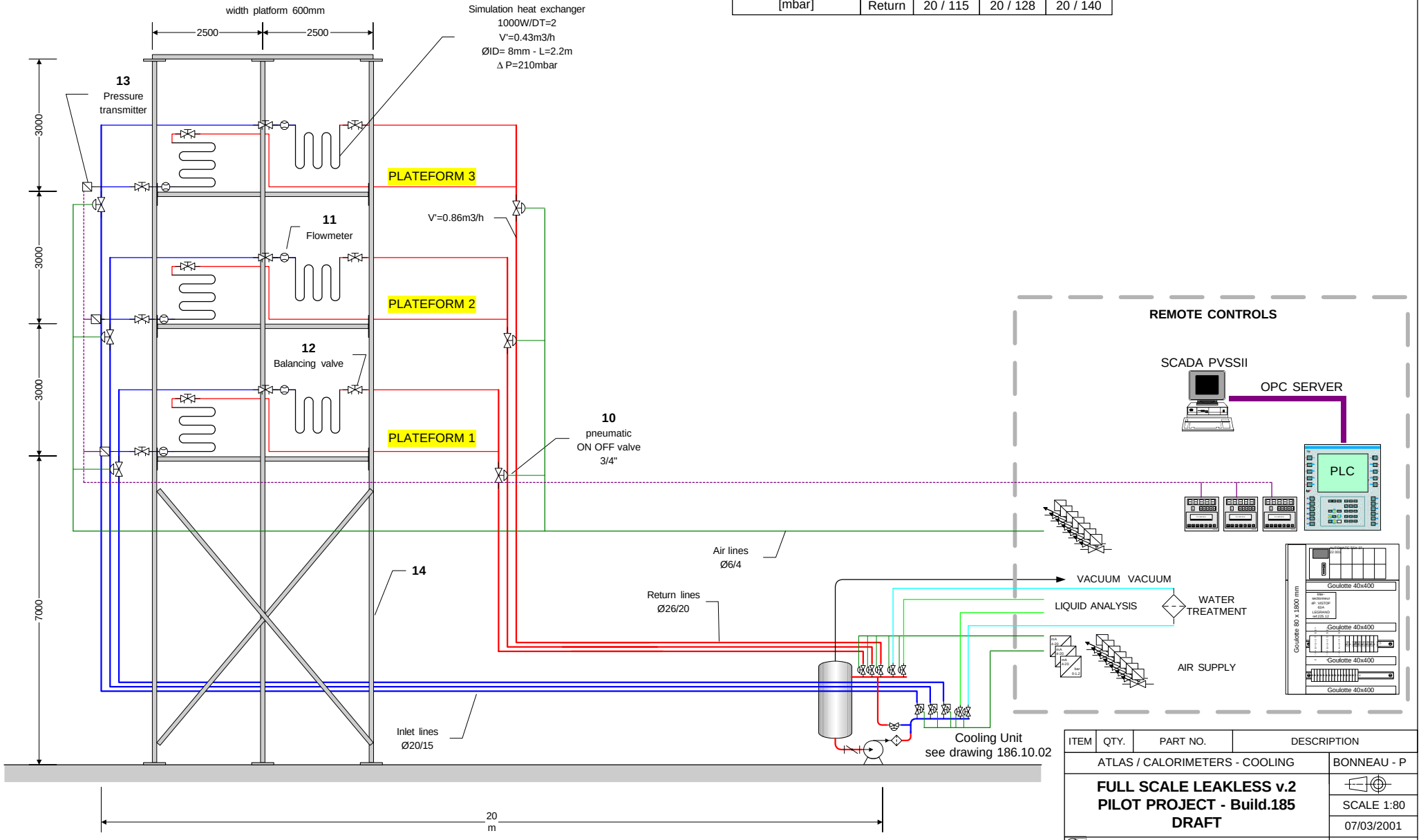
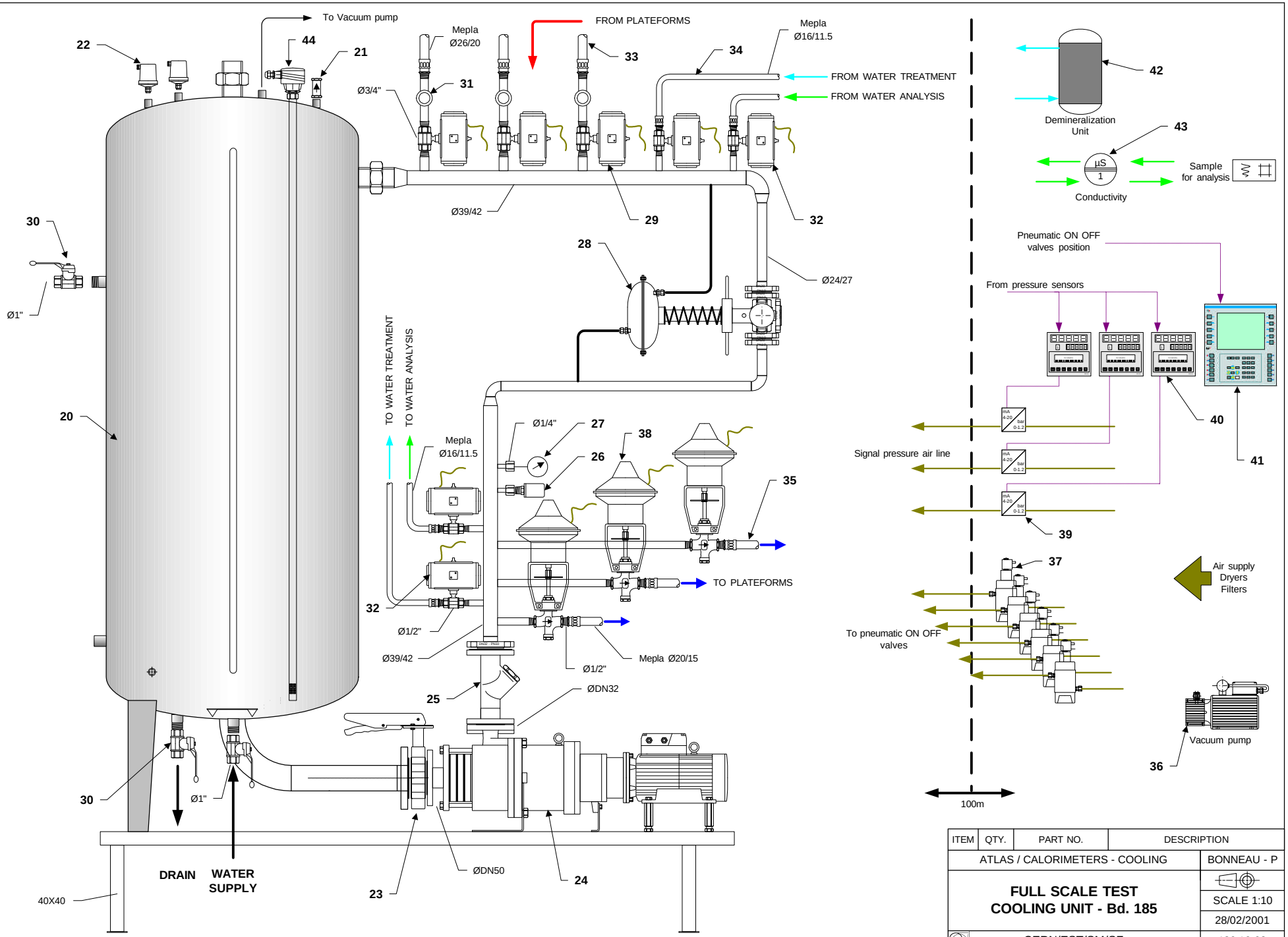
PIPING WITH MEPLA TUBES Ø20/15 and 26/20		PLATEFORM		
		1	1	1
Lenght [m]		28	31	34
ØID [mm] / DP [mbar]	Inlet	15 / 452	15 / 500	15 / 549
	Return	20 / 115	20 / 128	20 / 140



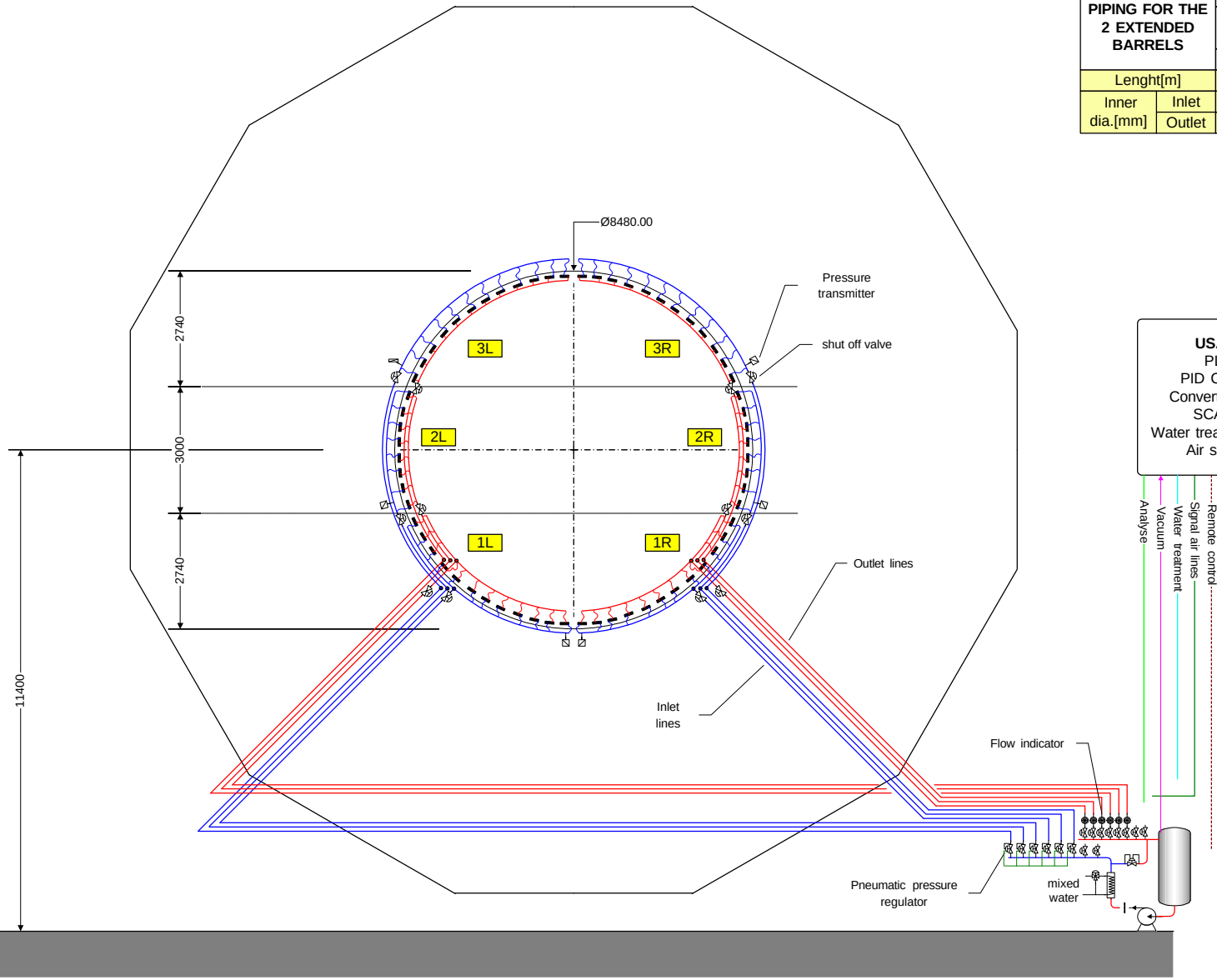
ITEM	QTY.	PART NO.	DESCRIPTION
ATLAS / CALORIMETERS - COOLING			BONNEAU - P
FULL SCALE LEAKLESS v.2 PILOT PROJECT - Build.185 DRAFT			SCALE 1:80
			07/03/2001
CERN/EST/SM/SF			186.10.01



DIMENSION		GENERAL TOLERANCES
>1	±0.2	±0.5
>30	±0.3	±0.8
>120	±0.5	±1
>315	±0.8	±2
>1000	±1.2	±3
>2000	±2	±4
MACHINING		
SHEET METAL WORK / WELDING		

ITEM	QTY.	PART NO.	DESCRIPTION
ATLAS / CALORIMETERS - COOLING			BONNEAU - P
FULL SCALE TEST COOLING UNIT - Bd. 185			SCALE 1:10
			28/02/2001
CERN/EST/SM/SF			186.10.02

PIPING FOR THE 2 EXTENDED BARRELS		SECTORS						Total volume of the piping
		12 drawers = 3600W				8 drawers = 2400W		
		1R	1L	3R	3L	2R	2L	
Lenght[m]		34	49	40.5	55.5	35.5	50.5	420 [l]
Inner dia.[mm]	Inlet	2Ø16	2Ø18	2Ø17	2Ø18	2Ø14	2Ø15	
	Outlet	2Ø26	2Ø29	2Ø27	2Ø29	2Ø23	2Ø25	



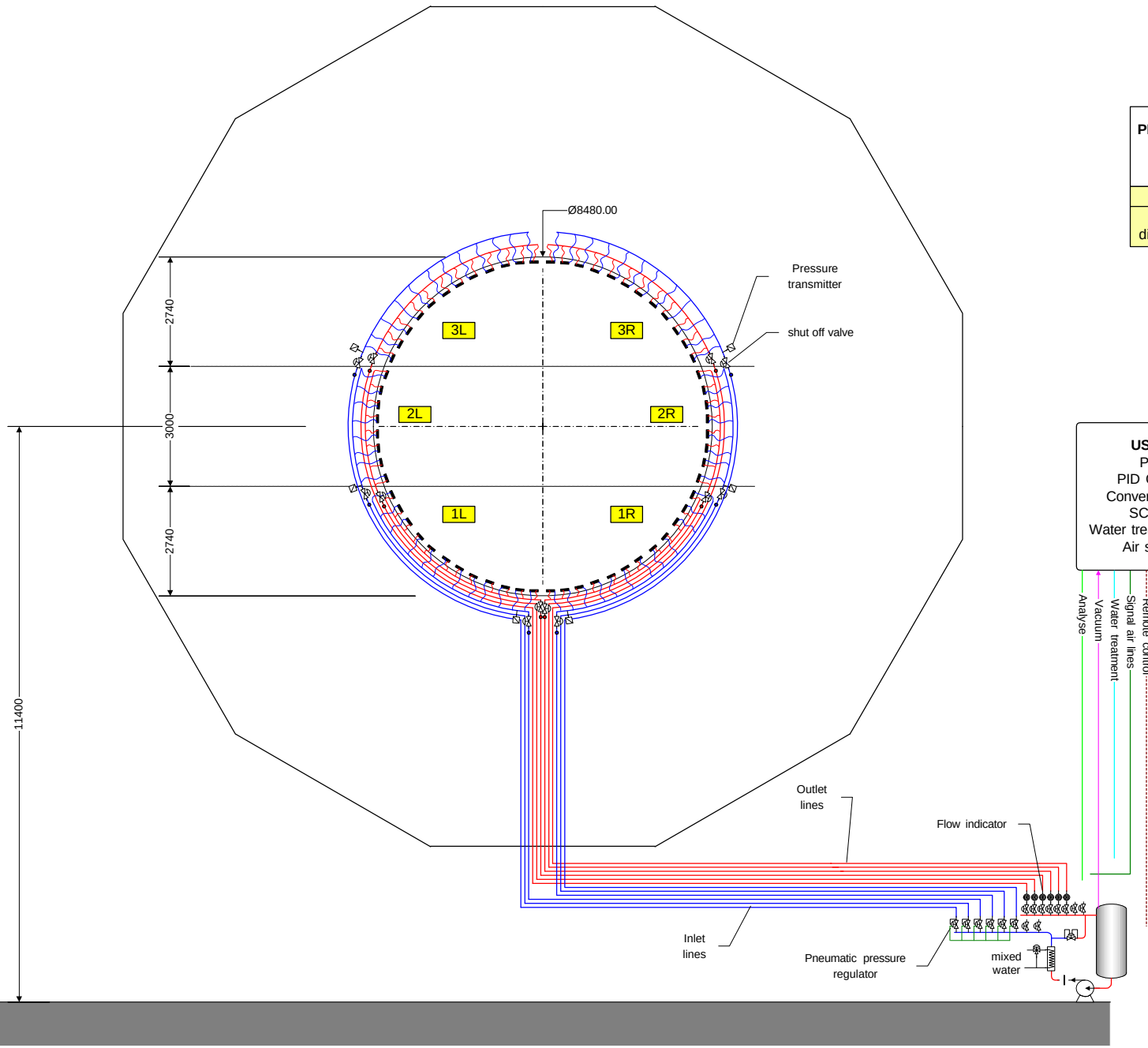
USA15
PLC
PID Control
Converter e->p
SCADA
Water treatment unit
Air supply

Analyse
Vacuum
Water treatment
Signal air lines
Remote control

General characteristics:
1 Cooling unit 77 kW
Primary circuit: mixed water - 13/17 °C - 16.5 m3/h
Secondary: Water - 18/20 °C - 33 m3/h
4 X 64 drawers 300W (200W in drawer + 100W power supply)

Pressure drops distribution:
-Overpressure: 1 bar in inlet pipe + head difference
-Subpressure: -300mbar head difference in sector
-200mbar heat exchanger drawer
-100mbar outlet line

ITEM	QTY.	PART NO.	DESCRIPTION
ATLAS - TILE CALORIMETER COOLING			BONNEAU - P
LAYOUT COOLING CIRCUIT UX15 EXTENDED SHOWN Modularity 6 sectors			SCALE 1:100
			08/03/2001
CERN/EST/SM/SF			186.9.18



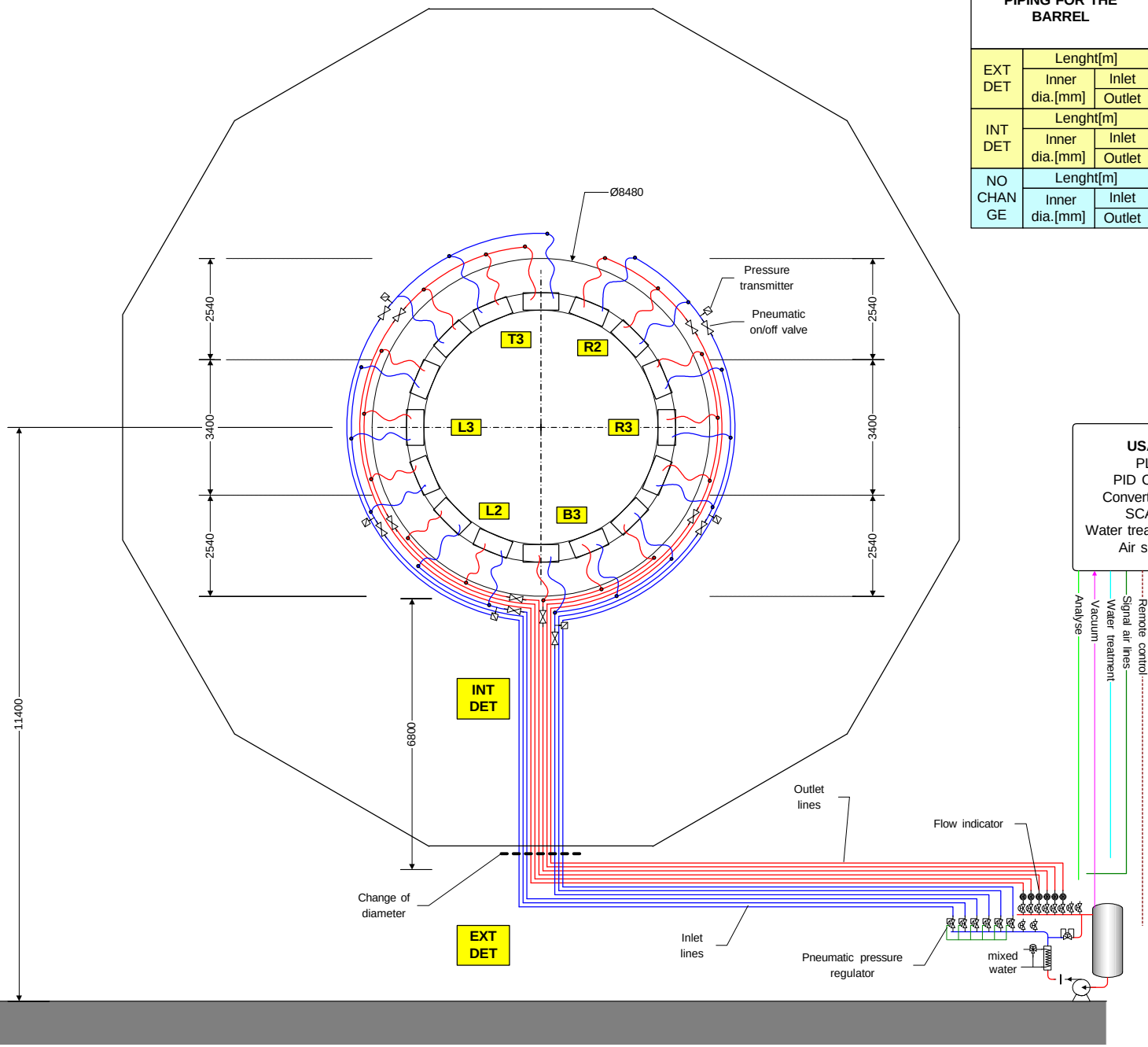
PIPING FOR THE BARREL (2 sides)		SECTORS			Total volume of the piping
		12 drawers = 3600W		8 drawers = 2400W	
		1R / 1L	3R / 3L	2R / 2L	
Lenght[m]		35	43	38	350 [l]
Inner dia.[mm]	Inlet	4Ø16	4Ø17	4Ø15	
	Outlet	4Ø27	4Ø28	4Ø23	

General characteristics:
1 Cooling unit 77 kW
Primary circuit: mixed water - 13/17 °C - 16.5 m3/h
Secondary: Water - 18/20 °C - 33 m3/h
4 X 64 drawers 300W (200W in drawer + 100W power supply)

Pressure drops distribution:
-Overpressure: 1 bar in inlet pipe + head difference
-Subpressure: -300mbar head difference in sector
-200mbar heat exchanger drawer
-100mbar outlet line

ITEM	QTY.	PART NO.	DESCRIPTION
ATLAS - TILE CALORIMETER COOLING			BONNEAU - P
LAYOUT COOLING CIRCUIT UX15 BARREL SHOWN Modularity 6 sectors			SCALE 1:100
			08/03/2001
CERN/EST/SM/SF			186.9.20

PIPING FOR THE BARREL			SECTORS						Total volume of the piping
			2 crates = 8800W		3 crates = 13200W				
			R2	L2	B3	L3	T3	R3	
EXT DET	Lenght[m]		20	20	20	20	20	20	590 [l]
	Inner dia.[mm]	Inlet	2Ø21	2Ø21	2Ø24	2Ø24	2Ø24	2Ø24	
		Outlet	2Ø33	2Ø33	2Ø38	2Ø38	2Ø38	2Ø38	
INT DET	Lenght[m]		24.5	14.5	14.5	19.5	24.5	19.5	
	Inner dia.[mm]	Inlet	2Ø17	2Ø16	2Ø18	2Ø20	2Ø21	2Ø20	
		Outlet	2Ø29	2Ø25	2Ø30	2Ø32	2Ø33	2Ø32	
NO CHANGE	Lenght[m]		44.5	34.5	34.5	39.5	44.5	39.5	550 [l]
	Inner dia.[mm]	Inlet	2Ø19	2Ø18	2Ø21	2Ø21	2Ø22	2Ø21	
		Outlet	2Ø30	2Ø29	2Ø33	2Ø34	2Ø35	2Ø34	

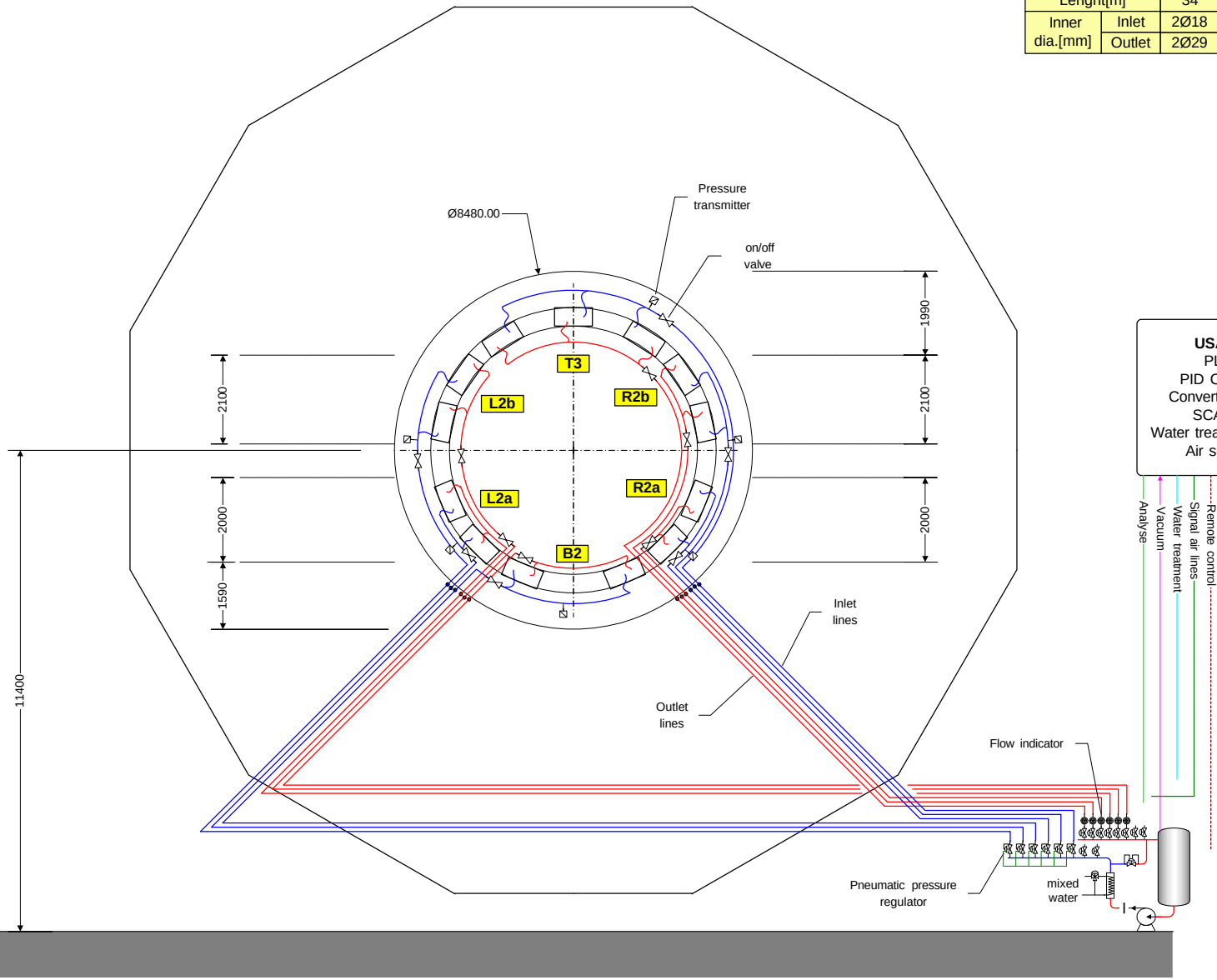


General characteristics:
1 Cooling unit 255 kW
Primary circuit: chilled water - 6/12 °C - 36.5 m3/h
Secondary: Water - 14/18 °C - 55 m3/h
2 X 16 (barrel) + 2 X 13 (end caps) crates 3.6kW
2 X 16 (barrel) + 2 X 13 (end caps) power supply 0.8kW

Pressure drops distribution:
-Overpressure: 1 bar in inlet pipe + head difference
-Subpressure: -300mbar head difference in sector
-200mbar heat exchanger drawer
-100mbar outlet line

ITEM	QTY.	PART NO.	DESCRIPTION
ATLAS - LAr CALORIMETER BOXES COOLING			BONNEAU - P
LAYOUT COOLING CIRCUIT UX15 BARREL SHOWN Modularity 6 sectors			SCALE 1:100
			08/03/2001
CERN/EST/SM/SF			186.5.08

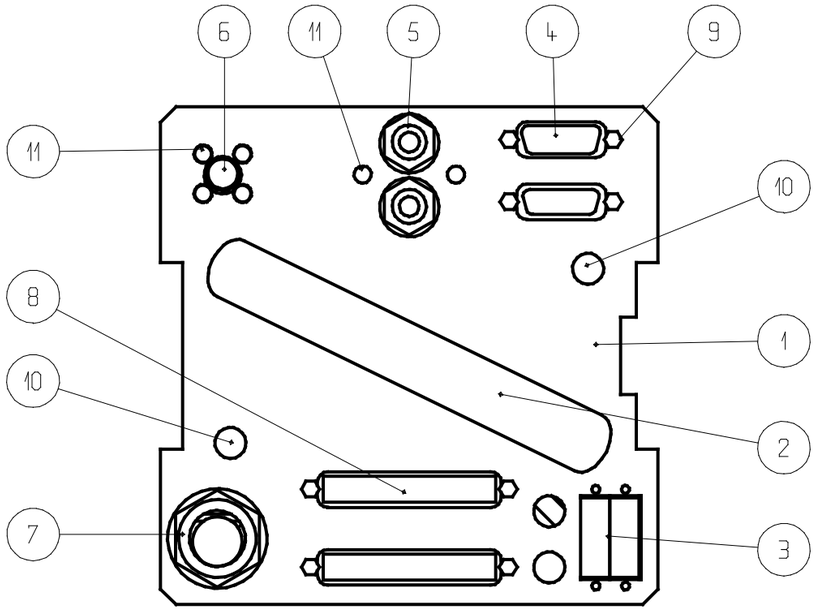
PIPING FOR THE END CAPS		SECTORS						Total volume of the piping
		2 crates = 8800W					3 crates = 13200W	
		R2a	L2a	B2	L2b	R2b	T3	
Lenght[m]		34	49.5	49.5	52.5	37	40	570 [l]
Inner dia.[mm]	Inlet	2Ø18	2Ø19	2Ø19	2Ø20	2Ø18	2Ø21	
	Outlet	2Ø29	2Ø32	2Ø32	2Ø32	2Ø30	2Ø35	

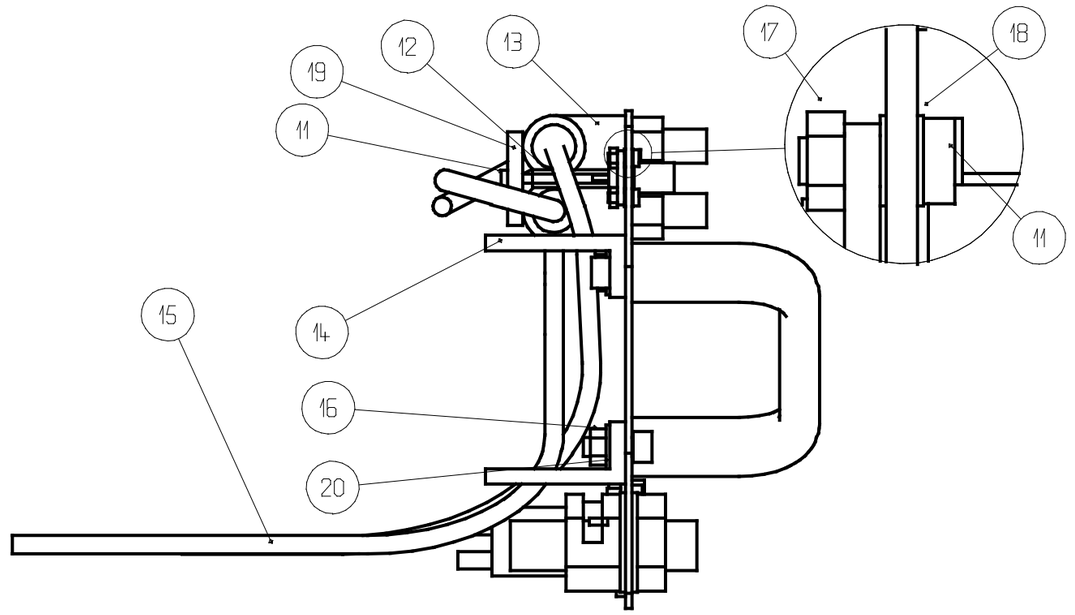


General characteristics:
1 Cooling unit 255 kW
Primary circuit: chilled water - 6/12 °C - 36.5 m3/h
Secondary: Water - 14/18 °C - 55 m3/h
2 X 16 (barrel) + 2 X 13 (end caps) crates 3.6kW
2 X 16 (barrel) + 2 X 13 (end caps) power supply 0.8kW

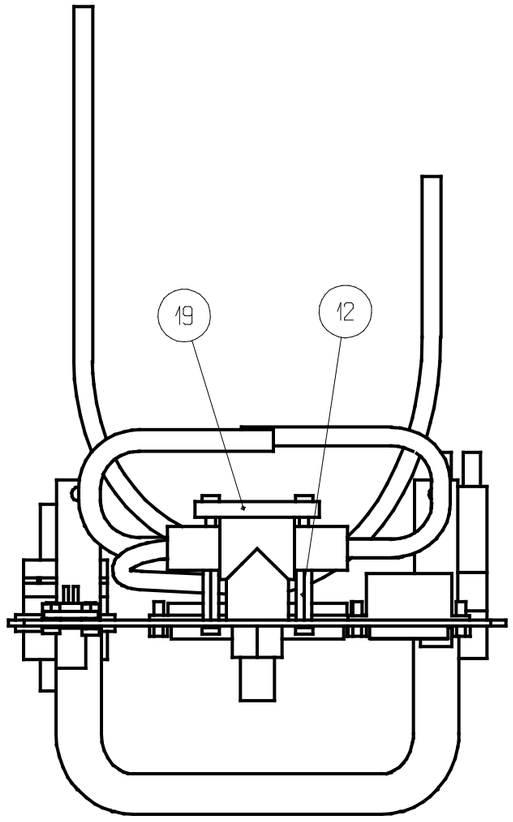
Pressure drops distribution:
-Overpressure: 1 bar in inlet pipe + head difference
-Subpressure: -300mbar head difference in sector
-200mbar heat exchanger drawer
-100mbar outlet line

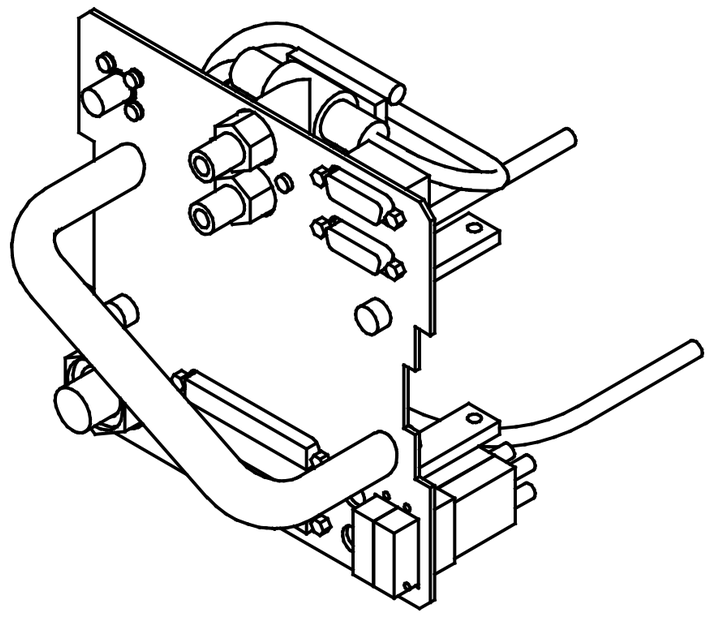
ITEM	QTY.	PART NO.	DESCRIPTION
ATLAS - LAr CALORIMETER BOXES COOLING			BONNEAU - P
LAYOUT COOLING CIRCUIT UX15 END CAP SHOWN Modularity 6 sectors			SCALE 1:100
			08/03/2001
CERN/EST/SM/SF			186.5.09





TOUTES LES VIS SERONT ASSEMLEES AVEC DU FREIN FILET (LOCTITE)
THREADLOCKING USED FOR BOLT CONNECTION





REP	Nbre	N° PLAN	DESIGNATION	OBSERVATIONS
20	2		RONDELLE M6	INOX
19	1		PLAQUE DE MAINTIEN	
18	4		ECROU H M3	INOX
17			CANON EPAULE PLASTIVIS REF:1090620000	
16	2		ECROU H M6	INOX
15	4		TUBE PU ∅ 4X6	
14		ATLLLMF_0003A	EQUERRES	
13	2		TE DN 4-6 NPT 3/8" 1A0300.42	PP
12	2		ENTRETOISE M3-30	
11	8		VIS CS 3-10	INOX
10	4		VIS CHc 6-16	INOX
9	4		KIT VIS EMBASE SUBD	
8	2		EMBASE SUBD 37 CONTACTS	ADDER+TRIGGER
7	1		PRESSE-ETOUPE AVEC SERRE CABLE	
6	1		EMBASE SHUNNER	HV
5	2		EMBOUT CPC REF PCLD 240-04	
4	2		EMBASE SUBD 15	
3	2		TRAVERSEE FIBRE DUPLEX	
2	1		POIGNEE ALUMINIUM	
1	1	ATLLLMA_0002A	PLAQUE PATCH PANEL	

IND	DATE	NOM	MODIFICATION
A	05-02-01	REINMUTH	optimisation apres test beam 2000

LABORATOIRE DE PHYSIQUE CORPUSCULAIRE
L.P.C CLERMONT-FD IN2P3/CNRS 63177 AUBIERE-Cedex

Quantite: 270	Tol.gen ±	Matiere:

Projet: ATLAS TILE CALORIMETER
ATLAS CALORIMETRE A TUILE

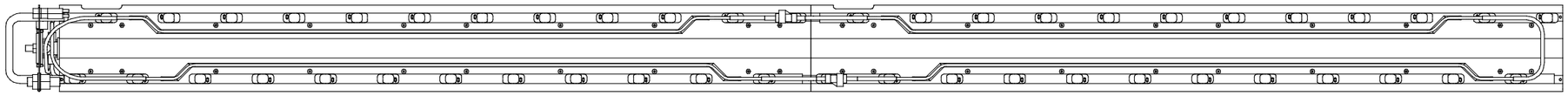
DRAWER PATCH PANEL

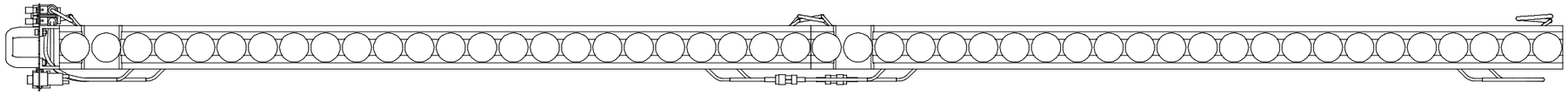
PATCH PANEL TIROIR

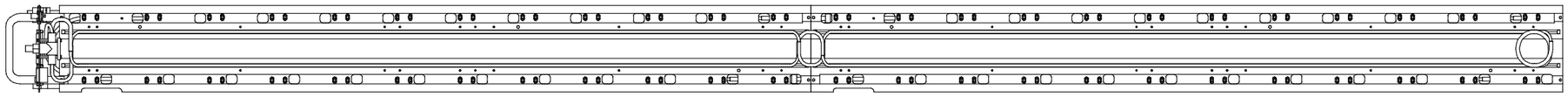
Echelle 0.75

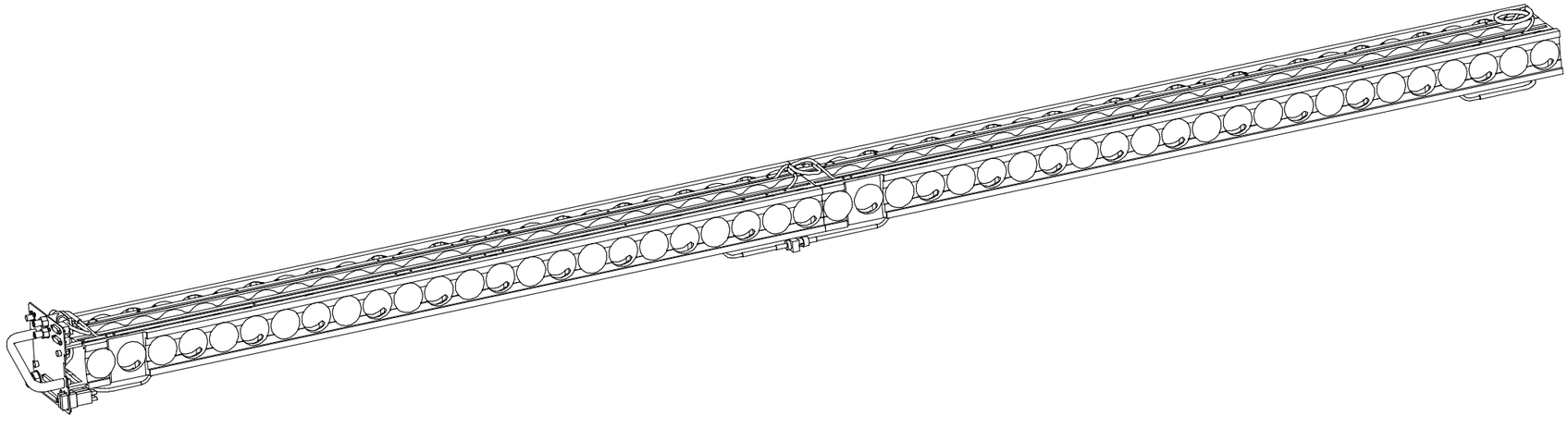
Projet:	CLR_ATLAS
S/Projet:	TIROIRDEF
Dessin:	H2ENSPANEL
Auteur:	VERDIER
Verif:	REINMUTH
Date:	01/06/1999

A.T.L.L.L.M.A._.0.0.0.1._2 A









A	09-12-2000	REINMUTH	MISE A JOUR
IND	DATE	NOM	MODIFICATION

LABORATOIRE DE PHYSIQUE CORPUSCULAIRE
L.P.C CLERMONT-FD IN2P3-CNRS 63177 AUBIERE-Cedex

Quantite:	Tol.gen ±	Matiere:	Projet: CLR_ATLAS
Projet: ATLAS TILE CALORIMETER ATLAS CALORIMETRE A TUILE		Echelle 0.3	S-Projet: TROIRDEF
			Dessin: HCCOOL2001
COOLING SYSTEM SUPERDRAWER COOLING			Auteur: VERDIER
			Verif: G REINMUTH
SYSTEME DE REFROIDISSEMENT REFROIDISSEMENT SUPERTIROIR			Date: 1-06-99
			ATL.LLMW_.0001.0 A

CERN ST

CH-1211
Geneva 23
Switzerland

EDMS No.

ST/CV - Cooling of Electronics & Detectors

File name:
LCSv.2calculations.doc

GUIDE

LEAKLESS COOLING SYSTEM V.2
PRESSURE DROP CALCULATIONS AND ASSUMPTIONS

Objectives
Guide to Leakless Cooling System v.2 in LHC experiments.

Abstract
This note gives the formula used to calculate the flow rate, pipe section and pressure drop in a monophase cooling system. It also presents the main assumptions used to design a circuit working according to the LCS v.2 principle.

Prepared		***Verified***		***Approved***	
By:	P. BONNEAU	***By:***	Reviewer	***By:***	Approver
Date:	2001/02/22	***Date:***	200Y/MM/DD	***Date:***	200Y/MM/DD

Distribution

List

History of Changes			
Rev. No.	***Date***	***Pages***	***Description of Changes***

TABLE OF CONTENTS

1. PRESSURE DROP CALCULATIONS

1.1 Mass flow: $\dot{M}\,[kg/s] = \frac{\dot{Q}}{C * \Delta T}$ with $\dot{Q}[W]$ dissipated power
C[J/kg.K] specific heat
ΔT[K] temperature difference

(temperature difference of the fluid between the inlet and the outlet of the heat exchanger)

1.2 Volumetric flow: $\dot{V}\,[m^3/s] = \frac{\dot{M}}{\rho}$ with $\rho[kg/m^3]$ density

$\dot{V} = A*c$ with $A[m^2]$ tube cross-sectional area
c[m/s] fluid velocity

1.3 Reynolds number: $Re[-] = \frac{\bar{c} * D_h}{\gamma}$ with $\bar{c}[m/s]$ average velocity of the fluid
D_h[m] hydraulic diameter of the tube
γ[m^2/s] kinematic viscosity of the fluid

$D_h = \frac{4 * A}{Pm}$ with Pm[m] inner perimeter of the tube

1.4 Linear pressure drop: $\Delta P[N/m^2] = \rho * \lambda * \frac{L}{D_h} * \frac{\overline{c^2}}{2}$

with λ[-] friction factor
L[m] length of the tube

1.4.1 Laminar flow: If $Re \le 2300 \Rightarrow \lambda = \frac{64}{Re}$ (laminar flow)

For a rectangular cross-sectional area this formula becomes: $\lambda = \frac{K}{Re}$

and value for K depends of the ratio width / height (a/b)

a/b	K	a/b	K
0	96.00	1/4	72.93
1/20	89.91	2/5	65.47
1/10	84.68	1/2	62.19
1/8	82.34	3/4	57.89
1/6	78.81	1	56.91

1.4.2 Turbulent flow: If $2300 \le Re \le 10000 \Rightarrow \lambda = 0.3164 * Re^{-0.25}$ (turbulent flow in smooth pipe).

1.5 Local pressure drop:

- Bend: if $\frac{\text{bending} \cdot \text{radius}}{D_h} \geq 3 \Rightarrow$ we use λ
- Entry: loss coefficient $\xi = 0.9$
- Exit: loss coefficient $\xi = 0.3$

$\} \xi^{tot} = 1.2$

$$\text{Equivalent pipe sraight length } L_{eq}[m] = \frac{\xi^{tot} * D_h}{\lambda}$$

2. NOTE ON THE CIRCULATOR

To made the fluid circulating we use centrifugal pump that gives kinetic energy in the liquid.
The Head H of the pump is used to measure this energy (height of a liquid column which the pump could create) and this Head is constant with all the newtonian fluids. A specific Flow at a specific Head give a duty point which one find on the performance curve of the pumps.

2.1 Output pressure: $P[bar] = \frac{\rho[m^3/kg] * 9.81 * H[m]}{100000}$

For a specific fluid: $P_{fluid} = P_{water}$*specific gravity

2.2 Change of Head due to viscosity: $\frac{H_{fluid}}{H_{water}} = 1.4 - 0.4\left(\frac{\gamma_{fluid}}{\gamma_{water}}\right)^{0.1}$

3. FLUID CHARACTERISTICS

	water @ 20°C	C6F14 @ 20°C	C6F14 @ -20°C	C8F18 @ 20°C	C8F18 @ -20°C
Density ρ [kg/m^3]	1000	1688	1792	1789	1887
Specific heat C [J/kg.K]	4187	1045	983	1045	983
Kinematic viscosity γ [m^2/s]	$1*10^{-6}$	$0.4*10^{-6}$	$0.8*10^{-6}$	$0.8*10^{-6}$	$2*10^{-6}$

4. PRESSURE DROP BALANCING

Figure 1 shows the different pressure at different point of a LCS v.2 circuit. To have the whole circuit working under atmospheric pressure one should limit the head difference to 3 [m].

For higher system one should admit over pressure in the inlet line to start sub pressure at the entrance of the heat exchanger. Return line is under atmospheric pressure.

The design of a such circuit is based on the following typical distribution of pressure drops:

- Overpressure: 1[bar] pressure loss in inlet line + head difference.
- Subpressure: 300[mbar] head difference in sector of heat exchangers.
  200[mbar] pressure loss in heat exchanger.
  100[mbar] pressure drop in return line.

Nota: one can have some differences in pressure distribution depending on the regime (free, laminar, turbulent) of the flow in the return line.

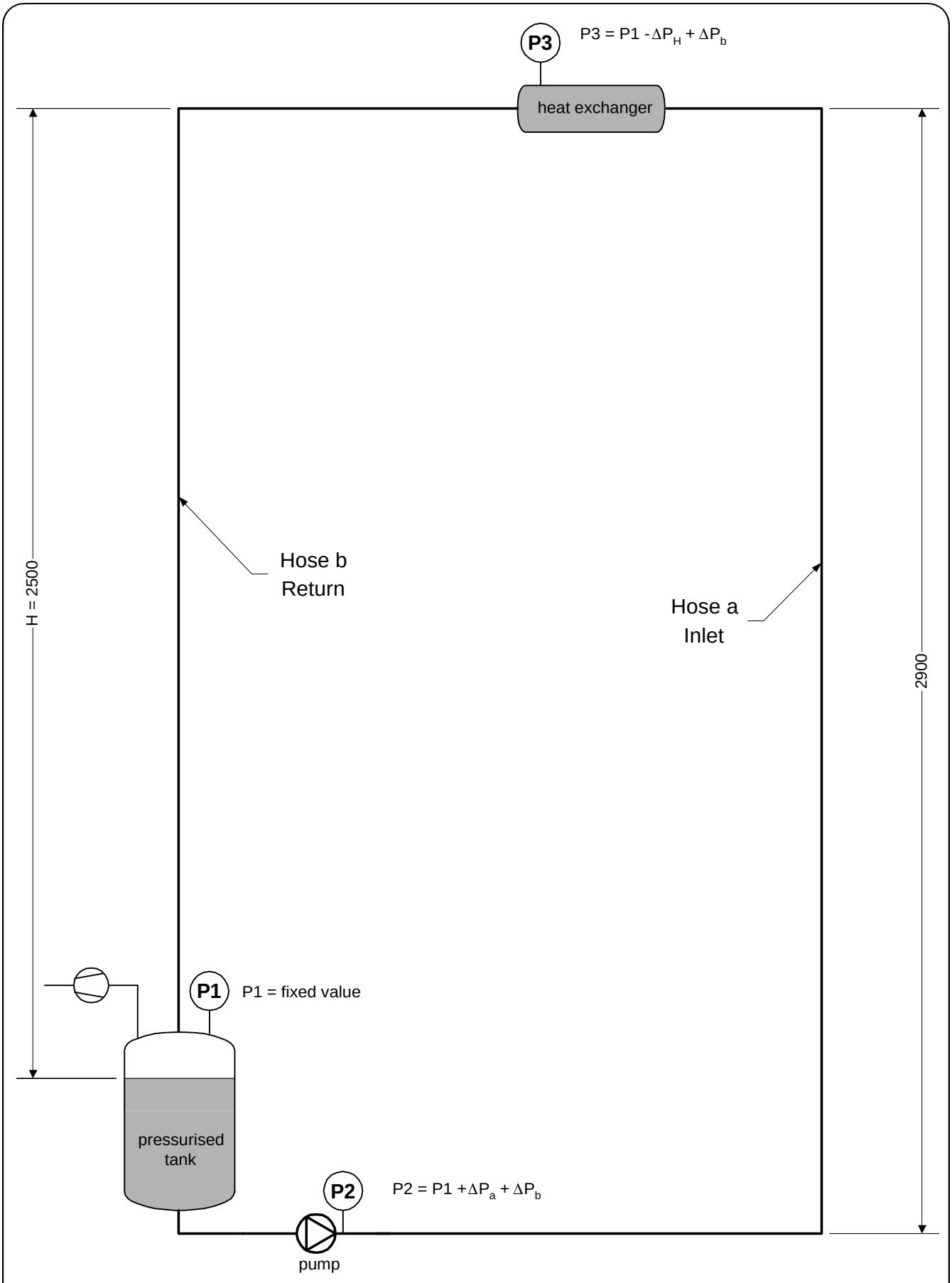
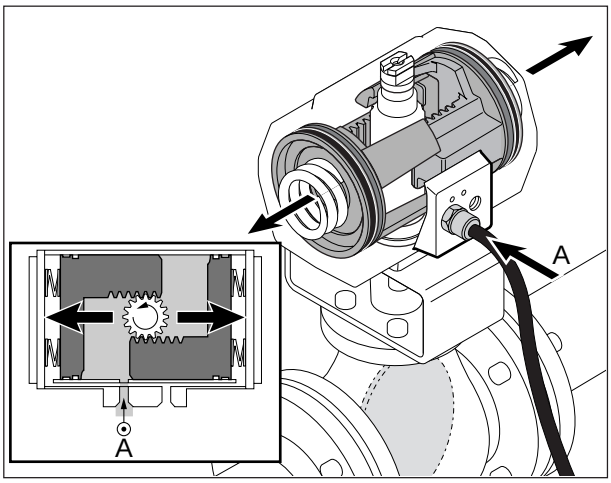
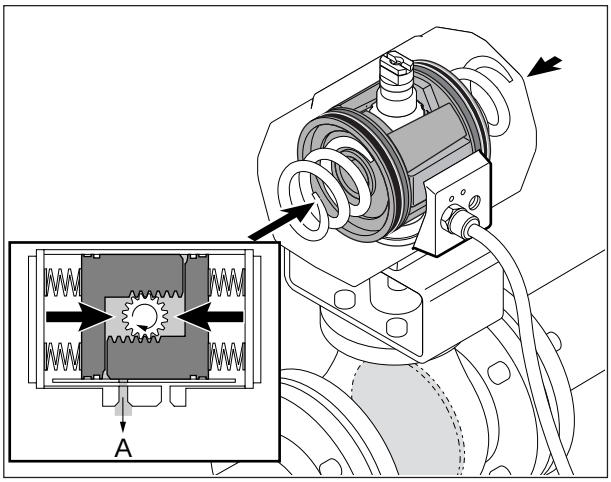

P3
P3 = P1 -ΔP_H + ΔP_b
heat exchanger
H = 2500
2900
Hose b
Return
Hose a
Inlet
P1
P1 = fixed value
pressurised
tank
P2
P2 = P1 +ΔP_a + ΔP_b
pump

Figure 1

3.2 Air connections spring return / Luftanschlüsse mit Federrückstellung / *Luchtaansluitingen, veerretour*



3.2.1



3.2.2

3.2.1

Air to port A: counterclockwise/open

Luftzufuhr zur Öffnung A: gegen den Uhrzeigersinn/offen

Lucht naar poort A: tegen de wijzers van de klok in/open

3.2.2

Spring return: clockwise/close

Federrückstellung: im Uhrzeigersinn/ geschlossen

Veerretour: met de wijzers van de klok mee / dicht

3.3 Recommended tubing sizes / Empfohlene Rohrabmessungen / *Aanbevolen buisafmetingen*

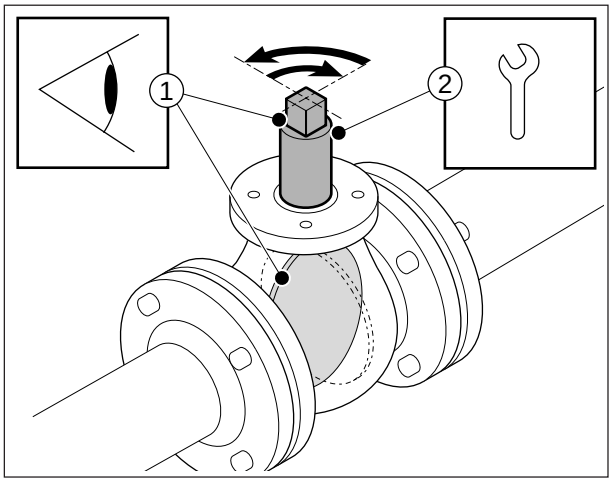
Actuator Model no.	Runs up to 1.2 mtr	Runs over 1.2 mtr.
Antriebstyp	**Bis 1,20 m**	**Über 1,20 m**
Aandrijving modelnr.	***Tot 1,2 m***	***Meer dan 1,2 m***
E-12, 25, 40, 65	6 mm	6 mm
E-100, 200, 350 / P-500, 750	6 mm	8 mm
P1100, 2500, 4000	6 mm	10 mm

3.4 Air consumption litre/stroke at atmospheric pressure / Luftverbrauch (Ltr./Hub) bei Atmosphärendruck / *Luchtverbruik liter/slag bij atmosferische druk*

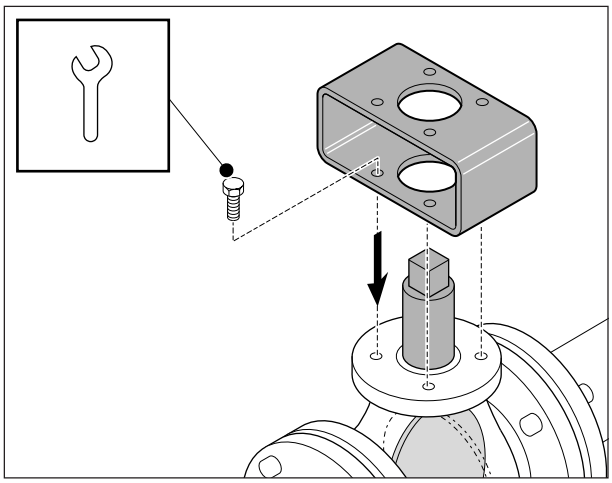
	Model						
Air chamber	**E12**	**E25**	**E40**	**E65**	**E100**	**E200**	**E350**
A	0.05	0.1	0.16	0.22	0.35	0.8	1.2
B	0.06	0.11	0.22	0.36	0.49	1	1.8
Air chamber	**P500**	**P750**	**P1100**	**P2500**	**P4000**		
A	1.9	3.2	4.2	8	13.5		
B	2.5	4.2	5.4	9.3	17.5		

Model - Modell - Model
Air chamber - Luft-kammer - Luchtkamer

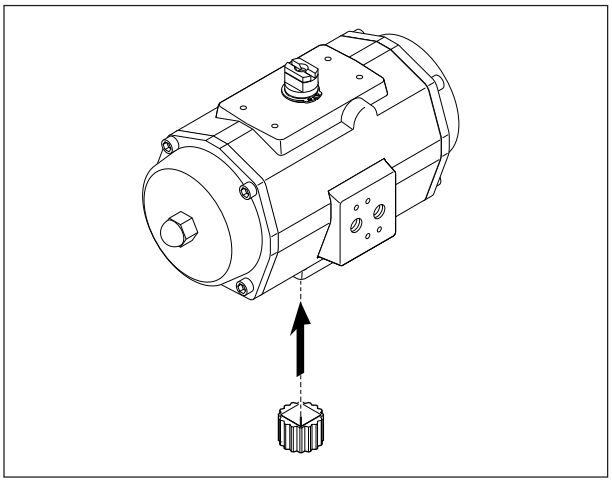
4.1 Installation / Aufbau / *Installatie*



4.1.1



4.1.2



4.1.3

4.1.1

Remove handle nut, handle, lockwasher, etc. from valve if required.

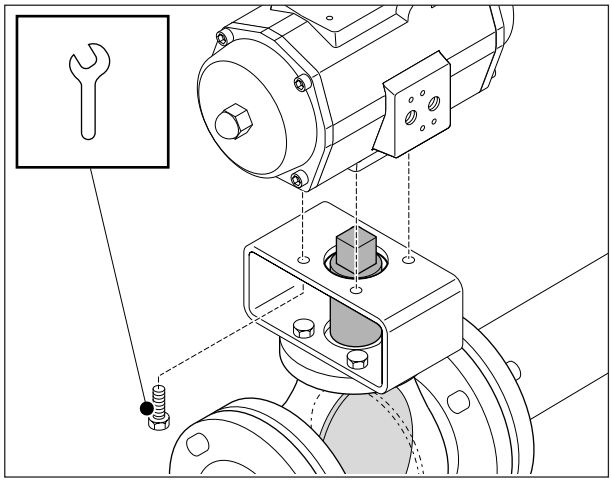
Caution! When mounting do not hit with hammer on shafttop.

Mutter der Handbetätigung, Handbetätigung, Sicherungsscheibe usw., falls erforderlich, von der Armatur entfernen.

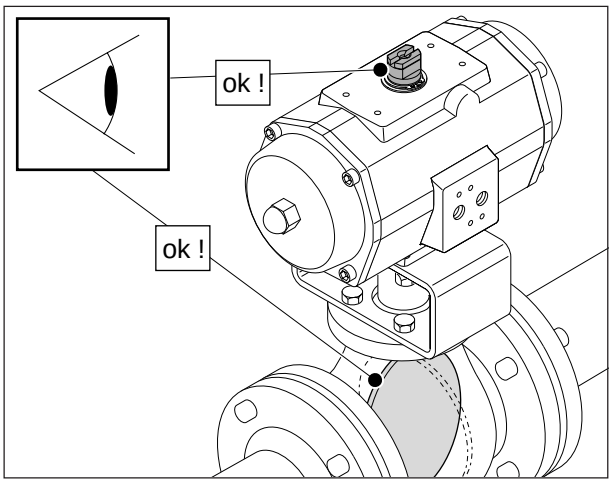
Achtung! Bei Montage nicht mit Hammer auf Wellenspitze schlagen.

Verwijder indien nodig hendelmoer, hendel, veerring etc. van de afsluiter.

Voorzichtig! *Bij montage niet met hammer op de astop slaan.*



4.1.4



4.1.5

4.1.4 / 4.1.5.

Valves are manufactured so that they operate in only one 90 degree segment. The actuator should be mounted for counterclock-wise rotation to open and clockwise to close the valve.

Die Armaturen sind so konstruiert, daß sie nur innerhalb eines 90°- Winkels wirksam sind. Der Antrieb sollte so montiert werden, daß eine Drehung gegen den Uhrzeigersinn die Armatur öffnet und daß eine Drehung im Uhrzeigersinn die Armatur schließt.

Afsluiters zijn zodanig geconstrueerd dat deze alleen in een segment van 90 graden werken. Bevestig de aandrijving zo dat bij rotatie tegen de wijzers van de klok in de afsluiter wordt geopend en bij rotatie met de wijzers van de klok mee de afsluiter wordt gesloten.

HP220X 15-50G (HP)

2/2 Way Externally operated valves

- Space saving in line design
- For robust industrial application
- Large capacity - suitable for systems with dirt particles
- For neutral liquid and gaseous media
- Flow range for water: up to 174 m³/h
- Differential pressure: 0-10 bar.
- Thread connections: G½" to G2"
- Versions with spring return or air return

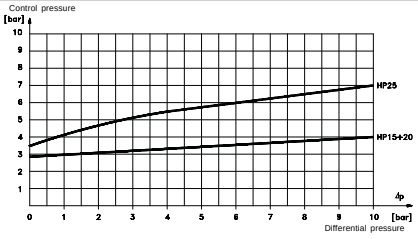
Technical data	Water/Air	Mineral Oil	Refrigerant R11/R113
Pressure range:	0 to 10 bar	0 to 10 bar	0 to 3.5 bar
Control connection:	G⅛"	-	-
Medium temperature:	0 to +60ºC	0 to +100ºC	0 to +80ºC
Viscosity:	max.400 cSt		
Materials:	Valve body: Gun metal	Seals: FKM/PTFE	Other internals: Brass/Stainless steel

Ordering

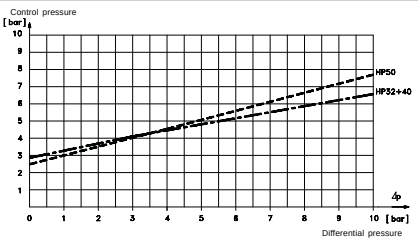
End connection	Kv value (m³/h)	Type designation Main type	Spring return Specification	Spring return **Code No.**	Air return Specification	Air return **Code No.**
G½"	7	HP220X 15G	G 12F NC000	**042N0172**	G 12F UN000	**042N0170**
G¾"	9	HP220X 20G	G 34F NC000	**042N0182**	G 34F UN000	**042N0180**
G1"	15	HP220X 25G	G 1F NC000	**042N0192**	G 1F UN000	**042N0190**
G1¼"	32	HP220X 32G	G 114F NC000	**042N0202**	G 114F UN000	**042N0200**
G1½"	33	HP220X 40G	G 112F NC000	**042N0212**	G 112F UN000	**042N0210**
G2"	55	HP220X 50G	G 2F NC000	**042N0222**	G 2F UN000	**042N0220**

Control pressure - Spring return

G½"
G¾"
G1"

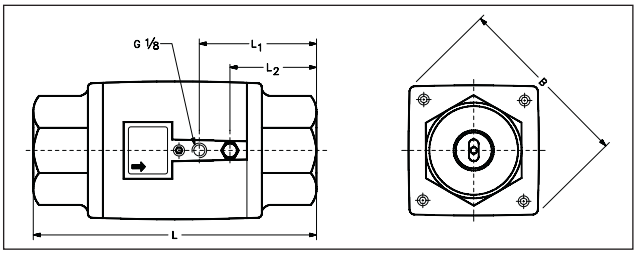


G1¼"
G1½"
G2"



Control pressure - air return: 3-10 bar depending on medium pressure.

Dimensions and weight



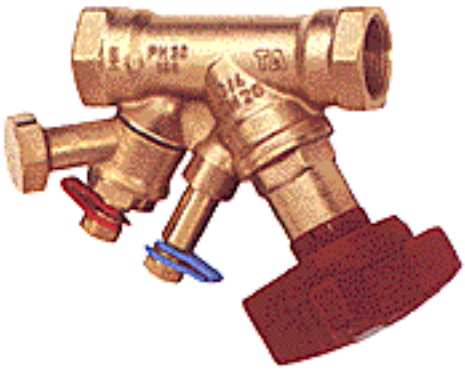
Type	L1 (mm)	L2 (mm)	L (mm)	B (mm)	Weight (kg)
HP15	116	49	32	66	1.2
HP20	116	49	32	66	1.1
HP25	127	51	34	73	1.5
HP32	140	54	37	86	2.1
HP40	140	54	37	86	2.0
HP50	161	64	47	112	3.5

STS, STA, STAD, STADA, STA-DR

Balancing valves
Einregulierungsventile
Vannes d'équilibrage

5-5-10

1995.02



Technical description

Application: Heating- and cooling installations (glycol/brine). Potable water installations (hot/cold). Seawater (cold).

Functions:
With internal threads:
STS Shut-off, draining (optional)
STA Shut-off, draining (optional), presetting of flow, internal threads
STAD Shut-off, draining (optional), presetting of flow, flow measuring, pressure reading
STA-DR Shut-off, draining (optional), presetting of flow, flow measuring, pressure reading
With external threads:
STADA Shut-off, draining (optional), presetting of flow, flow measuring, pressure reading

Nominal pressure: PN 20
Max. working pressure:
2.0 MPa = 20 bar ≈ 300 psi
Max. working temperature: 120°C
For higher temperatures (but not exceeding 150°C), contact TA.
Min. working temperature: -20°C

Material:
The valves are made completely of AMETAL® and are fitted with a red nylon handwheel and a protection cap. Seat seal: Stem with EPDM O-ring.
Spindle seals: EPDM O-rings.
Moulded polyurethane insulation with PVC cover, for heating and cooling systems.

Marking:
Body: PN 20/150, DN and inch size
Handwheel: Valve type and DN

Threads:
Internal: G3/8 - G2
External: G1/2 - G2 1/2

Technische Beschreibung

Anwendungsbereich: Heiz- und Kühlsysteme (Glykol, Brine). Brauchwassersysteme (warm/kalt). Salzwasser (kalt).

Funktionen:
Version: Innengewinde:
STS Absperren (Entleerung wahlweise)
STA Absperren, Voreinstellung (Entleerung wahlweise)
STAD Absperren, Voreinstellung, Differenzdruck- und Durchflußmessung (Entleerung wahlweise)
STA-DR Absperren, Voreinstellung, Differenzdruck- und Durchflußmessung (Entleerung wahlweise)
Version: Außengewinde für lose Verschraubung:
STADA Absperren, Voreinstellen, Differenzdruck- und Durchflußmessung.

Nenndruck: PN 20
Max. Betriebsdruck:
2,0 MPa = 20 bar
Max. Betriebstemperatur: 120°C
(Wegen höherer Temperaturen, max. jedoch 150°C, bitte bei TA anfragen)
Min. Betriebstemperatur: -20°C

Material: Gehäuse, Oberteil, Spindel, Drosselkegel: AMETAL®.
Handrad: Polyamid-Kunststoff.
Sitzdichtung: Kegel mit O-Ring aus EPDM.
Spindeldichtungen: O-Ring aus EPDM.
Vorgefertigte Isolierung aus Polyurethan mit PVC-Oberflächenbeschichtung für Wärme- und Kälteanlagen.

Kennzeichnung:
Gehäuse: PN 20/150, DN- und Zollkennzeichnung
Handrad: Ventiltyp und DN

Gewinde:
Innen: G3/8 - G2
Außen: G1/2 - G2 1/2

Caractéristiques techniques

Applications: Installations de chauffage et de conditionnement d'air (eau normale, glycolée et saumure). Installations de distribution d'eau sanitaire (chaude ou froide). Eau de mer froide.

Fonctions: (vidange en option)
Taraudage interne:
STS Vanne d'arrêt.
STA Vanne d'arrêt, préréglage.
STAD Vanne d'arrêt, préréglage, prises de pression.
STA-DR Vanne d'arrêt, préréglage, prises de pression, orifice interne réduit.

Taraudage externe:
STADA Vanne d'arrêt, préréglage, prises de pression.

Pression nominale: PN 20
Pression de service maxi:
2,0 MPa = 20 bar
Température de service maxi: 120°C
Températures plus élevées (mais inférieures à 150°C): prenez contact avec TA.
Température de service mini: -20°C

Matériaux: Vannes entièrement fabriquées en AMETAL®, poignée en nylon rouge. Étanchéité du siège: cône avec joint torique en EPDM.
Joints de tige: joint torique en EPDM.
Calorifuge préformé en polyuréthanne avec revêtement en PVC, prévu pour les installations de chauffage et de climatisation.

Marquage:
Corps: PN 20/150 (DN/pouce).
Volant: Type de vanne et DN.

Taraudages:
Interne: G3/8 - G2
Externe: G1/2 - G2 1/2

Menu

Pre-setting
STA, STAD, STADA

Initial setting of a valve for a particular pressure drop, e g corresponding to 2.3 turns on the graph, is carried out as follows:

1. Close the valve fully (Fig 1).
2. Open the valve to the preset value 2.3 turns (Fig. 2).
3. Using a 3 mm Allen key, turn the inner spindle clockwise to its end position.
4. The valve is now preset.

To check the presetting of a valve, open it to the stop position; the indicator then shows the presetting number, in this case 2.3 (Fig. 2).
Diagrams showing the pressure drop for each valve size at different settings and flow rates are available to help determine the correct valve size and presetting (pressure drop).

Four turns open the valves fully (see Fig. 3). Opening it further will not increase the capacity.

Voreinstellung
STA, STAD, STADA

Um einen Druckabfall entsprechend der Ziffer 2,3 des Diagrammes zu erreichen, muß die Einstellung des Ventils wie folgt vorgenommen werden:

1. Das Ventil ganz schließen (siehe Bild 1).
2. Ventil bis zur gewünschten Einstellung 2,3 öffnen (siehe Bild 2).
3. Mit dem Innensechskantschlüssel (3 mm) ist die Innenspindel im Uhrzeigersinn bis zum Anschlag zu drehen.
4. Das Ventil ist jetzt voreingestellt.

Das Ventil kann jetzt geschlossen, jedoch nicht mehr über die gewählte Voreinstellung hinaus geöffnet werden. Um die Voreinstellung eines Ventils zu kontrollieren: Das Ventil ganz öffnen. Die Anzeige am Handrad zeigt dann den Voreinstellwert, in diesem Fall die Ziffer 2,3 an (siehe Bild 2). Als Anleitung für die Bestimmung einer richtigen Ventildimension und Voreinstellung (Druckabfall) gibt es Diagramme. Diese Diagramme zeigen den jeweiligen Druckabfall bei verschiedenen Einstellungen und Durchflüssen.

Bei 4 Umdrehungen ist das Ventil voll geöffnet. Ein Öffnen um mehr als 4 Umdrehungen erhöht nicht die Durchflußmenge.

Préréglage
STA, STAD, STADA

Supposons qu' après examen des abaques pression/débit, on souhaite régler la vanne à la position 2,3:

1. Fermer complètement la vanne (fig .1).
2. Ouvrir la vanne à la position de réglage 2,3. (fig.2).
3. Visser la tige intérieure dans le sens des aiguilles d'une montre, jusqu'à butée, à l'aide d'une clé à six pans de 3 mm.
4. La vanne est maintenant préréglée.

Pour vérifier la position de préréglage d'une vanne, commencer par fermer la vanne (position 0,0). Ensuite, ouvrir la vanne jusqu'à butée. (position 2,3 selon l'exemple de la figure 2).
Pour déterminer la dimension d'une vanne ainsi que le préréglage correct, se servir des abaques qui, pour chaque diamètre de vanne, donnent la perte de charge en fonction des préréglages et des débits.

La vanne peut être ouverte à quatre tours au maximum (fig 3).Une ouverture supérieure à 4 tours n'augmente pratiquement pas le débit.

Fig 1/Bild 1
Valve closed
Ventil geschlossen
Vanne fermée

Fig 2/Bild 2
The valve is preset 2.3
Gewünschte Voreinstellung 2,3
Vanne réglée à la position 2,3

Fig 3/Bild 3
Fully open valve
Ventil voll geöffnet
Vanne ouverte

Menu

General

STS, STA, STAD and STADA

Draining optional:
- Valves with a draining banjo for 1/2" or 3/4" hose connection.
- Valves without draining banjo have a sleeve.

This sleeve can be temporarily removed and during draining a draining banjo is fitted which is available as an accessory.

Measurement points:
Measuring points are self-sealing.
To use, remove the cap and then insert the probe through the seal.

STA-DR valves for renovation purposes

Frequently, valves of the same dimension as the pipes are installed, and this may mean a setting in the lower range. For the same pipe size, an STA-DR renovation valve with a reduced bore gives a larger valve opening and thus improved flow control accuracy.

Draining:
Valves with drain nipples for 1/2" or 3/4" connections.

Measurement points:
Measuring points are self-sealing.
To use, remove the cap and then insert the probe through the seal.

Allgemeines

STS, STA, STAD und STADA

Entleerung wahlweise:
- Ventil mit schwenkbarem Schlauchanschluß und Kappe für 1/2" bzw. 3/4" Schlauchverschraubung.
- Ventil ohne Schlauchanschluß mit Distanzmuffe.

Die Distanzmuffe kann im Anlagenbetrieb und bei geschlossenem Ventil gegen einen Schlauchanschluß getauscht werden.

Meßnippel:
Die Meßanschlüsse sind selbstdichtend. Zur Messung ist die Schutzkappe zu entfernen. Danach wird die Meßnadel durch den selbstdichtenden Meßanschluß eingesteckt.

STA-DR Renovierungsventile

Häufig werden Ventile und Rohrleitungen in gleicher Dimension installiert. Dadurch müssen Ventile oft bis in den untersten Einstellbereich gedrosselt werden. STA-DR Renovierungsventile mit reduziertem Durchfluß erlauben bei gleichen Rohrabmessungen größeren Ventilkegelhub und damit bessere Regelgenauigkeit.

Entleerung:
Ventile mit Entleerungsnippel für 1/2"- oder 3/4"-Schlauchanschluß.

Meßnippel:
Die Meßanschlüsse sind selbstdichtend. Zur Messung ist die Schutzkappe zu entfernen. Danach wird die Meßnadel durch den selbstdichtenden Meßanschluß eingesteckt.

Généralités

Modèles STS, STA, STAD et STADA

Vidange en option:
- Le robinet de vidange à banjo est muni d'un couvercle de protection. Le robinet peut être prévu avec raccord gaz de 1/2 ou 3/4".
- Quant aux modèles sans robinet de vidange, ils comportent un raccord démontable auquel on peut substituer un robinet de vidange par la suite, même lorsque l'installation est sous pression.

Prises de pression:
Les prises de pression sont auto-étanches. Pour procéder à la mesure de la pression, dévisser le bouchon puis introduire la sonde de mesure au travers de la prise de pression.

Vannes STA-DR pour la rénovation

Souvent, les vannes déquilibrage sont choisies au diamètre de la conduite. Lorsque le débit est faible ou la perte de charge à reprendre importante, il en résulte un réglage de la vanne proche de la fermeture avec une précision réduite. Si on ne désire pas placer une vanne plus petite avec des réductions, on installe une STA-DR dont la section de passage est réduite, permettant d'obtenir une meilleure précision.

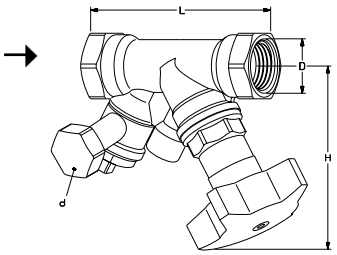
Vidange:
Vannes avec raccord de vidange 1/2 ou 3/4".

Prises de pression:
Les prises de pression sont auto-étanches. Pour procéder à la mesure de la pression, dévisser le bouchon puis introduire la sonde de mesure au travers de la prise de pression..

Menu

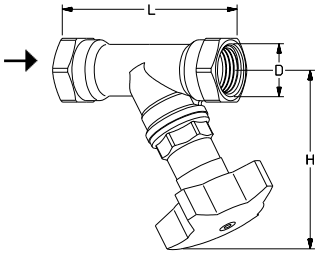
STS: For shut-off, draining/Absperren/Vanne d'arrêt, vidange

With draining/Mit Entleerung/
Avec raccord de vidange



TA No/TA Nr/No TA		DN	L	H1	D**	Kvs
d = 1/2	**d = 3/4**					
52 149-215*	52 149-615	15	90	100	G1/2	4,4
52 149-220*	52 149-620	20	97	100	G3/4	6,8
52 149-225	52 149-625	25	110	105	G1	9,8
52 149-232	52 149-632	32	124	110	G1 1/4	18,3
52 149-240	52 149-640	40	130	120	G1 1/2	25,4
52 149-250	52 149-650	50	155	120	G2	42,4

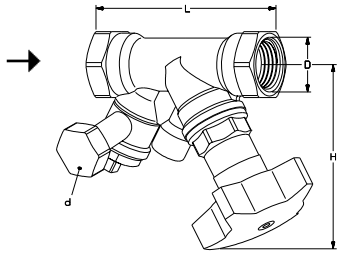
Excl. draining/Ohne Entleerung/
Sans raccord de vidange



TA No/TA Nr/No TA	DN	L	H1	D**	Kvs
52 149-015*	15	90	100	G1/2	4,4
52 149-020*	20	97	100	G3/4	6,8
52 149-025	25	110	105	G1	9,8
52 149-032	32	124	110	G1 1/4	18,3
52 149-040	40	130	120	G1 1/2	25,4
52 149-050	50	155	120	G2	42,4

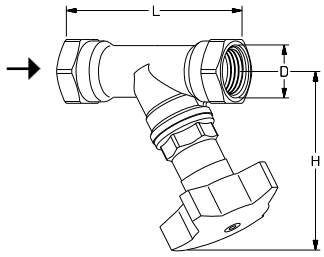
STA: For shut-off, draining, presetting of flow/Absperren, Voreinstellung/ Vanne d'arrêt, préréglage, vidange.

With draining/Mit Entleerung/
Avec raccord de vidange



TA No/TA Nr/No TA		DN	L	H1	D**	Kvs
d = 1/2	**d = 3/4**					
52 150-214*	52 150-614*	15/14	90	100	G1/2	2,52
52 150-220*	52 150-620*	20	97	100	G3/4	5,70
52 150-225	52 150-625	25	110	105	G1	8,70
52 150-232	52 150-632	32	124	110	G1 1/4	14,2
52 150-240	52 150-640	40	130	120	G1 1/2	19,2
52 150-250	52 150-650	50	155	120	G2	33,0

Excl. draining/Ohne Entleerung/
Sans raccord de vidange



TA No/TA Nr/No TA	DN	L	H1	D**	Kvs
52 150-014*	15/14	90	100	G1/2	2,52
52 150-020*	20	97	100	G3/4	5,70
52 150-025	25	110	105	G1	8,70
52 150-032	32	124	110	G1 1/4	14,2
52 150-040	40	130	120	G1 1/2	19,2
52 150-050	50	155	120	G2	33,0

Kvs = m^3/h at a pressure drop of 1 bar and fully open valve.
m^3/h bei einem Druckverlust von 1 bar und voll geöffnetem Ventil.
m^3/h pour une pression différentielle de 1 bar, la vanne étant complètement ouverte.

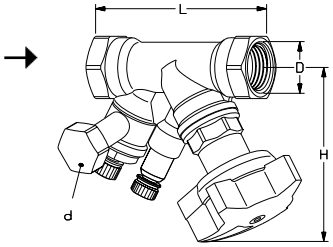
Menu

→ = Flow direction/Fließrichtung/Direction du débit

*) Can be connected to smooth tubes by means of KOMBI compression coupling/Kann an glatte Rohre mit der Klemmringkupplung KOMBI angeschlossen werden/Peuvent être raccordés à des tubes lisses à l'aide du raccord à compression KOMBI.
**) Pipe thread according to ISO7/1/Rohrgewinde nach ISO 7/1/Taraudage selon ISO 7/1.
***) Pipe thread according to DIN 3546/Rohrgewinde nach DIN 3546/Taraudage selon DIN 3546.

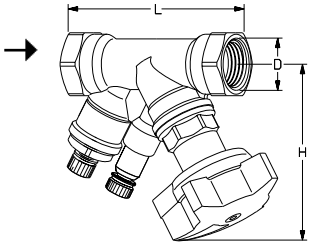
STAD: For shut-off, draining, presetting of flow, flow measuring and pressure reading
Absperren, Voreinstellung, Differenzdruck- und Durchflußmessung
Vanne d'arrêt, préréglage, prise de pression, vidange

With draining/Mit Entleerung/
Avec raccord de vidange



TA No/TA Nr/No TA		DN	L	H1	D**	Kvs
d = 1/2	**d = 3/4**					
52 151-209*	52 151-609*	10/09	83	100	G3/8	1,47
52 151-214*	52 151-614*	15/14	90	100	G1/2	2,52
52 151-220*	52 151-620*	20	97	100	G3/4	5,70
52 151-225	52 151-625	25	110	105	G1	8,70
52 151-232	52 151-632	32	124	110	G1 1/4	14,2
52 151-240	52 151-640	40	130	120	G1 1/2	19,2
52 151-250	52 151-650	50	155	120	G2	33,0

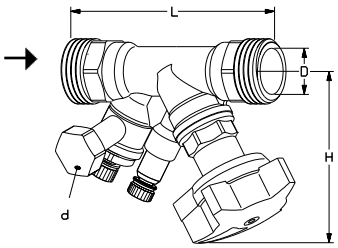
Excl. draining/Ohne Entleeradapter/
Sans raccord de vidange



TA No/TA Nr/No TA	DN	L	H1	D**	Kvs
52 151-009*	10/09	83	100	G3/8	1,47
52 151-014*	15/14	90	100	G1/2	2,52
52 151-020*	20	97	100	G3/4	5,70
52 151-025	25	110	105	G1	8,70
52 151-032	32	124	110	G1 1/4	14,2
52 151-040	40	130	120	G1 1/2	19,2
52 151-050	50	155	120	G2	33,0

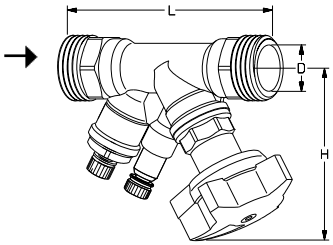
STADA: For shut-off, draining, presetting of flow, flow measuring and pressure reading
Absperren, Voreinstellung, Differenzdruck- und Durchflußmessung
Fonctions identiques à celles de la vanne STAD, mais avec raccords à filetage extérieur.

With draining/Mit Entleerung/
Avec raccord de vidange



TA No/TA Nr/No TA		DN	L	H1	D***	Kvs
d = 1/2	**d = 3/4**					
52 152-209	52 152-609	10/09	105	100	G1/2	1,47
52 152-214	52 152-614	15/14	114	100	G3/4	2,52
52 152-220	52 152-620	20	125	100	G1	5,70
52 152-225	52 152-625	25	142	105	G1 1/4	8,70
52 152-232	52 152-632	32	160	110	G1 1/2	14,2
52 152-240	52 152-640	40	170	120	G2	19,2
52 152-250	52 152-650	50	200	120	G2 1/2	33,0

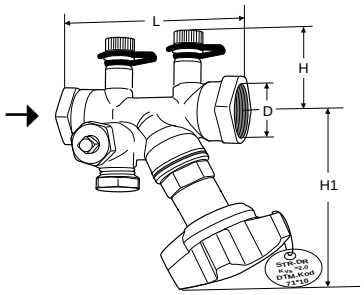
Excl. draining/Ohne Entleeradapter/
Sans raccord de vidange



TA No/TA Nr/No TA	DN	L	H1	D***	Kvs
52 152-009	10/09	105	100	G1/2	1,47
52 152-014	15/14	114	100	G3/4	2,52
52 152-020	20	125	100	G1	5,70
52 152-025	25	142	105	G1 1/4	8,70
52 152-032	32	160	110	G1 1/2	14,2
52 152-040	40	170	120	G2	19,2
52 152-050	50	200	120	G2 1/2	33,0

STA-DR: For the renovation section and when especially small flows are desired
Für den Renovierungssektor bei kleinen Durchflußmengen
Pour le secteur de la rénovation et particulièrement lorsque de faibles débits sont souhaités

Menu



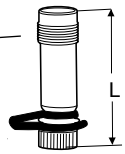
TA No/TA Nr/No TA		DN	L	H	H1	D	Kvs
d = 1/2	**d = 3/4**						
52 173-015*	52 173-615*	15	94	50	92	G1/2	2,0
52 173-020*	52 173-620*	20	104	50	92	G3/4	2,0
52 173-025	52 173-625	25	104	53	94	G1	4,01

Kvs = m^3/h at a pressure drop of 1 bar and fully open valve.
m^3/h bei einem Druckverlust von 1 bar und voll geöffnetem Ventil.
m^3/h pour une pression différentielle de 1 bar, la vanne étant complètement ouverte.

Accessories/Zubehör/Accessoires

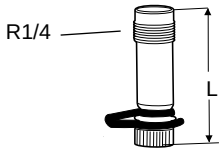
Measurement points/Meßnippel/Prises de pressions

STAD, STADA
Max 120°C
(Intermittent/Kurzzeitig 150°C)



TA No/TA Nr No TA	L	
52 179-014	44 mm	(1 piece/1 Stück/1 pièce)

STA-DR, STAF-SG DN 20-50
Max 120°C
(Intermittent/Kurzzeitig 150°C)

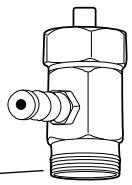


TA No/TA Nr No TA	L
52 179-009	30 mm
52 179-609	90 mm

STAD, STADA, STA-DR, STAF, STAF-SG, STAF-R
Extension 60 mm (not for 52 179-000/-601)
Verlängerung 60 mm (nicht für 52 179-000/-601)
Rallonge 60 mm (pas pour 52 179-000/-601)
Can be installed without draining of the system./Kann ohne Systementleerung montiert werden./Peut être installée sans devoir vidanger.

TA No/TA Nr No TA
52 179-006

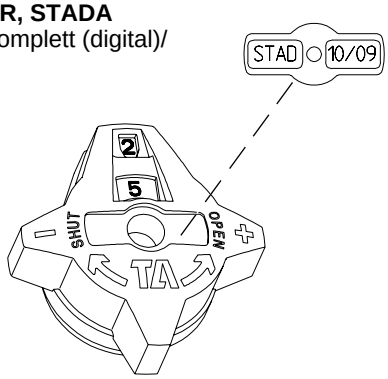
STA-DR
max 180°C
+ older STAD and STAF/Ältere STAD und STAF/
Anciennes STAD et STAF



TA no/TA Nr No TA	L
52 179-000	30 mm
52 179-601	90 mm

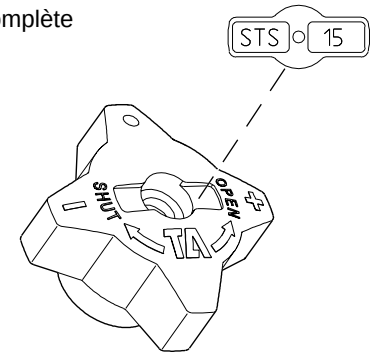
Handwheels/Handräder/Poignées

STA, STAD, STA-DR, STADA
Complete (digital)/Komplett (digital)/
Complète (digitale)
max 120°C



TA no/TA Nr No TA
52 186-003

STS
Complete/Komplett/Complète
max 120°C

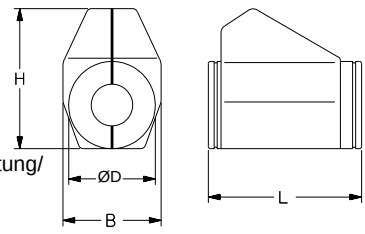


TA no/TA Nr No TA
307 841-01

Prefab insulation/Vorgefertigte Isolierungen, Brandklasse: B2/Calorifuge préformé

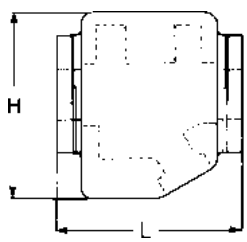
STS, STA, STAD, STAM
For heating/cooling
Für Heizung/Kühlung
Pour chauffage/
refroidissement

PVC cover/
PVC-Oberflächenbeschichtung/
Revêtement en PVC



TA no/TA Nr No TA	For/Für Pour DN	H	D	B	L
52 189-615	10, 15, 20	135	90	103	140
52 189-625	25	142	94	103	160
52 189-632	32	156	106	103	180
52 189-640	40	169	108	113	214
52 189-650	50	178	108	114	245

STA-DR
Heating/Heizung/Chauffage

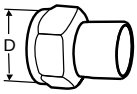


TA no/TA Nr No TA	For/Für Pour DN	L	H	ØD
52 189-015	10, 15	135	146	95
52 189-020	20	140	148	95
52 189-025	25	150	160	100

Menu

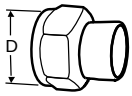
Connection sets/Verschraubungen/Jeu de raccordements

STADA
For welding/Für Schweißtülle/Pour souder
max 100°C (100-120°C: by special purchase order/
auf Sonderbestellung/sur commande spéciale)



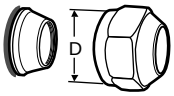
TA no TA Nr No TA	Valve DN Ventil DN Vanne DN	Thread D Gewinde D Filetage D	Pipe Ø Rohr Ø Tube Ø
52 009-010	10	G1/2	10
52 009-015	15	G3/4	15
52 009-020	20	G1	20
52 009-025	25	G1 1/4	25
52 009-032	32	G1 1/2	32
52 009-040	40	G2	40
52 009-050	50	G2 1/2	50

STADA
For soldering/Für Lötung/Pour soudage
max 100°C (100-120°C: by special purchase order/
auf Sonderbestellung/sur commande spéciale)



TA no TA Nr No TA	Valve DN Ventil DN Vanne DN	Thread D Gewinde D Filetage D	Pipe Ø Rohr Ø Tube Ø
52 009-510	10	G1/2	10
52 009-512	10	G1/2	12
52 009-515	15	G3/4	15
52 009-516	15	G3/4	16
52 009-518	20	G1	18
52 009-522	20	G1	22
52 009-528	25	G1 1/4	28
52 009-535	32	G1 1/2	35
52 009-542	40	G2	42
52 009-554	50	G2 1/2	54

STADA
Compression/Kompression
(100-120°C: by special purchase order/
auf Sonderbestellung/sur commande spéciale)

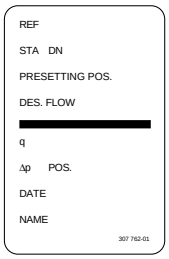


TA no TA Nr No TA	Valve DN Ventil DN Vanne DN	Thread D Gewinde D Filetage D	Pipe Ø Rohr Ø Tube Ø
53 719-108	10	G1/2	8
53 719-110	10	G1/2	10
53 719-112	10	G1/2	12
53 719-115	10	G1/2	15
53 719-116	10	G1/2	16
53 719-615	15	G3/4	15
53 719-618	15	G3/4	18
53 719-622	15	G3/4	22
53 719-922	20	G1	22
53 719-928	20	G1	28

Support bushes shall be used, for more information see FPL-catalogue sheet (4-5-5)/Stützhülsen verwenden. Weitere Informationen siehe Katalogblatt 4-5-5./Des douilles de renforcement peuvent être utilisées, pour plus d'information voir documentation FPL (4-5-5).

Miscellaneous/Diverses/Divers

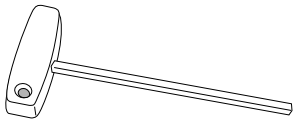
Rating plate, incl 1 pce per valve
Typenschild, 1 Stk pro Ventil inkludiert
Plaque de marquage, 1 pièce livrée par vanne



TA no/TA Nr
No TA

52 161-990

Allen key/Innensechskantschlüssel/Clé Allen



TA no/TA Nr
No TA

52 187-103 Presetting/Voreinstellung/Préréglage
52 187-105 Draining/Entleerung/Vidange

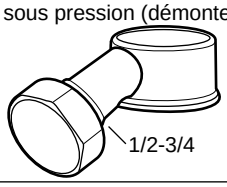
Installation of draining kit/Montage des Entleeradapters/Installation du robinet de vidange

STAD without draining kit can this be installed afterwards
There is a recess for a 5 mm Allen key under the cover **A**.
Fit drainage nipple by unscrewing cover **A** and nut **B**. Then pull off sleeve **C** and fit the turnable drainage nipple **D**. Finally refit nut **B** and cover **A**. Turn 8-14 turns to drain.

Bei STAD ohne Entleeradapter kann dieser nachträglich montiert werden.
Unter der Kappe **A** befindet sich ein Innensechskant für 5 mm Schlüssel. Bei nachträglicher Entleeradaptermontage **D**, die Kappe **A** und Mutter **B** entfernen. Dann die Hülse **C** abziehen und Entleeradapter **D** aufstecken. Mutter **B** und Kappe **A** anschließend wieder aufschrauben. Zur Entleerung öffnen Sie 8-14 Umdrehungen.

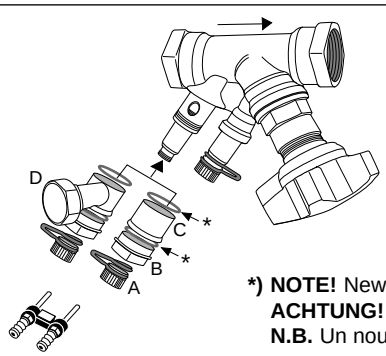
Le robinet de vidange peut être installé sur une STAD qui en est dépourvue
Sous le couvercle **A** est pratiquée une rainure pour une clé Allen 5 mm. Pour le montage du robinet de purge, desserrer les écrous **A** et **B**, enlever le raccord **C**, monter le robinet **D** puis resserrer les écrous **B** et **A**. Pour vidanger, ouvrir de 8 à 14 tours.

STS, STA, STAD, STADA
Draining kit/Entleeradapter/Dispositif de vidange
Can be installed during operation (remove sleeve no 307 778-01)/ Installierbar im Anlagenbetrieb (Hülse Nr. 307 778-01 wird demontiert/Peut être installé avec l'installation sous pression (démonter la douille "C" no 307 778-01)



TA no/TA Nr/No TA

52 179-990 1/2
52 179-996 3/4



***) NOTE!** New gaskets shall be fitted.
ACHTUNG! Neue Dichtungen montieren.
N.B. Un nouveau joint droit être installé.

Menu

Balancing

See the following manuals for descriptions of various adjustment methods:

Manual no. 1: Balancing control circuits
Manual no. 2: Balancing distribution systems
Manual no. 3: Balancing radiator systems
Total hydronic balancing

Einregulierung

Zur Beschreibung der verschiedenen Einregulierungsverfahren siehe:

Handbuch Nr. 1: Die hydraulische Einregulierung von Regelkreisen
Handbuch Nr. 2: Die hydraulische Einregulierung von Verteilungsystemen
Handbuch Nr. 3: Einregulierung von Heizkörpersystemen
Einregulierung – Total

Équilibrage

Pour la description des différentes méthodes d'équilibrage, voir:

Manuel no 1: Comment équilibrer hydrauliquement les circuits de régulation
Manuel no 2: L'équilibrage des systèmes de distribution
Manuel no 3: L'équilibrage des systèmes de radiateurs
L'équilibrage hydraulique global

Measuring accuracy

The handwheel zero position is calibrated and must not be changed.

Deviation concerning flow with different pre-setting
The curve (Fig. 4) holds for valves with normal pipe fittings* (Fig. 5). Try also to avoid mounting taps and pumps, immediately before the valve.

Messgenauigkeit

Die Nullstellung des Handrades ist kalibriert und darf nicht geändert werden.

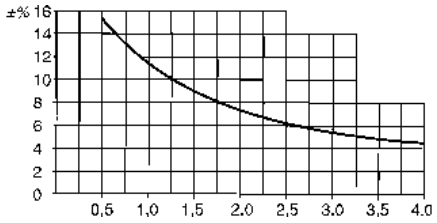
Durchflußabweichung bei verschiedenen Voreinstellungen
Die Kurve (Bild 4) gilt für installierte Ventile* (Bild 5). Es sollten jedoch Armaturen sowie Pumpen vor dem Ventil mit unten angeführten Mindestabständen eingebaut werden.

Précision

La mise à zéro du volant est calibrée et ne doit pas être modifiée.

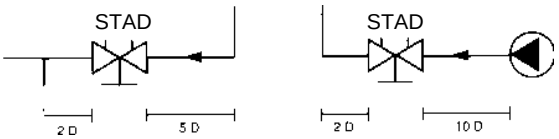
Ecart relatif maxi (en % de la valeur Kv)
La courbe (fig 4) est valable lorsque la vanne est montée normalement sur la tuyauterie* (fig 5) et selon les règles de l'art. Il faut éviter de les monter immédiatement en aval d'une pompe par exemple ou d'une autre robinetterie ou d'un coude. La pression différentielle limite en réglage ne doit pas être dépassée.

Fig./Bild 4



Pre-setting, No. of turns.
Voreinstellung, Anzahl Umdrehungen.
Position de préréglage (Nombre de tours).

Fig./Bild 5



*) The valve can be installed with the opposite flow direction. The specified flow details are also valid for this direction, although tolerances can be greater (maximum 5% more).
*) Das Ventil kann mit umgekehrter Durchflußrichtung eingebaut werden. Die angegebenen Durchflußmengen gelten auch für diese Richtung, jedoch können die Abweichungen größer ausfallen (zusätzlich 5%).
*) La vanne peut être montée avec le débit allant dans le sens inverse de celui indiqué sur le corps de vanne. Dans ce cas, il peut en résulter une erreur supplémentaire de mesure jusqu'à 5%.

Correction factors

For liquids other than water (20°C) the values from the CBI can be adjusted as follows:
Divide the flow rate as indicated by CBI by the square root of the volume by weight (specific density) (γ) in tonne/m³.

$$\text{Actual flow} = \frac{q_{CBI}}{\sqrt{\gamma}}$$

The above-mentioned applies to liquids having on the whole the same viscosity (≤20 cSt = 3°E = 100 S.U.) as water, i.e. most water/glycol mixtures and water/ brine solutions...aqueous brine solutions at room temperature. At low temperatures, the viscosity increases and laminar flow may occur in certain valves. The risk increases with small valves, low settings and low differential pressures. Contact TA for further information.

Berichtigungsfaktoren

Für andere Flüssigkeiten als sauberes Wasser (20°C) können die Angaben von CBI wie folgt berichtigt werden:
Dividieren Sie den vom CBI angegebenen Durchfluß durch die Quadratwurzel der Dichte (γ) in t/m³.

$$\text{Tatsächlicher Volumenstrom} = \frac{q_{CBI}}{\sqrt{\gamma}}$$

Obiges gilt für Flüssigkeiten mit im großen und ganzen gleicher Viskosität (≤20 cSt = 3°E = 100 S.U.) wie Wasser, d.h. für die meisten Wasser-Glykol-Mischungen und Salzwasserlösungen bei Raumtemperatur. Bei geringeren Temperaturen steigt die Zähigkeit an, und es kann bei einigen Ventilen laminare Strömung entstehen (das Risiko steigt bei kleineren Ventilen, geringeren Einstellungen und geringeren Differenzdrücken). Sprechen Sie deshalb TA wegen näherer Informationen an.

Facteurs de correction

Pour d'autres fluides que l'eau (20°C) les résultats affichés par le CBI peuvent être corrigés comme suit:
Diviser le débit donné par le CBI par la racine carrée de la masse volumique (γ) en tonne/m³.

$$\text{Débit réel} = \frac{q_{CBI}}{\sqrt{\gamma}}$$

Ceci est valable pour les fluides ayant une viscosité à peu près identique à celle de l'eau (≤ 20 cST = 3°E = 100 S.U.), c'est-à-dire, la plupart des solutions d'eau à base de glycol et d'autres antigels à température ambiante. Aux basses températures, la viscosité augmente. Il y a risque d'écoulement laminaire dans certaines vannes (risque d'autant plus important que le diamètre de la vanne est réduit, que la vanne est proche de la fermeture et que la pression différentielle est faible).

Formulas

A computer program, TA- Calc, is available from TA for calculation of presetting values and other applications.

Formeln

TA bietet u. a. zur Berechnung der Voreinstellung ein Computer-Programm, TA-Calc, an.

Formules

Pour la détermination des valeurs de préréglage, TA peut fournir un programme pour PC compatible -IBM.

Sizing a balancing valve

When Δp and the designed flow are known, use the formula (Fig. 6) to calculate the Kv-value or graph page 9.

Größenbestimmung von Strangregulierventilen

Wenn Δp und geplanter Durchfluß bekannt sind , können Sie Kv laut Formel (Bild 6) berechnen oder Diagramm Seite 9.

Dimensionnement de la vanne

Lorsque le Δp et le débit sont connus, utiliser la formule (fig 6) pour calculer la valeur Kv ou voir diagramme page 9.

Fig./Bild 6

$$Kv = 0{,}01 \frac{q}{\sqrt{\Delta p}} \quad q\ l/h,\ \Delta p\ kPa$$

$$Kv = 36 \frac{q}{\sqrt{\Delta p}} \quad q\ l/s,\ \Delta p\ kPa$$

Menu

Conversion disc

By using the conversion disc it is easy to calculate the relationship between flow, pressure and setting values for all valve sizes. Order the conversion disc from your nearest TA office.

Berechnungsscheibe

Mit Hilfe der Berechnungsscheibe kann leicht der Zusammenhang zwischen Durchfluß, Druck und Einstellwert für sämtliche Abmessungen ermittelt werden. Die Berechnungsscheibe können Sie beim nächstgelegenen TA-Büro bestellen.

Disque de calcul

Il est simple d'établir le rapport entre le débit, la pression et la valeur de préréglage pour toutes les dimensiones à l'aide du disque de calcul que vous commandez à votre revendeur TA.

Measuring instruments

Use the CBI electronic instrument. This is programmed with valve characteristics for TA valves, enabling measured differential pressure to be read off directly as a flow rate.
See Section 7 for further information on CBI.

Meßinstrument

Benutzen Sie das elektronische Meßinstrument CBI. Das CBI ist mit den Ventilkurven der TA-Ventile vorprogrammiert, so daß der gemessene Differenzdruck unmittelbar als Durchfluß abgelesen werden kann. Weitere Informationen über das CBI enthält Abschnitt 7.

Instrument de mesure

Utilisez l'instrument de mesure électronique CBI. Le CBI est programmé avec les courbes des vannes TA et permet la lecture directe du débit à partir de la pression différentielle mesurée. Pour en savoir plus sur le CBI, se reporter à l'onglet 7 du catalogue.

Example

Wanted: Presetting for DN 25 at a desired flow rate of 1,6 m³/h and a pressure drop of 10 kPa.
Solution:
Draw a straight line joining 1,6 m³/h and 10 kPa. This gives Kv=5.
Now draw a horizontal line from Kv=5. This intersects the bar for DN 25 at the desired presetting of 2,35 turns.

NOTE: If the flow rate falls outside of the scale in the diagram, the reading can be made as follows: Starting with the example above, we get 10 kPa, Kv=5 and flow-rate 1.6 m³/h. At 10 kPa and Kv=0,5 we get the flow-rate 0,16 m³/h, and at Kv=50, we get 16 m³/h. That is, for a given pressure drop, it is possible to read 10 times or 0.1 times the flow and Kv-values.

Beispiel

Voreinstellung für DN 25 bei gewünschtem Durchfluß 1,6 m³/h und Druckabfall 10 kPa.
Lösung:
Eine Linie zwischen 1,6 m³/h und 10 kPa ziehen. Dies ergibt einen Kv-Wert von 5. Danach eine waagrechte Linie vom Kv zur Skala für DN 25 ziehen = 2,35 Umdrehungen.

Achtung: Wenn der Durchflußwert außerhalb des Diagramms zu liegen kommt, kann die Ablesung folgenderweise erfolgen: Ausgehend von obigem Beispiel erhält man bei 10 kPa und Kv=0,5 einen Durchfluß von 0,16 m³/h und bei Kv=50 einen Durchfluß von 16 m³/h. Für jeden vorgegebenen Druckabfall kann somit der Durchfluß und der Kv-Wert als x 0,1 oder x 10 abgelesen werden.

Exemple

Diamètre de la vanne: soit DN 25
Débit: 1,6 m³/h. Perte de charge: 10kPa
Solution:
Tracer une ligne entre 1,6 m³/h et 10 kPa pour obtenir un Kv de 5. Tracer ensuite une ligne horizontale partant de ce Kv jusqu'à l'échelle correspondant à la vanne de DN 25, ce qui donne 2,35 tours.

N.B. Lorsque le débit est en dehors de l'abaque, procéder de la manière suivante:
Considérons une perte de charge de 10 kPa, un Kv de 5 et un débit de 1,6 m³/h. Pour 10 kPa et un Kv de 0,5 on a un débit de 0,16 m³/h. Pour 10 kPa et un Kv de 50 on a un débit de 16 m³/h. Par conséquent, pour toute perte de charge donnée, on peut lire soit 0,1, 1 et 10 fois le débit et le coefficient Kv car ils sont proportionnels l'un à l'autre.

Kv values

The values below or the diagram on page 9 may be used when calculating and dimensioning a piping system.

Kv-Werte

Bei der Berechnung und Dimensionierung von Rohrleitungssystemen können die untenstehenden Werte oder das Diagramm auf Seite 9 benutzt werden.

Valeurs Kv

Pour déterminer le diamètre et le préréglage des vannes d'équilibrage, on utilise les valeurs ci-dessous ou l' abaque de la page 9.

Kv-values for various presetting

Kv-Werte für verschiedene Voreinstellungen

Valeurs Kv pour différents préréglages

Number of turns Anzahl Umdrehungen Nbr de tours	DN								
	STA-DR 15 und 20	**STA-DR** 25	**STA-STAD-STADA** 10/09	15/14	20	25	32	40	50
0,5	—	0,210	—	0,127	0,511	0,60	1,14	1,75	2,56
1	0,107	0,361	0,090	0,212	0,757	1,03	1,90	3,30	4,20
1,5	0,172	0,520	0,137	0,314	1,19	2,10	3,10	4,60	7,20
2	0,362	1,02	0,260	0,571	1,90	3,62	4,66	6,10	11,7
2,5	0,645	1,85	0,480	0,877	2,80	5,30	7,10	8,80	16,2
3	1,16	3,00	0,826	1,38	3,87	6,90	9,50	12,6	21,5
3,5	1,78	3,70	1,26	1,98	4,75	8,00	11,8	16,0	26,5
4	2,00	4,01	1,47	2,52	5,70	8,70	14,2	19,2	33,0

Diagram

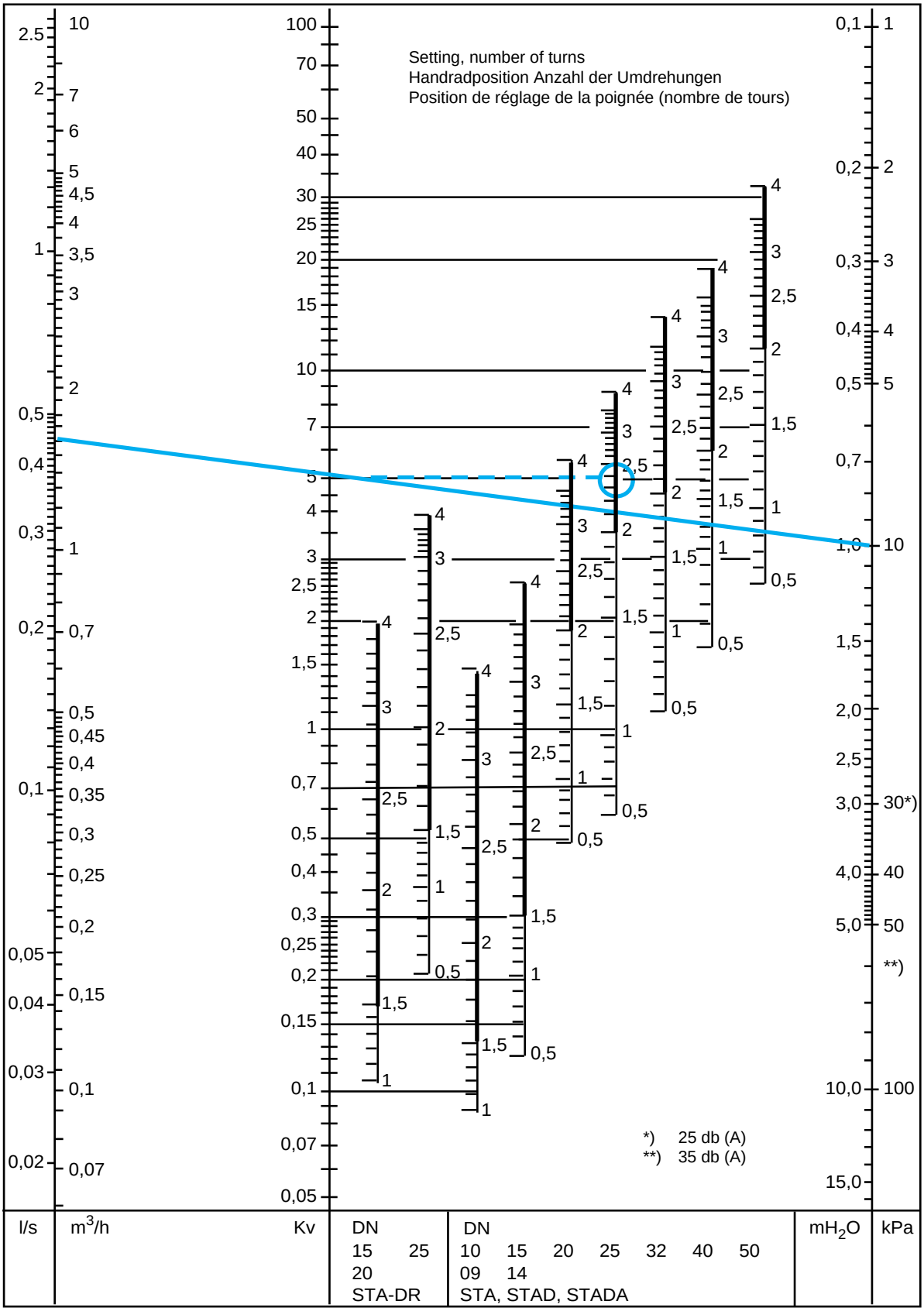
This graph shows the pressure drop over the pressure test point of the valve.
A straight line connecting the bars for flow rate, Kv and pressure drop shows the relationship between these variables.
The position for each valve size is arrived at by drawing a horizontal line from the Kv value obtained.

Diagramm

Dieses Diagramm zeigt den Druckverlust über dem Ventil.
Eine gerade Linie, welche die Skalen für Durchfluß - Kv -Druckabfall verbindet, dient als Zusammenhang zwischen den verschiedenen Werten.
Die Einstellposition für jede Ventilgröße erhält man durch Ziehen einer waagerechten Linie ausgehend vom errechneten Kv-Wert.

Abaque

Une ligne droite relie les échelles de débits, Kv et pertes de charge. Elle permet d'obtenir la correspondance entre les différentes données.
Détermination de la position de réglage en fonction d'un débit et d'une perte de charge donnés.
Pour avoir la position correspondant aux différentes dimensions de vannes, tracer une ligne horizontale au départ du Kv obtenu.




Settings
DN 10/09-15/14


Settings
DN 20-50

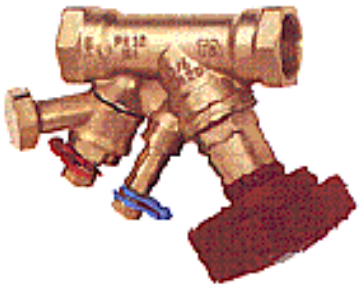

Settings
DN 15-25

Menu

Menu

307 781-01
97.10

STAD
MD 60 MD 61



Instructions for presetting

STAD, MD 60, MD 61
Fig. 1. Valve closed.
Fig. 2. Opened 2.3 turns.
Fig. 3. Fully open valve.

Presetting
The presetting of a valve for a certain pressure drop (e.g. corresponding to the presetting position 2.3) should be carried out as follows:

1. Close the valve fully (Fig. 1).
2. Open the valve 2.3 turns (Fig. 2).
3. Using a 3 mm Allen key, turn the inner spindle clockwise to its end position.
4. The valve is now preset.

A pressure drop diagram is available for each valve size, showing the pressure drop curves for various settings and flows.

→ = Recommended direction of flow for best accuracy.

Draining
There is a recess for a 5 mm Allen key under the cover **A**.
Turn 8-14 turns to drain.

Installation of draining kit (fig. 4)*
Fit drainage nipple by unscrewing cover **A** and nut **B***. Then pull off sleeve **C** and fit the turnable drainage nipple **D**. Finally refit nut **B** and cover **A**.

***) NOTE! New gaskets shall be fitted.**

Anleitung zur Voreinstellung

STAD
Bild 1. Ventil geschlossen.
Bild 2. Ventil 2,3 Umdrehungen geöffnet.
Bild 3. Ventil voll geöffnet.

Voreinstellung
Die Einstellung eines Ventiles für einen bestimmten Druckverlust, der z.B. der Position 2,3 entspricht, geschieht folgendermaßen:

1. Ventil völlig schließen (Bild 1).
2. Ventil bis zur gewünschten Einstellung 2,3 öffnen (Bild 2).
3. Mit dem Innensechskantschlüssel (3 mm) ist die Innenspindel im Uhrzeigersinn bis zum Anschlag zu drehen.
4. Das Ventil ist jetzt voreingestellt.

Für jede Ventilgröße sind Druckverlustdiagramme vorhanden, die den Druckverlust bei unterschiedlichen Voreinstellungen und Durchflußmengen zeigen.

→ = Empfohlene Durchflußrichtung für größtmögliche Meßgenauigkeit.

Entleerung
Unter der Kappe **A** befindet sich ein 5 mm Innensechskant.
Zur Entleerung öffnen Sie 8-14 Umdrehungen.

Montages des Entleerungsadapters (Bild 4)*
Bei nachträglicher Entleerungssatzmontage **D**, die Kappe **A** und Mutter **B*** entfernen. Dann die Hülse **C** abziehen und Entleerungssatz **D** aufstecken. Mutter **B** und Kappe **A** anschließend wieder aufschrauben.

***) ACHTUNG: Neue Dichtungen montieren.**

Recommended installation
Empfohlene Installation

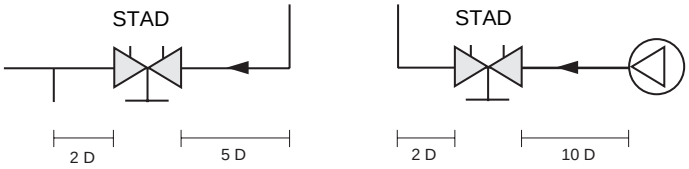
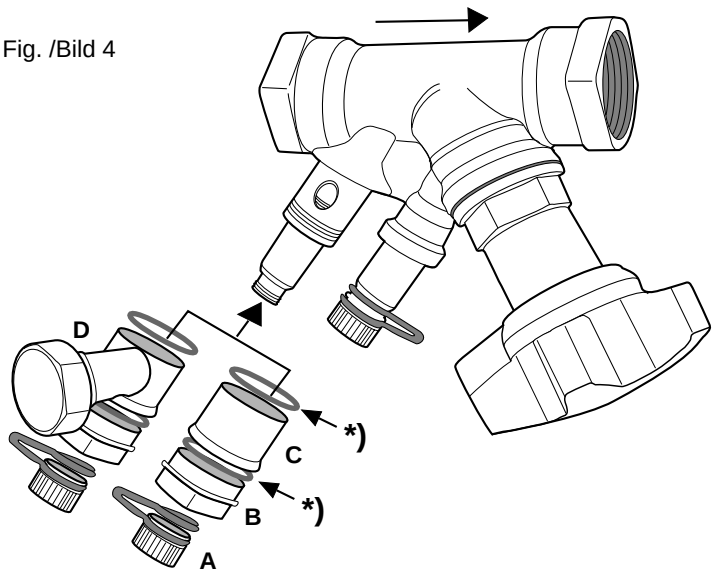


Fig. /Bild 1 Fig. /Bild 1 Fig. /Bild 1

Fig. /Bild 4



Menu

STA, STAD, STAF-SG (DN 20-50)

303 559-01
97.12

Byte av ratt

Exchange of handwheel

Auswechselung des Handrades

Echange de la poignée

Verwisselen van het handwiel

Käsipyörän vaihto

Udskiftning af håndhjul

Svensk

1. Stäng ventilen helt.
2. Demontera befintlig ratt utan att ändra inställning.
   (Dra loss ratten, eventuell rattskruv lossas först).
3. Montera ny ratt (inställd på 0,0).

English

1. Close the valve fully.
2. Dismantle existing handwheel, without changing the setting.
   (Pull off the handwheel. If there is a handwheel screw, undo first).
3. Assemble new handwheel (Position 0,0).

Deutsch

1. Das Ventil ganz schliessen.
2. Das Handrad abnehmen, ohne dabei die Voreinstellung zu verändern.
   (Das Handrad abziehen; falls vorhanden, Handradschraube vorher entfernen).
3. Neues Handrad aufstecken (Einstellung 0,0). Alte Handrad type bitte festschrauben.

Français

1. Fermer complètement la vanne.
2. Démonter la poignée existante sans changer le réglage.
   (Retirer la poignée. Si nécessaire, déviser l'écrou).
3. Placer la nouvelle poignée (Position 0,0).

Nederlands

1. Sluit de afsluiter volledig.
2. Verwijder het handwiel zonder de instelling te wijzigen.
   (Trek het handwiel eraf. Als er een schroef inzit, schroef deze er dan eerst uit).
3. Breng het nieuwe handwiel aan (Position 0,0).

Suomi

1. Sulje venttiili täysin.
2. Poista käsipyörä muuttamatta venttiilin esisäätöasentoa.
   (Irrota kahvanruuvi ja vedä kahva pois).
3. Asenna uusi käsipyörä (Asennossa 0,0).

Dansk

1. Luk ventilen helt.
2. Demonter det eksisterende håndhjul uden at ændre på indstillingen.
   (Håndhjulet trækkes løs, evt. topskrue løsnes først).
3. Monter det nye håndhjul (Indstilling på 0,0).
4. Ventilen åbnes igen **så meget som muligt** - tallene angiver da, hvilken forindstilling ventilen har. Sort skala = hele omdrejninger - rød skala = tiendedele af en omdrejning. Viser **sort** skala 3 og **rød** skala 4 er ventilen forindstillet på 3,4 (4,0 angiver åben ventil - ikke forindstillet og 0,0 angiver lukket ventil).

Menu

CBI^{II}

Balancing Instrument
Einregulierungs-Meßcomputer
Appareil d'équilibrage à microprocesseur

7-5-5

1998.09

Technical description

CBI^{II} is a computer programmed balancing instrument. It consists of an electronic differential pressure gauge and a micro computer which has been programmed with the TA valve characteristics which makes possible a direct reading of flow and differential pressures.
The CBI^{II} has two main components:
- An instrument which contains a micro computer, input touch pad, LCD display and re-chargeable NiMh batteries.
- A sensor unit which contains a piezo-resistive pressure sensor, one measurement valve and connections. The measurement valve has a safety function which protects the sensor from too high differential pressures.

Measurement range:
Total pressure: max 2 500 kPa.
Differential pressure: -9 to 200 kPa.
Flow: During flow measurements the pressure range is 0.5 to 200 kPa.
Temperature: -20 to 120°C

Temperature liquid medium:
-20 to 120°C

Measurement deviation:
Differential pressure: 0.2 kPa or 1% of reading, whichever is the highest.
Flow: As for differential pressure + valve deviation.
Temperature: <0.2°C + sensors' deviation.

Effective operating time:
8 to 10 h between charges depending upon application.

Ambient temperature for the instrument:
0 to 40°C (during operation)
-20* to 60°C (storage)
5 to 40°C (charging)
*) Do not leave water in the sensor when there is a risk of freezing.

Technische Beschreibung

CBI^{II} ist ein Meßcomputer zur Einstellung von Einregulierungsventilen. Er besteht aus einem elektronischen Differenzdruckmesser und einem Mikrocomputer. Sämtliche Kennlinien der TA-Einregulierungsventile sind im CBI^{II} gespeichert. Damit ist eine unmittelbare Umrechnung und Anzeige aller gemessenen Druck-, Differenzdruck- und Durchflußwerte möglich.
CBI^{II} besteht aus zwei Hauptteilen:
- Instrumententeil mit Mikrocomputer, eingebauter Tastatur und LCD-Anzeige sowie aufladbaren NiMh Batterien.
- Gebereinheit mit Druckgeber in piezoresistiver Ausführung, einem Meßventil und zwei Anschlußen. Das Meßventil enthält eine Absicherung des Gebers vor zu hohen Differenzdrücken.

Meßbereich:
Systemdruck: Maximal 2 500 kPa
Differenzdruck: -9 – 200 kPa
Durchflußmenge: Meßbar in einem Druckbereich zwischen 0,5 – 200 kPa
Temperatur: -20 – 120°C

Temperatur des flüssigen Medium:
-20 – 120°C

Meßfehler:
Differenzdruck: 0,2 kPa oder 1% von der abgelesenen Anzeige (jeweils höchster Wert).
Durchflußmenge: Nach den Angaben für Differenzdruck + Ventilabweichung.
Temperatur: <0,2K + Geberabweichung.

Effektive Betriebszeit:
8 – 10 h zwischen zwei Aufladungen, je nach Einsatz.

Umgebungstemperatur des Instruments:
0 – 40°C (bei Betrieb)
-20* – 60°C (im Lager)
5 – 40°C (beim Aufladen)
*) Bei Frostgefahr den Geber völlig entleeren!

Caractéristiques techniques

Le CBI^{II} est un appareil à microprocesseur programmé pour l'équilibrage des installations de chauffage et de climatisation. Il se compose d'un manomètre différentiel électronique et d'un micro-ordinateur. Le logiciel, conçu d'après les caractéristiques des vannes TA, permet d'indiquer directement le débit après une mesure de la pression différentielle.
L'appareil est composé de deux parties:
- L'instrument proprement dit, qui comprend un micro-ordinateur, un clavier et un écran d'affichage LCD ainsi que des batteries NiMh rechargeables.
- L'unité de mesure comporte un transmetteur de pression différentielle du type piézorésistif, une vanne manifold et des raccordements.
  Le manifold est équipé d'une sécurité protégeant le détecteur contre des pressions différentielles importantes.

Plage de mesure:
Pression statique maximale: 2 500 kPa
Pression différentielle: de -9 à 200 kPa
Débit: La plage de pression utilisable est 0,5 et 200 kPa lors de la mesure du débit.
Température: de -20 à 120°C

Température du milieu liquide:
-20 à 120°C

Erreur de mesure:
Pression différentielle: La marge d'erreur est la plus élevée des valeurs ci-après: 0,2 kPa d'une part et 1% de la valeur mesurée d'autre part.
Débit: idem + tolérance de la vanne.
Température: <0,2°C + tolérance de la sonde.

Durée d'utilisation effective:
Entre deux recharges successives:
8 à 10 h, selon l'utilisation.

Température ambiante pour l'appareil:
En service: 0 à 40°C
En stockage: -20* à 60°C
En recharge: 5 à 40°C
*) Ne pas laisser d'eau dans le transmetteur en cas de risque de gel.

Menu

CBI^{II}, complete
CBI^{II}, komplett
CBI^{II}, complet

TA No/TA Nr/No TA	Language/Sprache/Langue
52 197-001	SE
52 197-002	GB
52 197-003	DK
52 197-004	NO
52 197-005	FI
52 197-006	DE
52 197-007	FR
52 197-008	NL
52 197-009	ES
52 197-010	CZ
52 197-011	PL
52 197-012	RU
52 197-013	HU

Function

Differential pressure measurement
Sensor for high total pressures and low differential pressures gives quick results and reliable readings.

Temperature measurement
A Pt 1000 temperature sensor which allows measurement direct in the media is included.

Automatic calibration
When the sensor is connected and the instrument switched on, the sensor is automatically calibrated before each measurement sequence.

Automatic venting
The design of the sensor unit and a short flow-through during calibration eliminate measurement errors caused by insufficient venting.

Balancing
The instrument is programmed to calculate pre-setting values for balancing and also the TA Method and TA Balance.

PC communication
Measured values can be saved in the CBI^{II} and then transferred to a PC for printout as a commissioning report. It is also possible to prepare the measurements by describing the system in the PC and then download the data to the CBI^{II}. A PC program is included for this purpose.

Media correction
CBI^{II} can calculate flows with different contents of glycol or similar anti-freeze additives in the water.

Trouble shooting
CBI^{II} can log differential pressures, flows or temperatures: up to 24 000 measured values can be logged. With appropriate choice of logging interval, this means that periods from 20 hours to 65 days can be covered.

Funktion

Differenzdruckmessung
Der Geber für hohe Gesamtdrücke und niedrige Differenzdrücke liefert schnelle und zuverlässige Werte.

Temperaturmessung
Das Gerät verfügt über einen Pt 1000 Temperaturfühler, mit dem direkte Messungen im Medium durchgeführt werden können.

Automatische Kalibrierung
Bei eingeschalteter Geber- und Instrumenteneinheit kalibriert sich der Geber automatisch vor jedem Meßvorgang.

Automatische Entlüftung
Die Ausführung des Druckgebers und die Tatsache, daß der Geber während des Kalibrierens durchströmt it, verhindern Meßfehler aufgrund von mangelhafter Entlüftung.

Einregulierung
Das Instrument ist für die Berechnung von Voreinstellwerten zum Einregulieren und auch für die TA Methode und TA Balance programmiert.

PC-Kommunikation
Die gemessenen Werte können im CBI^{II} gespeichert und zum Ausdruck eines Einregulierungsprotokolls auf einen PC überspielt werden. Um eine Messung vorzubereiten, ist es ebenfalls möglich, die Systemdaten im PC einzugeben und diese Werte auf das CBI^{II} zu überspielen. Das entsprechende PC-Programm ist im Lieferumfang enthalten.

Mediumskorrektur
Das CBI^{II} kann ebenfalls die Durchflußmenge bei verschiedenen Prozentgehalten von Glykol oder ähnlichen Frostschutzmitteln durchführen.

Problemlösung
Das CBI^{II} kann Drücke, Durchflußmengen oder Temperaturwerte aufzeichnen. Es können bis zu 24.000 Meßwerte gespeichert werden. Bei diesen Langzeitmessungen kann das Meßintervall vorgegeben werden. Dadurch ist es möglich, Meßperioden zwischen 20 Stunden und 45 Tagen zu erzielen.

Fonctions

Mesure de la pression différentielle
La précision des mesures est conservée, même en cas de faibles pressions différentielles et de pression statique élevée.

Mesure de la température
Une sonde Pt 1000 qui permet la mesure directe de la température du fluide est incluse.

Calibrage automatique
Lorsque le transmetteur est raccordé et l'appareil branché, il y a un calibrage automatique et permanent du transmetteur avant chaque série de mesures.

Purge automatique
La conception du capteur ainsi qu'une circulation de débit pendant la calibration permet d'éliminer les erreurs de mesure dûes à une purge insuffisante.

Equilibrage
L'instrument est programé pour calculer les valeurs de préréglage, la détermination par abaque, ainsi que pour la méthode REGIS.

Connexion à un PC
Les valeurs mesurées peuvent être mémorisées dans le CBI^{II} puis transférées vers un PC pour l'édition du rapport d'équilibrage. Il est également possible de transférer la liste des vannes référencées dans le PC vers le CBI^{II}. Pour cela un logiciel est inclus.

Correction en fonction de la viscosité
Le CBI^{II} peut tenir compte du type de fluide utilisé (glycol ou autres) pour déterminer précisément les débits.

Enregistrement continu
Le CBI^{II} peut être utilisé comme enregistreur de débit, pression ou température. Il peut mémoriser jusqu'á 24 000 données qui suivant le pas de temps choisi, détermine une periode d'enregistrement de 20 heures à 65 jours.

Menu

Balancing

See the following manuals for descriptions of various adjustment methods:

Manual no. 1: Balancing control circuits
Manual no. 2: Balancing distribution systems
Manual no. 3: Balancing radiator system
Manual no 4: Stabilising differential pressure

Total hydronic balancing

TA BALANCE
This method involves balancing the circuits (the modules) separately. Measure each valve at two settings: the prescribed position, and closed. When all the valves in the module have been measured, the CBI^{II} will calculate the settings and assign a pressure drop of 3 kPa to the least favoured valve.

TA Method
In the TA Method you first choose the valve which is furthest away in the circuit as a reference valve. Using the main valve for this entire circuit, maintain a constant differential pressure during the course of the operation (for example 3 kPa) at the correct flow through the reference valve. Then, set the correct flow rate in the remaining valves in this circuit successively starting with the second furthest valve from the pump.

When all circuits are ready proceed with the main line. When the entire installation is balanced all valves have the correct flow. If it has been necessary to throttle a valve in series with the pump, adjust the pump or change to one with the correct capacity.

Einregulierung

Zur Beschreibung der verschiedenen Einregulierungs-Verfahren siehe:

Handbuch Nr. 1: Die hydraulische Einregulierung von Regelkreisen
Handbuch Nr. 2: Die hydraulische Einregulierung von Verteilungsystemen
Handbuch Nr. 3: Einregulierung von Heizkörpersystemen
Handbuch Nr. 4: Stabilisierung des Differenzdruckes

Einregulierung – Total

TA BALANCE
Mit diesem Verfahren werden einzelne Kreise, sogenannte Einregulierungs-einheiten, unabhängig voneinander einreguliert. Jedes Ventil wird zweimal gemessen, und zwar einmal in der berechneten Voreinstellposition und beim zweiten Mal in geschlossenem Zustand. Wurden alle Ventile einer Einregulierungseinheit gemessen, wird mit Hilfe des CBI^{II}-Computers die richtige Voreinstellung berechnet, wobei das Ventil mit dem kleinsten Durchfluß-widerstand mit einem Druckverlust von mindestens 3 kPa ausgelegt wird.

TA Methode
Bei der TA Methode wählt man das am weitesten von der Pumpe entfernte Ventil eines Heizkreises als Referenz-ventil aus. Mit Hilfe des Partnerventils für diesen Heizkreis wird während der gesamten Einregulierung sichergestellt, daß ein Mindestdifferenzdruck von z.B. 3 kPa bei der richtigen Durchflußmenge an diesem Referenzventil gehalten wird, während der Reihe nach die übrigen Ventile dieses Kreises eingestellt werden.

Nach Einregulierung aller Kreise werden dann die entsprechenden Hauptleitungen nach dem gleichen Prinzip eingestellt. Nach Abschluß der Einregulierung steht in allen Bereichen die richtige Durchflußmenge zur Verfügung. War es im Zusammenhang mit der Einregulierungsarbeit notwendig, ein Hauptventil an einer Umwälzpumpe zu drosseln, empfiehlt es sich bei regelbaren Pumpen, diese auf einen niedrigeren Wert einzustellen oder die vorhandene Pumpe gegen eine solche mit optimaler Leistung auszutauschen.

Équilibrage

Pour la description des différentes méthodes d'équilibrage, voir:

Manuel no 1: Comment équilibrer hydrauliquement les circuits de régulation
Manuel no 2: L'équilibrage des systèmes de distribution
Manuel no 3: L'équilibrage des systèmes de radiateurs
Manuel no 4: Stabilisation de la pression differentielle

L'équilibrage hydraulique global

Equilibrage selon la méthode REGIS
Cette méthode permet d'équilibrer une installation à l'aide d'un seul technicien muni d'un CBI^{II}. Il effectue deux mesures sur chaque vanne: l'une pour une position quelconque de par exemple 50%, l'autre à la position fermée. Une fois toutes les mesures effectuées, le CBI^{II} calcule le réglage relatif de toutes les vannes d'équilibrage en attribuant une perte de charge minimale à la vanne d'équilibrage du circuit le moins favorisé.

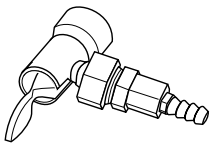
Méthode compensée TA
Celle-ci consiste à choisir comme vanne de référence la vanne du module la plus éloignée de la pompe. La vanne de compensation qui gère l'ensemble du module permet de maintenir constante, pendant l'opération d'équilibrage, une pression différentielle donnée – par ex. 3 kPa, pour le débit souhaité, à travers la vanne de référence. On régle à tour de rôle les autres vannes du module, pour le débit désiré, en commençant par l'avant-dernière par rapport au circulateur, tout en maintenant constant les 3 kPa de la vanne de référence.

Après en avoir terminé avec l'ensemble des circuits partiels, on procéde de façon similaire avec la distribution principale. L'ensemble de l'installation étant équilibré, on obtient partout les débits souhaités. Si, au cours de l'opération, il apparaît nécessaire de créer une forte perte de charge en série avec le circulateur, celui-ci devra être réglé ou bien remplacé par un circulateur de plus faible capacité.

Menu

Accessories/Zubehör/Accessoires

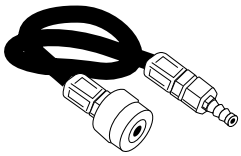
Measuring nipple, universal
Meßnippel, universal
Prises de pression, universelle



TA No/TA Nr/No TA

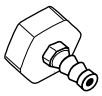
52 195-301

Measuring hose, extension
Meßschlauch, Verlängerung
Flexible de raccordement aux prises de pression, rallonge



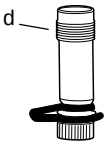
TA No/TA Nr No TA	Length/Länge Longueur
52 195-090	0,4 m (red/rot/rouge)
52 195-091	0,4 m (blue/blau/bleu)
52 195-092	3 m (extension/Verlängerung/rallonge)

Measuring nipple, thread connections 1/2 and 3/4
Meßnippel, Gewindeanschluß 1/2 und 3/4
Prises de pression, raccord femelle 1/2 et 3/4



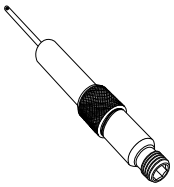
TA No/TA Nr No TA	
52 195-303	G1/2
52 195-304	G3/4

Measurement point
Meßnippel
Prise de pression



TA No TA Nr No TA	Length Länge Longueur	d	For valve Für Ventil Pour robinet
52 179-009	30 mm	1/4	STAF DN 20-50
52 179-609	90 mm	1/4	"
52 179-008	30 mm	3/8	STAF DN 65-300
52 179-608	90 mm	3/8	"

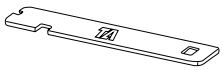
STAD, STADA, STA-DR, STAF, STAF-SG, STAF-R
Measuring nipple, extension 60 mm
Meßnippel, Verlängerung 60 mm
Prises de pression, rallonge 60 mm
Can be installed without draining of the system.
Kann ohne Systementleerung montiert werden.
Peut être installée sans devoir vidanger.



TA No/TA Nr
No TA

52 179 -006

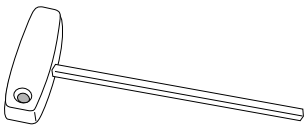
Key for measurement point
Schlüssel für Meßnippel
Clé pour prise de pression



TA No/TA Nr
No TA

52 187-004*

Allen key
Innensechkantschlüssel
Clé Allen



TA No/TA Nr
No TA

52 187-103*	3 mm	Presetting/Voreinstellung/Préréglage
52 187-105*	5 mm	Draining/Entleerung/Vidange

*) Included in the CBI^{II}.
Gehört serienmäßig zum CBI^{II}.
Livré avec le CBI^{II}.

Menu

Caution
Before you take the pressure switch into operation, make sure to read these operating instructions thoroughly. In the event of damages due to the nonobservance of these instructions, improper operation or use of the switch for purposes for which it is not intended, the warranty becomes null and void. We shall not be held liable for resultant consequential damages.
The switch is to be installed and removed by technicians only.
The applicable certified national safety regulations for the operation of pressure measuring devices shall be observed.
In the installed condition the respective devicespecific requirements on the type of protection must be fulfilled.

Calibration
Note: Only versions that have the number 1 in the fifth place after the point in the product number **(691.XXXX1XXXX)** can be calibrated.

3
▲

Factory setting
Pressure 0, output signal 0 or 4 mA or 15 - 25 mV (typically 20 mV) with voltage output.
Maximum pressure = maximum output signal.

Calibration options (example fig. 2)
A = Standard Output signal
B = Calibration range

Zero point with potentiometer, varnished white (fig. 3)
With pressure 0, the output signal (A) can be adjusted by + 10 % fs. However, with 0 - 10 V versions at a pressure of 10 % fs, the +/- 10 % adjustment has a low limit of 20 mV (B).

Slope with potentiometer, varnished red (fig. 3), +/- 10 % of the full scale output, can be adjusted with application of appropriate pressure.

Calibration procedure
– Make electrical connection according to diagrams in fig. 1.
– Unscrew four connector fastening screws, pull off connector to render potentiometers accessible.
– With pressure regulator of class 0.6 or better apply lower pressure.
– Adjust zero point output signal with zero point potentiometer (varnished white, fig. 3).
– Apply desired upper pressure and adjust output signal with slope potentiometer (varnished red, fig.3).
– Repeat this process two or three times until the values are within the tolerance range.
– After the calibration apply varnish to all potentiometers again.

Seal tight connection part.

Fig. 1

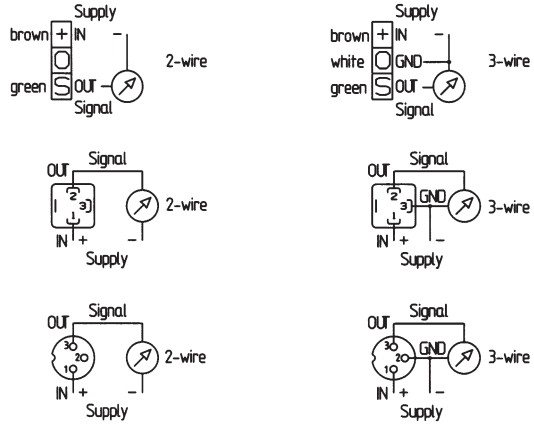


Fig. 2

NP ◢

A	P = 0	P = 10% FS	P = 60% FS	P = 80% FS	P = 100% FS
0 - 10V	20mV-1V	20mV - 2V	5.4 - 6.6V	7.2 - 8.8V	9 - 11V
0-20mA	0 - 2 mA	0 - 4mA	10.8-13.2mA	14.4-17.6mA	18-22mA
4-20mA	2.4-5.6mA	4-7.2mA	12.6-14.6mA	15.5-18.1mA	18.4-21.6mA
	B	B	B	B	B

Caution!
GND and case have only a capacitive, but not an electrical connection.

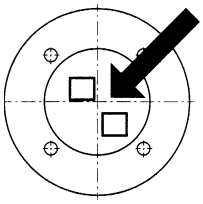


Fig. 3

NP
varnished white ◢
varnished red

Electromagnetic compatibility

Type of interference	Test standard	Effects
Electrostatic discharge	IEC 1000-4-2 / 8 kV air discharge 4 kV contact discharge	no failure (criterion B)
High-frequency electromagnetic radiation (HF)	ENV 50140 / 10 V/m / 80 ... 1 000 MHz	no effect (criterion A)
Conducted HF interference	ENV 50141 / 10 V/m / 0.15 – 80 MHz	no effect (criterion A)
Fast transients (burst)	IEC 801-4 / 2 kV	no failure (criterion B)
Magnetic fields	EN 61000-4-8 / 50 Hz 30 A/m	no effect (criterion A)
Conducted interference Radiation from housing	EN 55022 / 0.15 ... 30 MHz 30 ... 1 000 MHz, 10 meters	no effect no effect

FICHE TECHNIQUE

KSB

Pompes et Robinetterie

Date: 08.08.00
No. de demande
Repère client
No. d'offre
Poste 5

Pompe multi-étage avec entraînement magnétique
MTM-S2 2/3 C/110-20

Nombre pièces 1
Entraînement Moteur-E

CARACT. DE SERVICE

Débit	4	m3/h	Produit	Eau	
Débit min. admissible	1.02	m3/h	Solides		
Hauteur refoulement	46.2	m	Température (t/A)	20	C
NPSH installation		m	Densité (t/A)	0.998	kg/dm3
NPSH pompe	0.600	m	Viscosité (t/A)	1	mm2/s
Pression de vapeur (t/A)	0.0230	barabs	Vitesse de calcul	2900	1/min
Pression aspiration	0.100	bar	Puissance absorbée	2.81	kW
Pression sortie ppe.	4.39	bar	Puissance moteur	4	kW
Press. serv. adm. (t/A)	25	bar			

EXECUTION

nombre d'étages	2		
Roue dernier étage			
Sens rot. vu entraînement = sens horaire			
Support de palier	P02		
Entraînement magnet.	110-20		
Bride aspiration DN	50	mm	
Bride refoulement DN	32	mm	
Usiné PN 25	EN 1092		

Dégazage	auto-dégazant	
Vidange du corps		
Raccord p. manomètre	-	
Palier Roulem. / graisse		
Mode fonc. version normale		
Pression de rinçage	-	bar
Liquide de blocage	-	

ACCESSOIRES

Accouplement	Eupex	Moteur-E IM B3	50 Hz, 400/690V
Type / taille	N / 080	Taille IEC / classe isol.	112M / F
Douille intermédiaire		Marque	VEM
Socle/rail	1A	Protection moteur	IP55
		Classe température	-
Controle du débit ppe.	-	Exécution VIK	-
PT 100	-	Thermistance PTC	avec
		Entraînement fourni par	KSB

MATERIAUX

Corps de pompe	JS1025	Arbre pompe	1.4462
Corps d'aspiration	JS1025	Arbre d'entraînement	C 45N
Corps d'étage	C22.8	Palier lisse	SSiC
Roue/diffuseur	JL1040	Joints	PTFE
Couvercle de corps	C22.8	Socle/rail	acier
Lanterne-palier	JL1040	Accouplement	JL1040
Chemise d'entrefer, bride	1.4570	Prot. d'accouplement	acier
Chemise d'entrefer, tuyau/fond	2.4610 / 1.4462	Boulons scellement	acier

KSB

Pompes et Robinetterie

FICHE TECHNIQUE

Date: 08.08.00
No. de demande
Repère client
No. d'offre
Poste 5

Pompe multi-étage avec entraînement magnétique
MTM-S2 2/3 C/110-20

Nombre pièces 1
Entraînement Moteur-E

SUPPLEMENTS A LA FICHE TECHNIQUE

Conduite de vidange du corps: - :
-

Chauffage:

Chauffage pour: -

PEINTURE / EMBALLAGE / PLAQUES

Peinture/peinture spéciale

peinture standard, couche de finition epoxyde
RAL 5002, outremer bleu

Couche finition = peinture spéciale
Peint. spéciale 1ére couche de fond
Peint. spéciale 2e couche de fond

Emballage

emballage standard (sur bois)

Plaques

francais

Accessoires spéciaux

DOCUMENTATION, CERTIFICAT, ESSAI DE CONSTRUCTION

Pompes et Robinetterie

Date: 08.08.00
No. de demande
Repère client
MTM-S2 2/3 C/110-20

No. d'offre
Poste 5

DOCUMENTATION

Adresse client

KSB Zürich AG
Succursale de Vevey
46, Rue d'Italie
1800 Vevey
CHF

Adresse bureau d'étude

	Client (nombre / langue)	Bureau d'étude (nombre / langue)
Documentation	1 franzoesisch	-
Certificats matière	1 franzoesisch	-
Essais de construction	1 franzoesisch	-

Documentation comprenant:
feuille technique, notice de service,certificat de conformité,
plan d'installation,
1 exemplaire de la documentation accompagne la pompe.

CERTIFICATS MATIERE 2.2 SELON EN 10204

Composants princip.		Etendue fourniture	avec
Repère	Composant	Matériau	Code
101	Corps de pompe	JS1025	
106	Corps d'aspiration	JS1025	10
108	Corps d'étage	C22.8	3
210.01/03	Arbre	JL1040	22
82-15	Chemise d'entrefer (bride/tuyau/fond)	1.4571 / 2.4610 / 1.4462	24/45/22
818.01	Rotor interne	1.4539/1.4571	23/24

Autres composants		Etendue fourniture	sans
Repère	Composant	Matériau	Code
344	Laterne-palier	JL1040	

ESSAIS DE CONSTRUCT. 3.1B SELON EN 10204	Etendue fourniture	avec
Essai de pression pompe complète	-	
Eau 20 °C, durée d'essai 15 min., press. d'épreuve	-	bar
Essai hydraulique	sans présence du client	
Contrôle dimensionnel et inspection visuelle	-	
	-	
Réception finale	-	
Démontage et contrôle des jeux fonctionnels	-	
Contr. équilibrage roue selon standard KSB	-	
Contrôle de vibrations	-	
Mesure de température aux paliers	-	
Réception / essais svt. plan qualité WBP no.	-	

KSB

Pompes et Robinetterie

FEUILLE DE PRIX

Date: 08.08.00
No. de demande
Repère client
Pompe multi-étage avec entraînement magnétique

MTM-S2 2/3 C/110-20

No. d'offre
Poste 5

Nombre pièces 1

PRIX / POIDS UNITAIRE

Pompe	5859	CHF	105 kg
Socle	677	CHF	43 kg
Accouplement	118	CHF	2 kg
Prot. d'accouplement	69	CHF	2 kg
Moteur-E	435	CHF	32 kg
Controle du débit ppe	-	CHF	
PT 100	-	CHF	
Tuyauterie	-	CHF	
Peinture / emballage	-	CHF	
Accessoires spéciaux	-	CHF	- kg
Total	**7158**	**CHF**	
Essai	198	CHF	
Total	**7356**	**CHF**	**184 kg**

PRIX TOTAL / POIDS TOTAL

Total 1 pièces	7356	CHF	
Documentation	-	CHF	
Certificats matière	156	CHF	
Total du poste	**7512**	**CHF**	**184 kg**

KSB

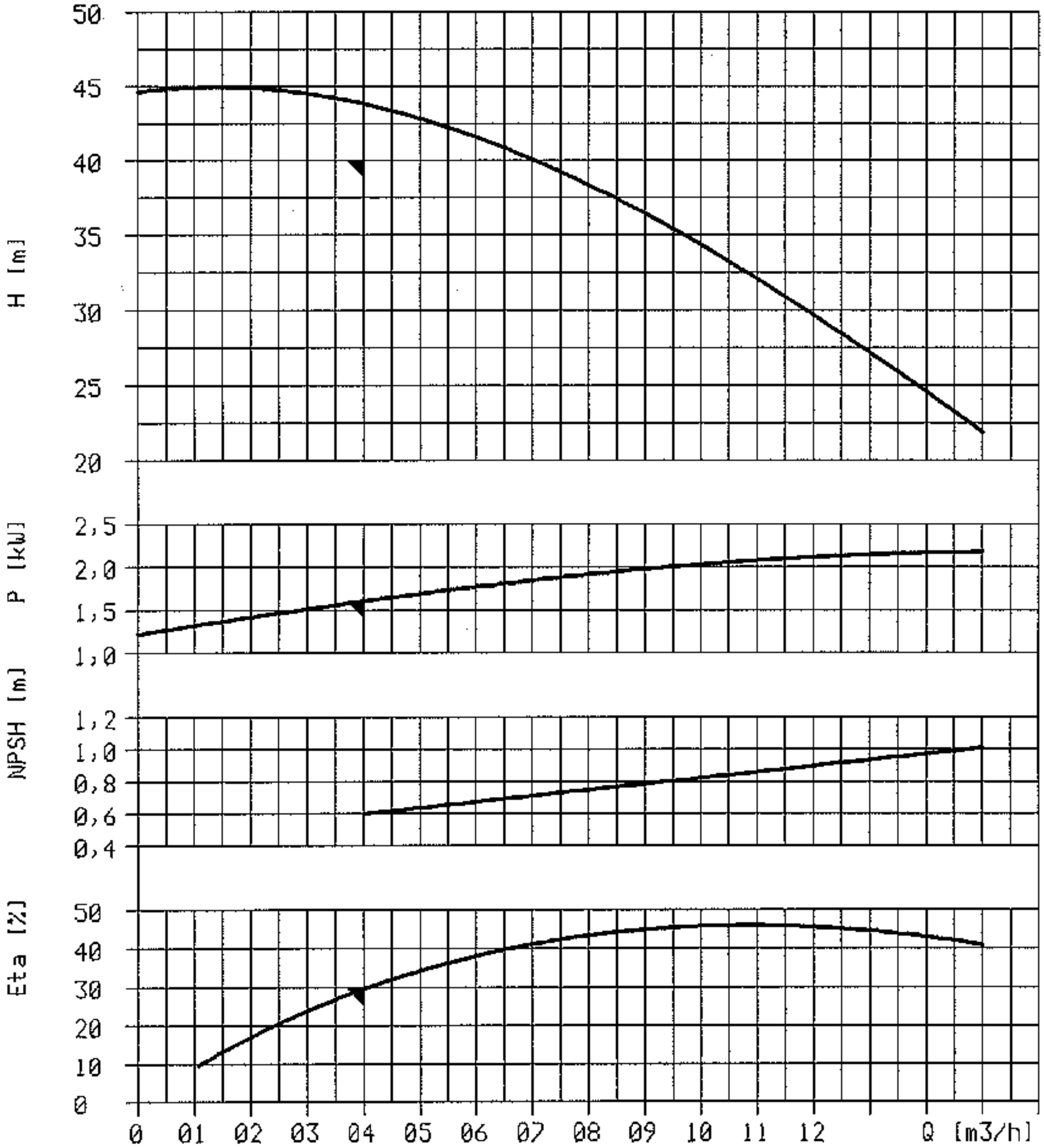
V.1.0.0

Pompes et Robinetterie

Date: 08.08.00
No. de demande:
Repère client:
Gamme: MTM-S2 2/3 C/110-20

No. d'ordre:
Poste: 5

Vitesse de calcul: 2900 1/min



* Valeurs obligatoires pour point nom. Voir fiche technique

Druckregler ohne Hilfsenergie

Régulateurs automoteurs de pression

Direct acting pressure regulators

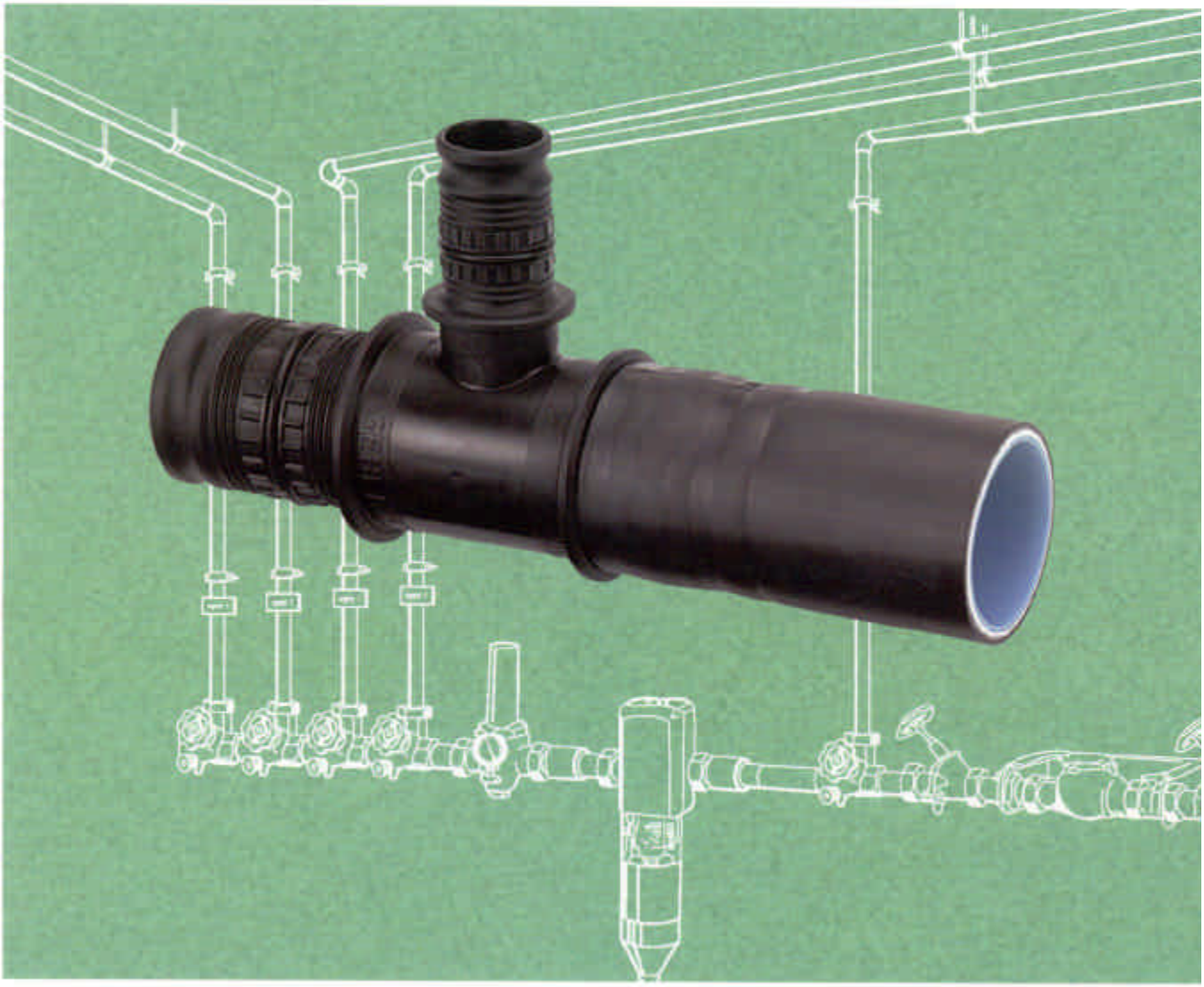
Typen *Types* Types	Druckminderer *Régulateur de pression aval* Output pressure regulator	Überströmregler *Régulateur de pression amont* Input pressure regulator	Differenzdruckregler *Régulateur de pression aval, amont ou différentielle* Input, output or differential pressure regulator	Druckminderer oder Überströmregler *Régulateur de pression aval ou amont* Output or input pressure regulator
Serie *Série* Series	5155	6155	5162 - 5362	5000 / CA 6000 / CA
Sollwert-Einstellung *Réglage de la consigne* Index value setting	Feder *Par ressort* By spring	Feder *Par ressort* By spring	Feder *Par ressort* By spring	Luftkissen *Par coussin d'air* By air cushion
Nennweite *Diamètre nominal* Connection	DN 15 - DN 200	DN 15 - DN 200	DN 15 - DN 200	DN 15 - DN 200
Nenndruck *Pression nominale* Nominal pressure	PN 16 - PN 40 ANSI 150 lbs - 300 lbs	PN 16 - PN 40 ANSI 150 lbs - 300 lbs	PN 16 - PN 40 ANSI 150 lbs - 300 lbs	PN 16 - PN 40 ANSI 150 lbs - 300 lbs
Gehäuse Corps Body	Guß GG 25 Stahl Edelstahl *Fonte* *Acier* *Acier inox* Cast iron Steel Stainless steel	Guß GG 25 Stahl Edelstahl *Fonte* *Acier* *Acier inox* Cast iron Steel Stainless steel	Guß GG 25 Stahl Edelstahl *Fonte* *Acier* *Acier inox* Cast iron Steel Stainless steel	GG 25 Stahl Edelstahl *Fonte* *Acier* *Acier inox* Cast iron Steel Stainless steel
Kegel *Obturation* Shutter	Metall/Metall Metall/PTFE *Métal/Métal Métal/PTFE* Metal/Metal Metal/PTFE	Metall/Metall Metall/PTFE *Métal/Métal Métal/PTFE* Metal/Metal Metal/PTFE	Metall/Metall *Métal/Métal* Metal/Metal	Metall/Metall Metall/PTFE *Métal/Métal Métal/PTFE* Metal/Metal Metal/PTFE
Antrieb *Actionneur* Actuator	Kunststoff-Membrane Faltenbalg *Membrane synthétique* *Soufflet métallique* Synthetic diaphragm Metal bellows	Kunststoff-Membrane Faltenbalg *Membrane synthétique* *Soufflet métallique* Synthetic diaphragm Metal bellows	Kunststoff-Membrane Faltenbalg *Membrane synthétique* *Soufflet métallique* Synthetic diaphragm Metal bellows	Kunststoff-Membrane Faltenbalg *Membrane synthétique* *Soufflet métallique* Synthetic diaphragm Metal bellows
Sollwertbereiche *Plage de réglage* Setting ranges	0,06 bar - 22 bar 0,06 bar - 22 bar* 0,06 bar - 22 bar*	0,06 bar - 22 bar 0,06 bar - 22 bar* 0,06 bar - 22 bar*	0,05 bar - 17 bar 0,05 bar - 17 bar* 0,05 bar - 17 bar*	0,05 bar - 35 bar Fernein stellbarer Sollwert *Possibilité de consigne à distance* *Faible différentielle de fonctionnement* Option of remote setting low operating differential

Fordern Sie Ihre detaillierten Unterlagen an.
Demandez vos notices détaillées.
Ask for detailed informations.

Sart von Rohr SA
25, rue de la Chapelle - F 68620 Bitschwiller-les-Thann
Tél. 33 3 89 37 79 50 - Fax 33 3 89 37 79 51

ZÜRCHER-TECHNIK
Automation und Verfahrenstechnik
Gewerbehaus Neumatt 6 - CH-4450 Sissach - Tel. 061/971 77 77 - Fax 061/971 70 10

Geberit Mepla
Système d'alimentation sanitaire



2/1997

Information sur le système

Nouveau avec raccords Mepla en matière synthétique

GEBERIT

Système d'alimentation Geberit Mepla

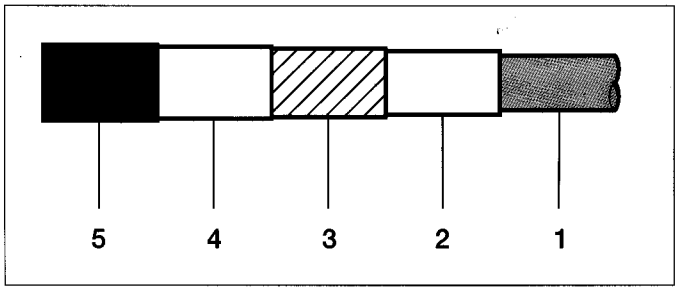
Le système Geberit Mepla a été conçu pour les installations d'alimentation en eau potable dans la technique du bâtiment. Il est utilisé pour les conduites d'alimentation en eau froide et chaude et possède des caractéristiques exceptionnelles en matière de façonnage et de résistance. Ainsi, le système Geberit Mepla répond à toutes les exigences d'une installation en eau potable moderne.

• Agrément du système
Le système d'alimentation Geberit Mepla dispose de l'agrément de la SSIGE pour les installations d'alimentation en eau potable. Le Geberit Mepla est également recommandé dans les installations de la protection civile.

• Convention sur les prestations de garantie
L'ensemble du système Geberit Mepla est soumis à la convention sur les prestations de garantie conclue entre Geberit et l'ASMFA et étendue au GRMFIS, pour autant que le façonnage soit exclusivement effectué avec des outillages Geberit Mepla ou avec des outillages d'autres marques testés et approuvés par Geberit.

Tubes Mepla et MeplaFlex

• Structure
1. Couche intérieure en tube PE-Xb réticulé au silane
2. Couche adhésive
3. Noyau en aluminium soudé sur la longueur
4. Couche adhésive
5. Matelas protecteur en PE



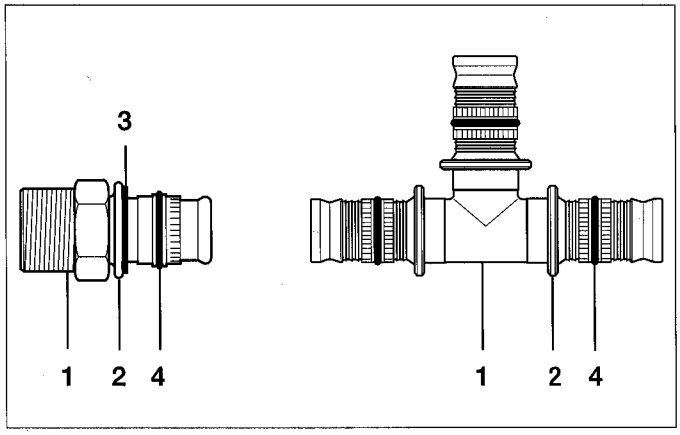
Tubes composites Mepla et MeplaFlex

• Caractéristiques
– de forme stable et pourtant flexible
– aucune corrosion intérieure ou extérieure
– coefficient de dilatation minime

Raccords Mepla

• Structure
1. Corps du raccord en PVDF ou en bronze
2. Rainure de guidage pour outillage
3. Anneau en PE (uniquement pour les raccords en bronze)
4. Joint torique en EPDM

• Propriétés
– résistance à la corrosion
– résistance élevée au viellissement
– résistance aux rayons UV



Raccords Mepla

Système d'alimentation Geberit Mepla

Assemblage Mepla à presser

L'assemblage à presser Mepla est une liaison radiale indémontable, agréée sans restrictions pour le montage sous crépi.

• Structure

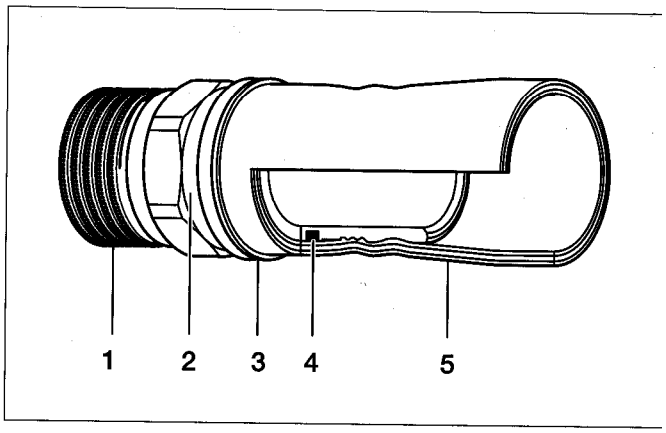
1. Corps du raccord
2. Rainure de guidage pour outillage
3. Anneau en PE (uniquement pour les raccords en bronze)
4. Joint torique en EPDM
5. Tube Geberit Mepla

• Caractéristiques

– assemblage propre et fiable
– positionnement clair des mâchoires de pressage
– résistance élevée au fluage
– profondeur d'emboîtement contrôlable en tout temps

• Système Geberit Mepla

Le système Geberit Mepla consiste en 3 composantes, tube, raccords et assemblage à presser. Les tubes et raccords Mepla qui s'adaptent parfaitement sont façonnés avec les outillages MEPLA, par assemblage à presser Mepla patenté pour les système Geberit Mepla. Les compléments au système comprennent des fixations Mepla adaptables ainsi qu'une technique de pose claire et simple.



L'assemblage Mepla à presser

Fiche technique des tubes Mepla

Tableau 601: Fiche technique des tubes MeplaFlex et Mepla

Désignation	Unité	MeplaFlex		Mepla					
Diamètre extérieur	mm	**16**	**20**	**16**	**20**	**26**	**32**	**40**	**50**
Diamètre intérieur	mm	11.5	15	11.5	15	20	26	33	42
Unité de raccordement	UR	4*	7	4*	7	20	55	180	540
Volume d'eau	l/m	0.104	0.177	0.104	0.177	0.314	0.531	0.855	1.385
Longueur par rouleau	m	50	50	-	-	50	-	-	-
Longueur par barre	m	-	-	5	5	5	5	5	5
Poids du tube	kg/m	0.135	0.185	0.135	0.185	0.300	0.415	0.595	0.840
Poids du tube et du tube de protection	kg/m	0.185	0.260	-	-	-	-	-	-
Poids du tube avec eau 10 °C	kg/m	0.239	0.362	0.239	0.362	0.614	0.946	1.450	2.225
Dilatation	mm/mK	0.026							
Conductibilité thermique	W/mK	0.43							
Capacité thermique C	kJ/mK	0.216	0.296	0.216	0.296	0.480	0.664	0.952	1.334
Indice de combustion		4.2							
Rayon de courbure recommandé	cm	8	10	8	10	13	16	20	25

* – 2 UR: longueur max. de tube admissible 12 m (valeur unitaire maximale)
– 3 UR: longueur max. de tube admissible 8 m
– 4 UR: longueur max. de tube admissible 5 m

AV42 to 45 P: Pneumatic valve drive

For activating the valves of the V6 . , B6 . , VX . und BX . , series in continuous or open/closed control systems.
Housing and fixing bracket of light alloy; rubber diaphragm with inlaid fabric; drive spindle of stainless steel with coupling piece and stroke indicator; direction of movement can be changed by fitting accordingly (factory setting: spindle normally retracted; fitting method E, valve closed); compressed-air connection Rp ⅛, female thread (AV45 P: Rp ¼**)**.

Type	For valveswith stroke of mm	Air consumption for 100 % stroke l_n	Control span [1] bar	Effective drive area cm²	Weight kg
AV42 P10 F001	14	0.5	0.6	125	2.3
AV42 P30 F001 [2]	14	0.4	0.32	125	2.3
AV43 P10 F001	14	0.9	0.32	250	4.6
AV43 P15 F001	14	1.2	0.6	250	5.2
AV43 P30 F001	40	2.2	0.6	250	4.9
AV44 P10 F001	14	1.5	0.21	500	11.3
AV44 P20 F001	40	4.2	0.6	500	11.4
AV45 P10 F001	40	8.0	0.35	1000	33.8
AV45 P15 F001	40	9.5	0.6	1000	38.6

Control pressure [3]	0...1.2 bar	Dimension drawing	M274951
Max. pressure	1.5 bar	Fitting instructions	
		Assembly	MV 40.136
Permissible ambient temp.	–15...50 °C	Valve/drive	MV 43190
Temperature at the diaphragm	max. 70 °C		

Accessories

XSP 31	Positioner [4] (see Section 79)
XSP 31G	Positioner [4], in protective housing (see Section 79)
XAP 1	Aux. contact unit [4] (see Section 79)
XAP 2	Potentiometer unit [4] (see Section 79)
XUEP	Electro-pneumatic pulse converter with mini-compressor (see Section 79)
XEP	Electro-pneumatic converter [4] for continuous signals (see Section 69)
274520 000	Manual-adjustment facility [5] for AV42 P; Weight 0.6 kg; MV 7326
274521 000	Manual-adjustment facility [5] for AV43 and AV44 P; Weight 1.7 kg; MV 7326
274522 000	Manual-adjustment facility [5] for AV45 P; Weight 5.2 kg; MV 7326

*) Dimension drawing for accessory is available under the same number

Assembly material for valve series V6 . , B6 . und B16 .

Drive type	XSP 31	XSP 31 G	XAP	XEP
AV42 P10, AV42 P30	226504 002	226532 002	226512 003	274700
AV43 P10, AV43 P15, AV44 P10	226506 002	226532 002	226513 003	274700
AV43 P30, AV44 P20	226508 002	226532 002	226513 003	274700
AV45 P10, AV45 P15	226510 002	226534 002	226514 003	274701

1) Pressure–stroke curves: see valve data sheet.
2) Only for valves with O-ring stuffing box.
3) Needed in order to attain the actuating power.
See Section 60 on regulations concerning the quality of supply air, especially at low ambient temperatures.
4) Of the accessories, only a positioner (XSP 31 or 31 G), a feedback unit (XAP) and an electro-pneumatic transducer (XEP) can be fitted. When fitting XSP 31 and XAP, the XEP must be screwed sideways onto the fixing bracket.
5) Can be used for minimum or maximum limitation of the stroke. Removable hand wheel.

Operation

Via a diaphragm, the control pressure acts against a pre-tensioned pressure spring. When the former force is greater than the latter, the spindle starts to move. The valve drive is reversible and can be fitted to the bracket in one of two ways:-
Function A: 'normally extended' (the spindle retracts as the control pressure rises).
Function E: 'normally retracted' (the spindle extends as the control pressure rises).
(The unit is set at function E at the factory.)
Used with the valves of the V6, B6 and VX . , BX . series (vertical plug), the following applies:-
Function A: (valve) 'normally open' (NO).
Function E: 'normally closed' (NC).

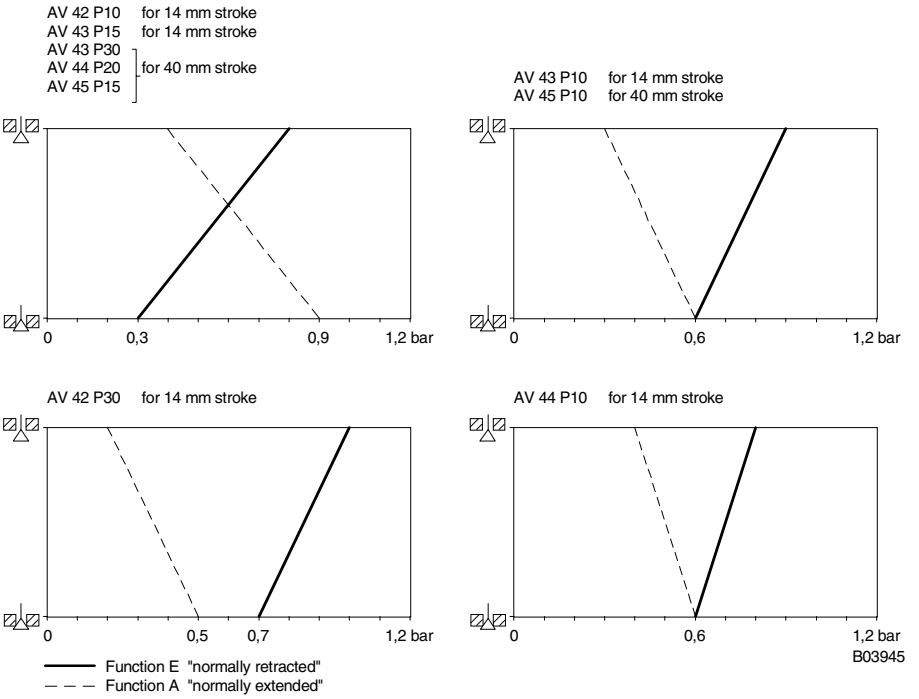
Engineering and fitting notes

The drive springs are pre-set for fitting to the valve (14 or 40 mm stroke). After fitting, the closing points should be checked as per MV 40.136. If necessary, the spring pressure should be adjusted by turning the nut in the centre.
The unit can be fitted in any position except facing downwards and at temperatures (of the valve medium) of up to 240 °C.
Where the temperature of the medium exceeds 180 °C, the unit should be fitted horizontally.
When used in combination with the AV42 P10 valve drive at temperatures above 130 °C, an accessory (no. 361259) should be used (see also PDS 76.526 and 76.528). This piece can also serve as an extension when the drive needs to extend beyond the pipe insulation.
The ingress of condensate, dripping water etc., along the stem and into the drive should be prevented. When fitting the drive to the valve, care must be taken not to turn the valve plug in the valve seat, thus damaging the seal.

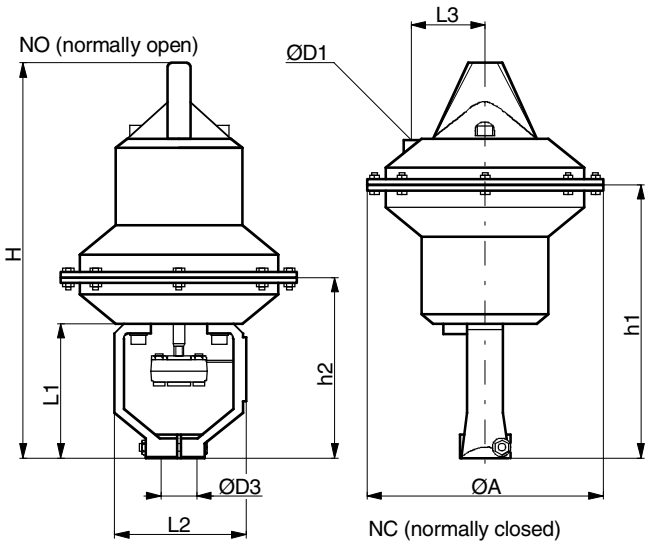
Pressure–stroke characteristics

Pre-set for through valves of 14 or 40 mm stroke (see table of types).

Pressure–stroke characteristics, pre-set for through valves.



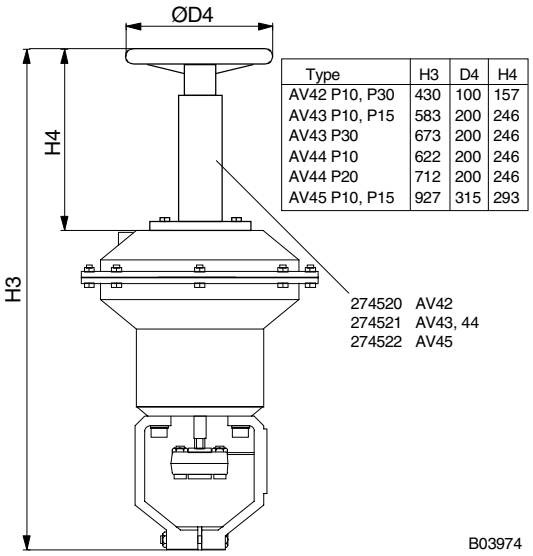
Dimension drawings



Type	A	D2	D1	D3	H	h1	h2	L1	L2	L3
AV42 P10,P30	190	M10	Rp 1/8	38	331	236	177	140	105	55
AV43 P10,P15	250	M10	Rp 1/8	38	417	288	191	142	139	70
AV43 P30	250	M16	Rp 1/8	60	507	378	281	232	139	70
AV44 P10	335	M10	Rp 1/8	38	466	326	192	142	139	105
AV44 P20	335	M16	Rp 1/8	60	556	416	282	232	139	105
AV45 P10 P15	465	M16	Rp 1/4	60	754	556	344	266	199	160

M274951a

Manual adjustment

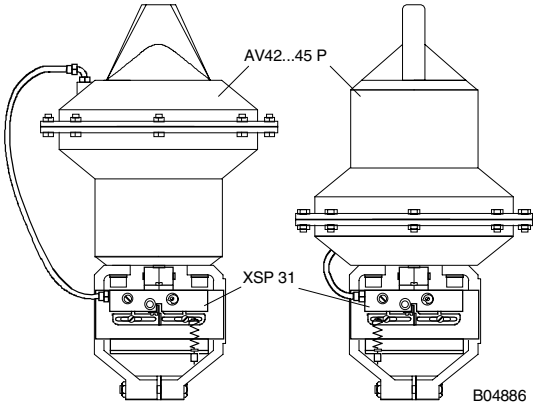


Type	H3	D4	H4
AV42 P10, P30	430	100	157
AV43 P10, P15	583	200	246
AV43 P30	673	200	246
AV44 P10	622	200	246
AV44 P20	712	200	246
AV45 P10, P15	927	315	293

B03974

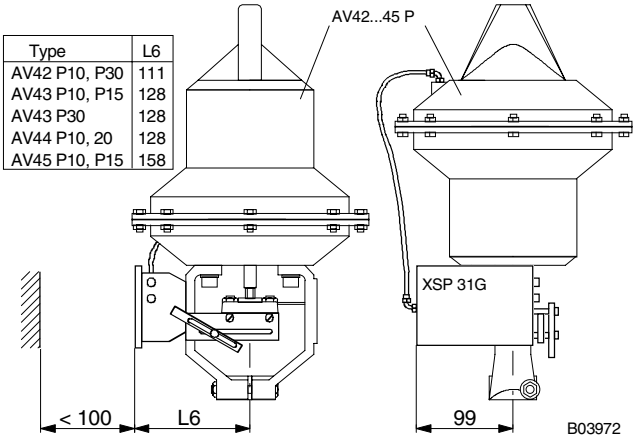
Fitted with one ancillary

XSP 31



B04886

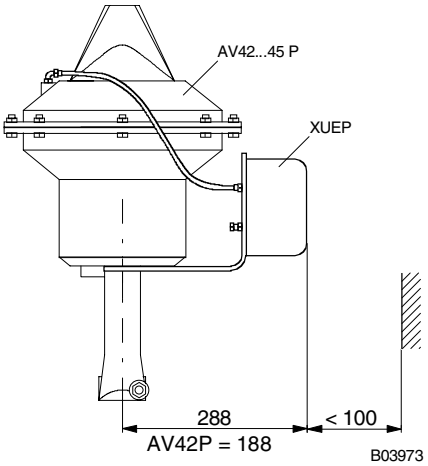
XSP 31 G



Type	L6
AV42 P10, P30	111
AV43 P10, P15	128
AV43 P30	128
AV44 P10, 20	128
AV45 P10, P15	158

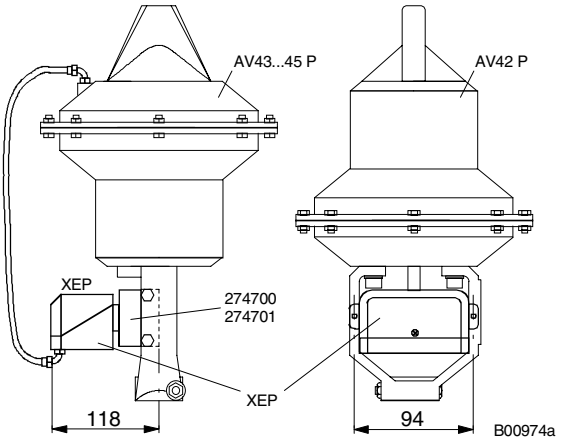
B03972

XUEP 1



B03973

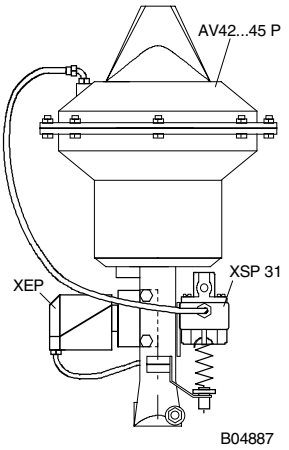
XEP



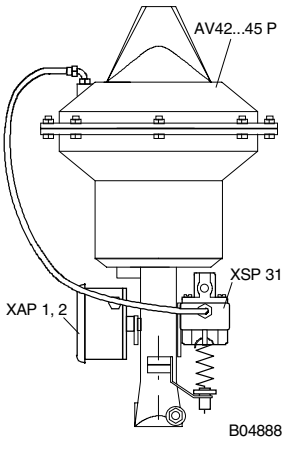
B00974a

Fitted with two ancillaries

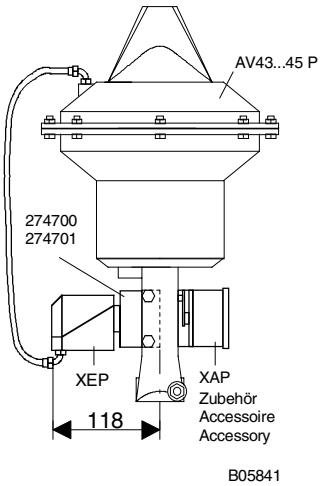
XEP + XSP 31



XAP + XSP 31



XEP + XAP



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N.B.: A comma between cardinal numbers denotes a decimal point
Fr. Sauter AG, CH-4016 Basle
7 171246 003 J11

V6R: Through valve with inside thread (nominal pressure 16 bar)

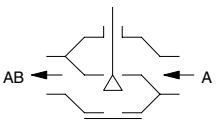
For continuous control of warm and cold water or of air. Valve body of bronze (RG 5). Valve seat of bronze; spindle of stainless steel; plug of either stainless steel or brass; metallic sealing. Stuffing box of brass with O-ring seal. Valve curve is either equal percentage or linear. When spindle is extracted, passage A-AB is closed.


T04230

Type	Nominal diameter DN	k_{VS}-value m^3/h	Valve plug material	Weight kg
V6R 15 F350	15	0.4	stainless steel	1.2
V6R 15 F340	15	0.63	stainless steel	1.2
V6R 15 F330	15	1	stainless steel	1.2
V6R 15 F320	15	1.6	stainless steel	1.2
V6R 15 F310	15	2.5	brass	1.2
V6R 15 F300	15	4	brass	1.2
V6R 25 F310	25	6.3	brass	1.6
V6R 25 F300	25	10	brass	1.6
V6R 40 F310	40	16	brass	3.4
V6R 40 F300	40	25	brass	3.4
V6R 50 F300	50	35	brass	4.6


Y07544

Operating temperature [1]	–15...130 °C	Valve stroke	14 mm
Operating pressure	up to 120 °C 16 bar		
	up to 130 °C 13 bar	Dimension drawing	7M100
Valve curve	equal percent	Fitting instructions	
Control ratio	50 (typical)	Valve	MV 505146
Leakage rate	≤ 0.05 % of k_{VS}-value	with AV42, AV43	MV 40.136 / MV 43190



B01133

Model variants

F2 . . With linear valve curve (available from DN 15 k_{VS} 4 m^3/h onwards only)

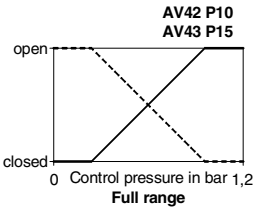
Accessories

217268 . . . Stuffing-box heating 15 W; specify when ordering: 24V = /001, 230V = /004, MV 505498

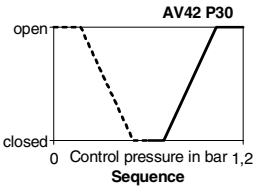
360391 . . . Union piece incl. asbestos-free seal, 2 pieces required; specify when ordering: DN 15 = /015, DN 25 = /025 etc.

DN 15 25 40 50

Pressure-stroke-curve
(with integrated valve)



Full range



Sequence

B01136

As delivered ex works
Fitting variant A

Combination with pneumatic drive AV42, AV43

Drive reversible max. pressure p_{stat} Operating time [2]	AV42 P10 ≤ 16 bar 7 s			AV42 P30 ≤ 13 bar 7 s			AV43 P15 ≤ 16 bar 14 s		
Valve	Δp_{max}	Δp_s		Δp_{max} [3]	Δp_s		Δp_{max}	Δp_s	
V6R 15 F300	4	16		4	16		4	16	
V6R 25 F300	4	9		3	16		4	16	
V6R 40 F300	2	2		0.7	5		3	4	
V6R 50 F300	1.6	1.6		0.5	3.8		2	3.3	

Complete type designation: Valve and drive each with F-variant
Valve: F-variant, technical data and accessories, see valve type table
Drive: F-variant, technical data, accessories and fitting position, see Sect. 71
Example: V6R 15 F300 /AV42 P10 F001

Δp_{max} in bar = Max. permissible pressure difference across the valve at which the drive can still safely open and close the valve.

Δp_s in bar = Max. permissible pressure difference across the valve during malfunction at which the drive can close the valve.

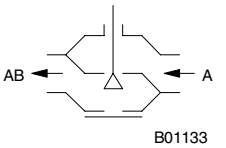
p_{stat} in bar = Dormant press. at valve when pump is inactive. Takes into account the fluidic level of the plant and the press. increase caused by the press. tank or the steam press.

1) At temperatures under 0 °C, use stuffing-box heating (accessory)
2) Based on the Centair air capacity (400 l_n/h) and a line of 20 m in length and 4 mm in diameter
3) When used with an XSP 31 or 31 G positioner, the Δp_{max} values are seven times bigger; observe the Δp_v value (see additional technical details).

Operation

Using a pneumatic drive, the valve can be moved to any position. When the spindle is extracted, control passage A-AB is closed. Where pneumatic drives are used, the valves should not close with the pressure, otherwise pressure surges ensue.

Closing against the operating pressure



Engineering and fitting notes

Can be fitted in any position except facing downwards.

The ingress of condensate, dripping water etc. along the stem and into the drive should be prevented.

When fitting the drive to the valve, care must be taken not to turn the valve plug on the two stops (seat), thus damaging the seal.

The drive can be equipped with the XSP 31 or XSP 31G positioner should any of the following be demanded: a split range; an improvement in the setting accuracy; an increase in positional speed or air capacity; reversible direction of action (see Section 79).

Additional technical details

Type	Δp_v
V6R 15 F. 50	4
V6R 15 F. 40	4
V6R 15 F. 30	4
V6R 15 F. 20	4
V6R 15 F. 10	4
V6R 15 F. 00	4
V6R 25 F. 10	4
V6R 25 F. 00	4
V6R 40 F. 10	3
V6R 40 F. 00	3
V6R 50 F. 00	2

Δp_v in bar = max. pressure difference across the valve in any stroke position, limited by the noise level and erosion (max. values without being limited by the force of the drive).

Additional details on accessories

217268/ . . . Heating for stuffing box 15 W; housing of light metal; connecting cable 3×0.75 mm^2, earth connection, 1 m in length, cable end sleeves; degree of protection IP 54.

Additional details on model types
Valve body with female thread. Flat seal of copper at the body. Stuffing box with O-ring of ethylene-propylene.

Material numbers as per DIN

	Material no.	Description	DIN norm
Valve body	2.1096.01	G-Cu Sn 5 Zn Pb (Rg 5)	1705
Valve seat	2.1096.01	G-Cu Sn 5 Zn Pb (Rg 5)	1705
Spindle	1.4305	X 8 CrNiS 18 9	EN 10088-3
Plug	2.0402.26	Cu Zn 40 Pb 2 F43	17 672
Plug V6R 15 F. 20...F. 50	1.4305	X 8 CrNiS 18 9	EN 10088-3
Stuffing box	2.0401.10	Cu Zn 39 Pb 3 F36	17 672

Explanation of terms used

Δp_v:
Maximum permissible pressure difference across the valve in any stroke position, limited by the noise level and erosion.
The valve as a traversed element is defined by this parameter specifically in its hydraulic behaviour. By monitoring cavitation, erosion and the noise thus produced, improvements can be achieved in both life expectancy and durability.

Δp_{max}:
Maximum permissible pressure difference across the valve at which the drive can firmly open and close the valve.
Static pressure and fluidic influences are taken into account. This value helps to maintain smooth stroke action and valve sealing. In doing so, the valve's Δp_v value is not exceeded.

Δp_s:
Maximum permissible pressure difference across the valve in the event of a malfunction (e.g. power failure, excess temperature or pressure, burst pipe) at which the drive can firmly close the valve and, if necessary, hold the full operating pressure against atmospheric pressure. Since this is a safety function with 'fast' stroke, Δp_s can be larger than Δp_{max} or, respectively, Δp_v. The resultant fluidic disturbances are soon overcome and play a minor role here.
On the three-way valves, the values apply only for the control passage.

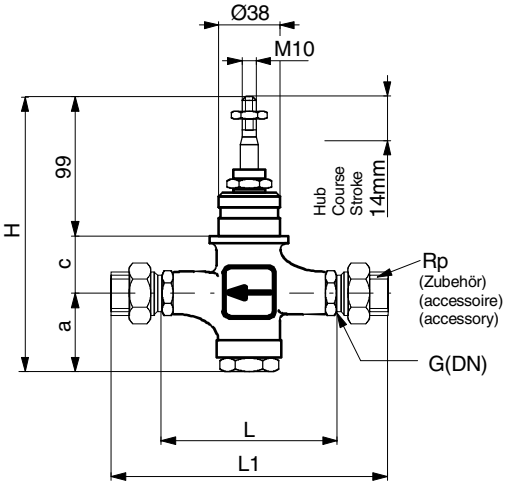
Δp_{stat}:
Line pressure behind the valve. This corresponds largely to the dead pressure when the pump is switched off, e.g. due to the level of liquid in the plant, an increase in pressure via the pressure store, steam pressure etc.
Where the valves close with the pressure, the static pressure plus the pump pressure should be used.

Technical information

- Pressure and temperature specifications — DIN 2401
- Flow parameters — VDI/VDE 2173
- Sauter slide rule for valve sizing — 7 090011 003
- Slide rule manual — 7 000129 003
- PC program "Valvedim" for Sauter valve sizing — 7 000675 003
- Technical manual 'Manipulating units': — 7 000477 003
  Parameters, Notes on installation, Control,
  Pneumatic manipulating units, General information

Dimension drawings 7M100

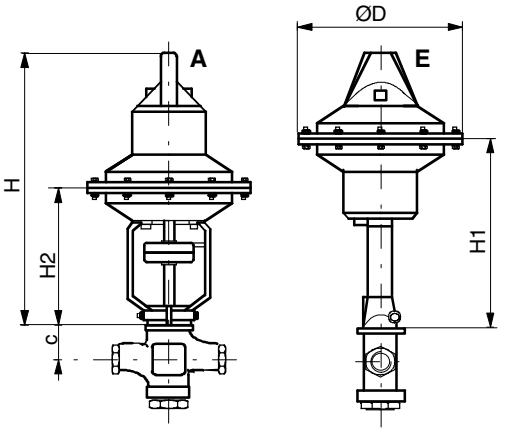
V6R



DN		a	c	H	L	L1	G	Rp
15	1/2"	56	29	184	85	159	1/2	1/2
25	1"	59	33	191	110	196	1	1
40	1 1/2"	76	47	222	150	256	1 1/2	1 1/2
50	2"	98	57	254	180	294	2	2

M361066a

AV42, AV43



Type	H	H1	H2	D
AV42	331	236	177	190
AV43	417	288	191	250

B01195

E: No pressure: CLOSED (as delivered ex works),
A: No pressure OPEN (fitting variant)
Take measurement ‘c' from valve dimension drawing

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N.B.: A comma between cardinal numbers denotes a decimal point
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7 176321 003 H8

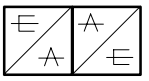
XEP: E-P and P-E converter

For converting an electrical signal into a pneumatic one and vice versa. Suitable for controlling pneumatic drives or controllers in HVAC and industrial installations, and for providing a feedback of pneumatic signals to the data centre.
Housing of plastic, with moving coil and nozzle-ball system. Suitable for mounting horizontally onto wall, drive or rail C EN 50024 or (with accessory) EN 50022. Compressed-air connector with Rp ⅛ female thread. Electrical connections (max. 2.5 mm²) with screw terminals; cable inlet with grommet.

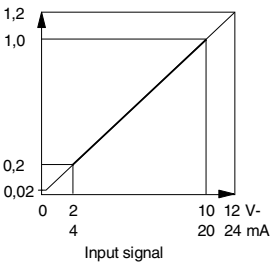
T04214

Type	Curve input	Curve output	Air capacity l_n/h	Voltage	Weight kg
E-P converter without electric pre-amplifier					
XEP 1 F001	2...10 V	0.2...1.0 bar	19 1)	–	0.24
XEP 1 F002	4...20 mA	0.2...1.0 bar	19 1)	–	0.24
XEP 10 F001	2...10 V	0.2...1.0 bar	400	–	0.26
XEP 10 F002	4...20 mA	0.2...1.0 bar	400	–	0.26
E-P converter with electric pre-amplifier					
XEP 110 F001	2...10 V	0.2...1.0 bar	400	24 V~/=	0.27
XEP 110 F011	0...10 V	0.2...1.0 bar	400	24 V~/=	0.27
E-P converter with electric pre-amplifier and additional P-E converter					
XEP 301 F001	2...10 V	0.2...1.0 bar	16 2)	24 V~/=	0.26
	0.2...1.0 bar	2...10 V			
XEP 301 F011	0...10 V	0.2...1.0 bar	16 2)	24 V~/=	0.26
	0.2...1.0 bar	0...10 V			

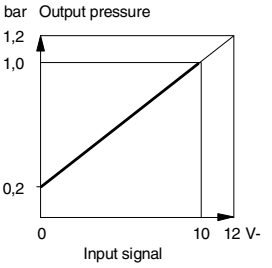

Y02120


Y02187

E-P curve F001, F002

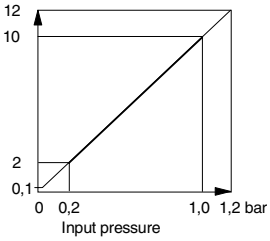


E-P curve F011

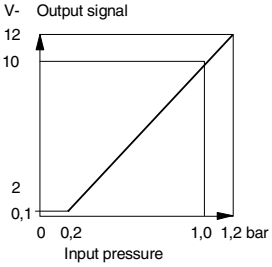


B00970

P-E curve XEP 301 F001



P-E curve XEP 301 F011



B00971

		XEP 1, XEP 10	XEP 110	XEP 301
Power supply	24 V~	–	± 20 %, 50...60 Hz	± 20 %, 50...60 Hz
	24 V =		± 20 %	+20 %, –10 %
Power consumption		–	2 VA	2 VA
Input resistance		590 Ω	100 kΩ	100 kΩ
F002 (current input)		120 Ω	–	–
Temperature influence		± 0.04 %/K	± 0.02 %/K	± 0.05 %/K
Perm. ambient temp.		0...55 °C	0...50 °C	0...55 °C
Linearity E-P		< 2 %	1 %	1 % 2)
Air consumption		20 ln/h	20 ln/h	16 ln/h 2)
Linearity P-E		–	–	0.3 %
Max. load P-E		–	–	> 5 kΩ

Supply pressure 3)	1.3 ± 0.1 bar
Control action	A (direct)
Perm. ambient humidity	< 90 %rh
Degree of protection	IP 54 (EN 60529)

Connection diagram	
XEP 1	A02055
XEP 10	A02057
XEP 110	A02056
XEP 301	A02058
Dimension drawing	M274950
Fitting instructions	MV 505428

Accessories

274700 000* Fixing bracket for AV42...44 P (including connecting parts to the drive).
274701 000* Fixing bracket for AV45 P (including connecting parts to the drive).
296936 000* Fixing bracket for rail EN 50022, 35 × 7.5 and 35 × 15
370560 011 Cable screw fitting (Pg 11) of glass-fibre-reinforced polyamide, grey, with brass nut.

*) Dimension drawing for accessory is available under the same number.

1) Normally, supply is via an in-built restrictor in connection 1. If there is continuous air recovery from RCP or RLP (connection 6), connection 1 should be closed off.
2) Normally, supply is from another bleed-off Sauter device with restrictor of Ø 0.14 mm (e.g. RLP). In autonomous mode with a line restrictor (e.g. XP 4), or in circuitry supplied by TSFP 80 (restrictor of Ø 0.2 mm), the following applies: air capacity = air consumption = 33 l_n/h; linearity 2 %; zero offset approx. +3 %, can be corrected as per MV 505428.
3) See Section 60 for regulations on the quality of the air supply, particularly at low ambient temperatures.

Operation

Using the bleed-off force-comparison principle, the unit converts the electrical input signal into a pneumatic output signal. The electrical input signal passes through a moving coil with permanent magnet, thereby producing a force proportional to the input signal. This is balanced against the nozzle-ball system. Types XEP 1 and XEP 10 do not require a power supply since the moving coil is activated directly by the electrical input signal.

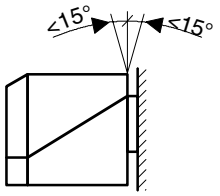
Type XEP 110 requires a power supply because the input resistance is increased due to its having an amplifier.

The XEP 301 also has an in-built piezo-resistive pressure sensor (p-e function). This converts the pneumatic standard pressure into an elecrical standard signal.

Depending on type, the air capacity is increased by a pneumatic amplifier.

Control action A: The output pressure rises in relation to the rising input signal.

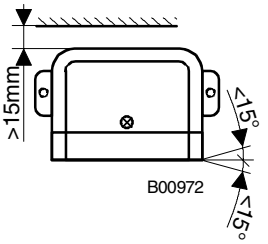
Engineering and fitting notes



The unit should be mounted in a horizontal position only, and with its connection facing downwards.

The pneumatic drives require a control pressure range of 0...1.2 bar if the full positioning forces are to be attained. If the electrical input signal is limited to the nominal range, then the drive must be equipped with a positioner.

A fixing bracket is required to fit the XEP to the AV42...45 P. If the AV42 P is mounted vertically, the XEP can be fitted directly.



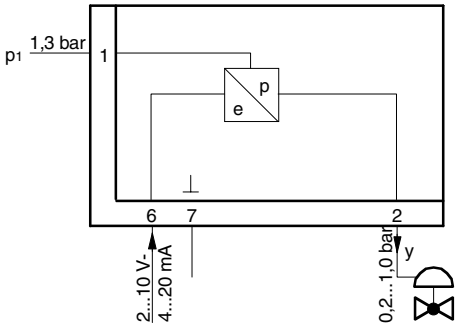
Compatibility of XEP with electronic controllers:-

- E-P converter with voltage input:
  The input resistance of the XEP must be larger than the permissible load of the controller.
- E-P converter with current input:
  The input resistance of the XEP must be smaller than the permissible load of the controller.
- P-E converter with voltage output:
  The input resistance of the connected controllers must be larger than the permissible load of the converter.

	Permissible load of the controller output		**Input resistance of the controller**
Electronic controller (Sauter)	Voltage signal	Current signal	for XEP 301 voltage signal
flexotron 2000	> 500 Ω	< 500 Ω	> 30 kΩ
flexotron M10, ERA 100	> 5 kΩ	–	> 100 kΩ
flexotron M300, RDT 100	> 5 kΩ	–	> 100 kΩ
flexotron M3000, RRK 100	> 5 kΩ	–	> 100 kΩ
EGE 110, 112	> 500 Ω	< 500 Ω	–
EY 2400-ecos	> 1 kΩ	–	> 10 kΩ
rse, rsk	> 500 Ω	–	> 50 kΩ
rsz with EYS 3A 341B card	> 500 Ω	–	–
rsz with EYS 3A 324B card	–	–	> 20 kΩ
rsz with EYS 3A 325B card	–	–	> 20 kΩ
EYZ 3A 342	–	< 560 Ω	–
EY 3600-ecos	> 1 kΩ	–	> 10 kΩ
nova 210, 220, 230	> 500 Ω	< 500 Ω	> 50 kΩ
nova 106	> 500 Ω	–	> 50 kΩ
nova Link 170	> 500 Ω	< 500 Ω	–
nova 106 with EYS 141 card	> 500 Ω	–	–
nova 106 with EYS 124 card	–	–	> 20 kΩ
nova 106 with EYS 135 card	–	–	> 20 kΩ

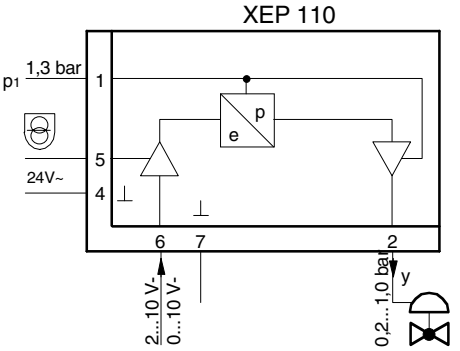
Connection diagrams

XEP 1



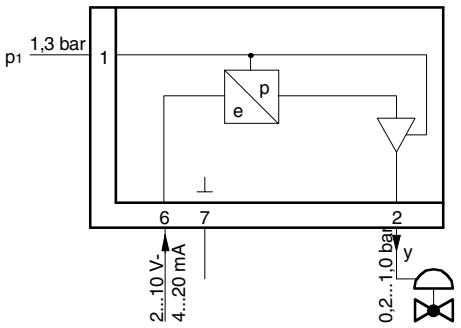
A02055

XEP 110



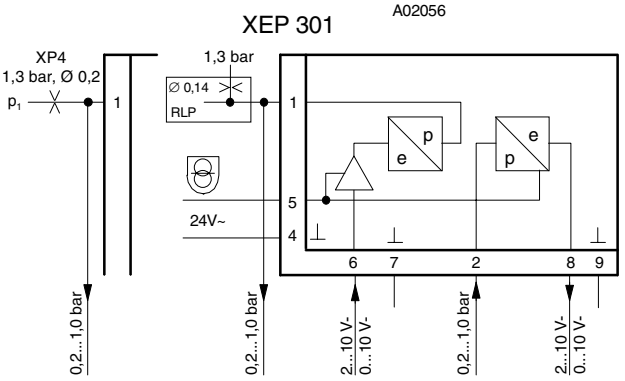
A02056

XEP 10



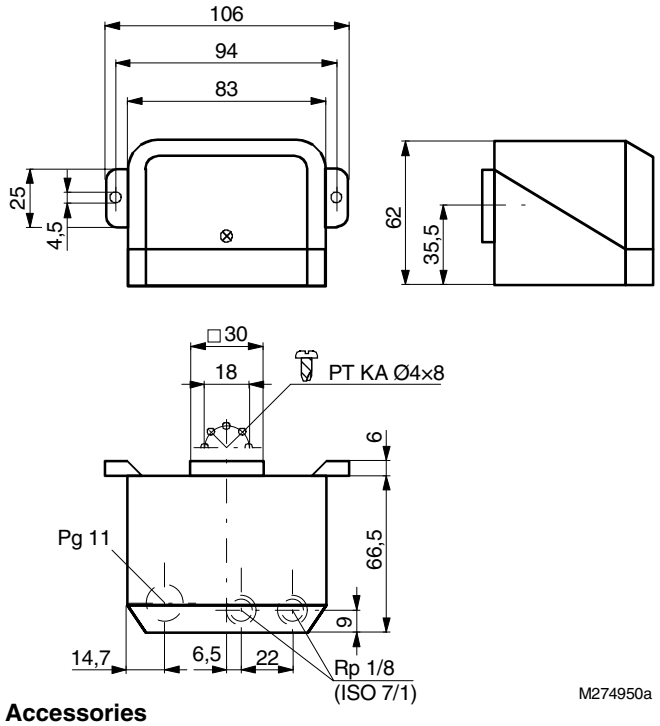
A02057

XEP 301



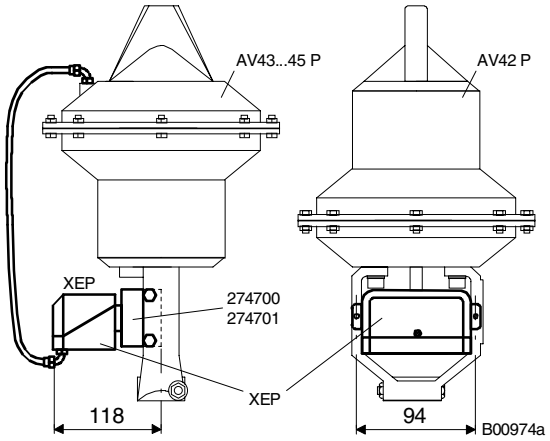
A02058b

Dimension drawing



M274950a

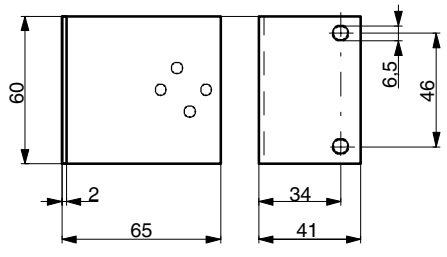
Mounting onto AV42...AV45 P



B00974a

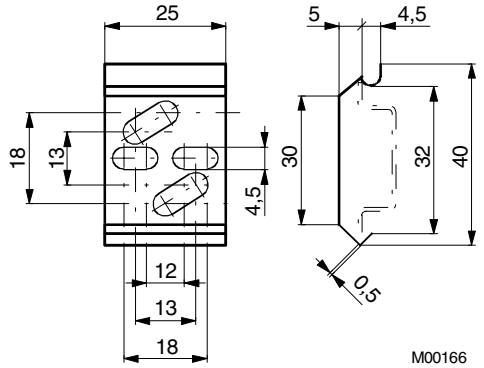
Accessories

274700
274701



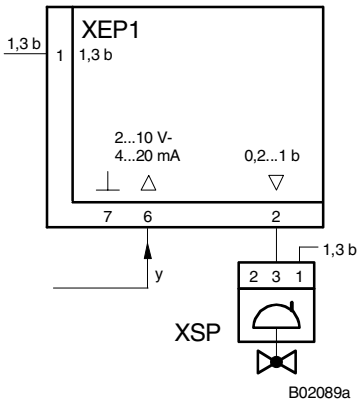
M00973

296936

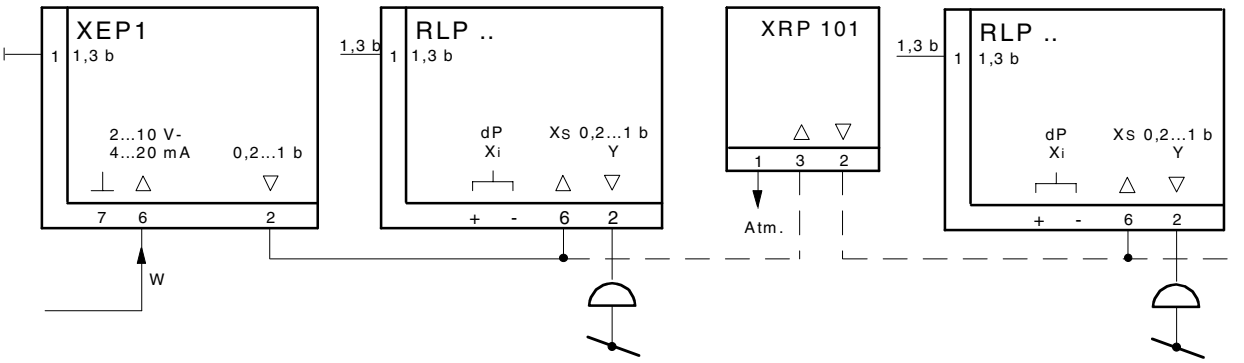


M00166

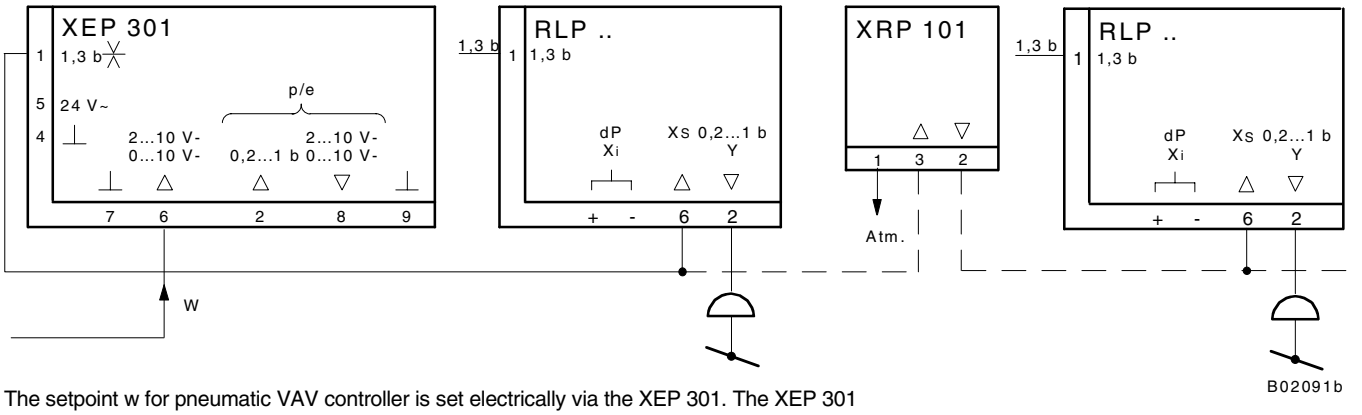
Examples of application



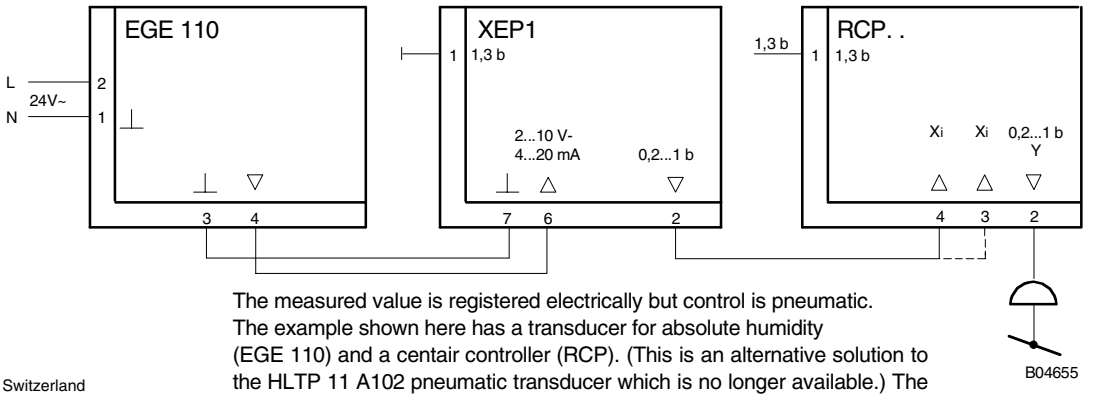
Electronic control, pneumatic positioning: the electrical signal y is converted by the XEP 1 into a pneumatic signal and transmitted to an XSP positioner.



The setpoint w for pneumatic VAV controller is set electrically via the XEP 1. The XEP 1 is fed by connection 6 of the RLP, which is why the supply-pressure connection 1 must be closed. If more than one RLP is desired, then an interface relay XRP 101 must be employed (up to three RLP units for each interface relay).



The setpoint w for pneumatic VAV controller is set electrically via the XEP 301. The XEP 301 is fed by connection 6 of the RLP. If more than one RLP is desired, then an interface relay XRP 101 must be employed (up to three RLP units for each interface relay).



The measured value is registered electrically but control is pneumatic. The example shown here has a transducer for absolute humidity (EGE 110) and a centair controller (RCP). (This is an alternative solution to the HLTP 11 A102 pneumatic transducer which is no longer available.) The XEP 1 is fed by the RLP, which is why the supply-pressure connection 1 must be closed.

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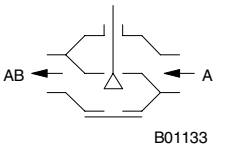
Sauter Components

Operation

Using a pneumatic drive, the valve can be moved to any position. When the spindle is extracted, control passage A-AB is closed. Where pneumatic drives are used, the valves should not close with the pressure, otherwise pressure surges ensue.

Closing against the operating pressure



Engineering and fitting notes

Can be fitted in any position except facing downwards.

The ingress of condensate, dripping water etc. along the stem and into the drive should be prevented.

When fitting the drive to the valve, care must be taken not to turn the valve plug on the two stops (seat), thus damaging the seal.

The drive can be equipped with the XSP 31 or XSP 31G positioner should any of the following be demanded: a split range; an improvement in the setting accuracy; an increase in positional speed or air capacity; reversible direction of action (see Section 79).

Additional technical details

Type	Δp_v
V6R 15 F. 50	4
V6R 15 F. 40	4
V6R 15 F. 30	4
V6R 15 F. 20	4
V6R 15 F. 10	4
V6R 15 F. 00	4
V6R 25 F. 10	4
V6R 25 F. 00	4
V6R 40 F. 10	3
V6R 40 F. 00	3
V6R 50 F. 00	2

Δp_v in bar = max. pressure difference across the valve in any stroke position, limited by the noise level and erosion (max. values without being limited by the force of the drive).

Additional details on accessories

217268/ . . . Heating for stuffing box 15 W; housing of light metal; connecting cable 3×0.75 mm^2, earth connection, 1 m in length, cable end sleeves; degree of protection IP 54.

Additional details on model types
Valve body with female thread. Flat seal of copper at the body. Stuffing box with O-ring of ethylene-propylene.

Material numbers as per DIN

	Material no.	Description	DIN norm
Valve body	2.1096.01	G-Cu Sn 5 Zn Pb (Rg 5)	1705
Valve seat	2.1096.01	G-Cu Sn 5 Zn Pb (Rg 5)	1705
Spindle	1.4305	X 8 CrNiS 18 9	EN 10088-3
Plug	2.0402.26	Cu Zn 40 Pb 2 F43	17 672
Plug V6R 15 F. 20...F. 50	1.4305	X 8 CrNiS 18 9	EN 10088-3
Stuffing box	2.0401.10	Cu Zn 39 Pb 3 F36	17 672

Explanation of terms used

Δp_v:
Maximum permissible pressure difference across the valve in any stroke position, limited by the noise level and erosion.
The valve as a traversed element is defined by this parameter specifically in its hydraulic behaviour. By monitoring cavitation, erosion and the noise thus produced, improvements can be achieved in both life expectancy and durability.

Δp_{max}:
Maximum permissible pressure difference across the valve at which the drive can firmly open and close the valve.
Static pressure and fluidic influences are taken into account. This value helps to maintain smooth stroke action and valve sealing. In doing so, the valve's Δp_v value is not exceeded.

Δp_s:
Maximum permissible pressure difference across the valve in the event of a malfunction (e.g. power failure, excess temperature or pressure, burst pipe) at which the drive can firmly close the valve and, if necessary, hold the full operating pressure against atmospheric pressure. Since this is a safety function with 'fast' stroke, Δp_s can be larger than Δp_{max} or, respectively, Δp_v. The resultant fluidic disturbances are soon overcome and play a minor role here.
On the three-way valves, the values apply only for the control passage.

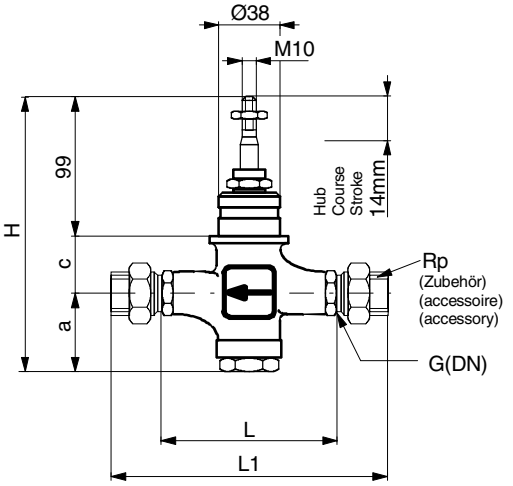
Δp_{stat}:
Line pressure behind the valve. This corresponds largely to the dead pressure when the pump is switched off, e.g. due to the level of liquid in the plant, an increase in pressure via the pressure store, steam pressure etc.
Where the valves close with the pressure, the static pressure plus the pump pressure should be used.

Technical information

- Pressure and temperature specifications — DIN 2401
- Flow parameters — VDI/VDE 2173
- Sauter slide rule for valve sizing — 7 090011 003
- Slide rule manual — 7 000129 003
- PC program "Valvedim" for Sauter valve sizing — 7 000675 003
- Technical manual 'Manipulating units': — 7 000477 003
  Parameters, Notes on installation, Control,
  Pneumatic manipulating units, General information

Dimension drawings 7M100

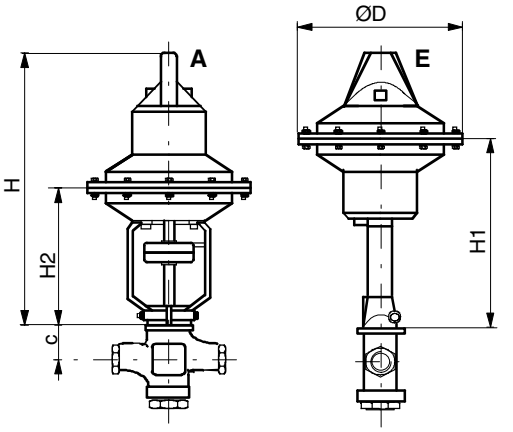
V6R



DN		a	c	H	L	L1	G	Rp
15	1/2"	56	29	184	85	159	1/2	1/2
25	1"	59	33	191	110	196	1	1
40	1 1/2"	76	47	222	150	256	1 1/2	1 1/2
50	2"	98	57	254	180	294	2	2

M361066a

AV42, AV43



Type	H	H1	H2	D
AV42	331	236	177	190
AV43	417	288	191	250

B01195

E: No pressure: CLOSED (as delivered ex works),
A: No pressure OPEN (fitting variant)
Take measurement ‘c' from valve dimension drawing

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7 176321 003 H8

RECOMMENDATIONS FOR THE USE OF PLC's AT CERN

The Working Group on Programmable Logic Controllers

D. Blanc ST/CV, J. Brahy LHC/IAS, W. Heinze PS/CO, J.-M. Maugain EP/EOS, O. Van Der Vossen SL/CO, S. Waeffler EP/EOS, R. Rausch SL/CO (Chairman).

ABSTRACT

Programmable Logic Controllers (**PLC**s) have been increasingly used at CERN for several years. In future control solutions, PLCs will initially be considered for the rejuvenation of old and obsolete systems, and then for the control of new equipment to be installed in technical services, accelerators and experiments. Many industrial systems will be installed for the control of equipment during the next 5 to 10 years, particularly for the construction of the LHC project. In order to increase efficiency, to reduce the initial investment and to minimise the long term maintenance costs in terms of money and human resources the Working Group recommends that all CERN equipment control projects, based on PLCs, select or specify PLCs from the product lines of the recommended PLC manufacturers.

- ## 1. OBJECTIVE

Programmable Logic Controllers (PLCs) will be used extensively to upgrade old and obsolete systems, to control and monitor new equipment for technical services, accelerators, experiments and to construct the LHC machine. A single manufacturer's line of PLC products may not satisfy all the needs of the various users, however, CERN cannot support the large diversity of PLCs proposed by industry. In order to reduce design time, installation cost and later maintenance effort, the number of PLC families of products used for integration of equipment at CERN must be reduced to a minimum.

For this purpose the CERN Controls Board, at its meeting of March 27, 1997, created the Working Group on the usage of PLCs in controls at CERN. The objective of this PLC-WG is to define a policy, valid for the next 5 to 10 years, for CERN and for the Institutes collaborating to the LHC project.

- ## 2. INVESTIGATION PROCEDURE

2-1 - General Approach

The first task of the PLC-WG members has been to clarify the definition of the technical terms used in the PLC world, with the aim of improving our common technical understanding. In order to make its recommendation the next tasks of the PLC-WG were to make a detailed inventory of the existing PLC applications at CERN, to define the technical and commercial selection criteria and to initiate a market survey of the main PLC manufacturers. The technical selection criteria take into account CERN's existing "Recommendation on the Usage of Fieldbuses".

2-2 - PLC Definition

A PLC is a component used for industrial controls. The structure of a PLC is that of a computer; it consists of a Central Processing Unit (CPU), a memory, input/output modules and an internal bus. The peripherals and the programming are conceived to be adapted to industrial process control. The functions implemented by a PLC are written in the form of programs stored in memory. A PLC receives input signals from process equipment to be controlled (switches, sensors), processes them according to a precise model defined by programs and provides output signals to the process equipment such as relays, motor starters, etc... The PLC is usually programmed with languages conforming to IEC-1131 standard and is conceived to work in an industrial environment. Unless a system reconfiguration is required, the functions executed by a PLC is fixed, the programs do not change and therefore they may be stored in Programmable Read Only Memory (PROM).

PLCs can be divided into at least three categories:

- full-size, for top level applications requiring fast program execution with very short instruction cycle times. They are capable of supporting several CPUs for multiprocessing to provide more processing power. They offer the TCP/IP communication capability over general purpose networks to the supervisory workstations, and support fieldbus data transmission with equipment controllers.

- middle-size, intended for industrial automated systems of medium power. They offer a large choice of analog and digital input/output modules. They are usually connected to a fieldbus on one side and to the equipment on the other side; their speed is not an important parameter, the amount of data transferred is small and the average price per function is low

- small or micro-size, for direct interface with sensors and actuators. They are very simple electrically and mechanically and are sometimes integrated with the intelligent sensor itself, they are characterised by short reaction times and they transfer a small amount of data.

2-3 - Inventory of Present Usage of PLCs

A detailed inventory of all existing PLCs installed since 1984 allowed us to identify the number of PLC suppliers, the diversity of models, the type of connection and the variety of communication protocols in use. The PLC-WG has quantified the average number of new PLC installations made each year. The survey included all types of PLCs, general purpose PLCs, system specialised PLCs (electricity, ventilation, buildings) and PLCs provided with Distributed Control Systems (DCSs). A DCS is defined here as a complete industrial turn-key control system delivered to CERN, with all the components from the I/O modules up to the supervisor including the process computers, the communication network and the supervisory workstations with all the system specific software (as for cryogenics or electricity for example). On average, some 80 to 100 PLCs per year, of various types and provided by 16 different manufacturers, have been installed at CERN, over the past 10 years, (see table in the Appendix).

2-4 - Scope of Application

At CERN PLCs are finding their application in accelerators, technical services, experiments and in the laboratory for equipment test-beds. The technical requirements of the accelerators, the technical services and the experiments are mostly the same. Thus, a range of PLC products is needed for general purpose applications in a large diversity of fields such as electricity, water, gas, cryogenics, cooling, ventilation, process control, magnet control, machinery, personnel access and safety systems. It is planned to use PLCs for accelerator specific systems like: interlocks for main magnet power supplies, beam targets, dumps, stoppers, collimators, aperture limiters and beam extraction electronics. In addition, over the past 25 years, a large volume of control equipment has been based on the MPX System, developed at CERN, on the CAMAC, G64 and VME standards and on special solutions. Most of this will be replaced with PLC products in coming years.

- **3. PLC MARKET SURVEY**

PLCs are offered by a large number of manufacturers with a vast variety of models; most of them are for general purpose applications and some are designed for specific control domains. At CERN we are looking for products that fit our particular needs, that are commercially available from manufacturers playing a leading role in the fast evolution of PLC technology and having a fair chance of still being on the market in a few years time to continue the support of their products.

CERN contracts are placed in the member states following CERN's official purchasing rules. The selected tenderers must supply equipment originating from the members states.

To gain knowledge of the industrial offer in the field of PLCs, a Market Survey exercise has been undertaken. For this Market Survey we have specified our technical requirements, listed our commercial and technical qualification criteria and prepared a detailed questionnaire to help in the discussion with manufacturers.

3-1 - Commercial Qualification Criteria

Perenniality

As particle accelerators have a life-time of 20 to 30 years it is highly desirable that the products which have been selected for their construction will still be available for purchase, repair and replacement by equivalent units during such a period, or at least, until new uses are required from the equipment.

Turnover

CERN is looking for large manufacturers of PLCs having an annual turnover of at least 50 MCHF in the field of PLCs. The turnover figure gives a measure of the manufacturer's capacity to innovate, to do research, to create, to develop, to implement standards and to support its products over several years in many countries. CERN's needs for PLCs are small compared to those in industry and consequently CERN wants to follow the main stream of industry.

Experience

The manufacturers must have at least ten years of experience in the design and production of

PLCs. Ten years is approximately the life-time of a PLC product line. Over this time one can observe the evolution of the product to match the changes of the environment, the increase in performance and the emergence of new product lines. Ten years experience demonstrates, with good probability, the PLC manufacturer's ability to provide long term support.

European Origin and Availability

As CERN contracts are placed in Member States following its official purchasing rules, the manufacturers must supply PLC products originating in the Member States. The manufacturers must offer commercial and technical support in most of CERN's Member States. As contracts are placed in all Member States a tenderer who needs information on PLCs or who has a particular problem to solve is in a better situation if he can rely on local support to obtain technical training, expertise, help and advice from the PLC manufacturer.

3-2 - Technical Qualification Criteria

General Purpose PLCs

The manufacturer must have a proven experience, or demonstrate that his PLCs are used in a large variety of fields such as electricity, water, gas, cryogenics, cooling, ventilation, process control, machinery and safety systems.

The Market Survey aims at identifying families of general purpose PLCs applying equally well to all the above systems. It does not address the supply of complete Distributed Control Systems (DCS), spanning from the sensor level up to the human-machine-interface, including the networks and the supervisory control software. The manufacturer's PLC product line should cover all the categories, ranging from the full-size units down to the small size units and very simple I/O modules. The PLCs should have a modular structure suitable for plugging into crates or fixing on standard rails.

TCP/IP Communication

In order to connect single or clusters of PLCs to the CERN controls network it is essential that the manufacturer offers an Ethernet interface unit with the standard TCP/IP suite of communication protocols. Proprietary networks and protocols are not acceptable to CERN. To make sure that the PLC communication offered is really compliant with the standard, CERN will test and validate them on the controls network

Standard Fielbuses

As the CERN Directorate has endorsed the Fieldbus Working Group's Recommendation on the usage of only three fieldbuses, it is mandatory that the PLC manufacturers offer interfaces to at least one of them: CAN, Profibus or WorldFIP. If the manufacturers offer either Profibus or WorldFIP it would be an asset to offer also a CAN interface. CAN, is limited in its transmission distance but is suitable for use in experiments and inside buildings while Profibus and WorldFIP, which can transmit over longer distances, provide solutions for inter-building communication links and large accelerators. WorldFIP offers, in addition, hard real time features for time critical applications. It is required that manufacturers implement their fieldbus hardware and software in conformance with the related Standard Specification Documents. Conformance certification of

PLC communication interfaces by official fieldbus test centres is clearly an asset.

For the CAN fieldbus, CAN controllers should be available, either from the selected PLC manufacturers or from second source suppliers certified by the PLC manufacturers. The Standard CANopen Communication Protocol must be implemented

Safety and Security

Some CERN systems, controlled by PLCs have to work safely in noisy and sometimes explosive environments. Thus, the PLC manufacturers should have in their catalogue a line of products conforming to the French, Swiss or European safety and security standards.

Standard software

In order that CERN can limit its investment in software for industrial systems the PLC programming has to be done according to the IEC 1131-3 standard languages and the development software should be available for Windows 95/NT. CERN intends to negotiate, with the selected PLC manufacturers, site licences for the development environment, for the target environment and for software maintenance.

- **4. THE RECOMMENDATIONS**

The purpose of the PLC market survey was to get a complete and up-to-date information on hardware and software available in industry and to evaluate what are the current technological trends. The PLC-WG's objective is to recommend European manufacturers capable of providing a full range of PLCs for general purpose usage, which respect standard network interfaces, communication protocols along with the software environment for development and target applications. This recommendation for PLCs is tightly coupled to the existing "Recommendation on the usage of standard fieldbuses at CERN". With the help of the CERN Management and SPL Division contracts will be negotiated and signed with these selected PLC manufacturers. These contracts will give CERN's project engineers access to all the hardware and software from the respective product catalogues, make available the support offered by the manufacturers, and this without having to justify the choice of the PLC manufacturer. The engineer will be free to choose the PLC products best suited for his/her project. In writing his Technical Specification a project leader will consequently be justified to ask the tenderers to base their offer, as far as technically sound, on the recommended PLC manufacturers only and on the three recommended fieldbuses

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4-1 - Administrative and Commercial Support

In order to support the usage of the recommended PLCs (and fieldbuses) as widely as possible, commercial and administrative support will have to be set up at CERN. This support should be limited to the PLC products from the recommended manufacturers. Given the large amount of PLC equipment to be purchased by CERN, either directly by CERN personnel or via CERN industrial contracts, centralised negotiation and purchasing procedures should be set up. For the development and target software CERN site licences should be negotiated with the selected PLC manufacturers

4-2 - Expertise and Technical Support

In order to create the necessary incentive to use the recommended PLCs and fieldbuses, as widely as possible, technical support and training will have to be made available.

Advice and expertise, on the products from the recommended PLC manufacturers, will be available from different groups of existing CERN users. Support for each family of products should be provided in a decentralised manner by experts who have current practical experience with a particular PLC line of products. These experts should be from groups involved in controls projects. A specialised central service of experts, not directly involved in controls projects, is not recommended. Experts can be consulted for advice but they will not provide any operational support to the users nor take up the responsibility to maintain industrial systems. Experts will advise users on the capabilities and limitations of PLCs and fieldbuses, they will help the users in the selection of hardware and software components, on the selection of development tools, explain the software tools and communication protocols. Experts will also ensure a technical liaison with industry and with the recommended manufacturers.

Considering the close relationship between PLCs and fieldbuses we recommend that these two domains be combined in a single entity. A single and common User's Group will exchange information between people having activities linked to PLCs and fieldbuses. This User's Group could be an emanation of an existing body with enlarged scope and should also monitor the evolution of the PLC market.

To help user's to learn and start-up with PLC's and fieldbuses it would be advisable to have available for them on loan a few complete demonstration assemblies, including the necessary software development tools.

4-3 - Training

The technical staff involved in controls projects should be knowledgeable in PLCs and fieldbuses in order to make the best use of them. According to the needs, the "User's Group" will organise practical training courses given by experts of the selected manufacturers and also in the context of the Training Programme of CERN's Education Services; for standard IEC-1131 programming, as an example.

- ## 5. CONCLUSION

The Working Group on PLCs recommends limiting the choice of PLCs which should be used at CERN during the next five to ten years. Two PLC manufacturers satisfying the required commercial and technical qualification criteria should be chosen according to the official CERN procedure.

This recommendation has an economic grounding. It aims at keeping development, maintenance, installation effort and cost to a minimum. It pays tribute to CERN's attempts to reduce manpower. The PLC-WG invites the Controls Board to support its recommendation and to present it to the CERN management for its endorsement.

The trend towards industrial controls will undoubtedly be of great benefit to CERN at a time when human resources become scarce and will enable industry to make a larger contribution to the LHC Project.

PLC Installations at CERN

MANUFACTURERS	TYPE of PLC	NUMBER of PLCs	TOTAL
SIEMENS (1984-97)	S5	336	365
	S7(New Model)	29	
SCHNEIDER (1984-97)	EPS	23	
	SEPAM	130	
- TELEMECANIQUE	TSX	6	
	APRIL	9	
- MERLIN-GERIN	PB400	8	176
ELTEK (1993)	SMNSP	40	40
HAZEMEYER (1992)	CIT	31	31
SACE (1992)	MEGAMAX	25	25
SAINCO (1992)	EMS	17	17
TEXAS (1987-88)	520	16	16
TRANE (1987)	M-S	16	16
MR (1992)	TCS	6	6
CEGELEC (1994)	C370	1	1

MANNESMAN (1996)	HNC	1	1
SILICON (1996)	SILICON	1	1
		PLCs used Individually GRAND TOTAL =	695
ABB (1987-97)	AC MP	8 43	51
LANDIS (1986-97)	various	205	205
		PLCs Integrated into DCSs GRAND TOTAL = 256	

Back to PLC's.

Advantages / Benefits

- *Easy* to commission with TEACH-IN function
- *Easy* to install with SIMULATION function
- *Easy* system integration by Easy LINK provides low Total Cost of Ownership
- Unsensitive against polluted fluids

Design

The conductivity transmitter compactly combines a conductivity sensor and a transmitter with display in splash-proof plastic IP 65 enclosure.

The sensor component consists of a pair of magnetic coils in a PVDF enclosure. In order to measure conductivity, an AC voltage source is connected to the primary magnetic coil. The magnetic field induced generates a current in the secondary magnetic coil. The intensity of the induced current is a direct function of the conductivity of the solution.

The temperature sensor for automatic compensation is a standard feature in the sensor housing.

The transducer component converts the measured signal and displays the actual value.

The transducer type 8226 functions in a 3-wire circuit and requires a power supply of 12-30 VDC. A 4-20mA standard signal is available as output signal, proportional to the conductivity or the temperature of the fluid. The setpoint values of the relays are freely adjustable.

A wide range of stainless steel, brass and plastic fittings available. (see corresponding ordering data)

Application

Conductivity measurements

Waste engineering

Contaminated liquids

Liquids with particles

Liquids with coating and sealing build up

bürkert
Easy Fluid Control Systems

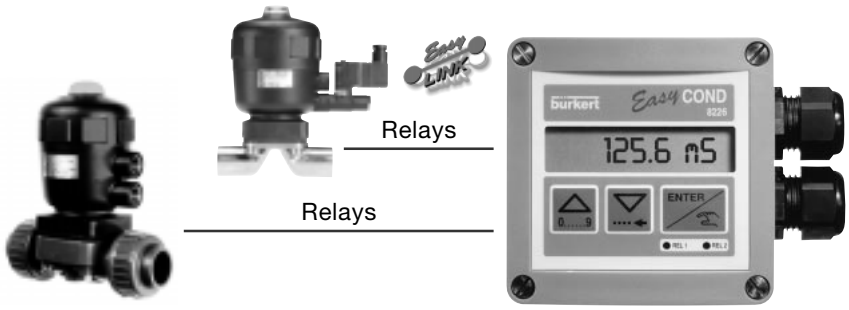
The Easy conductivity - control system

ON / OFF process control

Description:
On / Off valve

8226 transmitter

Applications:
Neutralization
Dosing
Waste water processing

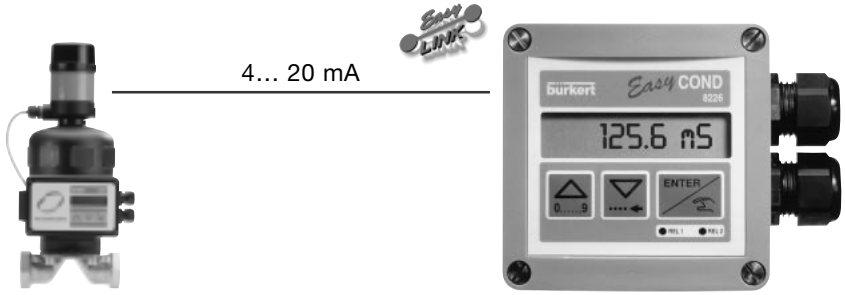


Continuous process control

Description:
Continuous control valve

8226 transmitter

Applications:
Water monitoring
Continuous chemical dosing
Waste water treatment



Design

The conductivity measuring system is available as a compact version type 8226. The cell constant is an average value over the hole measuring range. It can be readjusted depending on application. The temperature sensor for automatic compensation is a standard feature in the conductivity sensor housing.
The 8226 inductive conductivity transmitter output signal is a standard 4 – 20 mA signal. Optional with two freely adjustable relay outputs.

Principle of operation

The concudtivity is defined as the ability of a solution to conduct electrical current. The load carriers are ions (e.g. dissolved salts or acids). In order to measure conductivity, an AC voltage source is connected to the primary magnetic coil. The magnetic field induced generates a current in the secondary magnetic coil. The intensity of this induced current is a direct function of the conductivity of the solution.
The transmitter without relays or with 2 additional relays functions in a 3-wire circuit. Limit values are freely adjustable.

Installation

Ⓐ The inductive conductivity transmitter type 8226 is mounted in vertical position (max. ±90°) into a horizontal pipe.

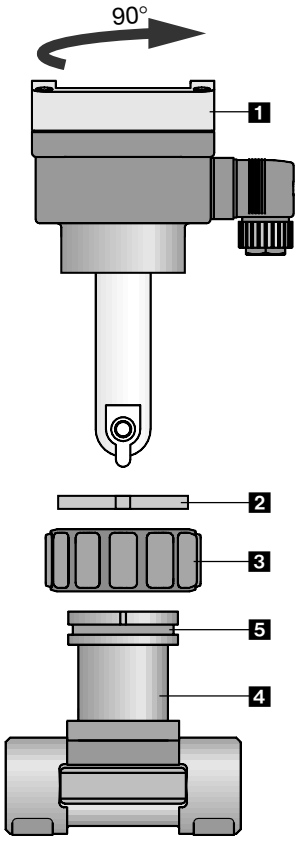
Ⓑ The inductive conductivity transmitter 8226 can be easily installed into pipes using our specially designed fitting system:

1. The fitting **4** must be installed into the pipe acc. to the installation specifications.
2. Insert plastic nut **3** into fitting and let plastic ring **2** snap into guide bush **5**.
3. Carefully insert transmitter 8226 **1** into fitting. If installed properly, the transmitter cannot be rotated.
4. Tighten transmitter housing to fitting with plastic nut **3**.

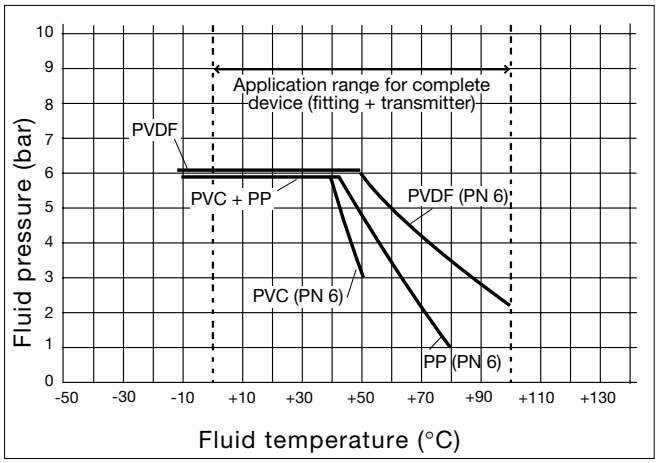
Ⓒ The device must be protected against constant heat radiation and other environmental influences, such as magnetic fields or direct exposure to sunlight.

Important!

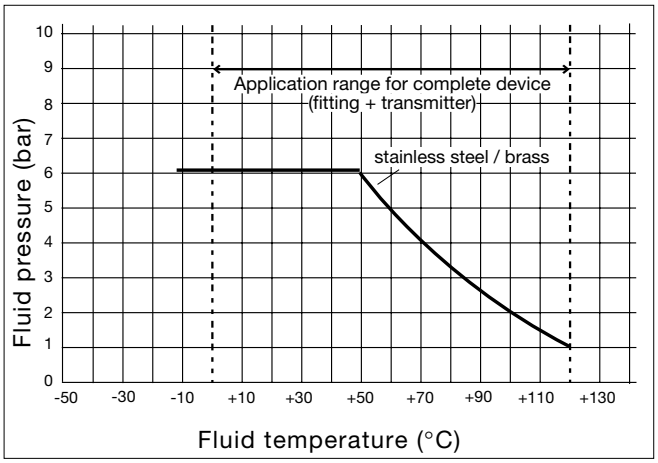
When mounted, the transmitter is being turned by 90°



Pressure-Temperature-Diagram (plastic fittings):



Pressure-Temperature-Diagram (metal fittings):



Operation / Commissioning

Customized adjustments, such as measuring ranges, engineering units and alarm setpoints can be carried out menu-supported on site via a multi-lingual display. Please consider the respective operating instructions prior to commissioning the devices.

Installation

The operation of the conductivity transmitter is classified in the following 3 different menus:

Main menu
- Conductivity
- Temperature
- Output current
- HOLD function

Calibration menu
- Language
- Engineering units
- Cell constant
- Temperature compensation
- Measuring range 4... 20 mA
- Relay function
- Filter selection

Test menu
- Offset
- Span
- Conductivity non compensated
- Simulation of conductivity

Display type 8226
- 8 digits alphanumeric

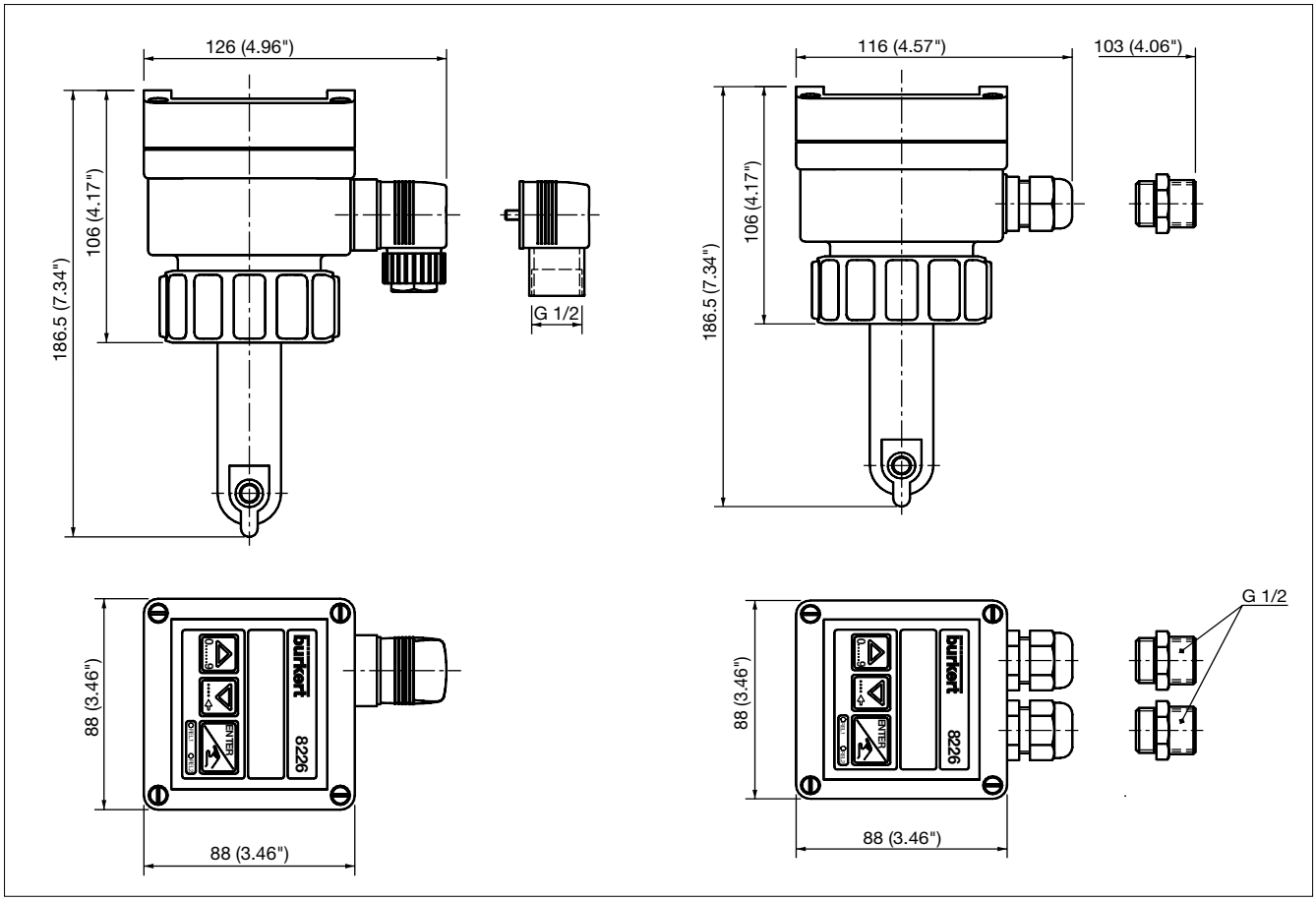
Description of buttons
- Acceptance of chosen parameter or adjusted value
- LED relay 2 (contact closed)
- LED relay 1 (contact closed)
- Direction downwards in menu or sidewards for digit selection
- Display selection and increasing key (numeric values) impulses or automatic

Technical data

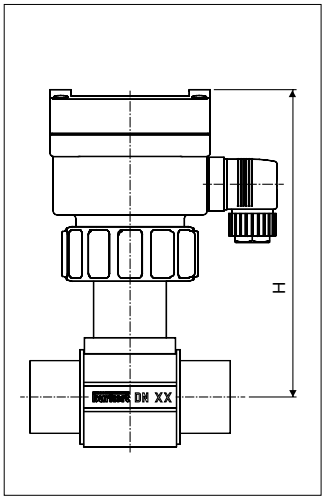
Measuring range	100 µS/cm ... 2 S/cm	Electronic housing	PC
Measuring error	± 2% of measured value	Sensor housing	PVDF; O-rings FPM / EPDM
Temperature compensation	automatic with standardized integrated temperature sensor with reference temperature 25°C (77°F)	Voltage supply	12...30 VDC
		Consumption	max. 250 mA
		Display	15 x 60 mm LCD 8 digits, alphanumeric
Fluid temperature	0 up to 120°C (32 up to 248°F) (depending on fitting, see Pressure-Temperature-Diagram)		15 segments, 9 mm high
		Analog output signal	4...20 mA programable, proportional to the conductivity or temperature
Ambient temperature	0 up to 60°C (32 up to 140°F)	Load	< 1000 Ω at 30 V
			< 800 Ω at 24 V
Storage temperature	0 up to 60°C (32 up to 140°F)		< 450 Ω at 15 V
			< 330 Ω at 12 V
Fluid pressure	(depending on temperature, see Pressure-Temperature-Diagram)	Relay output (optional)	2 relays, 3 A / 230 V; freely adjustable
Pressure class	PN 6		
Enclosure	IP 65 (NEMA 4)		
	Relative humidity max. 80%		

Dimensions [mm (inch)]

Conductivity transmitter type 8226 compact



Dimensions [mm] - fittings S020, DN 15 - 50 for transmitter 8226

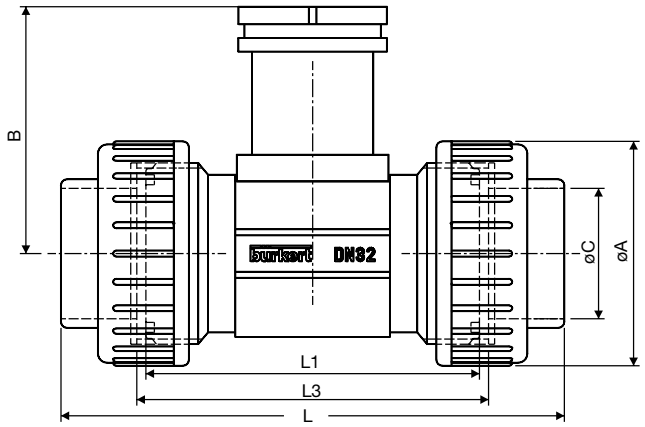


Variable Dimensions [mm]

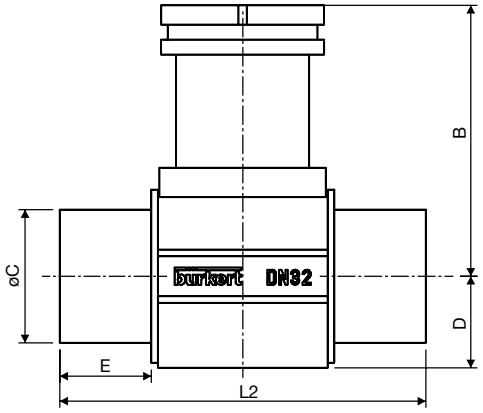
DN	H
15	177
20	177
25	177
32	177
40	178
50	184

Applicable for all fitting materials DN 15 ...50 sizes and process connections.

True union - PVC, PP, PVDF



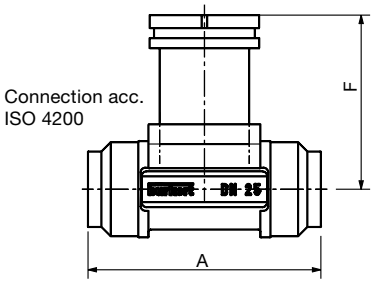
Solvent spigot - PVC, PP, PVDF



True union										Solvent spigot					
B	øA	L			øC			L1	L3	DN	D	L2		E	
		DIN	ANSI	JIS	(DIN)	(ANSI)*	(JIS)*					PVC	PP/PVDF	PVC	PP/PVDF
81.4	74	148	---	---	20	---	---	110	116	**15**	---	---	---	---	---
81.4	74	154	---	---	25	---	---	110	116	**20**	---	---	---	---	---
81.4	74	160	---	---	32	---	---	110	116	**25**	---	---	---	---	---
81.4	74	168	170.0	169	40	42.2	38.60	110	116	**32**	27.5	110	100	27.5	20
85.2	83	188	190.2	190	50	48.3	48.70	120	127	**40**	31.5	120	106	30.0	23
91.5	103	212	213.6	213	63	60.3	60.80	130	136	**50**	39.5	130	110	37.0	27

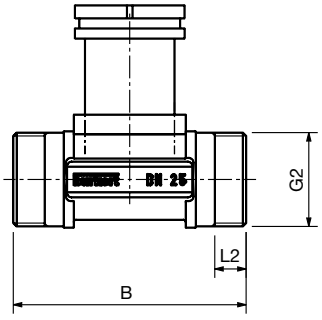
* only for PVC with true union

Weld ends - Stainless steel



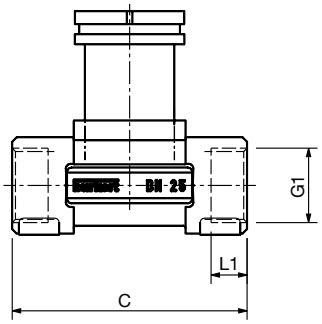
Material Stainless steel:
DIN 1.4404; BS 316L

Male threaded port - Stainless steel / Brass



Material Stainless steel:
DIN 1.4404; BS 316L

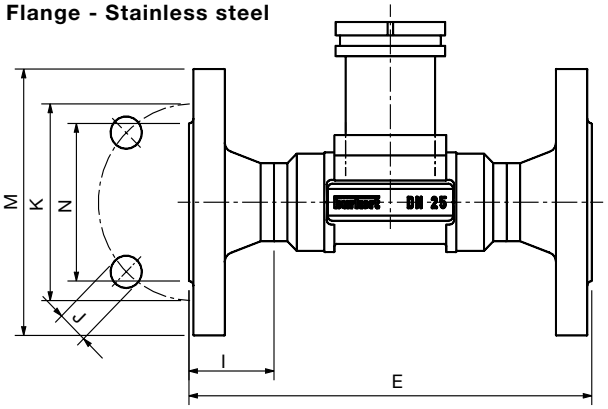
Female threaded port Stainless steel / Brass -



Material Stainless steel:
DIN 1.4404; BS 316L

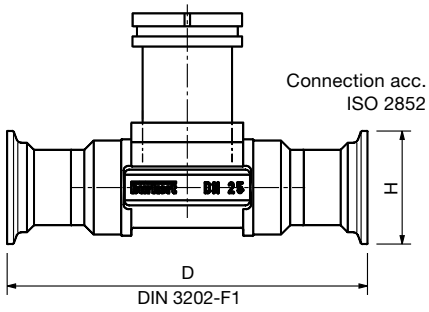
Dimensions [mm] - fittings S020, DN 15 - 50

Flange - Stainless steel



Material:
DIN 1.4404; B.S. 316 L

Tri-Clamp



Material:
DIN 1.4404; B.S. 316 L

Variable dimensions [mm] for Weld ends, Male threaded port, Female threaded port, Flange, Tri-Clamp

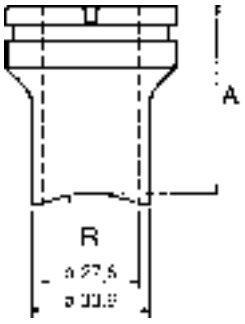
DN	Weld ends ø outside	Weld ends Wall-thickness	Length dimensions A	B	C	D	E (DIN) (ANSI)	E (JIS)	F	Thread G1	L1	G2	L2	Tri-Clamp H	Flange dimensions Norm*	I	J	K	M	N
										G 11/4	23.5				DIN	31.0	4x18.0	100.0	140	78.0
32	42.4	2.0	119	119	120	180	180	178	81.6	NPT 11/4	21.0	G 1/2	18.0	50.5	ANSI	31.0	4x15.8	88.9	117	63.5
										Rc	21.0				JIS	31.0	4x19.0	100.0	135	76.0
										G 11/2	23.5				DIN	36.0	4x18.0	110.0	150	88.0
40	48.3	2.0	129	129	130	200	200	190	85.4	NPT 11/2	20.0	M55x2	19.0	64.0	ANSI	36.0	4x15.8	98.4	127	73.0
										Rc 11/2	19.0				JIS	36.0	4x19.0	105.0	140	81.0
										G 2	27.5				DIN	41.0	4x18.0	125.0	165	102.0
50	60.3	2.6	149	149	150	230	230	216	91.5	NPT 2	24.0	M64x2	20.0	77.5	ANSI	41.0	4x19.0	120.6	152	92.1
										Rc 2	24.0				JIS	41.0	4x19.0	120.0	155	96.0

* Flange: DIN 2501/2633, length according to DIN 3201-F1;
ANSI B16-5-1988, length according to DIN 3201-F1
JIS 10K, length according to ANSI B16-10

Dimensions [mm] - fittings DN 65 - 100

Weld-o-let fittings with radius - Stainless steel

Material: 1.4404 (DIN),
316L (B.S.)



Variable Dimensions [mm]

DN	A	R
65	54.52	36.65
80	53.07	44.45
100	50.71	57.15

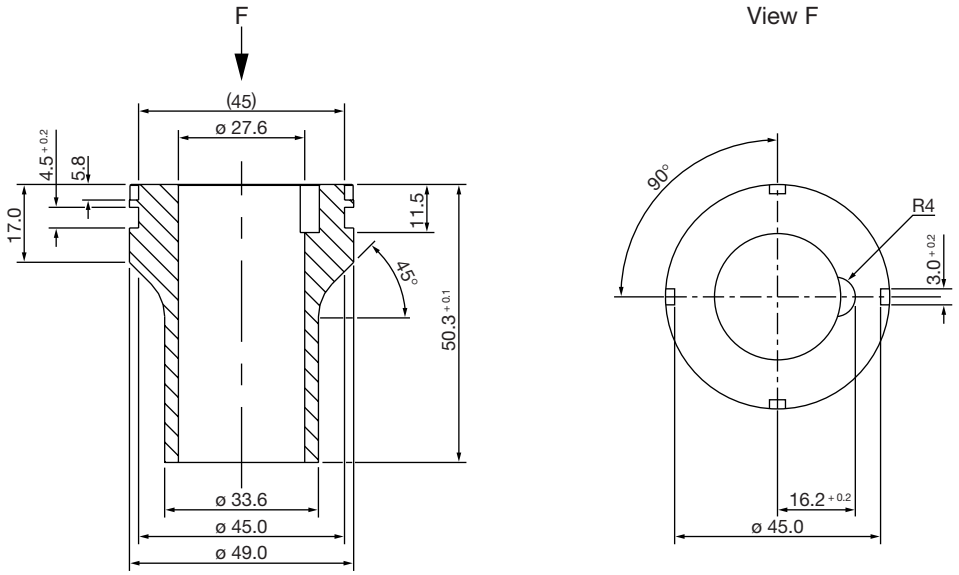
Dimensions [mm] - fittings DN 65 - 100

Weld-o-let fittings - PE, PP, PVDF

Variable Dimensions [mm]

DN	A	PE		PP		PVDF	
		B	C	B	C	B	C
65-100	72.5	13	---	13	---	10.4	---

Weld-o-let fittings for side-wall mounting



Ordering chart for inductive conductivity transmitter 8226

Conductivity transmitter compact 4...20mA output; without relays

Type description	Gasket	Cable connection	Voltage	Item-No.
Compact transmitter 8226 with 4...20mA	FPM	Cable plug PG9	12-30 VDC	431 673 U
Compact transmitter 8226 with 4...20mA	FPM	Cable gland PG13.5	12-30 VDC	631 674 V
Compact transmitter 8226 with 4...20mA	EPDM	Cable plug PG9	12-30 VDC	431 675 W
Compact transmitter 8226 with 4...20mA	EPDM	Cable gland PG13.5	12-30 VDC	431 676 X
Compact transmitter 8226 with 4...20mA	FPM	2x Cable gland PG13.5	115-230VAC	431 677 Y
Compact transmitter 8226 with 4...20mA	EPDM	2x Cable gland PG13.5	115-230VAC	431 678 H
Compact transmitter 8226 with 4...20mA	FPM	Cable plug G 1/2	12-30 VDC	431 683 P
Compact transmitter 8226 with 4...20mA	EPDM	Cable plug G 1/2	12-30 VDC	431 684Q
Compact transmitter 8226 with 4...20mA	FPM	2x Cable gland G 1/2	115-230VAC	431 685 R
Compact transmitter 8226 with 4...20mA	EPDM	2x Cable gland G 1/2	115-230VAC	431 686 J

Conductivity transmitter compact 4...20mA output; with 2 relays

Type description	Gasket	Cable connection	Voltage	Item-No.
Compact transmitter 8226 with 4...20mA	FPM	2x Cable gland PG13.5	12-30 VDC	431 679 A
Compact transmitter 8226 with 4...20mA	EPDM	2x Cable gland PG13.5	12-30 VDC	431 680 Y
Compact transmitter 8226 with 4...20mA	FPM	2x Cable gland PG13.5	115-230VAC	431 681 M
Compact transmitter 8226 with 4...20mA	EPDM	2x Cable gland PG13.5	115-230VAC	431 682 N
Compact transmitter 8226 with 4...20mA	FPM	2x Cable gland G 1/2	12-30 VDC	431 687 K
Compact transmitter 8226 with 4...20mA	EPDM	2x Cable gland G 1/2	12-30 VDC	431 688 U
Compact transmitter 8226 with 4...20mA	FPM	2x Cable gland G 1/2	115-230VAC	431 689 V
Compact transmitter 8226 with 4...20mA	EPDM	2x Cable gland G 1/2	115-230VAC	431 690 S

Ordering data of stainless steel fittings S020

Diameters	Materials	Item-No.
SS - Female G-Threaded Ports		
DN 32	SS, FPM	428 739 B
DN 40	SS, FPM	428 740 Q
DN 50	SS, FPM	428 741 D
SS - Female NPT-Threaded Ports		
DN 32	SS, FPM	428 745 H
DN 40	SS, FPM	428 746 A
DN 50	SS, FPM	428 747 B
SS - Female ISO7 (JIS) Threaded Ports		
DN 32	SS, FPM	428 751 F
DN 40	SS, FPM	428 752 G
DN 50	SS, FPM	428 753 H
SS- Male G Threaded Ports		
DN 32	SS, FPM	428 757 D
DN 40	SS, FPM	428 758 N
DN 50	SS, FPM	428 759 P
SS - Weld Ends		
DN 32	SS, FPM	428 763 B
DN 40	SS, FPM	428 764 C
DN 50	SS, FPM	428 765 D
SS - Tri-Clamp (ISO 2852)		
DN 32	SS, FPM	428 769 R
DN 40	SS, FPM	428 770 N
DN 50	SS, FPM	428 771 B
SS - DIN Flanges (DIN 2501)		
DN 32	SS, FPM	428 775 F
DN 40	SS, FPM	428 776 G
DN 50	SS, FPM	428 777 H
SS - Flanges (JIS 10K)		
DN 32	SS, FPM	431 056 M
DN 40	SS, FPM	431 057 N
DN 50	SS, FPM	431 058 X
SS - ANSI Flanges (ANSI B16-5-1988)		
DN 32	SS, FPM	428 781 W
DN 40	SS, FPM	428 782 X
DN 50	SS, FPM	428 783 Y
SS - Weld-o-let		
DN 65	SS	418 112 M
DN 80	SS	418 113 N
DN 100	SS	418 114 P
SS - Weld-o-let for side-wall mounting		
–	SS	415 294 R

Ordering data of brass fittings type S020

Diameters	Materials	Item-No.
Brass - Female G-Threaded Ports		
DN 32	Brass, FPM	428 715 T
DN 40	Brass, FPM	428 716 U
DN 50	Brass, FPM	428 717 V
Brass - Female NPT-Threaded Ports		
DN 32	Brass, FPM	428 721 Z
DN 40	Brass, FPM	428 722 S
DN 50	Brass, FPM	428 723 T
Brass - Female ISO7 (JIS) Threaded Ports		
DN 32	Brass, FPM	428 727 X
DN 40	Brass, FPM	428 728 G
DN 50	Brass, FPM	428 729 H
Brass - Male G/metric Threaded Ports		
DN 32	Brass, FPM	428 733 V
DN 40	Brass, FPM	428 734 W
DN 50	Brass, FPM	428 735 X

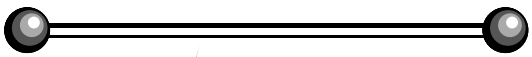
Ordering data of plastic fittings type S020

Diameters	Materials	Item-No.
PVC - True union DIN		
DN 15	PVC, FPM	430 837 L
DN 20	PVC, FPM	430 838 V
DN 25	PVC, FPM	430 839 W
DN 32	PVC, FPM	428 673 H
DN 40	PVC, FPM	428 674 A
DN 50	PVC, FPM	428 675 B
PVC - True union ASTM		
1" 1/4"	PVC, FPM	428 685 W
1" 3/4"	PVC, FPM	428 686 X
2"	PVC, FPM	428 687 Y
PVC - True union JIS		
DN 32	PVC, FPM	429 081 M
DN 40	PVC, FPM	429 082 N
DN 50	PVC, FPM	429 083 P
PVC - Solvent Spigot		
DN 32	PVC, FPM	428 679 P
DN 40	PVC, FPM	428 680 D
DN 50	PVC, FPM	428 681 S
PE - Weld-o-let		
DN 65-100	PE	418 642 G

Diameters	Materials	Item-No.
PP - True Union with Threaded Port		
DN 15	PP, FPM	430 840 B
DN 20	PP, FPM	430 841 Y
DN 25	PP, FPM	430 842 Z
DN 32	PP, FPM	428 691 U
DN 40	PP, FPM	428 692 V
DN 50	PP, FPM	428 693 W
PP - Weld Ends		
DN 32	PP, FPM	428 697 S
DN 40	PP, FPM	428 698 B
DN 50	PP, FPM	428 699 C
PP - Weld-o-let		
DN 65-100	PP	418 650 L
PVDF - True Union with Threaded Port		
DN 15	PVDF, FPM	430 843 S
DN 20	PVDF, FPM	430 844 T
DN 25	PVDF, FPM	430 845 U
DN 32	PVDF, FPM	428 703 G
DN 40	PVDF, FPM	428 704 H
DN 50	PVDF, FPM	428 705 A
PVDF - Weld Ends		
DN 32	PVDF, FPM	428 709 N
DN 40	PVDF, FPM	428 710 A
DN 50	PVDF, FPM	428 711 X
PVDF - Weld-o-let		
DN 65-100	PVDF	418 658 Q

Technical data

Easy **ON/OFF Control**



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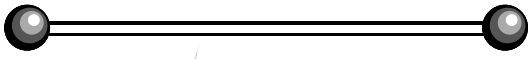
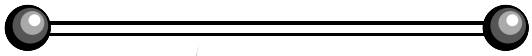
Easy **ON/OFF Control**



-50%

Easy **Continuous Control**



-60%

RF Capacitance Level Transmitter

for continuous liquid level measurement

Type 8100

Level transmitter with Teflon® probe

Advantages / Benefits

- **Accurate and reliable level measurement up to 3 meters**
- **Two-wire transmitter with isolated, 4-20 mA output**
- **Self grounding probe does not require any reference electrode in plastic tanks**
- **All plastic construction with FEP Teflon® probe**
- **Standard probes available in 500, 750, 1000, 1500, 2000, 2500 or 3000 millimeter lengths**
- **PP enclosure rated IP65 with PG13 cable gland**
- **G 3/4 mounting threads**

Application

Level Measurement

Relatively clean, non-coating liquids including acids, chemicals, water or waste water.

Conductive liquids greater than 100 micro-Siemens.

Non-conductive liquids greater than 20 dielectric constant units.

Output

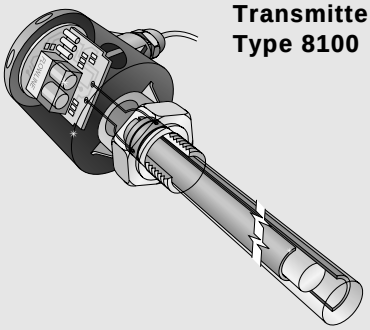
The capacitance transmitter provides a two-wire, 4-20 mA output for level measurement.

Interface

Controller

Type 8620 continuous rail mount controller

bürkert
Easy Fluid Control Systems



Transmitter Type 8100

Principle of Operation

The capacitance transmitter measures the dielectric constant values which are present in all materials to determine exact changes in liquid level. The patented capacitance probe features two electrode plates and a guard wire which are completely encapsulated in FEP Teflon®. When liquid rises or falls against the probe, the dielectric material in the medium bridges the signal across the active and ground plates to complete the circuit. The change in capacitance value is converted by the processing electronics into a proportional, 4-20 mA signal output. The transmitter is best applied with conductive liquids greater than 100 micro-Siemens and/or non-conductive liquids greater than 20 dielectric constant units.

Capacitance transmitter

Two-wire, capacitance transmitter with isolated 4-20 mA signal output

Unique, self grounding probe does not require any external reference electrodes in plastic or fiberglass tanks

FEP Teflon® probe is available in standard lengths from 500-3000 mm

Custom probe lengths are also available for specific requirements

Probe installs through any G 3/4 or NPT tank adapter

PP enclosure rated IP65 with PG13 liquid tight cable gland

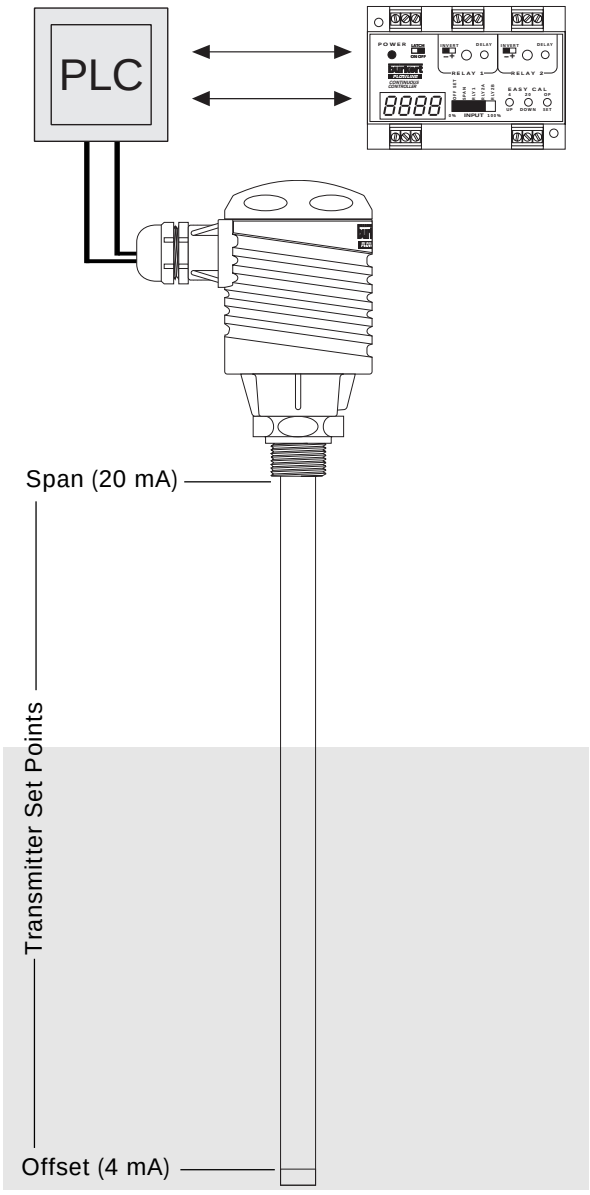
LED light provides user with power status

Potentiometers for offset and span adjustments

Signal invert switch for selectable 4-20 mA or 20-4 mA signal output

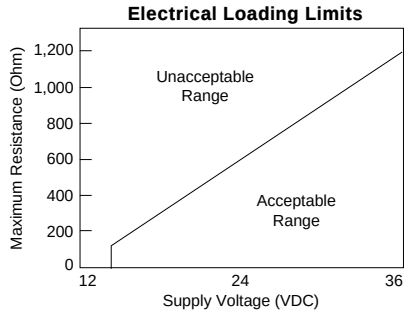
Removeable, two-wire connector ensures fast and simple installation

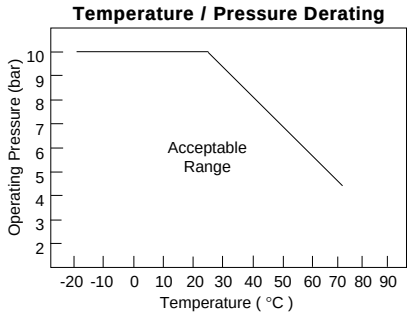
4-20 mA signal output

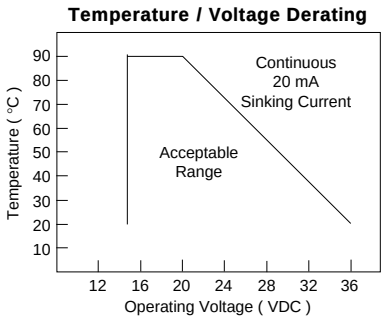


The transmitter is factory calibrated over the entire probe length. The two-wire configuration provides an isolated signal with PLCs, indicators or controllers.

Derating Graphs







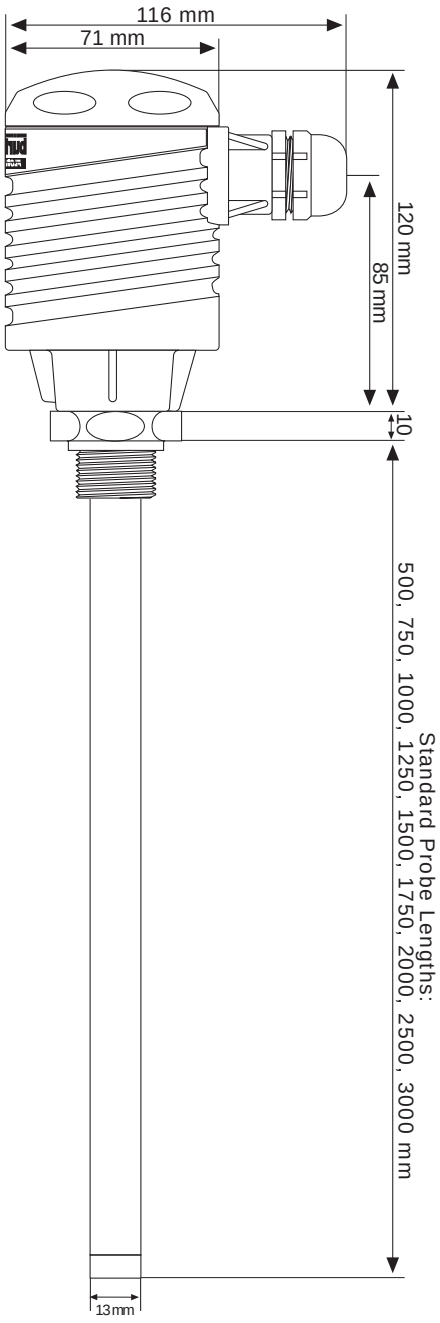
Transmitter Faceplate

The transmitter faceplate features an LED for power status, offset and span adjustments, a signal invert switch and removeable two-wire loop connector.

Type 8620 Continuous Controller

Easy-Cal™ push button calibration provides a fast and simple method to readjust the Type 8100 measurement span and apply the relay set points.

Dimensions

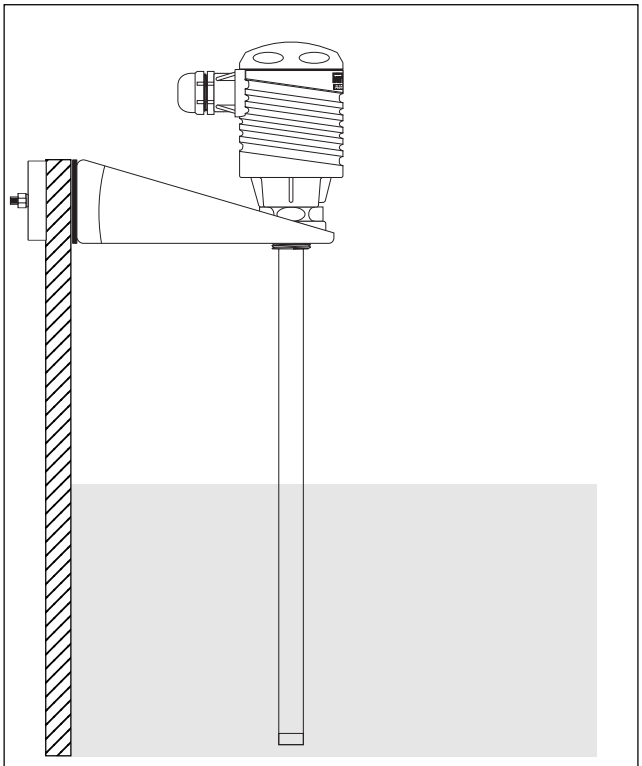


RF Capacitance Level Transmitter **Type 8100**

Technical Data

Accuracy:	± 1% of full scale
Repeatability:	± 3 mm
Dielectric range:	20 to 80 at 1 MHz
Blocking distance:	2 cm from mounting threads
Probe pF range:	100 to 1000 pF
Supply voltage:	2 wire interface, 15 - 36 VDC
Signal output:	4 - 20 mA, 15 - 26 VDC
Signal invert:	Selectable, 4-20 mA or 20-4 mA
Offset adjustment:	Potentiometer (4 mA)
Span adjustment:	Potentiometer (20 mA)
Indication:	LED for power status
Temperature rating:	-20 to 70 °C.
Max. pressure rating:	10 bar at 25 °C.
Probe lengths:	500, 750, 1000, 1250, 1500, 2000, 3000 mm
Probe material:	FEP (Teflon®)
Enclosure rating:	IP65 (NEMA 4X)
Enclosure material:	PP flame retardent (U.L. 94 VO)
Cable gland:	PG13 liquid tight gland
Mounting threads:	G 3/4 (Optional: NPT)
Gasket seal:	Viton (Accessory)

Side Mount Bracket



The side mount bracket provides a fast and simple method of attaching the capacitance transmitter to the side wall or lip of an open vessel.

Ordering Chart for RF Capacitance Level Transmitter Type 8100 with G 3/4 mounting threads

Probe Lenght [mm]	Order-No.
500	417 388 Z
750	417 389 S
1000	417 390 X
1250	417 391 L
1500	417 392 M
2000	417 393 N
2500	417 394 P
3000	417 395 Q

Ordering Chart for Accesories

Description	Order-No.
Viton Gasket	417 014 D
Side Mount Bracket	417 075 J