITH POSITION OF THERMO SWITCH



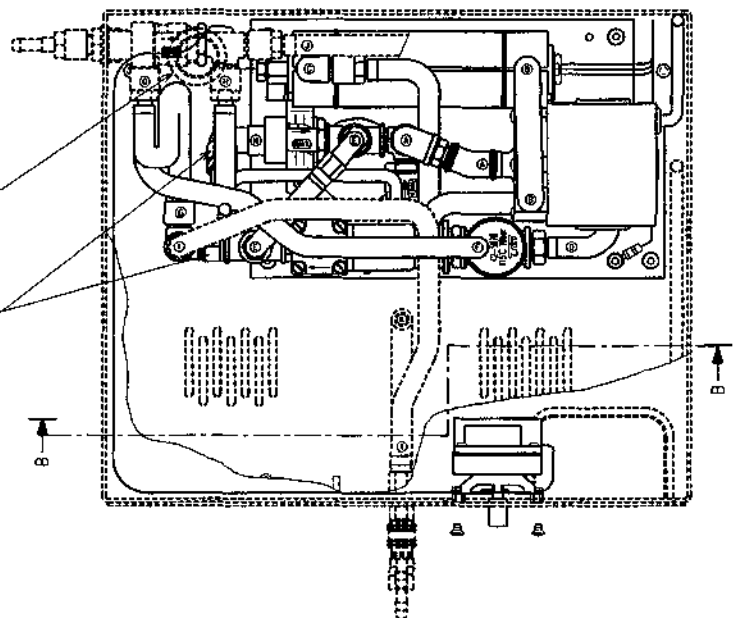
CONNECTIONS :

- A-A / INLET AD11018 - PUMP IN.
- B-B / PUMP OUT - HEATER IN.
- C-C / HEATER OUT - TO REACTOR.
- D-D / FROM REACTOR - AIR RELIEF VALVE.
- E-E / PRESSURE RELIEF VALVE - WATER OUT.
- F-F / AIR RELIEF VALVE - AIR RELIEF OUT.
- G-G / V-JUNCTION - DRAIN.
- H-H / WATER INLET - INLET AD11018.
- I-I / FROM CONDENSOR - V-JUNCTION.
- J-J / WATER INLET - TO CONDENSOR REGULATOR.
- K-K / FROM CONDENSOR REGULATOR - TO CONDENSOR.

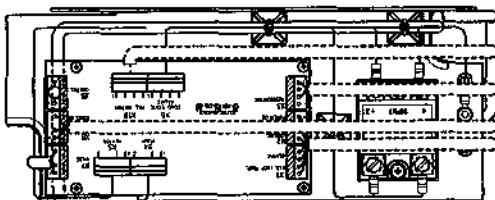
SECTION A-A  
WITH DETAIL OF THERMO SWITCH

POSITION OF PASSAGE  
THROUGH SEPARATION PLATE  
OF WIRE THERMOSTAT SWITCH.

ELBOW, V-DISTR. AND MALE  
ADAPTOR UNION COME WITH  
AD11035.  
APPLY OMNIFIT SEAL 50H WHEN  
INSTALLING THE MODULE.



DETAIL OF PROTECTION PLATE



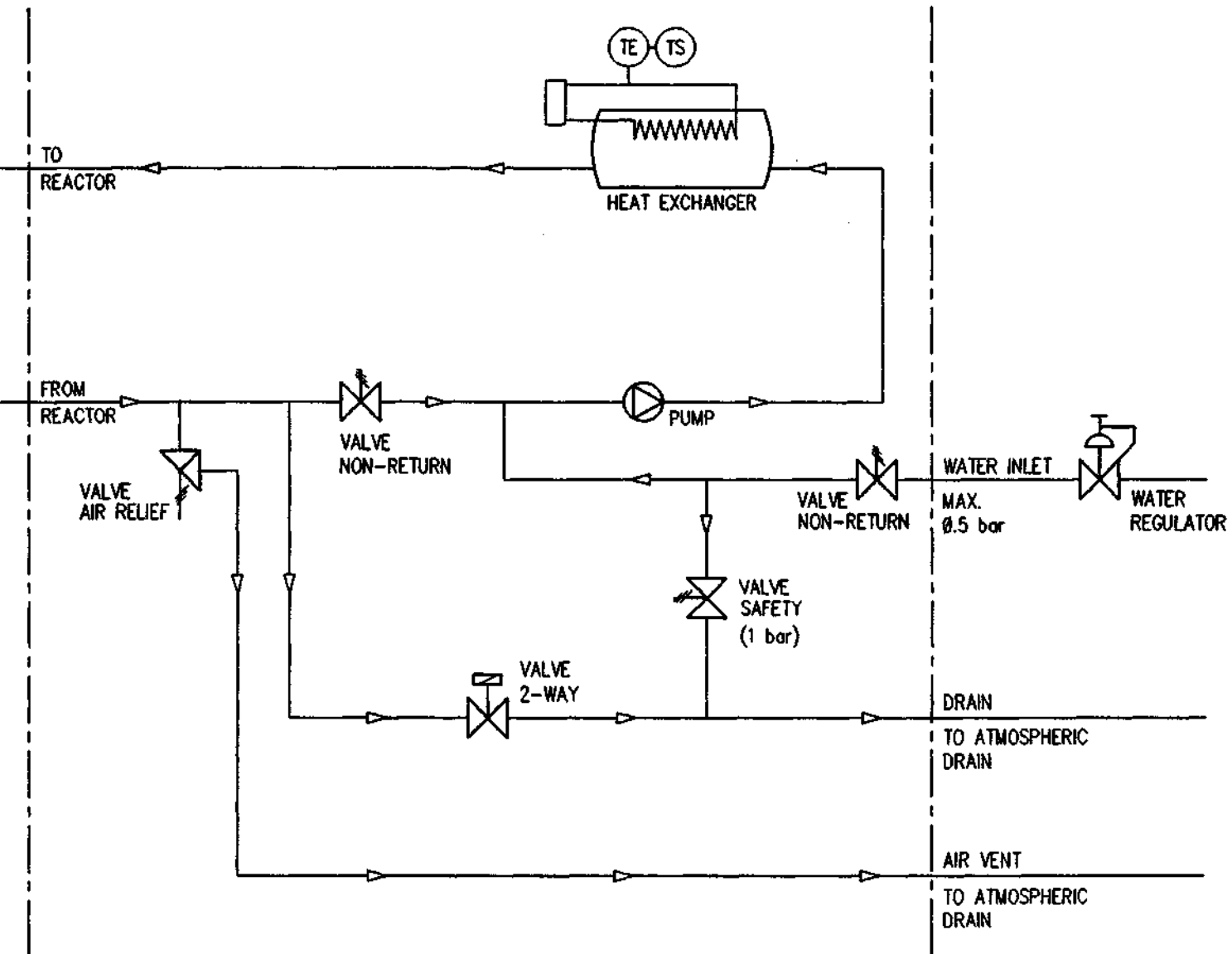
CONNECTIONS OF AD11035 WIRING TO AD11018 MODULE:

- X23 ON X8 MAINS IN
- X24 ON X10 "OFF/FILL/ON" SWITCH
- X25 ON X3 "THERMOSTATE" SWITCH
- X26 ON X9 CONTROL
- X27 ON X1 FOR "MAX. LOOP TEMP./HEATING" LEDS
- X28 ON X2 FOR "COOLING/POWER ON" LEDS
- X29 ON THERMO SWITCH : WH - 11  
BR - 12  
GN - 14

(X27 AND X28 ARE MOUNTED ON CENTRAL CONTROL BOARD AD11035)  
SWITCH S1 ON CENTRAL CONTROL BOARD AD11035 TO "THERM. CIRC."

| DESCRIPTION                                 | ART. NR.   |
|---------------------------------------------|------------|
| THERMO CIRCULATOR MODULE 110-120Voc AD11035 | Z310180040 |
| THERMO CIRCULATOR MODULE 220-240Voc AD11035 | Z310180030 |

|                                                                                                                                                                                                                                                            |              |                                      |            |                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------|------------|-------------------------------------------|
| REV. 1                                                                                                                                                                                                                                                     | DESIGN       | 27 nov. 1995                         | 27 nov. 95 | RC1                                       |
| PRODUCTION                                                                                                                                                                                                                                                 | DRAWING NAME | THERM.CIRC.MODULE 110-240Voc AD11035 |            |                                           |
| REVIEW MOD.                                                                                                                                                                                                                                                | PART NBR.    | SEE SHEET                            | DRAWING    |                                           |
|                                                                                                                                                                                                                                                            | SCALE        | 1 : 2                                | NBR.       | D1018-2c.12.003                           |
|                                                                                                                                                                                                                                                            | DESIGNED     | 12 oct. 1993                         | PVe        | APPR.                                     |
|                                                                                                                                                                                                                                                            | CHECKED      | 13 oct. 1993                         | MVo        |                                           |
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| <small>A.D.I. B.V. P.O. BOX 140 3900 AC SCHIEDAM HOLLAND (31)10-4521055 FAX (31)10-4370040</small>                                                                                                                                                         |              |                                      |            | <small>SZL : A2</small>                   |



LEGEND : (TE) THERMO ELEMENT (TS) THERMO SWITCH

P&ID FOR THERMO CIRCULATOR AD11018 (Z310180040 AND Z310180030)

|              |                                                     |          |              |                |         |
|--------------|-----------------------------------------------------|----------|--------------|----------------|---------|
| REV. C       | DRW. RHU                                            | REVISION | 27 nov. 1995 | 27 nov. 95 RCI | CHECKED |
| PROJECTION : | DRAWING NAME : THERM.CIRC.MODULE 110-240Vdc AD11035 |          |              |                |         |



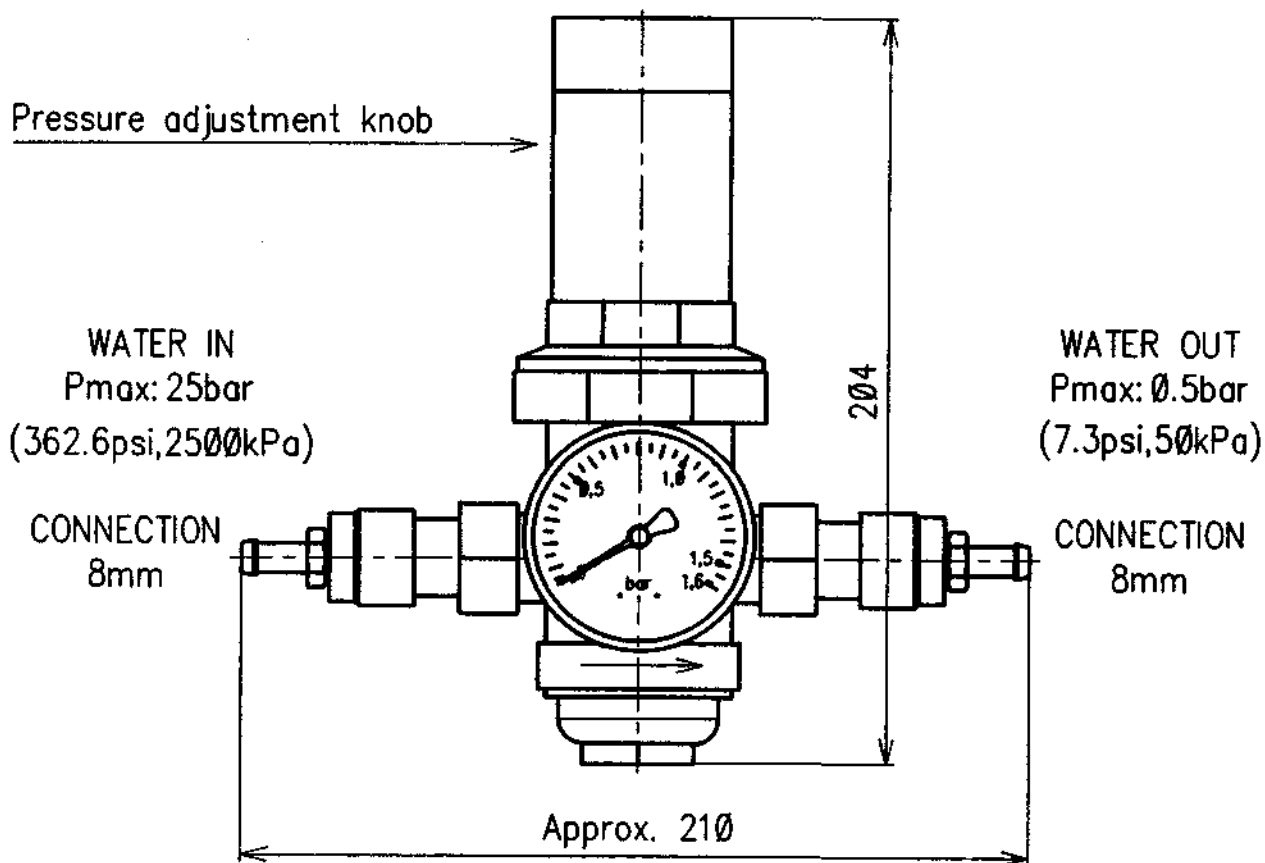
|                         |                                |
|-------------------------|--------------------------------|
| PART NBR. : SEE SHEET   | DRAWING NBR. : D1018-2c.12.003 |
| SCALE :                 | APPR. :                        |
| DESIGNED : 12 oct. 1993 | PVE                            |
| CHECKED : 13 oct. 1993  | MVO                            |
|                         | SHEET: 2 OF 2                  |

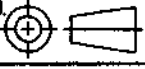
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DIMENSIONS ARE IN mm

AD1 B.V. ☒ P.O. BOX 149 3100 AC SCHIEDAM HOLLAND (31)10-4621855 FAX (31)10-4379648

SIZE : A4



| POS.                                                                                                                                       | QTY. | DESCRIPTION | MATERIAL OR TYPE | REMARKS                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------|------|-------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WATER PRESS. REDUCER FOR ADI1018                                                                                                           |      |             |                  | PROJ.  CHECKED:  |
|  <b>applikon</b> <sup>®</sup><br>DEPENDABLE INSTRUMENTS |      | PART NO. :  | Z310180050       | DRAWING NO.:                                                                                                                                                                               |
|                                                                                                                                            |      | SCALE :     | 1 : 2            | D1018-1a.12.005                                                                                                                                                                            |
|                                                                                                                                            |      | DESIGN. :   | MVo              |                                                                                                                                                                                            |
|                                                                                                                                            |      | DATE :      | 18 - 02 - 1994   | SHEET : 1 OF 1                                                                                                                                                                             |
|                                                                                                                                            |      | MOD. :      | a 11 04 94       | DIMENSIONS IN mm FORM: A4                                                                                                                                                                  |

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APPLIKON DEPENDABLE INSTRUMENTS BV SCHIEDAM-HOLLAND



P.O.B. 149



010 - 462 18 55

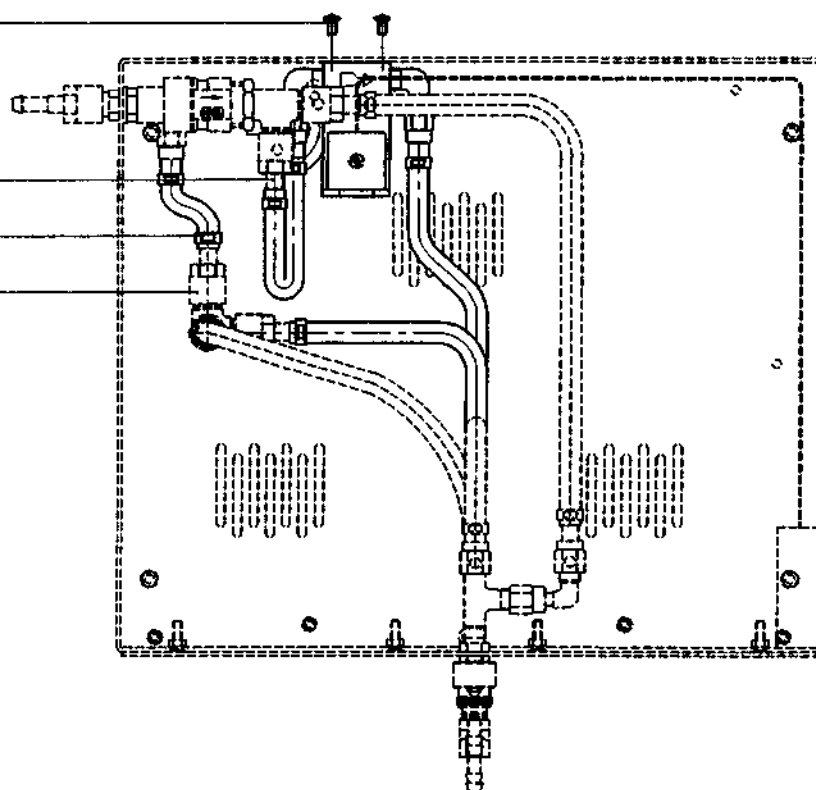
FAX 010 - 437 96 48

MOUNTING SCREW M4x8 (4x)

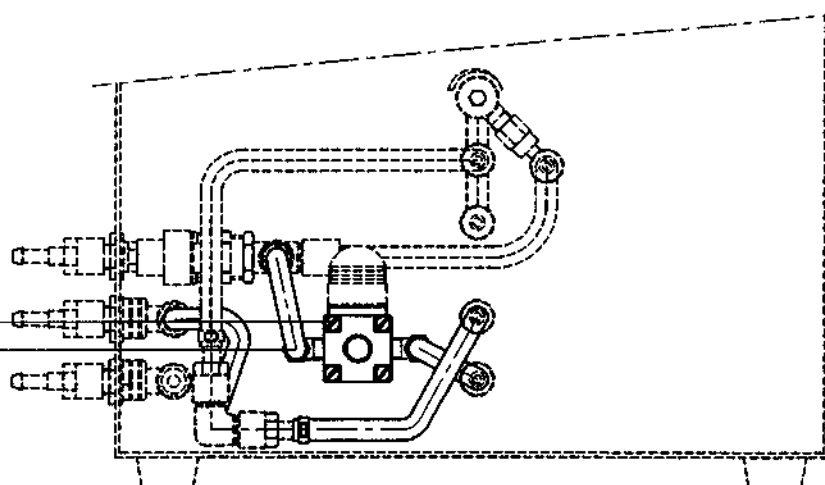
HOSE CONNECTOR O.D.6

HOSE CLAMP

V-DISTRIBUTOR UNION



VALVE  
ELBOW

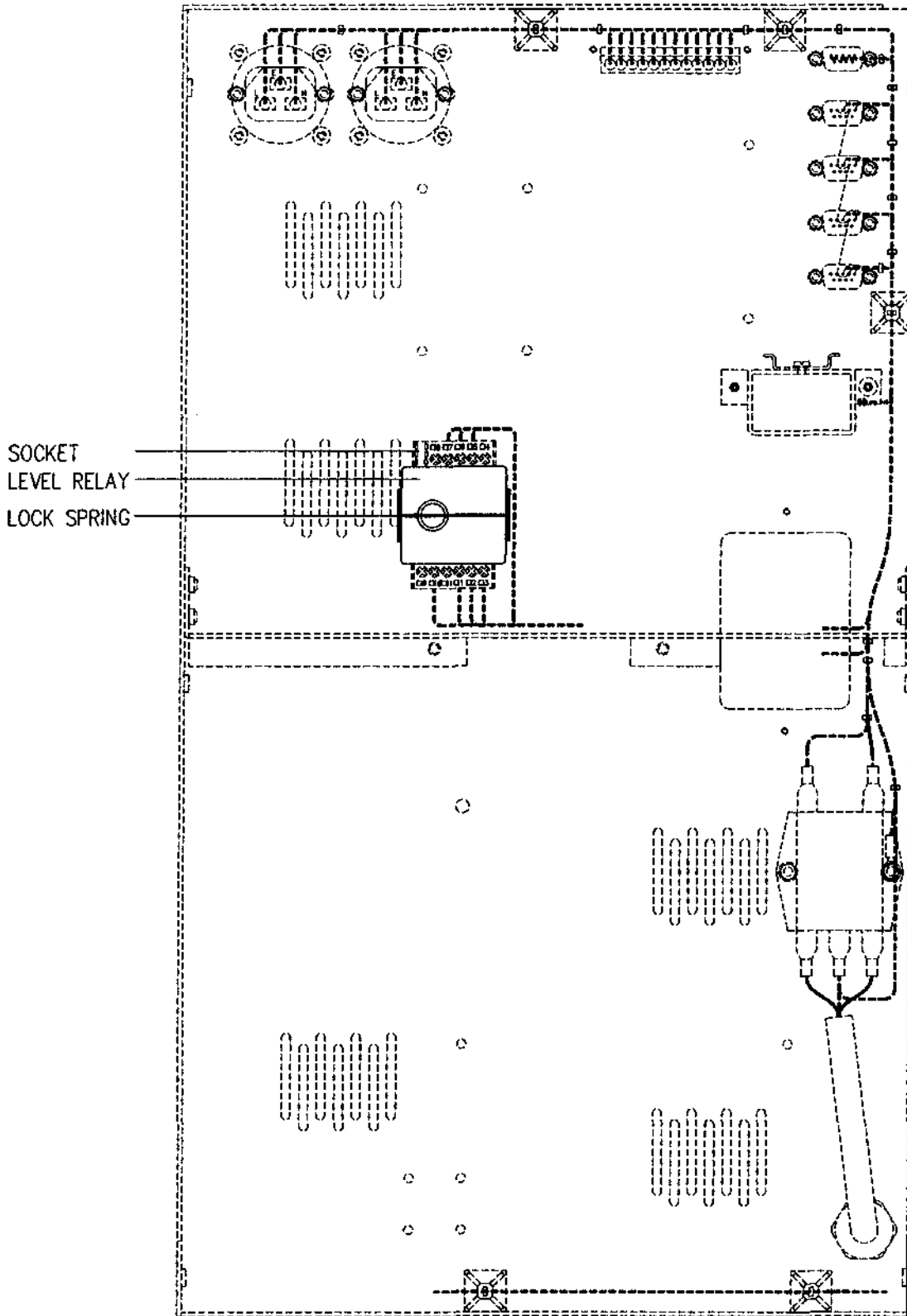


(FRONT PLATE IS REMOVED)

| DESCRIPTION                          | ART. NR.   |
|--------------------------------------|------------|
| COLD WATER VALVE MOD. 115Vac ADI1035 | Z310180070 |
| COLD WATER VALVE MOD. 230Vac ADI1035 | Z310180060 |

|                                                                                                                                                                                                                                                            |       |                                                    |              |               |                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------|--------------|---------------|----------------------|
| c                                                                                                                                                                                                                                                          | PVe   | 15 nov. 1994                                       |              | 15 nov.94 MVo |                      |
| REV.                                                                                                                                                                                                                                                       | DRAWN | REVISION                                           |              | REVISION DATE |                      |
| PROJECTION :                                                                                                                                                                                                                                               |       | DRAWING NAME : COLD WATER VALVE 115/230Vac ADI1035 |              |               |                      |
|  <b>applikon®</b><br>DEPENDABLE INSTRUMENTS                                                                                                                             |       | PART NBR.:                                         | ON SHEET     |               | DRAWING              |
|                                                                                                                                                                                                                                                            |       | SCALE :                                            | 1 : 2.5      |               | NBR. :               |
|                                                                                                                                                                                                                                                            |       | DESIGNED :                                         | 11 dec. 1992 | MVo           | APPR.:               |
|                                                                                                                                                                                                                                                            |       | CHECKED :                                          | 11 dec. 1992 | MVo           |                      |
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| <small>A.D.J. B.V. P.O. BOX 149 3100 AC SCHEDAM HOLLAND (31)10-4621855 FAX (31)10-4379648</small>                                                                                                                                                          |       |                                                    |              |               | SIZE : A3            |

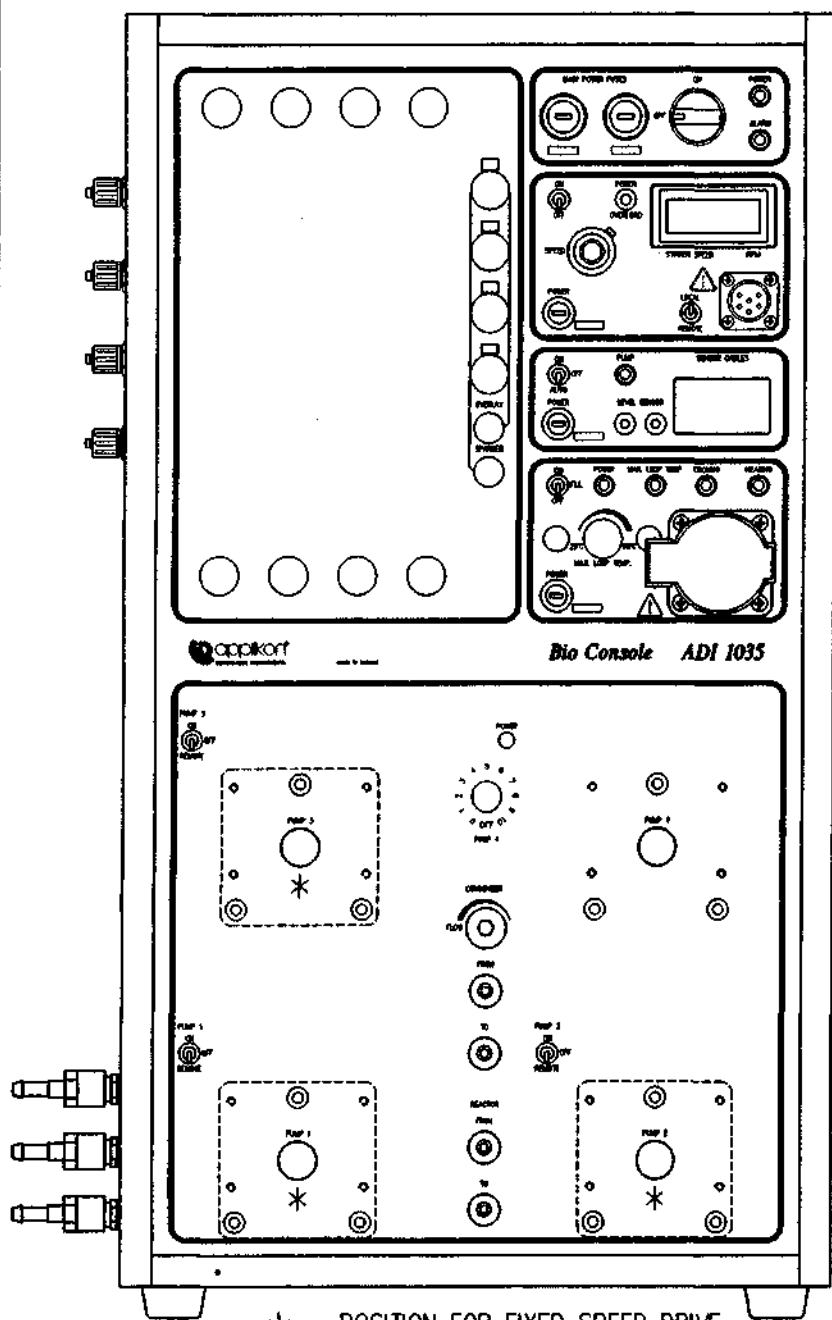
# INNER VIEW REAR PLATE



|                                |            |
|--------------------------------|------------|
| LEVEL CONTROL 220-240V AD11035 | Z510203095 |
| LEVEL CONTROL 110-120V AD11035 | Z510203096 |

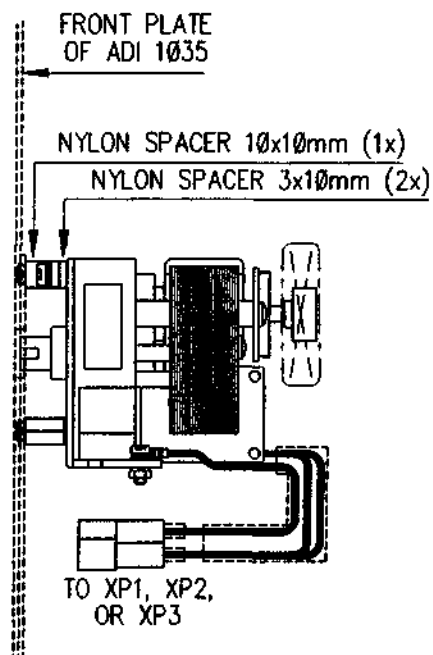
|                                                                                                                                                                                                                                                            |       |                                               |                                |                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------|--------------------------------|-------------------------------------|
| b                                                                                                                                                                                                                                                          | RHu   | RELAY CHANGED.                                | 31 aug. 1995                   | 31 aug. 95 RCI                      |
| REV.                                                                                                                                                                                                                                                       | DRAWN | REVISION                                      | REVISION DATE                  | CHECKED                             |
| PROJECTION :                                                                                                                                                                                                                                               |       | DRAWING NAME : LEVEL CONTROL 110-240V AD11035 |                                |                                     |
|  <b>applikon</b><br>DEPENDABLE INSTRUMENTS                                                                                                                              |       | PART NBR. :                                   | DRAWING NBR. : D1020-1b.12.309 |                                     |
| SCALE : 1 : 2                                                                                                                                                                                                                                              |       | DESIGNED : 27 jan. 1993                       | RHu                            | APPR. :                             |
| CHECKED : 27 jan. 1993                                                                                                                                                                                                                                     |       | RCI                                           |                                | SHEET: 1 OF 1                       |
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| <small>A.D.I. B.V. P.O. BOX 149 3100 AC SCHIEDAM HOLLAND (31)10-4621855 FAX (31)10-4379648</small>                                                                                                                                                         |       |                                               |                                | <small>SIZE : A3</small>            |

# FRONT VIEW



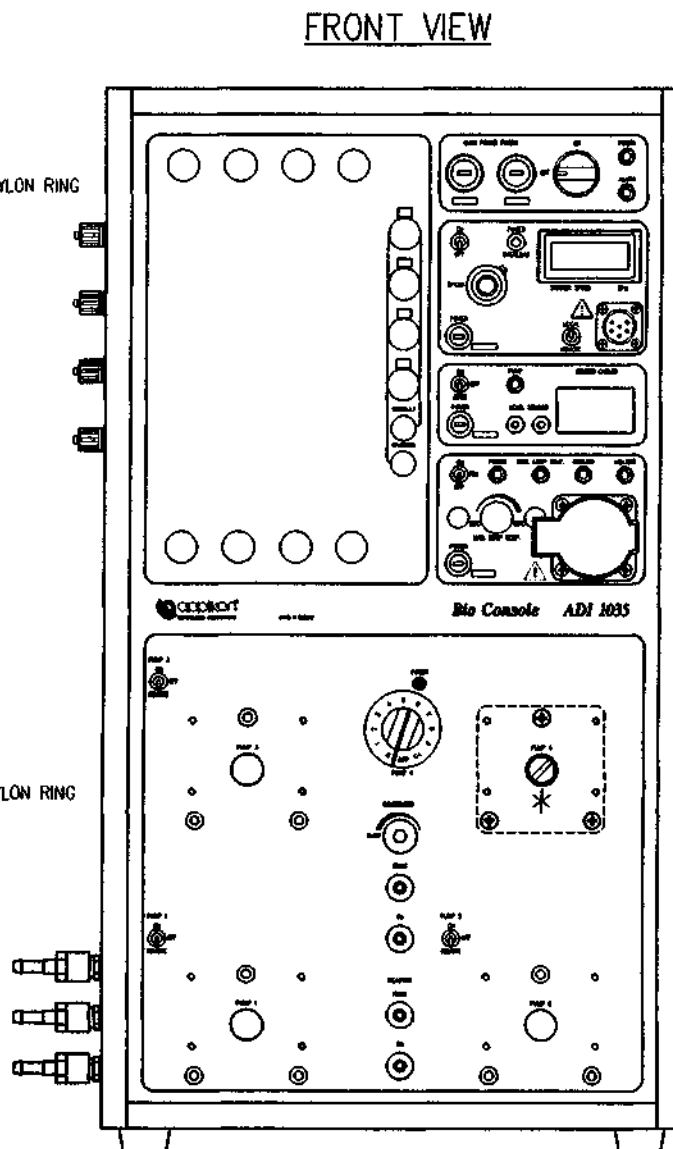
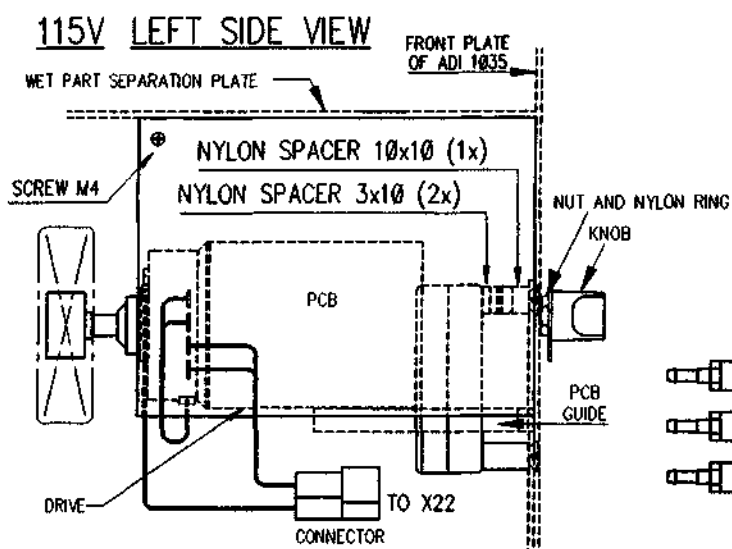
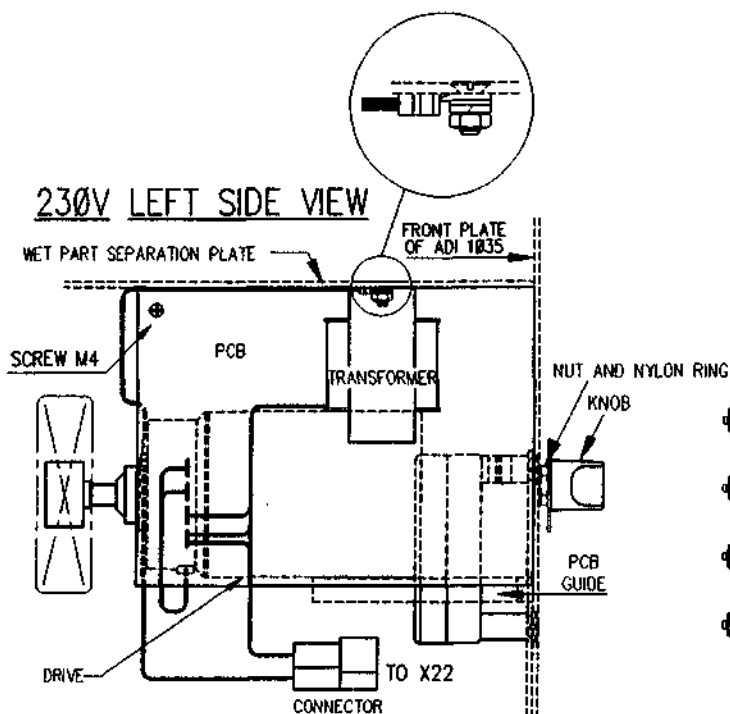
\* = POSITION FOR FIXED SPEED DRIVE

# RIGHT SIDE VIEW



|            |                              |
|------------|------------------------------|
| Z311500010 | FIXED SPEED DRIVE 5RPM 230V  |
| Z311500011 | FIXED SPEED DRIVE 6RPM 115V  |
| Z311500020 | FIXED SPEED DRIVE 17RPM 230V |
| Z311500021 | FIXED SPEED DRIVE 20RPM 115V |

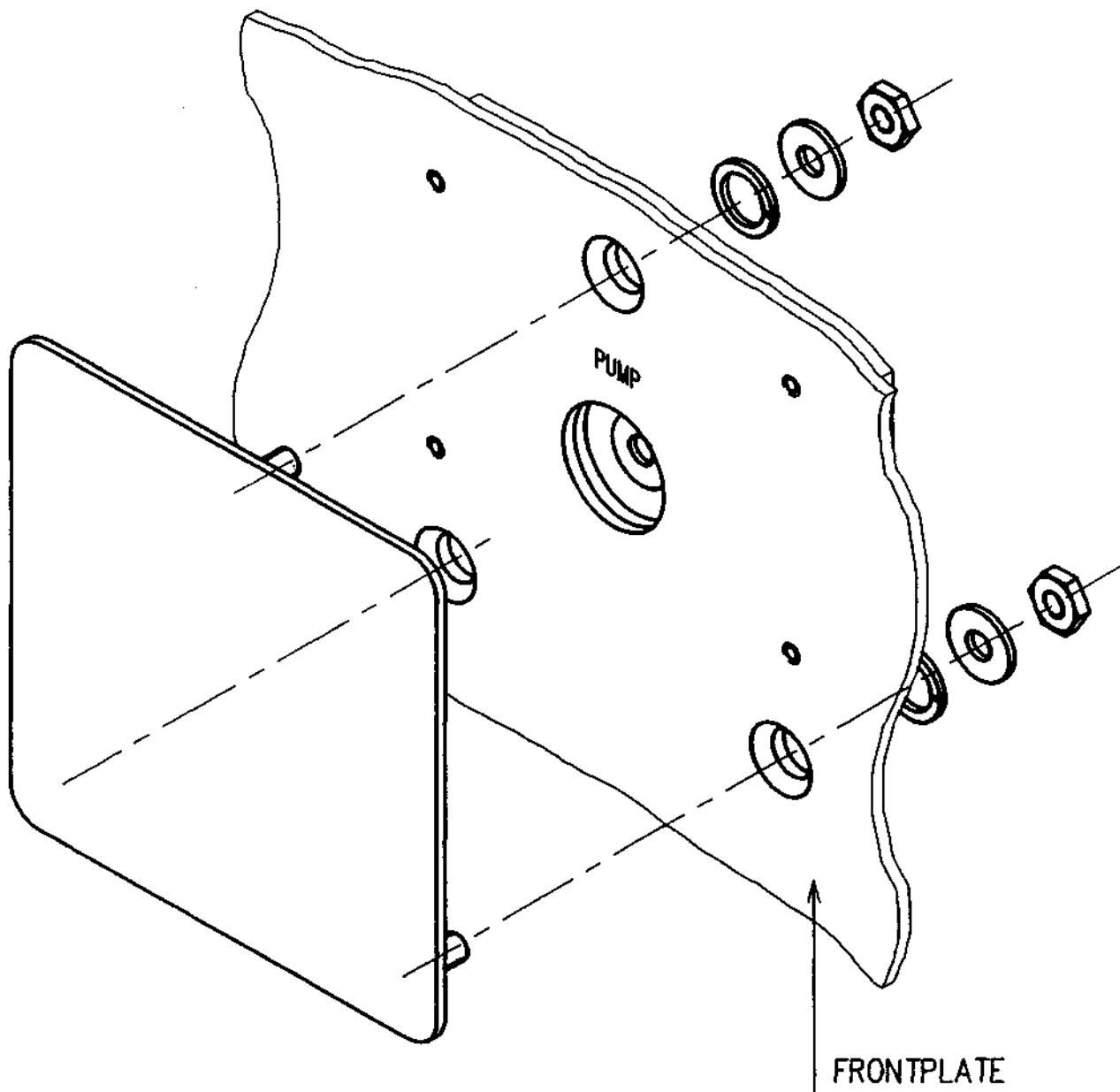
|                                                                                                                                                                                                                                            |       |                                                |                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------|--------------------------------|
| e                                                                                                                                                                                                                                          | DKo   | 23 jan. 1997                                   | 23 jan. 97 HMa                 |
| REV.                                                                                                                                                                                                                                       | DRAWN | REVISION                                       | CHECKED                        |
| PROJECTION :                                                                                                                                                                                                                               |       | DRAWING NAME : FIXED SP. DRIVE 5/20RPM ADI1035 |                                |
| <b>applikon®</b><br>DEPENDABLE INSTRUMENTS                                                                                                                                                                                                 |       | PART NBR.:                                     | DRAWING NBR. : D1035-1e.12.110 |
|                                                                                                                                                                                                                                            |       | SCALE : 1 : 2                                  |                                |
| DESIGNED : 14 oct. 1992                                                                                                                                                                                                                    |       | AvS                                            | SHEET: 1 OF 1                  |
| CHECKED : 14 oct. 1992                                                                                                                                                                                                                     |       | RCI                                            |                                |
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| A.D.I. B.V. P.O. BOX 149 3100 AC SCHEDAM HOLLAND (31)10-4621855 FAX (31)10-4379648                                                                                                                                                         |       |                                                | SIZE : A3                      |

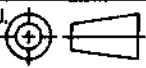


\* = POSITION FOR VAR. SPEED DRIVE

|            |                               |
|------------|-------------------------------|
| Z311600010 | VAR. SP. DRIVE 10-120RPM 230V |
| Z311600011 | VAR. SP. DRIVE 10-120RPM 115V |

|                                                                                                                                                                                                                                            |                                                 |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|--------------------------------------|
| d DKo                                                                                                                                                                                                                                      | 23 jan. 1997                                    | 23 jan. 97 HMa                       |
| REV. DRAWN                                                                                                                                                                                                                                 | REVISION                                        | CHECKED                              |
| PROJECTION :                                                                                                                                                                                                                               | DRAWING NAME : VAR. SP. DRIVE 10-120RPM ADI1035 |                                      |
| <br><b>applikon</b><br>DEPENDABLE INSTRUMENTS                                                                                                                                                                                              | PART NBR.:                                      | DRAWING NBR. : D1035-1d.12.220       |
|                                                                                                                                                                                                                                            | SCALE : 1 : 2                                   |                                      |
|                                                                                                                                                                                                                                            | DESIGNED : 14 oct. 1992                         | MVo                                  |
|                                                                                                                                                                                                                                            | CHECKED : 14 oct. 1992                          | RCI                                  |
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| A.D.I. B.V. P.O. BOX 149 3100 AC SCHIEDAM HOLLAND (31)10-4621855 FAX (31)10-4379648                                                                                                                                                        |                                                 | SIZE : A3                            |



| POS.                                                                                                                                       | QTY. | DESCRIPTION | MATERIAL OR TYPE | REMARKS                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------|------|-------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BLINDPLATE PUMP POSITION ADI1035                                                                                                           |      |             |                  | PROJ.  CHECKED  |
|  <b>applikon</b> <sup>®</sup><br>DEPENDABLE INSTRUMENTS |      | PART NO. :  | Z311500005       | DRAWING NO.:                                                                                                                                                                              |
|                                                                                                                                            |      | SCALE :     | .                | D1035-1 .12.000                                                                                                                                                                           |
|                                                                                                                                            |      | DESIGN. :   | PV               | SHEET : 1 OF 1                                                                                                                                                                            |
|                                                                                                                                            |      | DATE :      | 16-12-1992       | DIMENSIONS IN mm FORM: A4                                                                                                                                                                 |
|                                                                                                                                            |      | MOD. :      | .                |                                                                                                                                                                                           |

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APPLIKON DEPENDABLE INSTRUMENTS BV SCHIEDAM-HOLLAND



P.O.B. 149



010 - 462 18 55

FAX 010 - 437 96 48

# Description of Bioconsole 1035 and Biocontroller 1030 controller commissioning.

Connect all wiring , water supply and water drain and all gas supply lines. Then proceed as mentioned below.

- 1 Ensure 4 medical gas supplies of Air, N2, O2 and CO2 are present. 4 valves on wall must be opened. *S*
- 2 Ensure 4 medical gasses are present at pressure regulating box. Output pressure must be set to 0.5 Bar. See various manometers. *S*
- 3 All four gasses must enter the 1035 bioconsole at their designed entrances. Verify the identity of the gasses. *S*
- 4 Connect water with a pressure of 0.5 Bar to the water inlet on the side of the Bioconsole 1035. Make sure the valve under the table is opened. Tighten all waterconnections very well. *S*
- 5 Connect the water drain to the side of the Bioconsole 1035. *S*
- 6 Connect the 1030 controller to the 1035 controller with four cables *S*
  - 6.1 The green 230V connector with 9 core wire. *S*
  - 6.2 The 230V mains connector from "power switched " 1035 to The central point at the rear of the 1030 controller unit. *S*
  - 6.3 The Analoge signal wiring from the top analogue output to the 1035 bioconsole stirrer input. 4..20mA *S*
  - 6.4 The analogue signal wiring from the bottom analogue output to the 1035 bioconsole MFC2 input. 4..20 mA *S*
- 7 Connect the 230 V of the 1035 Bioconsole and the 230V of the 1030 controller to the output of a dedicated Ups. *S*
- 8 Connect the 1030 controller to the MFCS server. *S*
- 9 Configure the MFCS server. *CONF - F4 - SERIAL F2 - INTERFACES*  
MFCS-configuration menu *F1 - RS232*

| Com | Description | Protocol NT | Protocol Device | Network identity | Baud rate | parity | Data bits | stop bits |
|-----|-------------|-------------|-----------------|------------------|-----------|--------|-----------|-----------|
| 1   | Defective   | -           | -               | -                | -         | -      | -         | -         |
| 2   | PK-2900     | RS232       | RS232           | 2                | 9600      | Even   | 7         | 1         |
| 3   | IFX box     | RS232       | RS422           | 1,4,5,6,7        | 9600      | Even   | 7         | 1         |
| 4   | PK-0600     | RS232       | RS232           | 3                | 9600      | Even   | 7         | 1         |

*F2*

Run-Operations-Group-Select controller-Verify that all online parameters are active.

10 Verifying electrical connections:

10.1 Press Main menu 1030

10.2 Press Utility

10.3 Press Verify

10.4 Press output

10.5 Press Analogue

10.6 Select out put 1

10.7 Select Edit and give setpoint 0% and setpoint 100%

10.8 Upper analogue output 1 of ADI1030 must now change from 4 to 20 mA. Verify with external multimeter.

|                   |       |      |
|-------------------|-------|------|
| High value=... mA | 20.00 | 100% |
|                   | 12.00 | 50%  |
| Low Value=....mA  | 4.01  | 0%   |

10.9 Select out put 2

10.10 Select Edit and give setpoint 0% and setpoint 100%

10.11 Lower analogue output 12 of ADI1030 must now change from

10.12 4 to 20 mA. Verify with external multimeter.

|                   |       |      |
|-------------------|-------|------|
| High value=... mA | 20.00 | 100% |
|                   | 12.00 | 50%  |
| Low Value=....mA  | 4.01  | 0%   |

10.13 Press Main menu 1030

10.14 Press Utility

10.15 Press Verify

10.16 Press output

10.17 Press Digital P

Select out put 1 P

10.18 Switch on main switch of Bioconsole 1035. P

10.19 Switch on main switch of Bioconsole stirrer controller. P

10.20 Set switch of stirrer controller to local and verify that external motor can range in speed from 0 to 1200 rpm. P

Low ....rpm. 0

High ....rpm 1247 P

10.21 Set switch of stirrer controller to remote. P

10.22 Switch on and of output with F5 on the biostat controller 1030.

10.23 Test the following inputs

10.22.1 Output 1 Pump 1. Set pumpswitch to remote. P

10.22.2 Output 2 Pump 2. Set pumpswitch to remote. P

10.22.3 Output 3 Pump 3. Set pumpswitch to remote. P

Leave overlay (headspace) and sparger outputs on front Biostat console 1035 unobstructed. P

10.22.4 Output 6 O2 valve. The indicator ball moves up to .....ml/min 25

10.22.5 Output 7 CO2 valve. The indicator ball moves up to .....ml/min 20

Connect transparent tubing to reactor to and from connections and switch heating circuitry to fill until no airbubbles are visible within the external tube.

10.22.6 Output 8 Heating of vessel.  
Does the reactor tube heat up and does the temperature cut out activate? P

10.22.7 Output 9 Cooling of vessel  
Does the reactor tube cool down? P

# 11-assigning the analogue outputs:

Main menu-Config F4-Setup F1-Manual F5-Delete analogue 1 F4 -  
Delete Analogue 2 F4-Define F5-Analogue 1-Agitation F1-Edit F5-Max  
value 1200 rpm-Next F1-Low limit 0.00 rpm-Edit F5-High limit 1200.

Arrow up-Select analogue Output 2 F1-Define F5-Flowrate F2 ml/min F1  
-Next-Next-Edit F5-High limit 10.00 ml/min- Previous F2-Previous F2  
-Max value=10 ml/min

## Details of the fermentor controllers involved:

| Type    | Manufacturer | Serial no. | Alias   | Network ID | Version | Config | O2 mass flow | Display |
|---------|--------------|------------|---------|------------|---------|--------|--------------|---------|
| 8840326 | B.Braun      | 03276/00   | PM-3370 | 1          | 4.40    | BC70   | 0-200ml/min  | %       |
| AD11030 | Applikon     | P05260/34  | PK-2900 | 2          |         |        | 0-10ml/min   |         |
| AD11030 | Applikon     | P11328/77  | PK-0600 | 3          |         |        | 0-10ml/min   |         |
| 8840326 | B.Braun      | 04291/01   | PM-3600 | 4          | 4.43    | BC73   | 0-25ml/min   | Min/min |
| 8840326 | B.Braun      | 04310/01   | PM-3750 | 5          | 4.43    | BC73   | 0-25ml/min   | Min/min |
| 8840326 | B.Braun      | 4359       | PM4300  | 6          | 4.43    | BA82   | 0-150mln/min | Ccm     |
| 8840326 | B.Braun      | 4393       | PM4100  | 7          | 4.43    | BA82   | 0-150mln/min | Ccm     |
| AD11030 | Applikon     | P14571/20  | Karel   | 8          |         |        | 0-10ml/min   |         |