

# Product Selection Guide

**Satchwell Control Systems Ltd**  
**Advanced Building Systems**  
Farnham Road  
Slough  
Berkshire SL1 4UH  
United Kingdom

Telephone +44 (0) 1753 611000  
Facsimile +44 (0) 1753 611001  
Website [www.satchwell.com](http://www.satchwell.com)

**An Invensys Controls Company**

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Welcome to this new edition of our Product Selection Guide, encompassing Satchwell, Drayton and Controlli products in a single publication, complete with recommended retail prices. The Guide is designed to make it as easy as possible for you to identify the items you need, for both new projects and replacement of installed items.

**USING THE PRODUCT SELECTION GUIDE**

**Index Pages**

The individual products are listed in the order that they appear in the main section of the Guide. If they also appear in the Product Compatibility and Obsolete Product sections, the relevant page numbers are shown in the adjacent columns (applies only to Satchwell brand products).

**Brands**

Drayton brand products can be found on page 34

Controlli brand products and supporting information can be found on pages 66 - 74

The remainder of the Guide is devoted to Satchwell brand products.

**Data Sheets**

The Guide provides a convenient summary of the functionality and technical specification of each product. For full technical information, the reference number of the relevant data sheet is shown.

**FURTHER INFORMATION**

We provide a series of additional resources in the form of printed documentation, electronic files, an Internet site, and the services of our Customer Care Centre. Details are shown below.

**Product Range Catalogue**

The Product Range Catalogue is a compendium of all our data sheets. It is available in both CD-ROM and ring binder formats. Contact Customer Care to obtain a copy.

**Web Site**

Check our total portfolio by visiting our Internet site at [www.satchwell.com](http://www.satchwell.com), which also gives direct access to the latest versions of all our data sheets in pdf format.

**Customer Care Centre**

Our Customer Care Centre is available to answer all your questions, and can put you in direct contact with the sales office responsible for your area.

Customer Care details are as follows:

Tel: +44 (0) 1753-611000

Fax: +44 (0) 1753-611001

Email: [customer.care@invensys.com](mailto:customer.care@invensys.com)

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	" " (for Electro-thermal)	VSZ	17	66	72	-
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	Fan Coil Bodies, Threaded	VMT	19	66	72	-
	" " (for Electro-thermal)	VMZ	19	66	72	-
	<b>4-port Valves (fan-coil)</b>					
	Fan Coil Bodies, Threaded	VTT	20	66	72	-
	" " (for Electro-thermal)	VTZ	20	66	72	-
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Cast Iron Bodies, Screwed		VSB, VSBT	17	66, 67	72	-
" Flanged		VSB.F, VSG, SS-GA, VSS	17	67, 68	72	-
Cast Iron Bodies, Screwed, Short Stroke		VSBT	17	67	72	-
Cast Steel Bodies, Flanged		SS-AA, DS-AA	17	67	72	-
" " (Low Temperature)		SS-AACP	18	67	72	-
" " (High Temperature)		DS-AACP	18	67	72	-
SS-AACP		SS-AACP	18	67	72	-
Balanced Valves, Flanged		VBS, VBG	18	68	72	-
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" Flanged		VMB.F, VMS, 3V-SA, 3V-GA	19	67, 68	72	-
Cast Iron Bodies, Screwed, Short Stroke		VMBT	19	67	72	-
Cast Steel Bodies, Flanged	3V-AA	19	69	72	-	
" " (Low Temperature)	3V-AACP	20	69	72	-	
" " (High Temperature)	3V-AACP	20	69	72	-	
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SATCHWELL & DRAYTON PRODUCTS - ALPHANUMERIC PRICE LIST

Code	List Price	Code	List Price	Code	List Price	Code	List Price	Code	List Price
04-03-109	.83.00	AY1351	.61.00	FEU6416	.52.00	MNL-5RH2	.295.00	SPA1504	.175.00
0477-9-241	.160.00	BCA1601	.49.00	FEU6451	.48.00	MNL-5RR2	.295.00	SPA1505	.73.00
0561-9-220	.39.00	BCA1602	.20.00	FEU6452	.48.00	MNL-5RS1	.295.00	SPA1506	.73.00
0561-9-260	.110.00	BCA9201	.49.00	FEU6454	.48.00	MNL-5RS2	.295.00	SVT4201	.499.00
0561-9-261	.225.00	BCA9202	.39.00	FEX7401	.34.00	MNL-C	.139.00	SVT4251	.549.00
0563-9-231	.39.00	BFB1500	.98.00	FLS1502	.699.00	MN-LCD-100	.375.00	52554	.£27.00
0579-1-360	.360.00	BFB1501	.98.00	HDS9102	.134.00	MN-LCDP-100	.375.00	52980	.47.00
0588-9-210	.39.00	BFB1506	.92.00	HDS9103	.101.00	MNL-FLOW-BAL	.204.00	260915	.47.00
0617-9-410	.130.00	BFB1510	.92.00	HDS9201	.268.00	MNL-TS-100	.894.00	3V-AA100	.4,716.00
0617-9-411	.148.00	BFB1516	.92.00	HDS9202	.206.00	MNL-TSP-100	.990.00	3V-AA125	.6,407.00
0617-9-412	.163.00	BFB1520	.92.00	IAC2602	.75.00	MNL-V1RV2	.395.00	3VAA25	.1,346.00
0617-9-413	.163.00	BFB1525	.92.00	IAC420-F	.599.00	MNL-V2RV2	.420.00	TR2	.71.00
0618-9-210	.58.00	BRC-41N-100	.295.00	IAC420-P	.625.00	MNL-V3RV2	.420.00	TR3	.96.00
0618-9-510	.225.00	BRC-41N-101	.295.00	IAC600-B	.1,200.00	MN-MER	.2,500.00	TR4	.132.00
0618-9-511	.238.00	BRC-41N-500	.195.00	IAC-TS	.830.00	MN-MER-OUT	.850.00	TR5	.214.00
0618-9-512	.238.00	BRC-41N-501	.185.00	KMC3201	.550.00	MNN-30-100	.495.00	TSM2501	.26.00
0623-9-201	.26.00	BRC-51N-100	.295.00	LIB-4-485	.189.00	MNN-44-100	.475.00	TWK2301	.57.00
0626-9-203	.82.00	BRC-51N-101	.295.00	LK2407	.58.00	MNN-50-100	.695.00	TWL2302	.52.00
0626-9-204	.50.00	BRC-51N-500	.195.00	LK2408	.4.00	MNN-62-100	.1,050.00	TWM2401	.84.00
0626-9-310	.124.00	BRC-51N-501	.185.00	LK2701	.44.00	MNN-COM	.60.00	URC-41N-100	.195.00
0626-9-311	.155.00	BSA1501	.29.00	LK2702	.39.00	MNN-MI-100	.425.00	URC-41N-101	.195.00
0626-9-312	.22.00	CSC5252	.525.00	LK2703	.49.00	MNN-RTC	.65.00	URC-41N-102	.195.00
0626-9-313	.20.00	CSC5352	.550.00	LNK1402	.17.00	MNN-TS-100	.695.00	URC-41N-103	.195.00
0667-9-201	.112.00	CSM-CORE	.250.00	LNKF501	.109.00	MNN-TSP-100	.780.00	URC-51N-100	.210.00
0823-2-801	.18.00	CXR5805	.600.00	LNKF502	.109.00	MN-S1	.89.00	URC-51N-101	.210.00
0837-1-203	.44.00	CTX5605	.520.00	LNKHW01	.44.00	MN-S2	.99.00	URC-51N-102	.210.00
0837-1-352	.18.00	CZT5305	.650.00	LNKHY01	.109.00	MN-S3	.109.00	URC-51N-103	.220.00
0841-1-201	.72.00	CZU4201	.115.00	LNKHY02	.109.00	MN-S4	.125.00	URC-IR-100	.450.00
0841-2-201	.72.00	DC1100	.750.00	LNKIN01	.27.00	MN-S4-FCS	.120.00	URC-SET-100	.120.00
0851-2-401	.22.00	DC1100C	.1,200.00	LNKLS01	.44.00	MN-S5	.155.00	VEU4414	.71.00
0862-7-702	.8.00	DC2100	.299.00	LON-TERM1	.35.00	MN-TK	.55.00	VEU4415	.71.00
0866-1-405	.27.00	DC2100H	.2,250.00	LON-TERM2	.35.00	MN-VSCORE	.500.00	VEU4626	.116.00
A701	.52.00	DDC2601	.120.00	MB1402	.120.00	MN-VSLON	.350.00	VEX7201	.27.00
A702	.71.00	DDCO2602	.963.00	MB1452	.126.00	MN-VW100-UK	.1,400.00	VSF1476	.462.00
A703	.106.00	DDH7602	.356.00	MB1502	.142.00	MN-VW10K-UK	.5,500.00	VSF1526	.529.00
A704	.76.00	DDH7603	.276.00	MB1552	.200.00	MN-VW2K-UK	.4,000.00	VSF1576	.611.00
A705	.114.00	DDP3601	.21.00	MB1602	.244.00	MN-VW500-UK	.2,800.00	VSF1626	.741.00
AD-8961-220	.23.00	DDP5610	.366.00	MB1652	.282.00	MN-VW60K-UK	.10,000.00	VSF1676	.801.00
AD-8969-202	.20.00	DDP6601	.398.00	MBF4732	.411.00	MN-VWIO-MOD	.1,600.00	VSF2426	.455.00
ALA1211	.36.00	DDP6610	.398.00	MBF4782	.488.00	MN-VWIO-NCP	.1,100.00	VSF2427	.455.00
ALA1751	.51.00	DDP6610	.398.00	MBF4857	.505.00	MN-VWION-NCP	.1,100.00	VSF2428	.455.00
ALE1302	.760.00	DDT0001	.70.00	MBX4401	.99.00	MN-VWION-SNP	.1,100.00	VSF2429	.455.00
ALE1352	.740.00	DDTH7612	.367.00	MBX4451	.116.00	MN-VWIO-SNP	.1,100.00	VSF2430	.455.00
ALE1302	.899.00	DDTH7613	.318.00	MBX4501	.111.00	MN-VWP100-UK	.4,000.00	VV-LITE	.1,000.00
ALE1352	.899.00	DDU0001	.20.00	MBX4551	.116.00	MN-VWP10K-UK	.8,200.00	VV-LITE-TO-STD	.1,100.00
ALI1576	.610.00	DDU1803	.28.00	MBX4601	.128.00	MN-VWP2K-UK	.7,000.00	VV-STANDARD	.2,000.00
ALI1577	.650.00	DDV1201	.318.00	MBX4651	.176.00	MN-VWP500-UK	.5,500.00	VZ1401	.174.00
ALI1676	.530.00	DOS0002	.77.00	MEU4422	.71.00	MN-VWP60K-UK	.13,000.00	VZ1402	.174.00
ALI1677	.615.00	DOT0002	.70.00	MEU4423	.71.00	MZ3402	.174.00	VZ1403	.174.00
ALM1601	.479.00	DOW2701	.276.00	MEU4425	.71.00	MZ3452	.188.00	VZ1404	.174.00
ALMS1601	.769.00	DR3253	.54.00	MEU4626	.116.00	MZ3501	.215.00	VZ1451	.188.00
ALMS1651	.769.00	DR3253	.54.00	MEU4627	.116.00	MZ3551	.232.00	VZ2501	.215.00
ALX1201	.439.00	DRCO2702	.816.00	MEX7301	.28.00	MZ3601	.337.00	VZ2551	.232.00
ALX1251	.399.00	DRH7702	.318.00	MIU4252	.599.00	MZ3651	.455.00	VZ2601	.337.00
ALXS1201	.769.00	DRH7703	.297.00	MJF3426	.351.00	MZF3729	.865.00	VZ2651	.560.00
AM-135	.13.00	DRT3451	.50.00	MJF3427	.351.00	MZF3779	.1,138.00	VZF1727	.783.00
ARE2302	.179.00	DRT3453	.52.00	MJF3476	.409.00	MZF3854	.1,415.00	VZF1777	.1,057.00
ARE2303	.185.00	DRT3651	.54.00	MJF3526	.457.00	MZF3904	.1,688.00	VZF1852	.1,468.00
ARE2304	.219.00	DRT3652	.79.00	MJF3576	.549.00	MZF3958	.2,097.00	VZF1902	.1,605.00
ARE2352	.149.00	DRT3801	.85.00	MJF3626	.609.00	MZX4402	.126.00	VZF1954	.2,015.00
ARE2354	.179.00	DRT3851	.98.00	MJF3676	.651.00	MZX4452	.137.00	VZX4404	.114.00
ARE2355	.175.00	DRT4453	.58.00	MJC4601	.799.00	MZX4501	.155.00	VZX4451	.124.00
ARM2606	.135.00	DRTE2201	.128.00	MJC4601	.799.00	MZX4551	.185.00	VZX4501	.142.00
ARM2607	.165.00	DRTE2801	.185.00	MNA-C	.89.00	MZX4601	.203.00	VZX4551	.169.00
ARM2656	.105.00	DRTH7712	.333.00	MNA-FLO-1	.41.00	MZX4651	.245.00	VZX4601	.190.00
ARM2657	.135.00	DRTH7713	.308.00	MNA-R10	.750.00	RB1	.64.00	VZX4651	.231.00
ARX2202	.129.00	DRTH8731	.1,130.00	MN-DK	.89.00	RB2	.64.00	WP-TECH-32	.3,000.00
ARX2203	.159.00	DST0001	.64.00	MN-ETH	.399.00	RES7354	.374.00	WP-TECH-CD-E-32	.250.00
ARX2252	.105.00	DU4301	.81.00	MNL-10RF2	.425.00	RES7355	.185.00	XRM3201	.379.00
ARX2253	.135.00	DU54302	.90.00	MNL-10RH2	.425.00	RM3601	.379.00	ZVX4201	.61.00
AVA1752	.44.00	DUSF4351	.149.00	MNL-10RR2	.425.00	RMS7654	.361.00	ZVX4202	.66.00
AVE0001	.145.00	DUSF4352	.149.00	MNL-10RS1	.425.00	RMS7655	.387.00	ZVX4203	.72.00
AVE0002	.155.00	DWA0001	.30.00	MNL-10RS2	.425.00	RMS7656	.237.00	ZVX4301	.48.00
AVM7301	.55.00	DWA0002	.73.00	MNL-11RF2	.395.00	RMS7657	.237.00	ZVX4302	.64.00
AVM7351	.55.00	DWA0003	.57.00	MNL-13RF2	.425.00	RPW4425	.169.00	ZVX4303	.70.00
AVU2201	.83.00	DWA0004	.79.00	MNL-15RF2	.425.00	RXS7254	.361.00	ZVX4401	.81.00
AVUE4304	.206.00	DWA0005	.22.00	MNL-15RH2	.425.00	RXS7255	.387.00	ZY1201	.33.00
AVUE4354	.215.00	DWT0001	.61.00	MNL-15RR2	.425.00	RXS7256	.232.00	ZY1202	.33.00
AVUM4601	.196.00	EPT7401	.330.00	MNL-15RS1	.425.00	SFA1451	.83.00	ZY1203	.33.00
AVUX4202	.181.00	FEU5626	.80.00	MNL-15RS2	.425.00	SFW1251	.98.00	ZY1204	.37.00
AVX7201	.55.00	FEU5627	.80.00	MNL-20RF2	.555.00	SPA1401	.46.00	ZY1205	.37.00
AVX7251	.55.00	FEU6414	.52.00	MNL-20RH2	.555.00	SPA1402	.46.00	ZY1206	.37.00
AY1201	.61.00	FEU6415	.52.00	MNL-20RR2	.555.00	SPA1501	.140.00	ZY1301	.33.00
AY1251	.61.00			MNL-20RS1	.555.00	SPA1502	.140.00	ZY1302	.33.00
AY1301	.61.00			MNL-20RS2	.555.00	SPA1503	.175.00	ZY1303	.33.00
				MNL-5RF2	.295.00			ZY1304	.37.00
								ZY1305	.37.00
								ZY1306	.37.00

List prices are quoted in UK Sterling (£)

CONTROLLI VALVES AND ACTUATORS - ALPHANUMERIC PRICE LIST

Code	List Price	Code	List Price	Code	List Price	Code	List Price
244	.185.00	MDL56	.649.00	VFG10-150	.591.00	VSBT6	.184.00
245	.195.00	MVA21	.30.00	VFG10-200	.844.00	VSG100	.886.00
246	.195.00	MVA23	.28.00	VFG10-40	.369.00	VSG125	.1,537.00
51938	.32.00	MVA41	.30.00	VFG10-50	.366.00	VSG150	.2,239.00
52554	.£27.00	MVA43	.28.00	VFG10-65	.369.00	VSG65	.541.00
52980	.47.00	MVB26	.256.00	VFG10-80	.390.00	VSG80	.681.00
260915	.47.00	MVB46	.237.00	VMB1	.103.00	VSS25	.633.00
3V-AA100	.4,716.00	MVB52	.314.00	VMB11	.103.00	VSS251	.633.00
3V-AA125	.6,407.00	MVB56	.307.00	VMB11F	.190.00	VSS25R	.633.00
3VAA25	.1,346.00	MVBC	.32.00	VMB15	.103.00	VSS32	.835.00
3V-AA251	.1,346.00	MVBHT	.19.00	VMB15F	.190.00	VSS40	.982.00
3V-AA25R	.1,346.00	MVBPA2	.57.00	VMB16100	.838.00	VSS50	.1,188.00
3V-AA32	.1,609.00	MVL26	.603.00	VMB16125	.1,419.00	VSS65	.1,495.00
3V-AA40	.1,859.00	MVL46	.603.00	VMB16150	.1,902.00	VST09	.33.00
3V-AA50	.2,202.00	MVL46A	.703.00	VMB1665	.512.00	VST1	.33.00
3V-AA65	.2,691.00	MVL46C	.703.00	VMB1680	.610.00	VST10	.33.00
3V-AA80	.3,179.00	MVL56	.694.00	VMB1F	.190.00	VST11	.33.00
3V-AACP100	.5,811.00	MVL56A	.832.00	VMB2	.103.00	VST12	.33.00
3V-AACP100B	.5,811.00	MVL56C	.832.00	VMB2F	.190.00	VST13	.33.00
3V-AACP125	.7,826.00	MVLP2A	.85.00	VMB3	.108.00	VST2	.41.00
3V-AACP125B	.7,826.00	MVLP4AM	.85.00	VMB3F	.199.00	VST21	.41.00
3V-AACP25	.1,951.00	MVT44	.73.00	VMB4	.151.00	VST209B	.33.00
3V-AACP25B	.1,951.00	MVT56	.132.00	VMB4F	.210.00	VST210B	.33.00
3V-AACP25I	.1						

Software



VisiView

VisiView is a state-of-the-art graphical user interface for MicroNet and Satchnet networking controllers, utilising the latest web technology to give users total visibility of heating, ventilation and air conditioning installations in their buildings.

VisiView, provides fully flexible access to system parameters, status and performance via users' own PC browsers. Up to three users can log on concurrently. Installed on a simple plug-and-play basis, VisiView uses industry-standard Windows XP Pro and Microsoft Explorer software.

VisiView is ideal for smaller sites (and networks of sites) where cost-effective solutions are required. It is particularly effective where maintenance people require remote access via a standard browser, and where ease of installation and engineering is critical.

FEATURES

- Provides visualisation of live schemes from any location connected to the Internet/Intranet
- End user requires Web browser only
- Only authorised users can log on to VisiView projects
- Live information, streamed direct to the browser
- Uses VisiSat Points List as basis for project design
- MicroNet data source provided as standard
- Supports MicroNet, IAC and MMC controllers



MicroNet View

MicroNet View is a software platform that provides an intuitive, graphical interface for network-level supervisory and control functions. MicroNet View works on any of the MicroNet network options, LonWorks® FTT-10 Free Topology, NCP (Native Communications Protocol), and ARCNET, and works with the MicroNet family. MicroNet View supports also Satchnet range products such as IAC controllers and third party products such as chillers, boilers and access control systems.

FEATURES

- MicroNet View**
- Real-time data on active, multi-media graphical displays
  - Provides intuitive operation via customised control panels
  - Support for DDE, and fast DDE standards
  - Supports the use of bitmaps, photos, and other graphic formats when designing the network reporting display
  - Comprehensive logging and alarm management utilities
- MicroNet View Pro**
- Allows graphics generation and development of the application
  - Powerful scripting editor for creating and performing system tasks
  - Use of ActiveX® Controls and Wizards makes the system configuration easy
  - Allows monitoring and editing of system variables



VisiSat™2 Configuration Tool

This software is a cohesive, flexible, system engineering tool compatible with Microsoft Windows 2000 Professional and Windows XP. It uses Visio 2000 or Visio 2002 32-bit drawing interface for graphic representation of control applications and control objects. With this configuration tool, a designer can customise an application to match specific project requirements then loads the application to a stand alone or networked controller.

FEATURES

- Runs under Visio 2000 or Visio 2002
- Compatible with Windows 2000 Professional or Windows xp
- Controllers are programmed using graphical objects in "Bubbleland"
- Powerful and intuitive configuration of interfaces
- Unique mechanism to change LON controller profiles
- 'Custom' object creation for standard repeated applications
- Configuration report generation
- Autogeneration of wiring diagrams
- Multiple trends on single page.

	Description	Type
VV-LITE	VisiView Lite	up to 250 points, 2 concurrent clients
VV-STANDARD	VisiView Standard	up to 2000 points, 3 concurrent clients
VV-LITE-TO-STD	VisiView Lite to Standard Upgrade	

Data Sheet 10.204

HARDWARE SPECIFICATIONS

See data sheet for minimum hardware requirements.

FEATURES (cont)

- Graphical User Interface (GUI) using Internet Explorer
- Scalable Vector Graphics (SVG) enable dynamically generated, high-quality graphics from real-time data
- Comprehensive library of SVG objects provides graphical controls for a wide range of schemes
- Resolution independent graphics rendering
- Logging: both historical and live-trend display
- Alarms: value and state based with alarms transmitted by email
- Open architecture: can stream third-party data
- User interface available in multiple languages
- Any number of users (clients) possible, with up to 3 concurrent users
- Administrator configuration of users, projects and communications
- Security/Access: access rights can extend to individual rights on each Point of data

	Description	Type
MN-VW100-UK	MicroNet View	100 tag, English version
MN-VW500-UK	"	500 tag, English version
MN-VW2K-UK	"	2,000 tag, English version
MN-VW10K-UK	"	10,000 tag, English version
MN-VW60K-UK	"	60,000 tag, English version
MN-VWIO-NCP	I/O-servers (dongles)	NCP/ARCNET I/O-server, dongle
MN-VWIO-SNP	"	Satchnet I/O-server, dongle
MN-VWION-SNP	"	NCP/ARCNET I/O-server, for existing dongle
MN-VWP100-UK	MicroNet View Pro (development)	100 tag, English version
MN-VWP500-UK	"	500 tag, English version
MN-VWP2K-UK	"	2,000 tag, English version
MN-VWP10K-UK	"	10,000 tag, English version
MN-VWP60K-UK	"	60,000 tag, English version

Data Sheet 10.201

HARDWARE SPECIFICATIONS

See data sheet for minimum hardware requirements.

ACCESSORIES

- ECH-37200 LNS DDE server edition
- ECH-42100 LPR-10 Router Module TP/FT-10 to TP/FT-10
- ECH-42102 LPR-12 Router Module TP/FT-10 to TPXF-1250
- ECH-42105 LPR-15 Router Module TP/XF-1250 to TP/XF-1250
- ECH-48222 Type 2D DIN Base Plate
- ECH-73403 PCLTA-10/TP-1250 ISA (16-bit) Desktop interface
- ECH-74401 PCLTA-20/FT-10 PCI (32-bit) Desktop interface
- WPA-LON-1 PC ISA Card (16-bit) to connect PCs to LonWorks FTT-10 network
- WPA-LON-2 PCMCIA Card to connect Laptop PCs to LonWorks FTT-10 network
- SPI-1111 SPI Main Software (with dongle)
- SPI-1112 SPI Main Software (for existing dongle)

	Description	Type
MN-VSCORE	VisiSat 2	Configuration tool, core software
MN-VSLON	"	Plug-in option for LON devices

Data Sheet 10.202

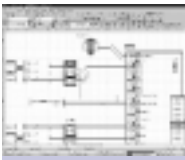
HARDWARE SPECIFICATIONS

See data sheet for minimum hardware requirements.

ACCESSORIES

- LIB-4-485 RS 232/RS 485 Converter to connect PC to NCP network
- WPA-LON-1 PCISA Card (16-bit) to connect PCs to LonWorks FTT-10 network
- WPA-LON-2 PC (PCMCIA) Card to connect Laptop PCs to LonWorks FTT-10 network
- ECH-33100-10 LonManager PCC-10 Protocol analyzer
- ECH-37000 LonMaker for Windows Integration Tool Siebe edition
- ECH-37100 LonMaker Credits (1 unit = 1 credit)
- ECH-73403 PCLTA-10/TP-1250 ISA (16-bit) Desktop interface
- ECH-74401 PCLTA-20/FT-10 PCI (32-bit) Desktop interface

Software (cont)



Workplace Tech Tool

WP Tech is a Windows 2000 compatible program used to create and download control logic applications to MicroNet LONMARK® controllers. The program uses a Visio 32-bit drawing interface for a graphical representation of applications control logic.

FEATURES/BENEFITS

- Easy operation
  - modify existing pre-engineered applications
  - engineer a complete custom application
  - compile and download control logic applications to controllers
  - examine controller memory usage required by an application
- Object-oriented programming environment
- Programmable shapes
- Visio drawing environment

	Description	Type
WP-TECH-CD-E-32	Workplace Tech CD-Rom	Configuration tool files for LONMARK controllers
WP-TECH-32	Workplace Tech Licence	Software unlock codes and licence Data Sheet –

**HARDWARE SPECIFICATIONS**  
See data sheet for minimum hardware requirements.

ACCESSORIES

WPA-LON-1	PC ISA Card (16-bit) to connect PCs to LONWORKS FTT-10 network
WPA-LON-2	PC (PCMCIA) Card to connect Laptop PCs to LONWORKS FTT-10 network
ECH-33100-10	LonManager PCC-10 Protocol analyzer
ECH-37000	LonMaker for Windows Integration Tool Siebe edition
ECH-37100	LonMaker Credits (1 unit = 1 credit)
ECH-73403	PCLTA-10/TP-1250 ISA (16-bit) Desktop interface
ECH-74401	PCLTA-20/FT-10 PCI (32-bit) Desktop interface



Remote Alarm Manager

Remote Alarm Manager is a powerful software package for routing alarm information to management and service personnel. It integrates seamlessly to Micronet View and includes comprehensive alarm tracking and history.

Alarms can be acknowledged remotely from a GSM or WAP-enabled mobile phone or from a Web browser. Message content can be customised and alarms can be routed according to alarm priority, type of alarm and time of day.

FEATURES

- Alarm information collected automatically from Micronet View
- Output drivers to fax, remote printer, Web pages, SMS messaging or E-mail.

	Description	Type
MN-RAM	Remote Alarm Manager, core	System software, includes 1 output driver
MN-RAM-OUT	"	Output drivers (see data sheet)

Data Sheet 10.220

**HARDWARE SPECIFICATIONS**  
See data sheet for minimum hardware requirements.

FEATURES (cont)

- Core software includes Web and WAP interfaces
- Self-monitoring of system hardware and software
- Console for system configuration and full alarm history



CSM Tool

The Commissioning, Service and Maintenance Tool (CSM Tool) is an engineering tool used by field engineers to modify (and monitor) a standard MicroNet system, by downloading VisiSat applications to one or more selected bus-du-jour (and LON) controllers and changing the properties of those controllers to suit the local requirements. All controllers supported by VisiSat are supported by the CSM Tool. The CSM Tool is based on VisiSat COM objects which enable communications, downloading of schemes and editing of properties. It is a stand-alone application intended to be run on a laptop connected to a Satchnet (IAC), NCP ARCNET® or LON network via a communications server. There is no need for Microsoft® Visio to be installed on the same computer. The CSM Tool is compatible with Microsoft® Windows® XP Professional and Windows 2000 Professional (Windows XP preferred).

FEATURES

- Download VisiSat applications to single or multiple controllers and edit their properties
- Uses VisiSat COM objects to communicate to the controller network
- Utilises the well established reliability and ease of use of VisiSat

	Description	Type
CSM-CORE	CSM Tool	Commissioning, Service and Maintenance Tool

Data Sheet 10.203

**HARDWARE SPECIFICATIONS**  
See data sheet for minimum hardware requirements

ACCESSORIES

LIB-4-485 RS 232/RS 485	converter to connect laptop to NCP network.
PCM20H-485 PCMCIA	Card to connect laptop PCs to ARCNET network (available from www.ccontrols.co.uk).

Note: only suitable for use with Windows XP.  
WPA-LON-2 PC (PCMCIA) Card to connect laptop PCs to LONWORKS FTT-10 network.

FEATURES (cont)

- Supports all controllers, network management and display devices supported by VisiSat

Controllers (LONMARK®)



MN 11 & 13 Fan Coil Unit Controller

The MNL-11RF2 is an interoperable, LONMARK Compliant Controller. When programmed using Workplace Tech Tool it provides control for fan coil applications. The controller conforms to the LONMARK fan coil unit functional profile (8020), for open communication and interoperability with third party LONMARK devices - providing greater freedom in system design.

The controller can function in a stand-alone mode or as part of a LONWORKS FTT-10 free topology network.

FEATURES

- LonTalk® FTT-10 support
- LONMARK® fan coil profile 8020 support
- Fully programmable using Workplace Tech Tool
- S-link support
- On board LED indication without cover removal
- Built-in LON jack, for connection to a LON network

	Controller	LONMARK profile	Inputs/outputs
MNL-11RF2	with Fan Coil Profile	Fan Coil	3 x universal input (UI) 4 x digital outputs (DO) 1 x 230Vac, 3A relay
MNL-13RF2	with Fan Coil Profile	Fan Coil	3 x universal input (UI) 4 x digital outputs (DO) 3 x 230Vac, 3A relays

Data Sheet – F26886/7

**Power supply** - 24Vac, 50/60Hz  
**Protection class** - IP 20  
**Mounting** - Wall mounted or DIN rail  
**Sensor inputs** - MN Sx digital sensor link  
**Universal inputs** - 10k resistance, 1kΩ Balco input, 1kΩ Platinum input, 1k resistance, 10kΩ thermistor with 11k shunt resistors, voltage, current, digital input  
**Digital outputs** - MN 11: 1 x relay output, 4 x 24Vac triac outputs  
MN 13: 3 x relay outputs, 4 x 24Vac triac outputs

ACCESSORIES – see page 28

Controllers (LONMARK®)



MN 50 Programmable Controllers

This range of MicroNet MN 50 Controllers are interoperable, LONMARK compliant units. When loaded with an application from the Workplace Tech Tool application library or programmed with the Workplace Tech Tool, these controllers provide control for packaged rooftops, heat pumps, fan coils, unit ventilators and similar applications.

FEATURES

- LONMARK compliant, programmable
- Capability to function in stand-alone mode or as part of a LONWORKS FTT-10 Free Topology communications network
- Proportional (P), Proportional Plus Integral (PI), and Proportional Plus Integral and Derivative (PID) control for cooling and heating
- LED indication
- Plenum-rated enclosure
- Satellite profile allows controller to be used in a broad range of applications

	Controller	LONMARK profile	Inputs/outputs
MNL-5RF2	with Fan Coil Profile	Fan Coil	1 x digital input (DI)
MNL-5RH2	with Heat Pump Profile	Heat Pump	1 x universal input (UI)
MNL-5RR2	with Roof Top Profile	Rooftop	3 x digital outputs (DO)
MNL-5RS2	with Satellite Profile	Satellite	

Data Sheet 10.070

**Power supply** - 20.4...30Vac, 50/60Hz  
**Consumption** - 84VA max : 12VA plus DO loads (24Vac each)  
**Surge immunity compliance** - ANSI C62.41 (IEEE-587, Category A & B)  
**Protection class** - IP 20  
**Mounting** - 35mm DIN rail or panel  
**Sensor inputs** - MN Sx digital sensor link  
**Digital input** - Input type: Dry contact  
**Universal inputs** - 10k resistance, 1kΩ Balco input, 1kΩ Platinum input, 1k resistance, 10kΩ thermistor with 11k shunt resistors, voltage, current, digital input  
**Digital outputs** - Relay outputs: SW24H1, 2 & 3 current ratings

ACCESSORIES – see page 28



MN 100, 150 & 200 Programmable controllers

MicroNet MN 100, 150 and 200 controllers are interoperable, LONMARK compliant units. When loaded with an application from the Workplace Tech Tool application library or programmed with the Workplace Tech Tool, these controllers provide control for packaged rooftops, heat pumps, fan coils, unit ventilators and similar applications.

All controllers use the same physical packaging, but differ in the onboard I/O points they provide.

FEATURES

- LONMARK compliant, programmable
- Capability to function in stand-alone mode or as part of a LONWORKS FTT-10 Free Topology communications network
- Proportional (P), Proportional Plus Integral (PI), and Proportional Plus Integral and Derivative (PID) control for cooling and heating
- LED indication
- Plenum-rated enclosure
- Satellite profile allows controller to be used in a broad range of applications

	Controller	LONMARK profile	Inputs/outputs
MNL-10RF2	with Fan Coil Profile	Fan Coil	1 x digital input (DI)
MNL-10RH2	with Heat Pump Profile	Heat Pump	2 x universal inputs (UI)
MNL-10RR2	with Roof Top Profile	Packaged Rooftop	4 x digital outputs (DO)
MNL-10RS2	with Satellite Profile	Satellite	

MNL-15RF2	with Fan Coil Profile	Fan Coil	3 x universal inputs (UI)
MNL-15RH2	with Heat Pump Profile	Heat Pump	2 x digital outputs (DO)
MNL-15RR2	with Roof Top Profile	Packaged Rooftop	2 x analogue outputs (AO)
MNL-15RS2	with Satellite Profile	Satellite	
MNL-20RF2	with Fan Coil Profile	Fan Coil	2 x digital inputs (DI)
MNL-20RH2	with Heat Pump Profile	Heat Pump	3 x universal inputs (UI)
MNL-20RR2	with Roof Top Profile	Packaged Rooftop	6 x digital outputs (DO)
MNL-20RS2	with Satellite Profile	Satellite	2 x analogue outputs (AO)

Data Sheet 10.100

INSTALLATION DETAILS (cont)

**Protection class** - IP 20  
**Mounting** - 35mm DIN rail or panel  
**Sensor inputs** - MN Sx digital sensor link  
**Digital inputs (MN 100 & 200 only)** - Input type: Dry contact  
**Universal inputs** - 10kΩ thermistor, voltage, current, digital input  
**Digital outputs** - Current ratings: 24VA @ 24Vac, pilot duty  
**Analogue outputs (MN 150 & 200 only)** - Current: 0...20mA. (Output load 80...550Ω.)

ACCESSORIES – see page 28



MN VAV Controllers with Integral Actuator

The VAV Series (Variable Air Volume) Controllers are interoperable, LONMARK-compliant devices. When loaded with an application from the Workplace Tech Tool application library or programmed with the Workplace Tech Tool, they provide a wide range of control strategies for pressure independent terminal boxes with, or without, reheat capabilities. Both models provide an integral actuator with manual override and an integral patented pressure transducer.

FEATURES

- LONMARK compliant, programmable
- Capability to function in stand-alone mode or as part of a LONWORKS FTT-10 Free Topology communications network
- Integrated packaging with actuator, pressure transducer, and controller
- Integral actuator with manual override and travel limit settings for easy set up and support
- Proportional (P), Proportional Plus Integral (PI), and Proportional Plus Integral and Derivative (PID) control for cooling and heating
- Plenum-rated enclosures
- Air balancing using the MicroNet VAV Flow Balance software

	Controller	Control	Inputs/outputs	Reheat type	Other
MNL-V1RV2	with integral actuator	Cooling, none	1 x digital input (DI) 1 x universal input (UI)	None	None
MNL-V2RV2	with integral actuator and fan and/or reheat control	Cooling, series fan, induction, parallel fan, time prop, none	1 x digital input (DI) 1 x universal input (UI) 3 x digital outputs (DO) 1 x analogue output (AO)	Staged electric, floating/proport hydronic reheat, time proportioned, none	Occupancy satellite

Data Sheet 10.120

INSTALLATION DETAILS (cont)

**Velocity pressure input** - Operating range: 0.0...0.622kPa  
Control range: 0.0025...0.498kPa  
Accuracy: ±5% @ 0.249kPa with Laminar flow @ 25°C and suitable flow station  
**Protection class** - IP 20  
**Sensor inputs** - MN Sx digital sensor link  
**Actuator output** - Torque rating: 6Nm  
Stroke: Fully adjustable from 0...90°C  
Timing: Approximately 3 minutes at 60Hz (3.6 minutes at 50Hz) for 90° rotation @ 24Vac  
Position indication:  
Manual override: Pushbutton  
**Digital (relay) outputs** - MNL-V2RV2: SW24H1, 2 & 3 current ratings 24VA each @ 24Vac, 50/60Hz  
**Digital input** - Input type: Dry contact  
**Universal input** - 10k thermistor input, voltage, current, digital input  
**Analogue output** - MNL-V2RV2: Current 0...20mA (output load from 80...550Ω.)

ACCESSORIES – see below and page 28

AM-135	3/8" (9.5mm) to 1/2" (12.8mm) shaft adaptor
MNA-FLO-1	MicroNet VAV Enclosure for conduit applications
MNL-FLOW-BAL	MicroNet Flow Balance Software

Controllers (LONMARK®) (cont)



**MN VAV**  
Controller only

The MicroNet VAV Series (Variable Air Volume) Controller is an interoperable, LONMARK-compliant device. When loaded with an application from the WorkPlace Tech Tool application library or programmed with the WorkPlace Tech Tool, it provides control strategies for pressure independent terminal boxes, with or without reheat capabilities.

**FEATURES**

- LONMARK compliant, programmable
- Proportional (P), Proportional Plus Integral (PI), and Proportional Plus Integral and Derivative (PID) control for cooling and heating
- Plenum-rated enclosure
- Air balancing using the MicroNet VAV Flow Balance software
- Directly compatible with terminal boxes which contain a synchronous-motor-driven damper actuator

**INSTALLATION DETAILS**

**Power supply** - 20.4...30Vac, 50/60Hz  
**Consumption** - 102VA max: 12VA plus DO loads (24VA each) and triac load (total 18VA)  
**Surge immunity compliance** - IEC 1000-4-5. ANSI C62.41 (IEEE-587, Category A & B)

	Controller	Control	Inputs/outputs	Reheat type	Other
MNL-V3RV2	with fan and/or reheat control	Cooling, series induction, parallel fan	1 x digital input (DI) 1 x universal input (UI) 3 x digital outputs (DO) 1 x analogue output (AO) 2 x triac outputs (TO)	Staged electric, floating/proportional hydronic, time Proportioned	Occupancy satellite

Data Sheet 10.121

**INSTALLATION DETAILS (cont)**

**Velocity pressure input** - Operating range: 0.0...2.5" of W.C. (0.0...0.622kPa)  
 Control range: 0.01...2.00" of W.C. (0.0025...0.498kPa)  
 Accuracy: ±5% @ 1.00" of W.C. (0.249kPa) with Laminar flow @ 77°F (25°C) and suitable flow station  
**Protection class** - IP 20  
**Sensor inputs** - MN Sx digital sensor link  
**Digital outputs** - Relay: SW24H1, 2 & 3 current ratings 24VA each @ 24Vac, 50/60Hz  
 Triac: current ratings 0.75A (18VA) each output at 24Vac. Total of 18VA for both outputs  
 Typical load: 24Vac synchronous motor with impedance protected windings  
**Digital input** - Input type: Dry contact  
**Universal input** - 10k thermistor input, voltage, current, digital input  
**Analogue output** - Current 0...20mA (output load from 80...550Ω).

**ACCESSORIES** – and see below

- MNA-FLO-1** MicroNet VAV Enclosure for conduit applications
- MNL-FLOW-BAL** MicroNet Flow Balance Software

**Accessories for MicroNet LONMARK Controllers**

- AD-8961-220** Voltage Divider (converts 1...11Vdc signal to 0.45...5Vdc signal) for universal inputs
- AD-8969-202** 250Ω Shunt Resistor Kit for 4...20mA universal inputs
- LON-TERM1** Single LON Terminator for Free Topologies
- LON-TERM2** Double LON Terminator for Bus Topologies (two required)
- MN Sx** MicroNet Digital Sensors
- WPA-LON-1** PC ISA Card (16-bit) to connect PCs to LonWorks FTT-10 network
- WPA-LON-2** PCMCIA Card to connect Laptop PCs to LonWorks FTT-10 network
- ECH-74401** PCLTA\_20/FT-10 PCI 932-bit) Desktop Interface
- WP-TECH-CD-E-32** WorkPlace Tech Tool
- WP-TECH-32** WorkPlace Tech Tool Unlock Codes

Controllers (Bus-du-jour®)



**MN 300**  
Programmable Bus-du-jour® Controller

The MN 300 controller is designed for unitary control, boilers and special applications that may require built-in transformers and relays.

The controller can function in stand-alone mode or as part of a networked system using Bus-du-jour communication options.

**FEATURES**

- LonWorks FTT-10, ARCNET and NCP communications options - Bus-du-jour
- Fully programmable using graphical objects
- Three built-in 230Vac relays
- 230Vac or 24Vac power supply combined with compact size
- Time schedules
- Switched outputs may be configured as stepped outputs (including plant rotation), actuator outputs or outputs for lights and fans
- Eight fully programmable inputs - digital, analogue 0...10V, resistive 0...10kΩ

	Controller	Comms protocol	Inputs/outputs
MNN-30-100	NCP Controller	NCP as standard ARCNET with plug-in card LonWorks with plug-in card	8 x universal inputs 4 x triac outputs 3 x relay outputs

Data Sheet 10.101

**INSTALLATION DETAILS**

**Power supply** - 24Vac or 230Vac, 50/60Hz  
**Consumption** - 12VA  
**Protection class** - IP 20  
**Mounting** - Wall or 35mm DIN rail  
**Sensor inputs** - MN Sx digital sensor link  
**Inputs** - 8 universal inputs (digital, resistive, 0...10Vdc)  
**Outputs** - 4 triac outputs for switching 24Vac  
 3 SPDT 230Vac relays (Line Relays)  
 Current ratings (for triac outputs): 6Va at 230Vac supply, 18VA at 24Vac supply  
**Power failure reserve** - Controller EEPROM preserves memory for 10 years under normal conditions of use. The software clock will stop during a power failure. However, if the controller has an RTC card, the time will not be lost.

**ACCESSORIES** – see page 29



**MN 440**  
Programmable Bus-du-jour® Controller

This controller is designed for rooftop, unit vent, air handling unit (AHU), and central heating and cooling applications.

The controller can function in stand-alone mode or as part of a networked system using Bus-du-jour communication options. An optional Real Time Clock Card can be fitted to the MN 440 on an NCP network.

**FEATURES**

- LonWorks FTT-10, ARCNET and NCP communications options - Bus-du-jour concept
- Fully programmable using graphical objects
- Intelligent multi-loop controller - up to 7 PID control loops
- Time schedules
- Proportional, integral and derivative control actions
- 0...10Vdc for stepped fan control
- Averaging module for analogue inputs
- Six easily configurable inputs - digital, analogue 0...10V, resistive 0...10kΩ

	Controller	Comms protocol	Inputs/outputs
MNN-44-100	NCP Programmable Controller	NCP as standard ARCNET with plug-in card LonWorks with plug-in card	6 x universal inputs 6 x digital outputs 3 x analogue outputs

Data Sheet 10.102

**INSTALLATION DETAILS**

**Power supply** - 24Vac, 50/60Hz  
**Consumption** - 10VA  
**Protection class** - IP 20  
**Mounting** - Wall or 35mm DIN rail  
**Inputs** - 6 universal inputs (digital, resistive, 0...10Vdc)  
**Outputs** - 6 digital outputs (triac) for switching 24Vac  
 3 analogue outputs (0...10Vdc)  
 Current ratings for triacs: 18VA at 24Vac.  
 Also has a 15Vdc power supply output capable of sourcing 25mA  
**Power failure reserve** - Controller EEPROM preserves memory for 10 years under normal conditions of use. The software clock will stop during a power failure. However, if the controller has an RTC card, the time will not be lost.

**ACCESSORIES** – see page 29

Controllers (Bus-du-jour®)



**MN 500**  
Programmable Bus-du-jour® controller

The MN 500 controller is designed for district heating, boiler plant, air handling unit (AHU), and zone heating and cooling applications.

The controller can function in stand-alone mode or as part of a networked system using Bus-du-jour communication options. An optional Real Time Clock Card (RTC) can be fitted to the MN 500 on an NCP network. Other options include a remote mounting Touch Screen Display which allows the user to view, query and edit controller properties. An LCD display option is also available to review the controller parameters locally.

**FEATURES**

- LonWorks FTT-10, ARCNET and NCP communications options
- Fully programmable using graphical objects
- Intelligent multi-loop controller - up to 8 PID control loops
- Optimisation module and time schedules
- Proportional, integral and derivative control actions
- Ten fully configurable inputs - digital, analogue 0...10V, resistive 0...10kΩ
- Six built-in line voltage relays, 230Vac 5A resistive
- Optional LCD Display for interrogation of local parameters

	Controller	Comms protocol	Inputs/outputs
MNN-50-100	NCP Programmable Controller	NCP as standard ARCNET with plug-in card LonWorks with plug-in card	2 x digital inputs 10 x universal inputs 6 x relay outputs 4 x analogue outputs

Data Sheet 10.103

**INSTALLATION DETAILS**

**Power supply** - 24Vac, 50/60Hz  
**Consumption** - 12VA  
**Protection class** - IP 40  
**Mounting** - Wall or 35mm DIN rail  
**Inputs** - 2 digital pulse counting inputs, 10 universal inputs (digital, resistive, 0...10Vdc)  
**Outputs** - 6 digital outputs (Line Relay) 5A resistive at 230Vac  
 4 analogue outputs (0...10Vdc)  
**Power failure reserve** - Controller EEPROM preserves memory for 10 years under normal conditions of use. The software clock will stop during a power failure. If the controller has an RTC card, then the time will not be lost.

**ACCESSORIES** – and see main section below

- MN-DK** Display Wall Mounting Kit
- MN-LCD-100** MicroNet LCD Display
- MN-LCDP-100** MicroNet LCD Display (for panel mounting)
- MN-TK** Trunking Mounting Kit
- MNN-COM** NCP Plug-in card
- MNN-TS-100** MicroNet Touch NCP Screen Display
- MNN-TSP-100** MicroNet Touch NCP Screen Display (for panel mounting)



**MN 620**  
Programmable Bus-du-jour® Controller

The MN 620 Controller is designed for rooftop, unit vent, air handling unit (AHU) and central heating and cooling applications.

The controller can function in stand-alone mode or as part of a networked system using Bus-du-jour communication options. An optional Real Time Clock Card can be fitted to the MN 620 on an NCP network. Other options include a touch screen and an LCD display.

**FEATURES**

- LonWorks FTT-10, ARCNET and NCP communications options
- Fully programmable using graphical objects
- Intelligent multi-loop controller - up to 8 PID control loops
- Optimisation module
- Time schedules for plant and controller switching
- Proportional, integral and derivative control actions can be individually set using controller objects
- Twelve easily configurable inputs, 8 digital inputs
- Eight triac outputs, four 0...10Vdc outputs

	Controller	Comms protocol	Inputs/outputs
MNN-62-100	NCP Programmable Controller	NCP as standard ARCNET with plug-in card LonWorks with plug-in card	8 x digital inputs 12 x universal inputs 8 x digital outputs 4 x analogue outputs

Data Sheet 10.104

**INSTALLATION DETAILS**

**Power supply** - 24Vac, 50/60Hz  
**Consumption** - 15VA  
**Protection class** - IP 40  
**Mounting** - Wall or 35mm DIN rail  
**Inputs** - 8 digital inputs, 12 universal inputs (digital, resistive, 0...10Vdc)  
**Outputs** - 8 digital outputs (triac). Current ratings 1A at 24Vac (24VA).  
 4 analogue outputs (0...10V)  
**Power failure reserve** - Controller EEPROM preserves memory for 10 years under normal conditions of use. The software clock will stop during a power failure. If the controller has an RTC card, then the time will not be lost.

**ACCESSORIES** – see main section below

- MN-DK** Display Wall Mounting Kit
- MN-LCD-100** MicroNet LCD Display
- MN-LCDP-100** MicroNet LCD Display (for panel mounting)
- MN-TK** Trunking Mounting Kit
- MNN-COM** NCP Plug-in Card required for installation in MN 500 or MN 620, when connecting controller to NCP network
- MNN-TS-100** MicroNet Touch Screen Display
- MNN-TSP-100** MicroNet Touch Screen Display (for panel mounting)

**Accessories for MicroNet Bus-du-jour Controllers**

- ECH-74401** PCLTA-20/FT-10 PCI (32-bit) Desktop Interface
- LIB-4-485** RS 232/RS 485 Converter to connect PC to NCP network
- LON-TERM1** Single LON Terminator for Free Topologies
- LON-TERM2** Double LON Terminator for Bus Topologies (two required)
- MN Sx** MicroNet Sensors
- MNA-C** ARCNET Plug-in Card
- MNA-R10** ARCNET Router
- MNL-C** LonWorks Plug-in Card
- MNN-MI-100** MicroNet Manager Interface
- MNN-RTC** Real Time Clock Card
- MN-VSCORE** VisiSat Configuration Tool (requires Visio 2000 software), core software (NCP & ARCNET)
- MN-VSLON** VisiSat LON plug-in (requires MN-VSCORE), required for Bus-du-jour LON devices
- WPA-LON-1** PC ISA card (16-bit) to connect PCs to LonWorks FTT-10 network
- WPA-LON-2** PC (PCMCIA) card to connect Laptop PCs to LonWorks FTT-10 network

Digital Modules



579-1-360

The Digital Output Module is designed for use with Satchwell controllers having one or more 0...10Vdc outputs. The module allows the 0...10Vdc output(s) to drive voltage free single pole Changeover (SPCO) contacts that are mains rated. Each module has four relay output channels.

FEATURES

- Enables controller 0...10Vdc outputs to be used to switch mains relay contacts
- LED indication of module output status
- 'HAND' /'OFF' /'AUTO' override switch for each channel

	Control	Input	Output
579-1-360	4-channel	0...10Vdc	250Vac 3A resistive, 1A inductive
Data Sheet 2.191	Associated controllers: IAC, MMC, CZT, KMC		

INSTALLATION DETAILS

Power supply - 24Vac (±10%) 50Hz (-10%) to 60Hz (+10%)  
 Consumption - 4VA max at 24Vac 50Hz  
 Protection class - IP20  
 Indication - LED indication of channel status  
 Overrides - 1 switch per channel giving 'HAND', 'OFF' and 'AUTO' positions

Fan Coil Unit Solutions

Function/associated products		Controllers																			
		CZU 4201	URC-41N-100	URC-41N-101	URC-41N-102	URC-41N-103	URC-51N-100	URC-51N-101	URC-51N-102	URC-51N-103	BRC-41N-100	BRC-41N-101	BRC-51N-100	BRC-51N-101	BRC-41N-500	BRC-41N-501	BRC-51N-500	BRC-51N-501	MNL-11RF2	MNL-13RF2	
Networkable		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Standalone		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2-pipe		✓		✓																	
2-pipe auto changeover		✓		✓																	
4-pipe		✓	✓				✓														
Air side control (4-pipe)		✓				✓				✓											
Actuator slaving		✓																			
Sensor slaving			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fan on/off			✓	✓	✓	✓				✓					✓	✓	✓	✓			
Fan 3-speed control			✓	✓	✓	✓				✓					✓	✓	✓	✓			
On board transformer			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
On board relays			1	1	1	1	3	3	3	3	1	1	3	3	1	1	3	3	1	1	3
Output for electric heater			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DX cooling					✓				✓					✓					✓		✓
Room sensors	DRT	✓																			
	DU		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	DUS		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	S1 (S-Link)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	S2		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	S3		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	S4		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	S4-FCS		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Duct sensors	DDU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	DDT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Actuator/valves	AVU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	AVX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	BFB (Bonsai)										✓	✓	✓	✓	✓	✓	✓	✓			
See page		37					31							31							26

Fan Coil Unit Solutions (cont)



Bonsai Pro & Bonsai Lite Fan Coil Control Loop

Bonsai is a revolutionary new Fan Coil Control Loop that offers incredible performance and features. The loop is configurable to suit your applications by offering the latest technology and variable options.

Select from a choice of controllers, valves and sensors to build your control loop. The control loop can be programmed locally and can be connected to Sigma or MicroNet if required (Bonsai Pro only). Alternatively it can be left to function stand-alone (Bonsai Lite). The controller meets the latest CEN application requirements and offers low cost engineering without maintenance. The patented valve design ensures long trouble free life

FEATURES

Valves

- Patented Fluid Control Methodology
- 3 main valve parts ensures reliable operation
- Ultra low torque valve requirement/Low to silent operation
- High speed of response
- Dramatically reduces the chances of valve blockage
- No user maintenance required
- 'Tool free' manual override
- Position indication
- Variable Kv allows large range of applications
- Modified equal percentage characteristic
- 1.5m fly lead
- IP 52 (actuator)
- Market leading technology
- Accurate performance across full ambient temperature range
- Coil balancing bypass as standard
- High differential pressure
- Simple installation and commissioning

Controllers

- Fully networkable or stand-alone controllers
- Easy upgrade of old systems
- High resolution control
- Simple connection to controller
- Controller tests and simulates operation to reduce commissioning times
- Controller has built in maintenance cycles
- Automated installation and commissioning
- Selectable control applications (fan-coil applications)
- Low installation cost
- Simple setup using PDA hand-held computer or PC via infra-red or RS 232 link
- Designed to maximise energy savings
- Optional networking to an MicroNet system



UniFact® Pro Terminal Unit Controllers

The UNIFACT<sup>PRO</sup> Terminal Unit Controllers have been designed to meet virtually any fan-coil heating/cooling applications. The controllers can be used as stand-alone devices or can be networked to MicroNet systems.

The controller has three main modes: comfort (day), night (off) and economy. The controller can be switched into any of these three modes from the MicroNet View PC (if used). When used stand-alone, the controller can be switched between two modes: either comfort and economy, or comfort and night, as selected during commissioning. A voltage-free input (a timer switch, digital room sensor or PIR) can be used to switch between the two modes. A second voltage-free digital input is available for connection to a thermostat for automatic changeover between cooling and heating modes for 2-pipe fan coil unit (FCU) applications.

FEATURES

- Fully networkable or stand-alone controllers
- Selectable control applications (fan-coil applications)
- Low installation cost
- Simple setup using PDA hand-held computer or PC via infra-red or RS 232 link
- Designed to maximise energy savings
- Optional networking to an MicroNet system

Controllers	Type	Inputs/outputs
Bonsai Pro	230Vac	
BRC-41N-10X	with on/off fan control (networkable)	2 x DI
BRC-51N-10X	with 3-speed fan control (networkable)	1 x DI – temperature
Bonsai Lite	24Vac	1 x AI – setpoint
BRC-41N-50X	with on/off fan control (stand-alone)	1 x DO – triacs (-41N- only)
BRC-51N-50X	with 3-speed fan control (stand-alone)	3 x DO – relays (-51N- only)
Where X denotes the pre-loaded application		2 x Bonsai outputs
(possible to change on the field)		
0 = 4-pipe FCU, 1 = 2-pipe with changeover		
URC-IR-100	Infra-red/RS 232 receiver	
URC-SET-100	NCP Palm/Expert commissioning software	
Data Sheet 4.102 & 4.103		

INSTALLATION DETAILS

Control range - 0...40°C  
 Control algorithm - Proportional + integral (time adjustable), or proportional only  
 Power supply - 230Vac (+10%...-6%) Bonsai Pro, 24Vac (+10%...-6%) Bonsai Lite  
 Power failure reserve - E<sup>2</sup>PROM preserves configuration data and user settings  
 Triac for heater battery - 24Vac output, 2.4VA max  
 Relay outputs - 230Vac, 5A resistive  
 Network interface - RS 485 to Sigma or MicroNet network (-10X only)  
 Sensor types - DU 4301, DUS 4302 or DDU 0001 (return air), MN-51, S2, S3, S4  
 Controller protection class - IP 10  
 Mounting - Wall mounting or DIN rail mounting

ACCESSORIES BCA 1601 – Controller enclosure for field mounting  
 BCA 1602 – Controller set-point adjustment module (±3°C)  
 BCA 9202 – Spare fuses (packet of 5)

VALVE/ACTUATORS	Size/Kv <sub>s</sub>	Loop compatible with:
BFB 1500	15mm – 1.6, 2.0, 2.5 Kv <sub>s</sub> *	Bonsai BRC Controller
BFB 1501	15mm – 0.6, 1.0 Kv <sub>s</sub> *	
BFB 1506	15mm – 0.6 Kv <sub>s</sub>	
BFB 1510	15mm – 1.0 Kv <sub>s</sub>	
BFB 1516	15mm – 1.6 Kv <sub>s</sub>	
BFB 1520	15mm – 2.0 Kv <sub>s</sub>	
BFB 1525	15mm – 2.5 Kv <sub>s</sub>	

Data Sheet 4.102

Kv<sub>s</sub> = Flow in m<sup>3</sup> to produce a 1 bar pressure drop when the valve is fully open.  
 \* Kv<sub>s</sub> is determined by a selectable Kv clip.

INSTALLATION DETAILS

Protection class - IP 52  
 Control medium - water or glycol solution in water (25% max, freeze protection)  
 Temperature Limits - 2...95°C  
 Bypass Kv<sub>s</sub> - 70% of rated Kv<sub>s</sub>  
 International Pressure Rating - PN 10  
 Type of Operation - Rotary  
 Actuator Protection Class - IP 52  
 Cable - 3 core fly lead with controller connection, length 1.5m  
 Manual Override - By rotary movement of valve arm  
 Position Indication - Reference moving part to actuator body  
 ACCESSORIES BSA 1501 – 1m extension lead (one per actuator)

	Controller type	Inputs/outputs
URC-41N-10X	with on/off fan control and S-link support	2 x DI
URC-51N-10X	with 3-speed fan control and S-link support	1 x RI – temperature
Where X denotes the pre-loaded application		1 x AI – setpoint
(possible to change on the field)		4 x DO – triacs
0 = 4-pipe FCU, 1 = 2-pipe with changeover, 2 = DX cooling and electric heater, 3 = airside control		3 x DO – relays
URC-IR-100	Infra-red/RS 232 Receiver	
URC-SET-100	NCP Palm Commissioning Software	
Data Sheet 10.130		

INSTALLATION DETAILS

Control range - 0...40°C  
 Power supply - 230Vac (+10%...-6%)  
 Power failure reserve - E<sup>2</sup>PROM preserves configuration data and user settings  
 Sensor types - DU 4301, DUS 4302, S1, S2, S3, S4 (room) or DDU 0001 (return air)  
 Protection class - IP 20  
 Mounting - Wall mounting or DIN rail mounting



Interfaces



**MN-MI**  
Bus-du-jour®  
Manager Interface

The MicroNet Interface (MI) provides network-level supervision functions for a network of MicroNet controllers and displays.

MN-MI features two RS 232 ports that can be connected to a PC running VisiSat Configuration Tool or MicroNet View graphical user interface. One of the ports can be connected to a modem/Ethernet device server on a remote site to provide WAN connectivity. MN-MI can be configured to monitor alarm conditions and collect data logs.

	Controller	Comms protocol	Number of devices
<b>MNN-MI-100</b>	MicroNet	NCP as standard	20 x 61 max (per network)
	NCP Interface	ARCNET with plug-in card	31 x 94 max (per network)

Data Sheet 10.210A

**INSTALLATION DETAILS**

**Mounting** - Panel or DIN rail  
**Power supply** - 24Vac  
**Protection class** - IP 40



**MNA-R10**  
ARCNET Router

This Router provides the means to extend an ARCNET network of MicroNet controllers and displays. Up to 31 ARCNET sub-nets can sit on the back-bone. Routers can also provide opto-isolation between sub-nets.

**FEATURES**

- Expands number of network devices
- Extends network length
- Parameter transfer between sub nets
- Provides opto-isolation between networks
- Complete with dedicated ARCNET card

	Controller	Comms protocol	Number of devices
<b>MNA-R10</b>	MicroNet	ARCNET	31 x 94 max (per network)

Data Sheet 10.215

**INSTALLATION DETAILS**

**Power supply** - 24Vac  
**No. and type of PC communication ports** - 1 RS 232  
**Power failure reserve** - Non-rechargeable Lithium battery supports the unit's RAM for up to 350 days  
**Mounting** - Wall or DIN rail  
**Protection class** - IP 40



**MN TOUCH**  
Touch Screen  
Display

The Touch Screen Display is a graphic LCD display that allows a user to monitor and configure parameters for multiple controllers on a Native Communications Protocol (NCP) or an ARCNET communications network.

**FEATURES**

- NCP, ARCNET and LonWorks Communications options
- Intuitive, graphics-based menu system
- Unique display for any LonWorks systems
- Built-in RTS and scheduling for LonWorks networks

**INSTALLATION DETAILS**

**Power supply** - 24Vac  
**Consumption** - 2.5VA max  
**Power failure reserve** - EEPROM technology – clock backed up with battery

	Description
<b>MNN-TS-100</b>	NCP Touch Screen Display
<b>MNN-TSP-100</b>	NCP Touch Screen Display (panel mounting)
<b>MNL-TS-100</b>	LON Touch Screen Display
<b>MNL-TSP-100</b>	LON Touch Screen Display (panel mounting)

Data Sheet 10.050

**ACCESSORIES**

**MN-DK** Display Wall Mounting Kit for Touch Screen, available for MNN-TS-100  
**MNA-C** ARCNET Plug-in Communications Card, available for MNN-TS-100 & MNN-TSP-100



**MN LCD**  
LCD Display

This LCD Display is a text menu driven LCD display that allows a user to monitor and configure parameters of an MN 500 or an MN 620 controller. The display is fully programmable using the VisiSat Configuration Tool. Up to 246 lines of data can be displayed.

**FEATURES**

- Clear, high contrast LCD Display
- Intuitive, text based menu system
- Fully programmable with VisiSat Configuration Tool
- Built-in Real Time Clock with battery back-up

**INSTALLATION DETAILS**

**Power supply** - 24Vac  
**Consumption** - 2.5VA max  
**15 Volt dc output** - 30 mA max  
**Power failure reserve** - EEPROM technology – clock backed up with battery

	Description
<b>MN-LCD-100</b>	LCD Display
<b>MN-LCDP-100</b>	LCD Display (panel mounting)

Data Sheet 10.060

**ACCESSORIES**

**MNN-COM** NCP Plug-in Card required for installation in MN 500 or MN 620, when connecting controller to NCP network  
**MN-DK** Display Wall Mounting Kit for LCD display, available for MN-LCD-100  
**MNN-50-100** MicroNet MN 500 NCP Controller  
**MNN-62-100** MicroNet MN 620 NCP Controller  
**MNA-C** ARCNET Plug-in Card for MNN-50-100 or MNN-62-100  
**MNL-C** LonWorks Plug-in Card for MNN-50-100 or MNN-62-100

Sensors



**MN 5x**  
Digital Temperature  
Sensors

The MicroNet Sensors MN 5x Series are a family of digital wall temperature sensors for use with I/A Series MicroNet Controllers. These sensors feature a Sensor Link (S-LK) communication protocol which provides a simple two-wire interface for power and exchange of sensor and subbase information. Subbase information includes selecting setpoint, fan speed, operating mode, or emergency heat. Available in six models, MicroNet Sensors provide an integral analogue-to-digital conversion for elimination of sensor-to-controller noise effects and wire resistance offset.

**FEATURES**

- Aesthetically styled, low profile packaging
- Digital zone temperature indication with variable resolution and unit of measure
- Self-compensating temperature conversions remove the need for periodic calibration
- Override button allows the user to switch to operation mode for out of hours occupation
- Displays selected system values such as setpoint, external air temperature and operating mode
- Enables the alteration of operating modes



**DU, DUS**  
**DUSF**  
MicroNet Sensors

These sensors are specifically used for Satchwell controllers. Models types have light that informs you that the controller is running. All sensors use the same single gang sized case.

**FEATURES**

- Small physical size
- Attractive case design and neutral colour fits in with most room designs
- Extra low voltage on all sensor types including fan speed control versions
- Simple wiring connections
- Simple commissioning
- Controller running power light on the sensor

	Description	Keypad	Display
<b>MN-51</b>	Sensor only	none	none
<b>MN-52</b>	Sensor with override	1 button	LED override status indication
<b>MN-53</b>	Sensor with setpoint adjustment and override	2 buttons	LCD and LED override status indication
<b>MN-54</b>	Sensor with setpoint, override and controller mode functions	5 buttons	LCD and LED override status indication
<b>MN-54-FCS</b>	Sensor with setpoint, on/off and fan speed functions	5 buttons	LCD and LED fan status indication
<b>MN-55</b>	Sensor with setpoint, override controller mode functions and emergency heat key/indication	6 buttons	LCD and LED override status indication

Data Sheet 10.000

**INSTALLATION DETAILS**

**Power supply** - Powered from the controller  
**Protection class** - IP 20  
**Ambient limits** - Operating temperature 0...50°C, humidity 5...95% rh, non-condensing

	Adjustable scale	Sensing range	Fan speed override	Switch function
<b>DU 4301</b>	none	-5...+50°C	-	-
<b>DUS 4302</b>	+/-	-5...+50°C	-	-
<b>DUSF 4351</b>	+/-	-5...+50°C	•	Auto, off, on
<b>DUSF 4352</b>	+/-	-5...+50°C	•	Auto, off, 1, 2, 3

Data Sheet 1.020 Associated controllers: MN 200/440/500/620 (DU & DUS only) URC

**INSTALLATION DETAILS**

**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - Low voltage dc (15Vdc), DU 3 wire, DUS 4 wire, DUSF 7 wire  
**Power supply** - 15Vdc from UniFact controller  
**ACCESSORY** 837-1-203 Guard Kit

## Controllers



### DC1100 DC1100C\*

Self Configuring Optimiser/Compensator

\* for replacement purposes only

The DC1100 is a stand-alone Direct Digital Controller, which has been designed to suit the control needs of the smaller commercial and larger domestic property.

It will control one or two boilers, with requirements for optimum start and with direct or valve compensation.

A separate channel is provided for the control of hot water.

Each of the control routines can be used independently or combined. In effect the unit can be a compensator, an optimiser or a combined unit.

LEDs provide an immediate visual indication of output status.

#### FEATURES

- Controller can be a combined or stand-alone optimiser or compensator
- One or two boiler control
- Self learning compensator or fully settable
- Self configuring or settable
- Optimum start- and stop-self learning
- Valve and boiler compensated flow
- Hot water timed channel
- Remote input (Auto/Summer/On/Holiday)
- Frost protection – Multi stage

	Networkable	Range	Inputs	Output relay
DC1100	No	-20...+120°C	6 x temperature sensors, 1 x remote switch unit (auto/summer/heating on/holiday)	230V, 1A inductive (SPNO)
DC1100C	Yes			

Data Sheet 2.042

**Associated sensors** - A701 (space), A702 (outdoor), A703 (immersion), A704 (strap-on), A705 (duct)

#### INSTALLATION DETAILS

**Power supply** - 230Vac, 50/60 Hz  
**Protection class** - IP 40

#### ACCESSORIES

**04 03 109 (RSU)** Remote Switch Unit  
**RB1** Interface Relay

#### FEATURES (cont)

- Day economy
- Pump run on
- Alarms on low temperatures, controller and sensor faults
- Pump and valve exerciser
- Space temperature influence of compensator

## Sensors



### A70– Room, Outside, Immersion, Duct and Surface Sensors

The wide range of temperature sensors is designed specifically for use with Theta, and DC controllers and provides a selection suitable for most HVAC applications.

In addition to the regular sensors, there are also range variants and special limit sensors.

The space sensors are mounted in attractive white plastic housings to complement any decor. All other types are housed in sturdy diecast units with mounting arrangements suitable for their duties.

	Type	Sensing range	Associated controllers
A701	Room (Iss E)	0...45°C	DC Range
A702	Outside (Iss E)	0...120°C	"
A703	Immersion (Iss D)	0...120°C	"
A704	Surface (strap on) (Iss J)	0...120°C	"
A705	Duct (Iss F)	0...120°C	"

Data Sheet 1.955

#### INSTALLATION DETAILS

**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - 2 wire non-polarised low voltage dc  
**Adjustments** - Concealed  
**Protection class** - IP 40 (space), IP 55 other types

## Relay & Switching Units



### RB1, RB2 Relay Units

Drayton relay units will operate over a wide range of ambient temperatures and are especially suited to heating and ventilating installations where they might be mounted in close proximity to boilers and other heat emitters.

#### FEATURES

- Enclosed and easy to mount
- Hassle free (time saving)
- Simple design

	No. of switches	Contact rating	Suitable for:
RB1	2 x DPCO	230V, 6A resistive	General purpose
RB2	3 x DPCO	230V, 6A resistive	Valve/actuator

Data Sheet 21.685

#### INSTALLATION DETAILS

**Power supply** - 230V ac, 45/60 Hz  
**Ambient limits** - -18...66°C



### 04 03 109 (RSU) Remote Switch Unit

This mode switch gives an easy means of overriding the DC1100 controller. The remote switch has four settings – Auto, Summer, Heating On and Holiday.

#### FEATURES

- User friendly
- Clearly labelled
- Positive feel switch reduces ambiguity of position

04 03 109	For use with DC 1100 controllers only
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Data Sheet 2.043

## Optimiser



### SVT 7-day Optimiser

This Fuel-saving Controller can replace a conventional time switch on a heating system and provides a variable start time dependent on the fall of room temperature during the off period.

It is used to switch on and off central heating systems and will substantially reduce fuel consumption compared with fixed time starting. In all but the very coldest weather the start time is delayed until the latest time consistent with the amount of heat necessary to regain the required temperature at occupancy time.

#### FEATURES

- Easy installation - only one sensor required (packed with the controller)
- Programme override switch
- Choice of day control by separate compensator or built-in on/off day control
- Minimum night 'inside' temperature protection
- Analogue and Digital clock versions available

	Version	Output relays
SVT 4201	Analogue clock	Plant, 250V, 2A (1A inductive)
SVT 4251	Digital clock	Control, 250V, 2A (1A inductive)

Data Sheet 2.001

Compatible room sensor: DR 3253 (supplied with controller)

#### INSTALLATION DETAILS

**Power supply** - 230V 50/60Hz  
**Power failure reserve** - For clock - 100 hours, 2 hours for a short power interruption  
**Protection class** - IP 41

## Compensators



### CSC Compensator Controllers

CSC Compensators are designed for use in residential/commercial radiator systems to control either a three port mixing valve or a boiler. The controller senses outside temperature and varies the water flow temperature to the radiators. As the outside temperature falls, the radiator temperature is increased.

An optional room temperature sensor can be used to trim the water temperature based on room temperature. The CSC can average up to four room sensors.

#### FEATURES

- Easy to install and commission
- Shipped with typical default values
- Operates a three port valve or boiler
- Max. return function for District Heating applications
- Adjustable economy function
- Night Set Back (NSB) and set-up/boost inputs
- Flow high limit feature
- User configurable Day/Night plant operation
- Room influence mode selection
- Cost effective upgrade of all obsolete Climatronic controllers

	Control	Output
CSC 5252	Mains or 24V output with no clock	Valve or boiler, 24Vac or 230Vac
CSC 5352	Mains or 24V output with clock	Valve or boiler, 24vac or 230Vac, Pump triac, 24Vac, 1A maximum

Data Sheet 2.021

#### INSTALLATION DETAILS

**Power supply** - 230Vac (+10%, -6%) 50/60Hz  
**Power failure reserve** - Settings stored in memory, 1 year battery for clock  
**Protection class** - IP 30  
**Switched inputs** - Night Set Back (NSB): Voltage free, make/break contacts. Normally closed.  
**Set Up (Boost):** Voltage free, make/break contacts. Normally closed.  
**Outputs** - Valve actuator or boiler output relays: 2 x single pole ON/OFF (interlocked) 230Vac, 10A resistive, 6A inductive.  
**Pump Output:** 1 x 24Vac triac, 1A (0V switched). Clock version only.  
**Output Supply:** 2 x 24Vac terminals used to power external devices up to a total of 10VA maximum.  
**Sensor inputs** - 'T' type sensors  
**Sensor types** - DRT 3453, 3451 (optional), DWT 0001, DST 0001, DOT 0002 (see table below)

## Main Plant Controllers



### CXR AHU Room Reset Controller

The CXR Controller is used to control room temperature by resetting the supply duct air temperature. The room sensor resets the duct supply temperature to achieve the desired room temperature. The room temperature can be sensed in the room or extract duct. The supply duct loop has a purely proportional control action with the room reset being a proportional plus integral control action.

#### FEATURES

- Easy to install and commission
- Shipped with typical default values
- Quick set mode allows basic settings to be easily checked and set
- Simple override switch
- Night Set Back (NSB), set-up, summer and night sensor selection switched inputs
- Optional Scandinavian night sensor
- Up to 4 room sensors can be used for average room temperature
- Remote setting input for room set value (RPW)
- Cost effective upgrade of all obsolete Climatronic controllers

	Control	Output
CXR 5805	Single, two or three stage	24V actuator control

Data Sheet 2.110

#### INSTALLATION DETAILS

**Power supply** - 230Vac (+10%, -6%) 50/60Hz  
**Power failure reserve** - settings stored in memory, 1 year battery for clock  
**Protection class** - IP 30  
**Switched inputs** - Night Set Back (NSB): Voltage free, make/break contacts. Normally closed.  
**Set Up:** Voltage free, make/break contacts. Normally closed.  
**Remote Low Limit (Summer):** Voltage free, make/break contacts. Normally closed.  
**Night Sensor Selection:** Voltage free, make/break contacts. Normally closed.  
**Outputs** - Valve Actuator Output Triacs: 2 x 24Vac triacs, 1A (0V switched and software interlocked).  
**Output Supply:** 2 x 24Vac terminals used to power the actuator up to a total of 10VA maximum.  
**Sensor inputs** - 'T' type sensors  
**Sensor types** - DRT 3651, 3453, DDT 0001, DWT 0001, DST 0001, RPW 4425 (see table below)

## SENSORS AND REMOTE SETTING UNIT

	Type	Range
DRT 3651, 3453, 3451	Room	-5...+40°C
DDT 0001	Duct	-5...+100°C
DWT 0001	Water	-10...+120°C
DST 0001	Water (strap on)	5...120°C
DOT 0002	Outside	-40...+55°C
RPW 4425	Remote Set Value	5...50°C

Main Plant Controllers



**CXT**  
PID Pulse 24V  
Controller

The CXT Controller is primarily designed to control systems with short time constants and fast response times. This would typically be the control of heat exchangers, non storage calorifiers or ventilation plant where the sensor is placed directly in the controlled medium. The CXT operates 24Vac actuators on two or three port valves. It is capable of operating single or two stage systems.

**FEATURES**

- Easy to install and commission
- Shipped with typical default values for the parameters, decreasing commissioning time
- Quick set mode allows basic settings to be easily checked and set
- Simple override switch
- Operates single or two stage systems
- Night Set Back (NSB) and set-up inputs
- Supports new or old generation Satchwell sensors
- Remote setting input for room set value (RPW)
- Cost effective upgrade of all obsolete Climatronic controllers

	Control	Output
<b>CXT 5605</b>	Single or two stage	24V actuator control

Data Sheet 2.101

**INSTALLATION DETAILS**

**Power supply** - 230Vac (+10%, -6%) 50/60Hz  
**Power failure reserve** - Settings stored in memory, 1 year battery for clock  
**Protection class** - IP 30  
**Switched inputs** - Night Set Back (NSB): Voltage free, make/break contacts. Normally closed.  
**Set Up:** Voltage free, make/break contacts. Normally closed.  
**Outputs** - Valve Actuator Output Triacs: 2 x 24Vac triacs, 1A (0V switched and software interlocked).  
**Output Supply:** 2 x 24Vac terminals used to power the actuator up to a total of 10VA maximum.  
**Sensor inputs** - 'T' type sensors  
**Sensor types** - DDT 0001, DWT 0001, DST 0001, RPW 4425 (see table on previous page)



**CZT**  
PID 0-10Vdc  
Controller

The CZT Controller is designed for use in systems such as room or return water control. The CZT can be used for single or two stage control. The CZT is suitable for use with 0 to 10Vdc actuators and/or step controllers.

**FEATURES**

- Easy to install and commission
- Shipped with typical default values for the parameters, decreasing commissioning time
- Quick set mode allows basic settings to be easily checked and set
- Simple override switch
- Operates single or two stage systems
- Standard 0...10Vdc output
- Night Set Back (NSB) and set-up inputs
- Existing CZT sensors can be used
- Remote setting input for room set value (RPW)
- Cost effective upgrade of all obsolete Climatronic controllers

	Control	Output
<b>CZT 5305</b>	Single or two stage	0...10Vdc for heating and cooling

Data Sheet 2.105

**INSTALLATION DETAILS**

**Power supply** - 230Vac (+10%, -6%) 50/60Hz  
**Power failure reserve** - Settings stored in memory, 1 year battery for clock  
**Protection class** - IP 30  
**Switched inputs** - Night Set Back (NSB): Voltage free, make/break contacts. Normally closed.  
**Set Up:** Voltage free, make/break contacts. Normally closed.  
**Outputs** - Control outputs: 2 x 0...10Vdc outputs for heating and cooling.  
**Output Supply:** 2 x 24Vac terminals used to power the actuator(s) up to a total of 10VA maximum.  
**Sensor inputs** - 'T' type sensors.  
**Sensor types** - DRT 3651, 3453, 3451, DDT 0001, DWT 0001, DST 0001, RPW 4425 (see table on previous page)

Keyboard



**FLS**  
C/O Step Control  
Function Module

The FLS is a Step Control Function Module which is designed to be used in conjunction with 0 to 10Vdc output Controllers thus providing a stepped on/off output from one or more stages.

**FEATURES**

- Six steps available
- Indication LEDs show status of each relay step
- Provides step control of electric heaters and alike
- Panel mounting optional

	Control Input	Relays	Voltage Free Contacts	Power Supply
<b>FLS 1502</b>	0...10Vdc	6	230Vac, 2A (IA inductive)	24Vac

Data Sheet 2.195

Associated input devices - IAC, MMC, CZT, KMC

**INSTALLATION DETAILS**

**Running time though 0...10V stroke** - 180 seconds (adjustable 60 to 720 seconds)  
**Protection class** - IP 40 when flush mounted

**ACCESSORY** 866-1-405 Panel Mounting Kit



**KMC**  
Multiple  
Application PID  
Controller

The KMC Controller can be used to control humidity or temperature in ventilation and air conditioning systems. The KMC uses Satchwell sensors to monitor humidity or temperature and control the plant.

The KMC is designed to carry out the general control functions of the Satchwell KZT, KZH and KET controllers with the added benefit of a digital display.

The KMC control stage outputs are all 0...10Vdc, except the single stage humidity application that has an optional 24Vac pulsed output.

The controller can be configured to run in one of the applications by simply selecting that application number.

1. Single Stage Humidity Controller
2. Two Stage Humidity Controller
3. Single Stage Temperature Controller
4. Two Stage Temperature Controller
5. Three Stage Temperature Controller

**FEATURES**

- Direct digital control
- Programmed via the keyboard and display
- Digital display provides comprehensive indications of all current parameter values, settings and measurements

	Control	Range	Output	Power Supply
<b>KMC 3201</b>	PID	-40...+150°C	0...10Vdc	24Vac
	3-stage temp.	0...100% rh	for heating or cooling	
	2-stage humidity			

Data Sheet 2.120

**FEATURES (cont)**

- Low voltage (24Vac)
- Proportional + Integral + Derivative control action for stable control without offset
- Default programme of typical settings for each parameter operates on initial start-up
- Security code prevents unauthorised access to setting parameters
- Five applications to deal with most humidity and temperature control schemes, see the previous section for details of each scheme
- The KMC can be used in place of the Satchwell KZT, KZH and KET controllers
- Real Time Clock (RTC) on the two humidity applications

**INSTALLATION DETAILS**

**Power failure reserve** - Settings stored in memory, 5 year battery for clock  
**Inputs** - Sensors: DRT, DDT, DOT, DRH, DDH  
**Outputs** - Actuators: ALI, ALE, ALES, AVUE  
 24Vac switched outputs: 2 x digital outputs, ALX, ALXS, ARX  
**Protection class** - IP 40 when flush mounted

Keyboard



**MMC 4701**  
Universal Air  
Handling Unit  
Controller

This PID Controller can be used to control humidity or temperature in various ventilation and air conditioning system applications.

The serial link function allows the MMC to be fully integrated into a networking system with all the advantages of remote monitoring, alarms, logging, graphics and remote setting of all control parameters. The MMC can work as a fully stand-alone controller.

The controller can be configured to run in one of the applications by simply selecting that application number.

1. Single Stage Temperature Controller
2. Two Stage Temperature Controller
3. Three Stage Temperature Controller
4. Three Stage Room Temperature Reset Controller with Heat Recovery
5. Three Stage Cascade Temperature Controller
6. Single Stage Temperature Controller (24Vac Actuator Output)
7. Single Stage Humidity Controller
8. Two Stage Humidity Controller
9. Simple Single Stage Temperature Controller
10. Simple Two Stage Temperature Controller
11. Simple Three Stage Temperature Controller

	Control	Range	Output	Power Supply
<b>MMC 4701</b>	PID	-40...+150°C	3 x 0...10Vdc	24vac
		0...100% rh	2 x 24V digital	

Data Sheet 2.701

**FEATURES**

- Serial link
- Can be programmed through its own keyboard
- Low voltage (24Vac)
- Proportional + Integral + Derivative control action for stable control without offset
- Eleven applications to deal with most humidity and temperature control schemes
- Built-in real time clock and time schedule

**INSTALLATION DETAILS**

**Power failure reserve** - Settings stored in memory for 1 year, 5 year battery  
**Inputs** - Sensors: DRT, DDT, DOT, DRH, DDH, DOW, DOS, DWT  
**Outputs** - Actuators: ALI, ALE, ALES, AVUE  
 24Vac switched outputs: 2 x digital outputs, ALX, ALXS, ARX  
**Protection class** - IP 40 when flush mounted



**MMC 4601**  
Multi-loop District  
Heating Controller

The MMC is a Multi-loop Controller for use in district heating schemes.

The controller incorporates three separate control loops, two compensated and the other a constant temperature loop.

Up to 3 specific points are programmed for the compensation graph. The MMC automatically joins up these points to produce a user defined compensation curve. This adjusts and calculates the required set value of the supply temperature to the compensated system to match the prevailing requirements.

The MMC has a self tuning function that allows each of the 3 control loops to have its proportional band, integral action and derivative action values automatically tuned. Self tuning can be carried out from the MMC keyboard or from optional external momentary switches connected to it. Self tuning maximises the efficiency of control loop operation.

**FEATURES**

- Serial link
- Can be programmed through its own keyboard
- Real Time Clock (RTC)
- Self tuning for each control loop, maximises efficiency for each loop

	Control	Range	Output	Power Supply
<b>MMC 4601</b>	Multi-loop	-40...+150°C	2 x 0...10Vdc	24Vac
			2 x 24V digital	

Data Sheet 2.751

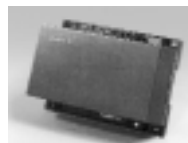
**FEATURES (cont)**

- Fast response time ensures suitability for tap water control
- Compensation curve can have up to three programmable points giving the curve two calculated ratios
- Supply high limit
- Built-in 'default programme' of typical settings for every parameter operates on initial start-up
- 0...10Vdc control outputs
- PID programmable control loops
- Periodic pump cycling
- Frost protection logic

**INSTALLATION DETAILS**

**Power failure reserve** - Settings stored in memory for 1 year, 5 year battery  
**Inputs** - Global sensors  
**Outputs** - Actuators: ALI, ALE, ALES, AVUE  
 24Vac switched outputs: 2 x digital outputs  
**Protection class** - IP 40 when flush mounted

Terminal Unit



**CZU**  
Fan Coil Unit  
Controller

The CZU is an Electronic Modulating Controller for the control of terminal units or fan coils in air conditioning systems serving small zones of buildings such as individual offices and hotel bedrooms.

The range includes temperature sensors and actuators for valve operation and associated two, three and four port valves.

**FEATURES**

- Simple installation
- Three wire connection to actuators
- Optional auto changeover
- Minimal commissioning time

	Control	Range	Output
<b>CZU 4201</b>	2-stage heating and cooling with dead zone	10...40°C	24V actuator control

Data Sheet 2.201

**INSTALLATION DETAILS**

**Power supply** - 24Vac (±10%) 50/60Hz  
**Protection class** - IP 20  
**Override inputs** - TSM 1501: Pipe surface thermostat  
**Adjustments** - Set Value: 10...40°C, Proportion Band: 0...3°K per stage  
 Dead Zone: 0...6°K, Actuator Stroke Setting: 12.5...75mm  
**Sensor inputs**

	Type	Range
<b>DRT 3451, 3453, 3801, 3851</b>	Room	-5...+40°C
<b>DDT 0001</b>	Duct	-5...+100°C
<b>DDU 0001, 1803</b>	Duct	-5...+40°C

Networking



**MIU**  
Modem Interface Unit

The Modem Interface Unit provides the necessary link between a modem and Satchwell Networking controllers on a remote site, when using Satchnet Pro Networking Software. An RS232 input is provided for connection to a modem on a Wide Area Network (WAN). The MIU is then able to be connected (via its RS422/485 link) to upto 31 Networking controllers.

**FEATURES**

- RS232 and RS422/485 ports
- Autoanswer operation on modem sites
- Optional battery backed up Real Time Clock Board
- Allows a further 32 Networking controllers to be connected, making a maximum of 63 on a single LAN

	Comms. ports Comms. speed	Max. cable length
<b>MIU 4252</b>	1 - RS232 1200, 2400, 4800 or 9600 BPS	15m
	2 - RS422/485 1200, 2400, 4800 or 9600 BPS (opto isolated)	1000m

Data Sheet 2.511

**INSTALLATION DETAILS**

**Power supply** - 24Vac (±15%) 47/63Hz  
**Protection class** - IP 41, IP 00 if the RS232 connected is used  
**Mounting** - DIN rail or surface mounting  
**Status display** - 5 LEDs  
**Power failure reserve** - EPROM preserves configuration data such as password, telephone numbers, baud rate (if LK 5 is not used) etc.

**ACCESSORY 841-2-201** Real Time Clock Board

Intelligent/Programmable



**IAC 420**  
Universal Multi-Loop Intelligent Advanced Controller

This Intelligent Advanced Controller is designed for use in small and large buildings such as office blocks, hotels and schools. The IAC has a stand alone capability, and may be configured from a central computer over the serial link.

The IAC has pre-sets to control common applications such as terminal unit control, VAV and zone control. In addition the controller can be customised to work on other less common applications.

The Satchnet software is used to program and monitor the IAC controllers.

**FEATURES**

- Compact size allows mounting in a confined space such as on a fan coil unit
- Serial link
- IACs configured from a computer using the simple Bubbleland graphical interface
- Internal software time clock, controller and lighting time schedules
- Complies with latest European EMC standards
- Switched outputs may be configured as stepped outputs (including plant rotation), actuator outputs or outputs for lights and fans
- Six configurable inputs that can be individually configured as temperature (resistive), analogue (0...10Vdc) or Digital (Switched) inputs
- 0...10 volt inputs can be used for humidity/pressure/velocity control or as a reset input
- Resistive inputs can be used for Satchwell "T" type temperature sensors, RPW remote setting units, Ohms and Light sensors (NORP-12 Light Dependent Resistor (LDR)).

	Terminals	Control	Range	Outputs
<b>IAC 420 - F</b>	Fixed	3 loop	-40...+150°C 20...90% rh	3 x 0...10Vdc 3 x 24V pulsed
<b>IAC 420 - P</b>	Plug-in		250...9750 Ohms 0...10,000 Lux	24V switched 1 x 15Vdc

Data Sheet 2.801

**FEATURES (cont)**

- 15Vdc supply output for humidity, pressure and UniFact sensors
- 0...10Vdc or stepped fan control
- Averaging of temperature (resistive) sensors and analogue inputs
- Three off two stage controllers with each stage individually selected as PID, PI or P only
- Three cascade controllers
- Optional Real Time Clock (RTC) board available

**INSTALLATION DETAILS**

**Power supply** - 24Vac (±10%) 47/63Hz  
**15 Volt dc Output** - 25 mA max  
**Power failure reserve** - EPROM preserves configuration data and user settings.  
 Inputs: 6 x configurable inputs  
 Outputs: 3 x 0...10V outputs, 6 x digital (triacs on/off) outputs  
**Protection class** - IP 20  
**Mounting** - DIN rail or surface mounting

**ACCESSORY 841-1-201** Real Time Clock Board

Intelligent/Programmable (cont)



**IAC 600**  
Universal Multi-Loop Intelligent Advanced Controller

The IAC 600 is a Multi-loop Configurable Controller designed primarily for use in typical multi-loop situations such as air-conditioning systems and Central Plant Heating/Cooling Systems.

The base unit's 6 control loops are configurable and can be used, for instance, to control the pre-heater, the main duct temperature, humidity, and re-heat. One advantage of this integrated multi-loop controller is that the normal interlocks set up between discrete controllers on a typical system, are carried out internally by the controller, thus saving on external wiring. The IAC unit also has a clock and time schedules built-in which are used to switch plant control modules etc. the IAC includes full plant sequence control and rotation based on plant hours run to control Chillers and Boilers as required. The controller also includes a number of preset applications in the software to cater for typical control schemes.

The Satchnet Bubbleland software is fully graphical. Setting and amending the IAC configurations involves selecting and joining the required modules using the mouse.

**FEATURES**

- Intelligent Multi-loop Controller – up to 6 PID control loops
- Compensation and optimisation modules
- Configured via Satchsoft Networking
- Standard selectable applications built in to the controller



**Touchscreen**  
for IAC 600 Controller

This optional Touchscreen gives access to upto 31\* IAC base units on its own sub LAN (including the IAC 600, 400, 420 and 200). The Touchscreen is mounted direct on the IAC base unit.

The Touchscreen allows the user to interrogate the IACs by using the touch sensitive screen and menu system. Information on the sensor values and outputs can be displayed and parameters can be altered if required. The Touchscreen contains a battery backed clock that is used by the IACs on the sub LAN as a back up to their own internal clocks.

\* Dependent on the number of parameters to be displayed. Each Touchscreen can display upto 256 parameters.

**FEATURES**

- Mounts on IAC base unit or optional panel mounting
- Touch sensitive graphic LCD screen
- Menu operation for interrogation and setting
- Back-lit screen for easy viewing
- Communicate with up to 31 - IACs
- Battery backed clock provides time synchronisation

	Control	Range	Outputs
<b>IAC 600-B</b>	6 x PID loops	-40...+150°C 20...90% rh 250...9750 Ohms 0...10,000 Lux	4 x 0...10Vdc 8 x on/off triac 1 x 15Vdc

Data Sheet 2.951

**FEATURES (cont)**

- Six temperature (resistive) sensor inputs
- Six 0...10Vdc inputs for humidity, pressure and velocity
- Eight Voltage free switched inputs for use as alarms, Pulse counting etc
- Proportional, Integral and Derivative control actions can be individually set on each controller module
- Lighting and chiller/boiler Sequence control
- Internal time clock and time schedules for plant and controller switching

**INSTALLATION DETAILS**

**Power supply** - 24Vac (±10%) 50/60Hz  
**15 volt dc output** - 30 mA max  
**Power failure reserve** - Non volatile RAM preserves memory for 10 years under normal conditions of use.  
**Inputs** - Sensors: Six temperature (resistive). Six 0...10 Volt dc, max input 10 Volts dc  
 Digital input: Eight voltage free contacts, opto isolated. the inputs can be used for pulse counting, 0.5Hz max. They can also be used for alarms, overrides etc.  
 Serial link: EIA standard RS422/485 half duplex opto isolated  
**Outputs** - Actuators: Four 0...10 Volt dc. Eight digital (triac on/off) outputs  
**Protection class** - IP 20  
**Mounting** - DIN rail or surface mounting

**Part number & item**

**IAC-TS** Touchscreen

Data Sheet 2.951

**INSTALLATION DETAILS**

**Power supply** - Powered from the IAC unit  
**Power failure reserve** - Non volatile RAM with built-in Real Time Clock gives 3 year back up of clock and memory under normal conditions of use.

**ACCESSORY DDC 2601** Remote Touchscreen Adaptor Kit

Room Temperature, Temperature/humidity & Carbon Dioxide Sensors



**DR/DRT**  
Air Temperature Sensors

Designed for use with Satchwell controllers to provide temperature control of heating and air conditioning plant.

**FEATURES**

- Aesthetically pleasing case designs
- Small physical size
- Wide temperature sensing range
- Simple wiring connections
- Simple commissioning

**INSTALLATION DETAILS**

**Sensing element** - Negative temp. coefficient thermistor (0...10k ohm)  
**Wiring** - Low voltage dc, DRT - 2, 3 or 4 wire and DR - 2 wire

	Adjustable scale (exposed)	Sensing range	For use with controller or controller actuator types								
			CZT CXR	CSC	LIB	MMC	CZU	KMC	IAC MN	SVT	BAS Sigma
<b>DR 3253</b>	none	-5...+40°C	-	-	-	-	-	-	-	-	-
<b>DRT 3451</b>	10...35°C	-5...+40°C	-	•	-	-	•	-	-	-	-
<b>DRT 3453</b>	none	-5...+40°C	•	•	•	•	•	•	•	-	•
<b>DRT 3651</b>	10...35°C	-5...+40°C	•	-	-	•	-	•	•	-	•
<b>DRT 3652</b>	10...35°C + LED	-5...+40°C	-	-	-	-	-	-	•	-	-
Data sheet			2.105	2.021	2.041	2.701	2.201	2.120	2.951	2.001	13.341
			2.110		2.541	2.751			10.XXX		13.XXX

Data Sheet 1.001

**ACCESSORIES**

**837-1-203** DR/DRT Guard Kit - protects against impact and tampering  
**837-1-352** DRT +/- Scale Converter – used to convert standard exposed adjustment types. Consists of just the sensor front cover. Suitable for DRT 3451 and 3651.



**DRT**  
Room Temperature Sensors

Designed for use with controllers to provide temperature control of heating and air conditioning plant.

**FEATURES**

- Aesthetically pleasing case designs
- Small physical size
- Wide temperature sensing range
- Simple wiring connections
- Simple commissioning

	Adjustable scale (exposed)	Sensing range	For use with controller or controller actuator types								
			CZT CXR	CSC	LIB	MMC	CZU	KMC	IAC MN	SVT	BAS Sigma
<b>DRT 4453</b>	none	-5...+40°C	•	•	•	•	•	•	•	-	•
Data sheet			2.105	2.021	2.041	2.701	2.201	2.120	2.951	2.001	13.341
			2.110		2.541	2.751			10.XXX		13.XXX

Data Sheet 1.040

**INSTALLATION DETAILS**

**Sensing element** - Negative temp. coefficient thermistor (0...10k ohm)  
**Wiring** - Low voltage dc, DRT - 2, 3 or 4 wire

Room Temperature, Temperature/humidity & Carbon Dioxide Sensors (cont)



**DRT**  
Temperature Sensors with Fan Speed Switches

Sensors incorporate fan speed control switches and are used with CZU and IAC temperature controllers. This system is used for the control of temperature zones in buildings, such as hotel bedrooms or individual offices, which are air conditioned by fan coil units.

- FEATURES**
- Aesthetically pleasing case designs
  - Robust
  - Easy to operate
  - Simple wiring connections
  - Simple commissioning

	Adjustable scale	Sensing range	No. switch positions	Switch position	Switch function
<b>DRT 3801</b>	10...35°C	10...35°C	2	0, 1	Off, on
<b>DRT 3851</b>	10...35°C	10...35°C	4	0, 1, 2, 3	Off, on, medium, high

Data Sheet 1.002

Associated controllers: CZU, IAC

**INSTALLATION DETAILS**

**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - 2 wire low voltage dc, non-polarised to controller  
**Switch rating** - 2.5A 250Vac. Motor full load current. 12A motor starting, 250Vac. Note: manual switches suitable for choke controlled or capacitor controlled fan motors.



**DU, DUS, DUSF**  
MicroNet Sensors

These sensors are specifically used for Satchwell controllers. Models types have light that informs you that the controller is running. All sensors use the same single gang sized case.

- FEATURES**
- Small physical size
  - Attractive case design and neutral colour fits in with most room designs
  - Extra low voltage on all sensor types including fan speed control versions
  - Simple wiring connections
  - Simple commissioning
  - Controller running power light on the sensor

	Adjustable scale	Sensing range	Fan speed override	Switch function
<b>DU 4301</b>	none	-5...+50°C	-	-
<b>DUS 4302</b>	+/-	-5...+50°C	-	-
<b>DUSF 4351</b>	+/-	-5...+50°C	•	Auto, off, on
<b>DUSF 4352</b>	+/-	-5...+50°C	•	Auto, off, 1, 2, 3

Data Sheet 1.020

Associated controllers: MN 200/440/500/620 (DU & DUS only) URC

**INSTALLATION DETAILS**

**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - Low voltage dc (15Vdc), DU 3 wire, DUS 4 wire, DUSF 7 wire  
**Power supply** - 15Vdc from UniFact controller

**ACCESSORY** 837-1-203 Guard Kit



**DRTE**  
Active Temperature Sensor

The DRTE Active Sensor gives proportional 0...10Vdc output for control of rooms or small zones. The sensor will control actuators such as Satchwell ALI and ARE. Alternately the output can be used as a low limit on other 10 volt equipment or as a reset signal to other controllers.

- FEATURES**
- Tamperproof
  - Small physical size
  - Reversible output ramp: heating or cooling
  - Low cost installation
  - Simple commissioning

	Adjustable scale	Sensing range
<b>DRTE 2201</b>	none	0...40°C

Data Sheet 1.101

Associated controllers: MMC and IAC (reset or low limit)  
 Associated actuators: ALE, ALES, ARE, ARES, AVE, AVUE, ALI

**INSTALLATION DETAILS**

**Sensing element** - Negative temp. coefficient thermistor  
**Output** - 1 reversible 0...10Vdc signal (heating or cooling), 1 fixed 10Vdc output.  
**Proportional band** - 2...15K  
**Power supply** - 24Vac (+/-10%) 50/60Hz  
**Protection class** - IP 20



**DRH, DRTH**  
Room Humidity/Temperature Sensors

Sensors incorporate fan speed control switches. These devices are used for the control of temperature zones in buildings, such as hotel bedrooms or individual offices, which are air conditioned by fan coil units. Can be used with any 0...10V actuator.

- INSTALLATION DETAILS**
- Sensing element** - Negative temp. coefficient thermistor  
**Switch rating** - 2.5A 250Vac. Motor full load current. 12A motor starting, 250Vac. Note: manual switches suitable for choke controlled or capacitor controlled fan motors.

	Adjustable scale	Sensing range	No. switch positions	Switch position	Switch function
<b>DRH 2801</b>	10...40°C	10...35°C	2	0, 1	Off, on
<b>DRH 2851</b>	10...40°C	10...35°C	4	0, 1, 2, 3	Off, on, medium, high

Data Sheet 1.102

Associated actuators: ALE, ALES, ARE, ARES, AVE, AVUE, ALI



**DRH, DRTH**  
Room Humidity/Temperature Sensors

This sensor range is designed for use with controllers to provide relative humidity measurement and temperature control in ventilation systems.

Models are available with humidity sensing only or humidity combined with temperature sensing. Two ranges of resistive outputs are available across the monitored temperature range i.e. T type or standard NTC thermistor. 2% and 1% accuracy versions are available certified for the National Institute of Standards Technology (NIST).

- FEATURES**
- Aesthetically styled, low profile packaging
  - 0...10Vdc humidity output
  - 24Vac or 12...24Vdc input power
  - Humidity or humidity and temperature output
  - Removable Humidity sensor element; replacement elements available
  - 1% and 2% versions supplied with NIST certificate

	Sensing	Accuracy	Temp. sensor	Control range
<b>DRH 7702</b>	Relative humidity only	±2% rh*	None	0...90% rh and 0...+50°C
<b>DRH 7703</b>	"	±3% rh*		
<b>DRTH 7712</b>	Relative humidity and temp.	±2% rh*	T type	Humidity: 0...90% rh and 0...+50°C
<b>DRTH 7713</b>	"	±3% rh*		
<b>DRTH 8731</b>	"	±1% rh**	0...10Vdc	Temperature 0...+100°C

Data Sheet 1.502/1.504

\*@10...90% rh \*\*NIST Certified

**INSTALLATION DETAILS**

**Power supply** - 24Vac or 12...24Vdc for humidity sensors  
**Humidity sensor** - Digitally profiled thin-film capacitive element  
**Temperature effect** - ±0.03% rh/°C over 0...50°C  
**Stability** - ±1% rh annually at 20°C  
**Protection class** - IP 20  
**Ambient limits** - Operating temperature 0...60°C, humidity 10...90% rh, non-condensing  
**Compatible controllers** - KMC, MMC, IAC, MicroNet, BAS, Sigma

- ACCESSORIES**
- HDS 9201** 1% Humidity Element (NIST Certified)
  - HDS 9202** 2% Humidity Element (NIST Certified)
  - HDS 9102** Replacement Humidity Element (2%)
  - HDS 9103** Replacement Humidity Element (3%)

Room Temperature, Temperature/humidity & Carbon Dioxide Sensors (cont)



**DRCO**  
Infrared Analyser CO<sub>2</sub> Sensor

The DRCO is a non-dispersive infrared analyser designed for measuring environmental CO<sub>2</sub> concentration in indoor living spaces. Its measurement range of 0...2000 or 0...5000 ppm covers the range required to monitor compliance with ASHRAE or other ventilation efficiency standards.

An LCD display is available to provide local indication of CO<sub>2</sub> concentration and facilitate the setup and calibration process. An adjustable setpoint relay is available for direct control and alarm applications. Microprocessor-based digital electronics and a unique self-calibration algorithm improves long-term stability and accuracy.

	Measurement range (selectable)	Repeatability	Operating temp.	Input voltage	Analogue output (selectable)
<b>DRCO 2702</b>	0...2000 or 0...5000 ppm	±20 ppm	0...50°C	20...30V ac/dc	0...5Vdc, 0...10Vdc or 4...20mA

Data Sheet 1.601

**Protection class** - IP 20  
**Accuracy** - ±75 ppm  
**Response time** - <60 seconds for 90% step change

Duct Temperature, Temperature/humidity, Carbon Dioxide & Pressure Sensors



**DDT 0001**  
Air Temperature Sensor

This sensor's revolutionary adjustable probe length enables the user to find the best monitoring position with ease. It is designed to be used with Satchwell controllers to provide temperature control in ventilation systems.

- FEATURES**
- Very fast response to temperature changes
  - Stylish design has easily removable screw lid
  - Simple wiring connections
  - Simple commissioning
  - Variable probe length (covers many applications)
  - Optimum sensing position can be easily set
  - Simple replacement of existing sensors

	Sensing range	Stem length	Resistance at 20°C
<b>DDT 0001</b>	-5...+100°C	Min 100mm, max 330mm infinitely variable between limits	5573Ω

Data Sheet 1.003

Compatible controllers: CSC, CXR, CXT, CZT, CZU, IAC, KMC, MMC, MicroNet, BAS, Sigma

**INSTALLATION DETAILS**

**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - 2 wire non-polarised low voltage dc (safety extra low voltage SELV)  
**Protection class** - IP 65



**DDU 0001, 1803**  
Fan Coil Unit Return Air Temp. Sensors

Temperature sensors specifically designed for use in return air space of terminal units.

- FEATURES**
- Simple fixing (direct or spring clip)
  - Compact size
  - 1.5m fly lead

	Sensing range	Resistance at 20°C	Fixing
<b>DDU 0001</b>	-5...+40°C (non adjust.)	5573Ω	Direct
<b>DDU 1803</b>	"	5573Ω	Spring clip

Data Sheet 1.030

Associated controllers: CZU, IAC, URC, BRC, MN300...MN620, Sigma

**INSTALLATION DETAILS**

**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - 2 wire non-polarised low voltage dc



**DDH, DDTH**  
Duct Humidity/Temperature Sensors

This sensor range is designed for use with controllers to provide relative humidity measurement and temperature control in ventilation systems.

Models are available with humidity sensing only or humidity combined with temperature sensing. Two ranges of resistive outputs are available across the monitored temperature range i.e. T type or standard NTC thermistor.

- FEATURES**
- 0...10Vdc or 0...5Vdc humidity output
  - 24Vac or 12...24Vdc input power
  - Humidity sensor element contained in removable probe tip; replacement element available
  - Small physical size
  - Simple wiring connections and commissioning

	Sensing	Accuracy	Temp. sensor	Control range
<b>DDH 7602</b>	Relative humidity only	±2% rh*	None	0...90% rh and 0...+50°C
<b>DDH 7603</b>	"	±3% rh*		
<b>DDTH 7612</b>	Relative humidity and temp.	±2% rh*	NTC thermistor	Humidity: 0...90% rh and 0...+50°C
<b>DDTH 7613</b>	"	±3% rh*		

Temperature: 0...+100°C

Data Sheet 1.503 \*@10...90% rh

**ACCESSORIES**

- HDS 9201** 1% Humidity Element (NIST Certified)
- HDS 9202** 2% Humidity Element (NIST Certified)
- HDS 9102** Replacement Humidity Element (2%)
- HDS 9103** Replacement Humidity Element (3%)



**DDP**  
Differential Air Pressure Sensor

These sensors are for the control of air pressure in duct-work by the regulation of variable volume fans and pressure regulating dampers in distribution systems and terminal units. They can also be used for monitoring air filter conditions.

- FEATURES**
- Suitable for clean, dry air or any inert gas
  - Field selectable output voltages
  - Rapid dynamic response
  - Short circuit and reverse polarity protection

	Mounting type	LCD display	Pressure ranges (pa) (field selectable)	Output (field selectable)
<b>DDP 5601</b>	Duct	No	24.9/62.2/124.5/249	4...20mA or 0...5/0...10V
<b>DDP 5610</b>	"	"	±24.9/±62.2/±124.5/±249	"
<b>DDP 6601</b>	Panel	Yes	249/622/1245/2490	4...20mA or 0...5/0...10V
<b>DDP 6610</b>	"	"	±249/±622/±1245/±2490	"

Data Sheet 21.606

Associated controllers: URC, IAC 420, IAC 600, MN300...620, BAS, Sigma

**INSTALLATION DETAILS**

**Accuracy** - ±1% f.s.  
**Dynamic response** - <5msec  
**Protection class** - IP 65

**ACCESSORY** DDP 3601 Fitting Kit

Duct Temperature, Temperature/humidity, Carbon Dioxide & Pressure Sensors (cont)



**DDCO**  
Infrared Analyser  
CO<sub>2</sub> Sensor

The DDCO is a non-dispersive infrared analyser designed for measuring environmental CO<sub>2</sub> concentration in ventilation systems and indoor living spaces. Its measurement range of 0...2000 or 0...5000 ppm covers the range required to monitor compliance with ASHRAE or other ventilation efficiency standards.

An LCD display is available to provide local indication of CO<sub>2</sub> concentration and facilitate the setup and calibration process. An adjustable setpoint relay is available for direct control and alarm applications. Microprocessor-based digital electronics and a unique self-calibration algorithm improves long-term stability and accuracy.

	Measurement range (selectable)	Repeatability	Operating temp.	Input voltage	Analogue output (selectable)
<b>DDCO 2602</b>	0...2000 or 0...5000 ppm	±20 ppm	0...50°C	20...30V ac/dc	0...5Vdc, 0...10Vdc or 4...20mA

Data Sheet 1.601

**Protection class** - IP 65  
**Accuracy** - ±75 ppm  
**Response time** - <60 seconds for 90% step change  
**Sensor connection** - 2 plastic tubes with inside diameter of 6mm ??????



**DDV**  
Air Velocity Sensor

The DDV gives a 0...5Vdc output over a range of 0.4...10 m/s. The velocity range may be limited if required to give greater resolution. On its minimum setting the range is approximately 0.4 to 4 m/s.

	Output	Measuring range (adjustable by min/max knob)
<b>DDV 1201</b>	0...5Vdc	0.4...10 m/s (max) 0.4...4 m/s (min)

Data Sheet 21.671 Associated controllers: IAC, MicroNet, BAS, Sigma

**INSTALLATION DETAILS**  
**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - 3 wire (signal, earth and 24Vac power supply)  
**Protection class** - IP 41

Pipe Temperature Sensors



**DST 0001**  
Water Temp.  
Sensor (surface)

The DST 0001 permits the monitoring and control of fluid temperature through its specially designed thermistor housing. Its simple installation promotes its flexible use for temporary or permanent monitoring/control applications.

**FEATURES**

- Allows direct mounting to pipe surface, allowing any point to be monitored
- Easily fitted, making it perfect for permanent or temporary situations
- Simple commissioning

	Sensing range	Mounting	Resistance at 20°C
<b>DST 0001</b>	5...120°C	Pipe surface	5573Ω

Data Sheet 1.203

Compatible controllers: CSC, CXR, CXT, CZT, IAC, KMC, MMC, LIB, MicroNet, BAS, Sigma

**INSTALLATION DETAILS**  
**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - 2 wire non-polarised low voltage dc (safety extra low voltage SELV)  
**Protection class** - IP 65  
**Fixing strap** - Metal, sufficient for pipes up to 100mm



**DWT 0001**  
Water Temperature  
Sensor  
(immersion)

This sensor simplifies product selection and improves control loop performance with its unique probe assembly. The shaft is simply extended and inserted into the pocket, ensuring a good contact. The sensor can be used with a vast range of other manufacturer's pockets when used in conjunction with the pocket adaptor DWA 0001. The use of the adaptor avoids system drain downs and costly down time.

**FEATURES**

- Variable stem length - 100mm to 330mm
- Sensor crown ensures good thermal contact with pocket end
- Fast response
- 120mm brass pocket (DWA 0005) and heat conductive paste supplied as standard
- Simple commissioning

	Sensing range	Stem length	Resistance at 20°C
<b>DWT 0001</b>	-10...+120°C	Min 100mm, max 330mm infinitely variable between limits	5573Ω

Data Sheet 1.203

Compatible controllers: CSC, CXR, CXT, CZT, IAC, KMC, MMC, LIB, MicroNet, BAS, Sigma

**INSTALLATION DETAILS**  
**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - 2 wire non-polarised low voltage dc (safety extra low voltage SELV)  
**Protection class** - IP 65  
**Time constant** - 7 secs.

**ACCESSORIES**

- DWA 0001** - Brass Pocket Adaptor
- DWA 0002** - Immersion Pocket, 120mm, stainless steel
- DWA 0003** - Immersion Pocket, 200mm, brass
- DWA 0004** - Immersion Pocket, 200mm, stainless steel
- DWA 0005** - Immersion Pocket, 120mm, brass



**DWT 0002**  
Fast Response  
Water Sensor  
(immersion)

The DWT 0002 sensor is designed for use in the most demanding control schemes. Many modern applications call for above average performance and this device is key to stability and efficiency. The sensing element is encased in the optimum amount of high quality stainless steel, permitting ultra fast detection of temperature change.

**FEATURES**

- Very fast response to temperature change
- Small probe diameter for direct insertion into small pipes
- Stainless steel probe
- Simple commissioning

	Sensing range	Stem length	Resistance at 20°C
<b>DWT 0002</b>	-10...+120°C	120mm (non adjustable)	5573Ω

Data Sheet 1.204

Compatible controllers: CSC, CXR, CXT, CZT, IAC, KMC, MMC, LIB, MicroNet, BAS, Sigma

**INSTALLATION DETAILS**  
**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - 2 wire non-polarised low voltage dc (safety extra low voltage SELV)  
**Protection class** - IP 65  
**Time constant** - 2 secs

Outside Sensors



**DOT 0002**  
Outside Temp.  
Sensor

This sensor is for use with Satchwell controllers to provide relevant temperature influence on the heating and air conditioning plant, in accordance with prevailing weather conditions.

**FEATURES**

- Fully backwards compatible
- Small physical size
- Simple commissioning

	Sensing range	Resistance at 20°C
<b>DOT 0002</b>	-40...+55°C	5573Ω 12490Ω

Data Sheet 1.402

Compatible controllers: CSC, IAC, KMC, MMC, LIB, MicroNet, BAS, Sigma

**INSTALLATION DETAILS**  
**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - 2 wire non-polarised low voltage dc (safety extra low voltage SELV)  
**Protection class** - IP 65



**DOS 0001**  
Outside Solar  
Sensor

The DOS Solar Sensor has particular advantages to combat the specific effect of solar heat gain. Its application is a true benefit to modern glass/translucent buildings where solar gain is a negative influence on comfort and occupant efficiency. Energy savings will be realised by allowing for solar contributions.

**FEATURES**

- Fully backwards compatible
- Small physical size
- Simple commissioning

	Sensing range	Resistance at 20°C
<b>DOS 0001</b>	-40...+55°C	5573Ω

Data Sheet 1.402

Compatible controllers: CSC, IAC, KMC, MMC, LIB, MicroNet, BAS, Sigma

**INSTALLATION DETAILS**  
**Sensing element** - Negative temp. coefficient thermistor  
**Wiring** - 2 wire non-polarised low voltage dc (safety extra low voltage SELV)  
**Protection class** - IP 65



**DOW**  
Wind Sensor

This sensor is used with Satchwell controllers to influence temperature or time control of heating and air conditioning plant in accordance with prevailing weather conditions.

	Control function	Sensing range
<b>DOW 2701</b>	Wind effect only	-40...+40°C (wind effect zero above 20°C)

Data Sheet 1.401

**INSTALLATION DETAILS**  
**Sensing element** - Negative temp. coefficient thermistor  
**Output signal** - 0...10V signal  
**Power supply** - 24Vac  
**Protection class** - IP 47

Remote Adjustment Units



**RPW**  
Remote Setting  
Unit

The RPW Unit is used for adjusting the controller's setpoint from remote site.

These units are used on various Satchwell temperature controllers to give remote set value adjustment.

**INSTALLATION DETAILS**

**Indication** - Graduated dial  
**Adjustment** - Dial  
**Mounting** - Suitable for surface or conduit box mounting  
**Protection class** - IP 20

	Scale range	Controlled condition	For use with controller type				
			CZT CXR CXT	MMC	KMC	IAC	MN (300, 440, 500, 620)
<b>RPW 4425</b>	-5...+50°C	Temperature	•	•	•	•	•

Data Sheet 1.901

Duct Temperature Thermostats, Pressure and Air Flow Switches



**TDR, TDC**  
Air Temperature Thermostats

These thermostats are for duct applications and incorporate a single pole double throw contact switch.

**FEATURES**

- Simple installation and commissioning
- Cable gland supplied

	Sensing range	Adjustment	Stem type	Contact rating
<b>TDR 2201</b>	0...60°C	Exposed	Rigid stem (190mm x 8mm Ø)	230Vac, 16A SPDT
<b>TDC 2202</b>	0...60°C	Exposed	Capillary stem (1 metre)	

Data Sheet 21.001

**Protection class - IP 40**  
**Max head temperature - 80°C**



**SPA**  
Universal Differential and Universal Pressure Switches

The SPA 1501...1504 Differential Pressure Switches can be used to signal when the pressure difference is too high due to a blocked filter, too low due to flow failure, or for level control in a pressurised vessel. Suitable for use on a vacuum.

The SPA 1505 & 1506 Pressure Switches can be wired into control circuits or contactors to provide a high or low pressure cut-out. Alternatively, they can be wired directly to a bell or light to provide a high or low pressure alarm. Not suitable for use on a vacuum.

Type	Spec. no.	Sensing range	Reset differential*	Contact rating
Universal Differential Pressure	<b>SPA 1501</b>	150 - 1000 mbar	50 - 100	1A @ 250v
	<b>SPA 1502</b>	6 - 20 mbar	3 - 8	1A @ 250v
	<b>SPA 1503</b>	15 - 60 mbar	5 - 16	1A @ 250v
	<b>SPA 1504</b>	40 - 200 mbar	20 - 60	1A @ 250v
Universal Pressure	<b>SPA 1505</b>	120 - 2200 mbar	110 - 450	6A @ 250v
	<b>SPA 1506</b>	1000 - 6000 mbar	200 - 1500	6A @ 250v

**Protection class - SPA 1501-1504 IP 65, SPA 1505/1506 IP 54. \*Adjustable between (mbar)**  
**Max line pressure - SPA 1501 - 20 bar, SPA 1502-1504 - 10 bar, SPA 1505/1506 - 6 bar**



**SFA**  
Air Flow Switch

This switch is designed to control air flow using a paddle to switch on and off the power supply. The paddle can be trimmed if the air flow is above 5 metres per second.

	Flow setting	Contact rating
<b>SFA 1451</b>	1 m/s, 2.5 m/s (paddle untrimmed)	24...230Vac, 15A single pole, double throw

Data Sheet 21.670

**Head protection class - IP 65**



**SPA**  
Air Differential Pressure Switch

The SPA Differential Pressure Switch is used to monitor non-inflammable and non-aggressive gases. Typical applications are filter dirty and fan run/stop detection.

**ACCESSORY DDP 3601** Fitting Kit (containing 2 metres of PVC tubing and 2 duct mounting pitot tubes)

	Adjustable range for trip pressure	Max. operating pressure	Repeatability	Contact rating
<b>SPA 1401</b>	0.2...3.0 mbar	50 mbar	0.025 mbar	230Vac, 1A SPDT
<b>SPA 1402</b>	1.0...10.0 mbar	50 mbar	0.05 mbar	

Data Sheet 21.601

**Protection class - IP 54**  
**Pressure connection - 2 plastic tubes with inside diameter of 6mm**

Pipe Temperature Thermostats and Flow Switches



**SFW**  
Water Flow Switch

The SFW Flow Switch is designed to control water flow, in pipe diameters from 1" to 6", using a paddle to switch on and off the power supply. The paddle can be trimmed to suit the flow required. It is designed to be mounted in a short necked welded socket or a tee with a short branch.

	Max fluid temp.	Contact rating
<b>SFW 1251</b>	85°C	24...230Vac, 15A single pole, double throw

Data Sheet 21.670

**Head protection class - IP 65**



**TWK**  
Water Immersion Thermostat

The TWK Thermostat is for water applications and incorporate a single pole double throw contact switch.

**FEATURES**

- Simple installation and commissioning
- Cable gland supplied

	Sensing range	Adjustment	Pocket	Contact rating
<b>TWK 2301</b>	0...90°C	Exposed	1/2" NPT (100mm x 8mm Ø)	230Vac, 16A SPDT

Data Sheet 21.001

**Protection class - IP 40**  
**Max head temperature - 80°C**



**TWL, TWM**  
Water Immersion Thermostats (manual reset)

These thermostats are typically used in water high limit/control applications such as HWS cylinders or boilers. The TWL is a manual reset, high limit thermostat with a Single Pole Double Throw (SPDT) action. The TWM is a combined control thermostat and manual reset, high limit thermostat allowing independent setting of both the control point and high limit temperature.

**FEATURES**

- Simple installation and commissioning
- Cable gland supplied
- Manual reset
- Concealed setting for reset temperature

	Sensing range	Adjustment	Pocket	Contact rating
<b>TWL 2302</b>	65...85°C	Exposed	1/2" NPT (100mm x 8mm Ø)	230Vac, 16A SPDT
<b>TWM 2401</b>	0...90°C (control) 70...90°C (limit)	Exposed Concealed	1/2" NPT (100mm x 16mm Ø)	

Data Sheet 21.002

**Protection class - IP 40**  
**Max head temperature - 80°C**

Pipe Temperature Thermostat



**TSM**  
Strap-on Pipe Thermostat

The TSM Thermostat is typically used in water control applications where it is not possible to insert a pocket into the pipe. The thermostat is attached to the pipe by a spring strap (supplied).

**FEATURES**

- Simple installation and commissioning
- Cable gland supplied

	Sensing range	Adjustment	Contact rating
<b>TSM 2501</b>	0...90°C	Exposed	230Vac, 16A SPDT

Data Sheet 21.003

**Ambient temperature limits - Maximum sensing plate temperature 100°C**  
**Maximum pipe diameter - 150mm**  
**Protection class - IP 40**

Outside and Pipe Frost Thermostats



**TCL**  
Air Temperature Thermostats

The range of TCL Freeze Thermostats covers both outside, heater battery and water pipe freeze protection.

The TCL 1601 wall mounting freeze thermostat is suitable for outside mounting.

The TCL 1602 and TCL 1603 have a capillary that will sense the lowest temperature on the face of the battery or the surface of a pipe.

	Sensing range	Type	Stem type	Contact rating
<b>TCL 1601</b>	-15...+10°C	Outside (auto reset)	-	230Vac SPDT heating 10A, cooling 3A
<b>TCL 1602</b>	-18...+13°C	Coil and pipe (manual reset)	Capillary stem (6m)	230Vac, 6A SPDT
<b>TCL 1603</b>	-18...+13°C	Coil and pipe (auto reset)	Capillary stem (6m)	

Data Sheet 21.004

**INSTALLATION DETAILS**  
**Protection class - TCL 1601: IP 65, TCL 1602/3: IP 43**

Transducer



**EPT**  
Electro Pneumatic Transducer

This transducer is used as an interface between an electronic controller and a pneumatically operated control valve or damper. It is set to receive a 0...10Vdc input and converts it to a proportional 0...20 PSI output signal. The input may be configured, if required, for 0...5Vdc or 4...20mA by using the jumpers on the PCB.

**FEATURES**


- Smooth stable linear performance
- Choice of input signals to meet most control applications. 0...10Vdc, 0...5Vdc or 4...20mA selected from onboard jumpers
- LED indication of supply status and increasing/decreasing pressure signal
- Indication gauge for actual air pressure output
- Manual override of output pressure signal

	Input signal	Output signal	Max supply pressure	Input power
<b>EPT 7401</b>	0...10Vdc 0...5vdc 4...20mA	0...20 psi or 3...15 psi	45 psi	24Vac/dc nominal

Data Sheet 25.021

**INSTALLATION DETAILS**  
**Indication - Output air pressure gauge (indication only)**  
Power on LED  
Pressure increasing LED  
Pressure decreasing LED

Zone Valves & Actuators




The AVU Mk 2, 24Vac Valve Actuator is designed for use on Satchwell zone valves such as the VEU, MEU and FEU. The AVU has a linear output and is suitable for use on hot or chilled water applications on terminal units. The AVU is controlled by the Satchwell CZU, IAC, URC and MicroNet MN controllers.

- AVU Mk2 Zonemaster Control System (24Vac)**
- FEATURES**
- Simple installation and commissioning (self stroking)
  - Direct coupling without the use of tools
  - Built-in manual operator
  - Connect up to seven AVU actuators in parallel from one CZU or IAC controller output

	Power supply	Control action	Thrust
<b>AVU 2201</b>	24Vac	Reversing-modulating	105N

Data Sheet 3.010

**INSTALLATION DETAILS**  
**Stroke** - 11.5mm  
**Stroke time** - 60 secs  
**Action** - Reversing-modulating  
**Associated controllers** - CZU, IAC, URC, MN  
**Manual override** - Adjusted by means of a screwdriver slot in the top of the cover  
**Protection class** - IP 41




The AVE 24Vac zone valve actuator is designed for use on the Satchwell VEU, MEU and FEU valves and is used in conjunction with any controller providing a 0-10Vdc output signal. The AVE has a linear output and is suitable for use on hot or chilled water applications on terminal units.

- AVE Zone Valve Actuator (0-10Vdc)**
- FEATURES**
- Simple installation and commissioning (self referencing)
  - Direct coupling without use of tools
  - Built-in Manual Operator and Override Reset
  - Connect up to 10 AVE actuators in parallel from one controller output

	Power supply	Input control	Control action	Thrust
<b>AVE0001</b>	24Vac, 50Hz	0...10Vdc	Direct acting	105N
<b>AVE0002</b>	24Vac, 50Hz	0...10Vdc	Reversing acting	105N

Data Sheet 3.011

**INSTALLATION DETAILS**  
**Action** - Direct or Reverse Acting specifications available  
**Stroke** - Approximately 9.5mm  
**Stroke time** - 60 secs  
**Associated controllers** - DRTE, CZT, IAC, KMC, MMC, URC, MN, BAS, Sigma  
**Associated valves** - VEU, MEU, FEU  
**Manual Override** - Reset button on underside for use when manual override is operated when AVE is powered up.  
**Protection class** - IP 40



The AY range of actuators has been designed for use on the ZY range of Zone Valves in ON/OFF HVAC applications. They mount directly onto the valves without the need for linkages or calibration. Flexibility is provided with the variety of voltages and functions, all making for ease of installation.


- AY Zone Valve Actuators**
- FEATURES**
- Normally open and normally closed models available in both 230Vac and 24Vac
  - Direct coupling to the ZY range of valves without the need for linkage kits
  - High performance duty for commercial HVAC applications
  - Positive spring return for fail safe operation
  - Manual Override Lever
  - ON/OFF Control

	Power supply	Spring return
<b>AY 1201</b>	230Vac	Normally closed
<b>AY 1251</b>	230Vac	Normally open
<b>AY 1301</b>	24Vac	Normally closed
<b>AY 1351</b>	24Vac	Normally open

Data Sheet 3.030

**INSTALLATION DETAILS**  
**Valve running time** - Power stroke 9...11 secs, Spring return stroke 4...5 secs  
**Max different pressure** - 350 kPa  
**Compatible valves** - ZY range of Zone Valves  
**Compatible controllers** - IAC, BAS, Sigma and thermostats  
**Manual operation** - By means of a lever located on the side of the body  
**Protection class** - IP 41

Mid-sized Actuators




These proportional actuators utilise a linear output drive and are used in conjunction with any controller providing a 0...10Vdc output signal. These control valves are applied, typically, to regulate the flow of either hot or chilled water supplying heating or cooling coils in various types of terminal unit, for example fan coils units, reheat coils associated with variable air volume units, also small air handling plants and heat exchangers.

- AVUE Valve Actuators (0-10V)**
- FEATURES**
- Simple to install. Direct coupling to valve without use of tools
  - Minimal commissioning. No site adjustments required (self stroking)
  - Compact size
  - Built in manual operator

	Power supply	Input control	Control action	Thrust
<b>AVUE 4304</b>	24Vac	0...10Vdc	Direct acting	220N
<b>AVUE 4354</b>	24Vac	0...10Vdc	Reversing acting	220N

Data Sheet 3.001

**INSTALLATION DETAILS**  
**Action** - Reversing, modulating  
**Stroke** - 12.7mm (1/2")  
**Stroke time** - 150 secs/50Hz, 125 secs/60Hz  
**Associated controllers** - DRTE, CZT, KMC, MMC, IAC, URC, MN, BAS, Sigma  
**Associated valves** - VEU, MEU, FEU, VZX, MZX  
**Manual operator** - By thumb rotation of partially exposed gear wheel  
**Protection class** - IP 40  
**ACCESSORY** AVA 1752 Rain Protection Cover



These valve actuators are designed to be used on the VZX two port and the MZX three port valves. The AVUX is a 24 volt ac reversing actuator suitable for modulating the VZX and MZX valves from any 24 Volt ac controller or device. The AVUM is a mains Voltage reversing actuator and can be controlled from any controller or device having a mains switched output.


- AVUX, AVUM Valve Actuators (pulsed)**
- FEATURES**
- Simple to install. Direct coupling to valve without use of tools
  - Minimal commissioning. No site adjustments required (self stroking)
  - Compact size
  - Built in manual operator

	Power supply	Control action	Thrust
<b>AVUX 4202</b>	24Vac	Reversing-modulating	220N
<b>AVUM 4601</b>	230Vac	Reversing-modulating	220N

Data Sheet 3.005

**INSTALLATION DETAILS**  
**Action** - Reversing, modulating  
**Stroke** - 12.7mm  
**Stroke time** - 100 secs  
**Associated controllers** - CSC, MMC, CXT, CXR, IAC, URC, MN, BAS, Sigma  
**Associated valves** - VEU, MEU, FEU, VZX, MZX  
**Manual operator** - By thumb rotation of partially exposed gear wheel  
**Protection class** - IP 40  
**ACCESSORY** AVUA 1752 Rain Protection Cover

Rotary Actuators




These actuators operate Satchwell MB valves. The XRM is a modulating actuator for use with Climatronic integral controllers and the MMC controller. The RM is a 230V reversing actuator for two-position control when used with a changeover type thermostat or modulating control when used with an appropriate controller. On power failure the actuator can be operated manually.

- RM, XRM Modulating and Two-position Light Duty Actuators**

	Power supply	Transfer switch	Application
<b>XRM 3201</b>	24Vac (0.5VA)	24Vac/0.02A	Integral (controlled by CXT, CXR, CSC, MMC, URC or IAC)
<b>RM 3601</b>	230Vac (5VA)	230Vac/3A	Two-position (controlled by changeover thermostat or switch). Also suitable for CSC, CMC.

Data Sheet 3.201

**INSTALLATION DETAILS**  
**Stroke** - 90° angular in 4 minutes. Reversing  
**Torque** - 2 Nm  
**Associated valves** - MB valves (3-port)  
**Actuator position indicator** - Marked 0...10 visible from both sides  
**Transfer switches** - Two single pole. Not electrically separate  
**Protection class** - IP 41



The 'AR' range of Reversing Actuators have a rotary output for coupling to air dampers or rotary valves requiring a rotary drive through approximately 95°. These can be used for either modulating or ON/OFF control depending on the control signal supplied to the actuator.


- ARX, ARE, ARM Rotary Actuators**
- FEATURES**
- Compact size
  - Hollow actuator drive output shaft accommodates any length of damper shaft without the need to cut it
  - Simple to install, most dampers do not require universal joints or rods
  - Accommodates shaft diameters from 10...20mm and square shafts from 10...16mm square
  - Stroke limiter supplied with the actuator
  - Double insulated, no earth required
  - 0...10V Feedback signal for monitoring the actual actuator position via BMS (ARE only)

	ARX 2202 ARX 2203	ARX 2252 ARX 2253	ARE 2302 ARE 2303 ARE 2304	ARE 2352 ARE 2354 ARE 2355	ARM 2606 ARM 2607	ARM 2656 ARM 2657
<b>Power supply</b>	24Vac	24Vac	24Vac	24Vac	230Vac	230Vac
<b>Input signal</b>	Pulsed 24Vac	Pulsed 24Vac	0...10Vdc	0...10Vdc	Pulsed 230Vac	Pulsed 230Vac
<b>Torque</b>	15 Nm	8 Nm	15 Nm	8 Nm	15 Nm	8 Nm
<b>Start &amp; span</b>	2202-no 2203-no	2252-no 2253-no	2302-no 2303-yes 2304-yes	2352-no 2354-yes 2355-no	2606-no 2607-no	2656-no 2657-no
<b>Auxiliary switches</b>	2202-no 2203-yes	2252-no 2253-yes	2302-no 2303-no 2304-yes	2352-no 2354-yes 2355-yes	2606-no 2607-yes	2656-no 2657-yes

Data Sheet 3.215

**INSTALLATION DETAILS**  
**Action** - Reversing-modulating  
**Stroke time** - 90...220 seconds  
**Angular stroke** - 95°  
**Protection class** - IP 54  
**Position indicator** - Marked 0...10 representing 0...100% of the actuator stroke

**LINKAGE KIT ACCESSORIES**  
**LK 2701** MBF 3-port Flanged Valves 65...100mm  
**LK 2702** MB 3-port Screwed Valves 1/2"...2"  
**LK 2703** VV Butterfly Valve 2...4"  
**LK 2407** Traditional Connection to Damper Boxes  
**LK 2408** Direct Damper Mounting Kit



These actuators have a rotary output for direct coupling to air dampers. Models are available for on/off operation from 230V or 24V power supplies. There is also a 0...10Vdc input version that is fully modulating.

- RMS, RXS, RES Spring Return Rotary Actuators**
- FEATURES**
- Direct coupling to all normal dampers without mounting brackets linkage kits
  - Positive spring return operation

	RXS 7254	RXS 7255	RES 7354	RMS 7654	RMS 7655	RXS 7256 RXS 7257	RES 7355	RMS 7656 RMS 7657
<b>Power supply</b>	24Vac	24Vac	24Vac	230Vac	230Vac	24Vac	24Vac	230Vac
<b>Input signal</b>	Pulsed 24Vac	Pulsed 24Vac	0...10Vdc	Pulsed 230Vac	Pulsed 230Vac	Pulsed 24Vac	0...10Vdc	Pulsed 230Vac
<b>Torque</b>	15 Nm	15 Nm	15 Nm	15 Nm	15 Nm	4 Nm	4 Nm	4 Nm
<b>Built-in auxiliary switches</b>	-	2 SPDT (3A)	-	-	2 SPDT (3A)	1 SPDT (1.5A) (7257 only)	-	1 SPDT (1.5A) (7657 only)
<b>Running time (approx)</b>	150s	150s	150s	150s	150s	40...70s	150s	40...70s

Data Sheet 3.305/3.310

**INSTALLATION DETAILS**  
**Action** - Open/close  
**Angular stroke** - 95°  
**Protection class** - IP 54



Linear Actuators



**ALi**  
Intelligent Linear Actuators

The Satchwell ALi is an Intelligent Linear Actuator providing a modulating output for the control of two and three port seat valves with a stroke of up to 38mm (1 1/2"). It is self-stroking, automatically adjusting for any valve within the stroke range.

The ALi has several modes of operation, from start and span settings to reverse acting including two safety modes. It incorporates a manual override with a gear train disengagement feature by means of a manual operation key located on top of the case.

The ALi has the ability to provide a 0...10V feedback signal for monitoring purposes.

**FEATURES**

- Self-stroking
- Various operating modes
- Direct coupling to Satchwell and 3rd party seat valves
- Electronic control of thrust under stall conditions
- LED indication of actuator status
- Safety modes in the event of controller failure reducing software engineering
- Selectable resolution 200 or 25 steps
- No need to re-stroke after power failure
- 0...10V feedback (ALi 1577 & 1677)

	ALi 1576	ALi 1577	ALi 1676	ALi 1677
0...10Vdc feedback	No	Yes	No	Yes
Frame	Standard	Standard	Short	Short
Power supply	34Vdc or 24Vac			
Input signal	0...10Vdc, 0...4Vdc, 6...10Vdc, 2...10Vdc (safety mode)			
Thrust	700N			
Running speed	1 s/mm			
Max stroke	38mm	38mm	25mm	25mm
Auxiliary switches	Use kit ALA 1211 (2 x 5A, 250V adjustable)			

Data Sheet 3.601

**INSTALLATION DETAILS**

**Stroke** - 0...38mm max (1 1/2")  
**Associated controllers** - CZT Mk 5 (separate transformer required), IAC, KMC, MMC, MN 440, MN 500, MN 620, URC, BAS, Sigma  
**Associated 2-port valves** - VSF, VZF, VZ  
**Associated 3-port valves** - MJF, MZF, MZ  
**Type of operation** - Reversing, modulating  
**Protection class** - IP 54  
**Drive** - Operates on screw-jack principle. Ultra reliable  
**Spindle coupling** - Freely rotating coupling, screwed 3/8" (24UNF)  
**Manual operator and override** - Hand operator with gear train disengagement failure  
**ACCESSORIES** - see below



**ALX, ALE, ALM**  
Linear Actuators

Satchwell Linear Actuators type 'AL' are reversing actuators having a linear output, for direct coupling to Satchwell lift and lay seat-type control valves or other seat valves requiring a linear driver over stroke lengths of up to 38mm (1 1/2"), within the limits of output thrust and with compatible mounting arrangements.

The ALE actuator can be set to operate a low hysteresis when used for tight control applications on microprocessor based controllers such as the KMC and MMC.

**FEATURES**

- Direct coupling to Satchwell and third party valves
- Universal for valve strokes, up to 38mm (1 1/2"). Actuator stroke is self-setting to suit valve stroke
- Alternative stroke times, to suit application
- Standard or low hysteresis selection on ALE types

	ALX 1201	ALX 1251	ALE 1302	ALE 1352	ALM 1601
Frame	Standard	Short	Standard	Short	Standard
Power supply	24Vac	24Vac	24Vac	24Vac	230Vac
Input signal	Pulsed 24Vac	Pulsed 24Vac	0...10Vdc	0...10Vdc	Pulsed 230Vac
Thrust	538N	311N	538N	311N	538N
Running speed	8.5 s/mm	5.0 s/mm	8.5 s/mm	5.0 s/mm	8.5 s/mm
Max stroke	38mm	16mm	38mm	16mm	38mm
Auxiliary switches	Use kit ALA 1211	1 x 5A, 250V fixed, built-in	Use kit ALA 1211	1 x 5A, 250V fixed, built-in	Use kit ALA 1211

Data Sheet 3.401

**INSTALLATION DETAILS**

**Action** - Reversing-modulating  
**Stroke time** - 5 sec/min minimum (see data sheet for other actuator/valve stroke times)  
**Protection class** - IP 54  
**Associated controllers** - ALX: MMC, CXR, CSC, CXT, IAC, MicroNet, URC  
 ALE: MMC, KMC, CZT, MicroNet, IAC (sensors DRTE, DDTE, DWTE), BAS, Sigma  
 ALM: CSC  
**Associated valves** - See valve data sheets  
**Drive** - Operates on screw-jack principle  
**Spindle coupling** - Freely rotating coupling, screwed: 3/8" 24-UNF, female (ALM 1601, ALX 1201, ALE 1302), 1/4" 32-UNEF, female (ALX 1251, ALE 1352)  
**ACCESSORIES** - see below



**ALXS, ALES, ALMS**  
Spring Return Linear Actuators

'AL-S' Actuators are power failure return types having a linear output, for direct coupling to Satchwell lift and lay seat-type control valves. They are also suitable for other seat valves requiring a linear drive over stroke lengths of up to 25.4mm (1"), within the limits of output thrust, with compatible mounting arrangements and spindle projections.

The ALES actuator can be set to operate a low hysteresis when used for tight control applications on microprocessor based controllers such as the CZT, KMC and MMC.

**FEATURES**

- Positive power failure operation
- Patented maintenance free air brake system
- Spring return action to 'spindle retracted' or 'spindle extended' position
- Direct coupling to Satchwell and third party valves
- Universal for valve strokes, up to 25.4mm (1"). Actuator stroke is self-setting to suit valve stroke
- Standard or low hysteresis selection on ALES types

	ALXS 1201	ALXS 1251	ALES 1302	ALES 1352	ALMS 1601	ALMS 1651
Power supply	24Vac	24Vac	24Vac	24Vac	230Vac	230Vac
Input signal	Pulsed 24Vac	Pulsed 24Vac	0...10Vdc	0...10Vdc	Pulsed 230Vac	Pulsed 230Vac
Thrust	311N					
Running speed	7 s/mm					
Spring return speed	0.3 s/mm					
Max stroke	25.4mm					
Auxiliary switches	2 x 5A, 250V fixed, built-in					

Data Sheet 3.501

**INSTALLATION DETAILS**

**Action** - Reversing-modulating  
**Stroke time** - 8.5 sec/min minimum (see data sheet for other actuator/valve stroke times)  
**Spindle coupling** - Freely rotating coupling, screwed: 3/8" 24-UNF, female, adaptor to 1/4" 32-UNEF, female, supplied fitted  
**Protection class** - IP 54  
**Associated controllers** - ALXS: MMC, CXR, CSC, CXT, IAC, MicroNet, URC  
 ALES: MMC, KMC, CZT, MicroNet, IAC (sensors DRTE, DDTE, DWTE), BAS, Sigma  
 ALMS: CSC  
**Associated valves** - VZ, MZ, VSF, MZF, VZF, MJF (up to 25mm stroke)

**Accessories for 'AL-' Type Actuators**

**Auxiliary switches** - ALA 1211 Available for internal mounting. Two voltage-free change-over switches rated 5A, 250V  
**Spindle adaptor** - LNK 1402 1/4" 32-UNEF female x 3/8" 24-UNF male. One supplied with each actuator, except ALX 1251 and ALE 1352, for which it is not required  
**Rain protection cover** - ALA 1751

Small Valves



**ZY**  
2 and 3-port Zone Valves

This range of Zone Valves are designed to be used with the AY range of actuators. The use of these valves in open systems is not recommended.

It is imperative that the valves be piped so that the paddle closes against the direction of the flow.

**FEATURES**

- Suitable for chilled and hot water applications, up to 50% glycol
- Range of actuators available for direct connection
- 100% tight shut-off

**INSTALLATION DETAILS**

**Pipe connections** - BSP parallel female  
**Operating pressure limits** - 300 PSI - PN20 (2,100kPa)  
**Seat leakage** - 100% tight shut-off - (zero leakage)  
**Valve type** - Paddle action

	Size	Type	Cv <sub>s</sub>	Max Δp (kPa)	Compatible actuators
<b>2-port</b> BSP (female), parallel fitting	1/2"	ZY 1201	1.0	350	AY 1201 - 230Vac NC
	1/2"	ZY 1202	2.6	350	AY 1251 - 230Vac NO
	1/2"	ZY 1203	3.6	350	AY 1301 - 24Vac NC
	3/4"	ZY 1204	3.6	175	AY 1351 - 24Vac NO
	3/4"	ZY 1205	5.2	175	
<b>3-port</b> BSP (female), parallel fitting	1/2"	ZY 1301	1.0	350	AY 1201 - 230Vac NC
	1/2"	ZY 1302	2.6	350	AY 1251 - 230Vac NO
	1/2"	ZY 1303	3.6	350	AY 1301 - 24Vac NC
	3/4"	ZY 1304	3.6	175	AY 1351 - 24Vac NO
	3/4"	ZY 1305	3.6	175	
	3/4"	ZY 1306	7.3	175	

Data Sheet 4.001



**VEU, MEU, FEU**  
2, 3 and 4-port Unit Valves

This range of characterised Plug and Seat Control Valves for operation by AVU actuators and principally for use in conjunction with the CZU temperature controller, IAC controllers and MicroNet MN controllers. The valves are designed to regulate the flow of hot or chilled water to air heaters and coolers in fan coil units, induction units, small hot water re-heaters associated with V.A.V units or other similar types of terminal unit for the control of room temperature.

**FEATURES**

- Small compact unit valves
- Wide range of Kv/Cv values
- Long plug travel improves performance and reduces the risk of blockage
- Direct coupling actuators

**INSTALLATION DETAILS**

**Power supply** - 24Vac  
**International pressure rating** - PN 22

	Size	Type	Flow	Cv <sub>s</sub> Bypass	Temperature limits	Max internal pressure (kPa)	
<b>2-port</b> BSP (male), parallel fitting	1/2"	VEU 4414	0.63	-	2...120°C	2200	
	1/2"	VEU 4415	1.0	-			
	1/2"	VEU 4416	1.6	-			
	3/4"	VEU 4626	4.0	-			
<b>3-port</b> BSP (male), parallel fitting	1/2"	MEU 4422	0.63	-	2...120°C	2200	
	1/2"	MEU 4423	1.0	-			
	1/2"	MEU 4425	2.0	-			
	3/4"	MEU 4626	4.0	-			
	3/4"	MEU 4627	6.0	-			
	<b>4-port</b> BSP (male), parallel fitting	1/2"	FEU 6414	0.63	0.5	2...120°C	2200
		1/2"	FEU 6415	1.0	0.7		
1/2"		FEU 6416	2.0	1.4			
15mm		FEU 6451	0.63	0.5			
	15mm	FEU 6452	1.0	0.7			
	15mm	FEU 6454	2.0	1.4			
	3/4"	FEU 5626	4.0	2.8			
	3/4"	FEU 5627	5.6	4.0			

Data Sheet 4.101

(fittings not provided)



**ZVX**  
2 and 3-port Zone Valves

The ZVX 2-port Flow Control and 3-port Diverter Valves are for the regulation of low pressure heating and chilled water circuits where on/off control is required.

**FEATURES**

- Complete compact unit; no site assembly required
- Two-wire control with positive spring return

**INSTALLATION DETAILS**

**Valve type** - Paddle  
**Power supply** - 230Vac, 50Hz  
**Operation** - 2-port valve: NC, 3-port valve: Port A is NC  
**Pipe connections** - BSP parallel female or compression (includes nuts and olives)

	Size	Type	Cv <sub>s</sub>	Temperature limits	Max differential (kPa)
<b>2-port</b> BSP (female), parallel fitting	1/2"	ZVX 4201	3.2	5...110°C	200
	3/4"	ZVX 4202	4.5		150
	1"	ZVX 4203	5.8		100
<b>3-port</b> BSP (female), parallel fitting	1/2"	ZVX 4301	3.8	5...110°C	200
	3/4"	ZVX 4302	5.8		200
	1"	ZVX 4303	5.8		200
<b>3-port</b> compression fitting	22mm	ZVX 4401	5.8	5...110°C	200

Data Sheet 24.001



**VEX, MEX, FEX, AVX, AVM**  
2, 3 and 4-port Electro-thermic Valves

These valves are designed to control heating/cooling coils in terminal units such as fan coils and reheat coils.

The thermo-electric actuator is suitable for either on/off or pulse width modulation operation.

**FEATURES**

- Small compact valves particularly suitable for mounting in small enclosures
- Fly lead for easy electrical connection

**INSTALLATION DETAILS**

**Power supply** - AVX: 24Vac ±10%. AVM: 230Vac ±10%  
**Thrust** - 110N  
**International pressure rating** - PN16  
**Protection class** - IP 44  
**Operation** - On/off pulse width modulation  
**Associated devices** - AVX - IAC, BAS, Sigma  
 AVM - Thermostats and time clocks

	Size	Type	Cv <sub>s</sub>	Temp. limits	Mode	Max. diff. pressure (bar) AVX 7201 AVM 7301 (NO)	Max. diff. pressure (bar) AVX 7351 AVM 7351 (NC)
<b>2-port</b> BSP (male)	1/2"	VEX 7201	0.2-1.9	4...100°C	-	7	7
<b>3-port</b> BSP (male)	1/2"	MEX 7301	1.7	4...100°C	Mix	2.5	2.5
					Divert	3	7
<b>4-port</b> BSP (male)	1/2"	FEX 7401	1.7	4...100°C	Mix	2.5	2.5
					Divert	3	7

Data Sheet 24.020

(fittings not provided)

2-port Valves



VZX  
2-port Seat Valves

These seat valves are of 'Globe' construction with a linear moving spindle and equal percentage characterised plug which closes against the seat when the spindle is lifted.

The valves are suitable for the control of hot or chilled water and brine or glycol solutions within their limits – see data sheet. They are suitable for operation by the AVUX, AVUM and AVUE actuators only.

INSTALLATION DETAILS

**Pipe connections** - Screwed BSP to BS 21 female – taper  
Screwed BSP to BS21 female - parallel  
**Characteristic** - Equal percentage  
**Rangeability** - 50:1  
**International pressure rating** - PN16

	Size	Type	Cv <sub>s</sub>	Stroke	Max Δp pressure (kPa)	Temperature limits
VZX Screwed, bronze	1/2"	VZX 4404	2	12.7mm	1180	2...120°C
	3/4"	VZX 4451	4		720	
	1"	VZX 4501	8		340	
	1 1/4"	VZX 4551	12		200	
	1 1/2"	VZX 4601	20		120	
	2"	VZX 4651	32		60	

Data Sheet 4.401

ACCESSORY

626-9-204 Replacement Gland Kit



VZ, VZF, VSF  
2-port Seat Valves

These seat valves are of 'Globe' construction with a linear moving spindle and equal percentage characterised plug which closes against the seat when the spindle is lifted. They are suitable for the control of hot or chilled water, steam, brine or glycol solutions within their limitations – see data sheet.

INSTALLATION DETAILS

**Pipe connections** - Screwed BSP to BS 21 female - taper  
Screwed BSP to BS 21 female - parallel  
Flanged BS 4504 16/11 = DIN 2533 ND 16  
Face to Face dimension to DIN 3300  
**International pressure rating** - PN16

ACCESSORIES

Replacement Gland Kits  
626-9-203 VZ, VSF 15, 20 & 25mm  
667-9-201 VSF 32...50mm  
626-9-311 VZF  
**Spring Accessory Kit 823-2-801** - Available for use in conjunction with ALM 1601, ALX 1201, ALE 1302, to increase maximum differential pressure.

	Size	Type	Cv <sub>s</sub>	Stroke	Max Δp pressure (kPa)	Temperature limits (max internal pressure kPa)	Spring access. kit
VZ Screwed bronze	1/2"	VZ 1401	0.2	9.5mm	1600	2...130°C	-
	1/2"	VZ 1402	0.5		1600	at (1500 kPa)	-
	1/2"	VZ 1403	1.0		1600	or 2...120°C	-
	1/2"	VZ 1404	2.0		1600	at (1600 kPa)	-
	3/4"	VZ 1451	4.0		1600		-
	1"	VZ 2501	8	15.9mm	970	2...200°C	823-2-801
	1 1/4"	VZ 2551	12		580	at (1300 kPa)	"
	1 1/2"	VZ 2601	20		410	or 2...120°C	"
	2"	VZ 2651	32		240	at (1600 kPa)	"
VSF Flanged SG iron	15mm	VSF 2426	0.63	9.5mm	1600	"	-
	15mm	VSF 2427	1.0		1600		-
	15mm	VSF 2428	1.6		1600		-
	15mm	VSF 2429	2.5		1600		-
	15mm	VSF 2430	4.0		1600		-
VSF Flanged cast iron	20mm	VSF 1476	6.3	15.9mm	1600	"	-
	25mm	VSF 1526	10		1170		823-2-801
	32mm	VSF 1576	16	24.5mm	640	"	823-2-801
	40mm	VSF 1626	25		400		"
	50mm	VSF 1676	40		240		"
VZF Flanged cast iron	65mm	VZF 1727	63	25.4mm	140	"	-
	80mm	VZF 1777	80		100		-
	100mm	VZF 1852	125		50		-
	125mm	VZF 1902	200	38mm	28	"	-
	150mm	VZF 1954	315		18		-

Data Sheet 4.410

3-port Valves



MB, MBF, MBX  
3-port Rotary Valves

These 3-port Rotary-shoe Type Valves are characterised for use as mixing or diverting, with hot or chilled water, in heating, ventilating and air conditioning applications.

INSTALLATION DETAILS

**Pipe connections** - Screwed parallel (female) BSP to BS 21  
Flanged BS 4504, Table 6/11  
**International pressure rating** - MB: PN10, MBF: PN6

ACCESSORIES

Reconditioning Kits  
617-9-410 MB 1/2...1" 618-9-510 MBF 65mm  
617-9-411 MB 1 1/4" 618-9-511 MBF 80mm  
617-9-412 MB 1 1/2" 618-9-512 MBF 100mm  
617-9-413 MB 2"

	Size	Type	Cv <sub>s</sub>	Max internal pressure (kPa)	Temperature limits (kPa)
MB Screwed BSP parallel female	1/2"	MB 1402	1.8	1000	2...120°C
	3/4"	MB 1452	4.0		
	1"	MB 1502	8.0		
	1 1/4"	MB 1552	12.0		
	1 1/2"	MB 1602	20.0		
	2"	MB 1652	32.0		
MBF Flanged	65mm	MBF 4732	63	600	2...120°C
	80mm	MBF 4782	80		
	100mm	MBF 4857	120		
MBX Screwed BSP parallel female	1/2"	MBX 4401	1.8	1000	2...110°C
	3/4"	MBX 4451	4.0		
	1"	MBX 4501	8.0		
	1 1/4"	MBX 4551	12.0		
	1 1/2"	MBX 4601	20.0		
	2"	MBX 4651	32.0		

Data Sheet 4.501 & 4.502



MZX  
3-port Seat Valves

These 'Globe' construction valves are suitable for the control of hot or chilled water and brine or glycol solutions within their limits - see DS 4.601. They are suitable for operation by the AVUM, AVUX and AVUE actuators only.

INSTALLATION DETAILS

**Pipe connections** - Screwed BSP to BS 21 female - taper  
Screwed BSP to BS 21 female - parallel  
**Control medium** - Brine, 15% max. NaCl or CaCl<sub>2</sub> (freeze protection), Glycol solution, 25% max. (freeze protection)  
**International pressure rating** - PN16

ACCESSORY

626-9-204 Replacement Gland Kit

	Size	Type	Cv <sub>s</sub>	Stroke	Max Δp pressure (kPa)	Max internal pressure (kPa)	Temp. limits
MZX Screwed BSP bronze	1/2"	MZX 4402	2.5	12.7mm	1180	1600	2...120°C
	3/4"	MZX 4452	4		720		
	1"	MZX 4501	8		340		
	1 1/4"	MZX 4551	12		200		
	1 1/2"	MZX 4601	20		120		
	2"	MZX 4651	32		60		

Data Sheet 4.601

3-port Valves (cont)



MZ, MZF, MJF  
3-port Seat Valves

These 'Globe' construction Seat Valves are suitable for the control of hot or chilled water and brine or glycol solutions within the limits below.

INSTALLATION DETAILS

**Pipe connections** - Screwed BSP to BS 21 female - taper  
Screwed BSP to BS 21 female - parallel  
Flanged BS 4504 16/11 = DIN 2533 ND 16  
**Control medium** - Brine, 15% max. NaCl or CaCl<sub>2</sub> (freeze protection), Glycol solution, 25% max. (freeze protection)  
**International pressure rating** - PN16

ACCESSORIES

Replacement Gland Kits  
626-9-203 MZ, MJF  
626-9-311 MZF

	Size	Type	Cv <sub>s</sub>	Stroke	Max Δp pressure (kPa)	Temperature limits (max internal pressure kPa)
MZ Screwed bronze	1/2"	MZ 3402	2.5	9.5mm	1600	2...200°C
	3/4"	MZ 3452	4		1600	at (1300 kPa)
	1"	MZ 3501	8	15.9mm	970	or 2...120°C
	1 1/4"	MZ 3551	12		580	at (1600 kPa)
	1 1/2"	MZ 3601	20		410	
	2"	MZ 3651	32		240	
MJF Flanged cast iron	15mm	MJF 3426	1.0	9.5mm	1600	2...200°C
	15mm	MJF 3427	4.0		1600	at (1300 kPa)
	20mm	MJF 3476	6.3	15.9mm	1300	or 2...120°C
	25mm	MJF 3526	10		850	at (1600 kPa)
	32mm	MJF 3576	16	24.5mm	550	
	40mm	MJF 3626	25		350	
	50mm	MJF 3676	40		220	
MZF Flanged cast iron	65mm	MZF 3729	63	25.4mm	140	2...200°C
	80mm	MZF 3779	80		100	at (1300 kPa)
	100mm	MZF 3854	125		50	or 2...120°C
	125mm	MZF 3904	200	38mm	28	at (1600 kPa)
	150mm	MZF 3958	315		18	

Data Sheet 4.610

Satchwell Actuators to Satchwell Valves and Dampers

LK 2701, 2702, 2703, 2408, 2407

RM, XRM, ARM, ARX, ARE Actuators to ...

Valve type	Suitable actuators	Linkage kit	Comprises
MB Valves 1/2" ... 2"	RM, XRM	None require	-
	ARM 2657 ARX 2253 ARE 2354	LK 2702 (826-2-702)	Bracket 2 x screws Output shaft adapter
	MBF Valves 65...100mm	LK 2701 (826-2-701)	Bracket Actuator crank with pin Valve crank with slot and manual override lever
	VV Valves 2...4"	ARM 2607 ARX 2203 ARE 2304	LK 2703 (826-2-703) Bracket, linkage, screws and spring

Data sheet 5.001

Valve type	Suitable actuators	Linkage kit	Comprises
Dampers	ARM 2607 ARX 2203 ARE 2304 ARM 2657 ARX 2253 ARE 2354	LK 2407 (866-2-407)	Bracket Output shaft Adjustable crank Universal coupling Universal coupling for damper
	ARM 2607 ARX 2203 ARE 2304 ARM 2657 ARX 2253 ARE 2354	LK 2408 (866-2-408)	Anti-rotation bracket Stroke limiter

Data sheet 5.001

Satchwell Actuators to Third Party Valves

LNK LS01  
LNK HW01  
LNK FS01  
LNK FS02  
LNK HY01  
LNK HY02  
LNK IN01

ALX, ALE, ALM, Ali Actuators\* to ...

Valve type	Linkage kit	Comprises
Landis & Staefa VVF and VXF 20mm valve stroke	LNK LS01	-
Honeywell V5011A 20mm valve stroke	LNK HW01	-
Fisher Y body 3/4"...1 1/2", A body 1 1/2" Y body 2"...3", A body 2"...4"	LNK FS01 LNK FS02	- -
Hymatic 1700 3/4"...1 1/2", 1450 1 1/4", 1400R 1 1/2" 1400R 2"...3", 1700 2"...3"	LNK HY01 LNK HY02	- -
Siebe VB valves up to 2"	LNK IN01	-

Data sheet 3.601

\* Not ALX 1251 and ALE 1352

Transformers



230Vac/24Vac  
Isolating  
Transformers

If mains voltage electricity supply is available locally, e.g. at a fan coil unit, it is convenient to use one transformer for each control system. If mains supply is not available locally it may be more convenient to use a larger central transformer.

Two fly leads are provided for the primary and secondary electrical connections, for ease of installation.

These transformers conform to EN 60742.

	Code	Size	INSTALLATION DETAILS
TR1	871-1-201	25VA	<b>Primary</b> - 230V, 50/60 Hz <b>Secondary</b> - 24V r.m.s. <b>Electrical connections</b> - 3-core input (fly lead) cable, 0.5m long 2-core output (fly lead) cable, 0.5m long
TR2	871-1-202	50VA	
TR3	871-1-203	80VA	
TR4	871-1-204	200VA	
TR5	871-1-205	300VA	

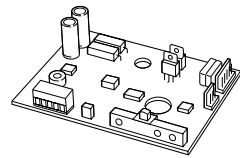
Data Sheet 25.001

Spares

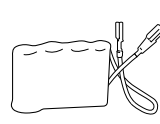
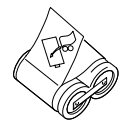
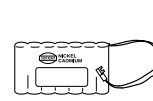
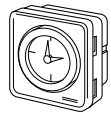
Actuators

PCB Board

Model	Description	Part number	Data sheet
ALE	Circuit board	477-9-241	3.401
ALES	"	477-9-241	3.501



Controllers



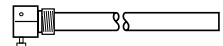
Clocks

Model	Description	Part number	Data sheet
CSC	Analogue T/S	561-9-260	2.021
SVT	"	561-9-260	2.001
CSC	Digital T/S	561-9-261	2.021
SVT	"	561-9-261	2.001

Batteries

Model	Description	Part number	Data sheet
CMC 1	-	561-9-220	-
CMC 3	---	563-9-231	-
CSMC 3	---	563-9-231	-
MMC 2	---	563-9-231	-
MMC 3	---	563-9-231	-
SMT	-	563-9-231	-
SVT	-	588-9-210	2.001

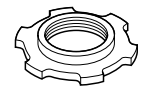
Sensors



Pockets

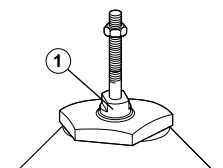
Model	Description	Part number	Data sheet
(T) Range	125mm immersion	851-2-401	-

Valves



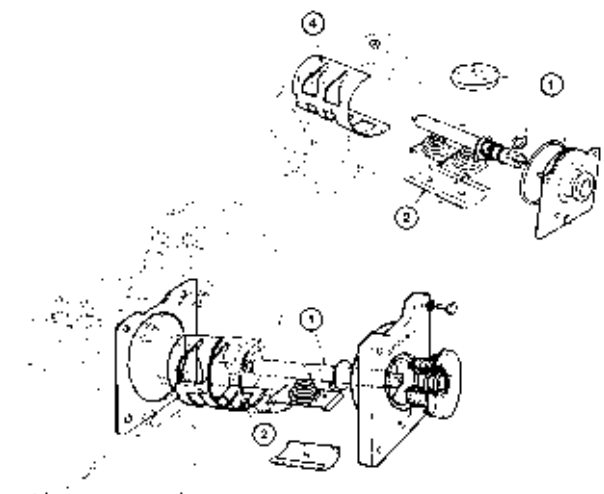
Lug Nuts

Description	Part number	Data sheet
1/2" ... 2" valves	626-9-313	-
2 1/2" ... 6" valves	626-9-312	-



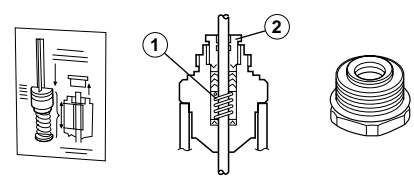
Replacement Gland Nut and Tube of Grease Kits

Model	Description	Part number	Data sheet	General notes
MEU	-	623-9-201	4.101	
MJF	-	626-9-203	4.610	
MZ	1/2" ... 2" valves	626-9-203	"	- series 3 valves
FEU	-	623-9-201	4.101	
VEU	-	623-9-201	"	
VJF	-	626-9-203	4.610	
VSF	15...25mm	626-9-203	4.110	
VZ	1/2" ... 2" valves	626-9-203	4.110	- series 1 & 2 valves
MZX	1/2" ... 2" valves	626-9-204	4.601	
VZX	1/2" ... 2" valves	626-9-204	4.101	



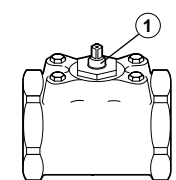
Reconditioning Kits

Model	Description	Part number	Data sheet
MB	1/2" ... 1" valves	617-9-410	4.501
	1 1/4" valves	617-9-411	"
	1 1/2" valves	617-9-412	"
	2" valves	617-9-413	"
MBF	65mm valves	618-9-510	4.501
	80mm valves	618-9-511	"
	100mm valves	618-9-512	"



Replacement Gland Assembly, Gland Nut and Tube of Grease Kits

Model	Description	Part number	Data sheet	General notes
MZ	1/2" ... 2" valves	626-9-310	4.610	- series 1 valves
MZF	65...150mm	626-9-311	"	
VSF	32...50mm	667-9-201	"	
VZ	1" ... 2" valves	626-9-310	4.110	- series 1 valves
VZF	65...150mm	626-9-311	"	- series 1 valves



Reconditioning Kit

Model	Description	Part number	Data sheet
VV	2" ... 4" valves	618-9-210	-

CSC Controller

Adjustable scale Location	DRT 3451	DRT 3453	DWT 0001	DWT 0002	DST 0001	DOT 0002		
	exp. room	none room	none imm.	none imm.	none clamp	none outs.		
Spec. no.								
Control								
Output								
<b>Compensators</b>								
CSC 5252	None	230V or 24Vac	•	•	•	•	•	
CSC 5352	Digital		•	•	•	•		
Data sheet DS 2.021								
Product Selection - page no.	39	39	42	42	42	43		

SVT Controllers

Adjustable scale Location	DR 3253	DRT 3453	DWT 0001	DWT 0002	DST 0001	DOT 0002	DOS 0001	RPW 4425
	none room	none room	none imm.	none imm.	none clamp	none outs.	none outs.	exp. room
Spec. no.								
Control								
Output								
<b>Optimisers</b>								
SVT 4201	Analogue	230V on/off	• (included)					
SVT 4251	Digital		• (included)					
Product Selection - page no.	39	39	42	42	42	43	43	43

CXT, CZT, CXR Controllers

Adjustable scale Location	DRT 3451	DRT 3453	DRT 3651	DDT 0001	DWT 0001	DWT 0002	DST 0001	RPW 4425
	exp. room	none room	exp. room	none duct	none imm.	none imm.	none clamp	exp. room
Spec. no.								
Control								
Output								
<b>Climatronic</b>								
CXT 5605	-10...120°C	24V modulating		•	•	•	•	
<b>CZT</b>								
CZT 5305	-10...120°C	0...10Vdc	•	•	•	•	•	
<b>CXR</b>								
CXR 5805	-10...120°C	24V modulating	•	•	•	•	•	
Data sheet DS 2.101, 2.105, 2.110								
Product Selection - page no.	39	39	39	41	42	42	42	43

KMC Controller

Adjustable scale Location	DRT 3453	DRT 3451	DDT 0001	DWT 0001	DST 0001	DOT 0002	DRTH	DDTH	RPW 4425
	none room	exp. room	none duct	none imm.	none clamp	none outs.	none room	none duct	exp. room
Spec. no.									
Control									
Output									
<b>Keyboard</b>									
KMC 3201	-40...150°C	0...10Vdc or 0...100% rh	•	•	•	•	•	•	•
Data sheet DS 2.101, 2.105, 2.110									
Product Selection - page no.	39	39	41	42	42	43	40	41	43

URC, BRC Controller

Adjustable scale Location	DU	DUS	MN-S 1-5	DDU 0001	DDT 0001				
	none room	exp. room	note 1 room	none duct	none duct				
Spec. no.									
Control									
Output									
<b>UniFact Pro</b>									
URC-41	•	•	•	•	•				
URC-51	•	•	•	•	•				
<b>Bonsai</b>									
BRC-41 (Pro)	•	•	•	•	•				
BRC-51 (Lite)	•	•	•	•	•				
Data sheet DS 10.130 & 4.103									
Product Selection - page no.	40	40	33	41	41				

Note 1: MN-S1 is not adjustable, MN-S2/3/4/5 are adjustable

MMC Controllers

Adjustable scale Location	DRT 3453	DRT 3651	DDT 0001	DWT 0001	DST 0001	DOT, DOS	DOW 2701	RPW 4425
	none room	exp. room	none duct	none imm.	none clamp	none outs.	none outs.	exp. room
Spec. no.								
Control								
Output								
<b>District Heating Controller</b>								
MMC 4601	-40...150°C	0...10Vdc		•	•	•	•	•
<b>Micro Management Controller with built-in time schedules</b>								
MMC 4701	-40...150°C	Pulsed 24V or 0...10Vdc	•	•	•	•	•	•
Data sheet DS 2.751, 2.701								
Product Selection - page no.	39	39	41	42	42	43	43	43

Adjustable scale Location	DRTH	DDTH	RPW 4425		
	none room	none duct	exp. room		
Spec. no.					
Control					
Output					
<b>Micro Management Controller with built-in time schedules</b>					
MMC 4701	20...90%rh	Pulsed 24V or 0...10Vdc	•	•	•
Data sheet DS 2.701					
Product Selection - page no.	40	41	43		

CZU Controller

Adjustable scale Location	DRT 3451	DRT 3453	DRT 3801	DRT 3851	DDT 0001	DDU 0001	DDU 1803
	exp. room	none room	exp. room	exp. room	none duct	none duct	none duct
Spec. no.							
Control							
Output							
<b>Zonemaster</b>							
CZU 4201	10...40°C	24V	•	•	•	•	•
Data sheet DS 2.201							
Product Selection - page no.	39	39	40	40	41	41	41

MN Controllers (LonMARK®)

Adjustable scale Location	DRT 3453	DRT 3651/2	DU 4301	MN-S 1-5	DWT 0001/2	DST 0001	DDU 0001	DOT, DOS	DOW 2701	DRH	DDH
	none room	yes room	none room	note 1 room	none imm.	none clamp	none duct	none outs.	none outs.	none room	none duct
Spec. no.											
Control											
Output											
<b>MN 11/13</b>											
MN 50	•	•	•	•	•	•	•	•	•	•	•
MN 100	•	•	•	•	•	•	•	•	•	•	•
MN 150	•	•	•	•	•	•	•	•	•	•	•
MN 200	•	•	•	•	•	•	•	•	•	•	•
MN VAV	•	•	•	•	•	•	•	•	•	•	•
Product Selection - page no.	39	39	40	33	42	42	43	43	43	40	41

Note 1: MN-S1 is not adjustable, MN-S2/3/4/5 are adjustable

MN Controllers (Bus-du-jour®)

Adjustable scale Location	DRT 3453	DRT 3651/2	DU DUS	MN-S 1-5	DWT 0001/2	DST 0001	DDU 0001	DOT, DOS	DOW 2701	RPW 4425	DRH	DDH
	none room	yes room	note 1 room	note 2 room	none imm.	none clamp	none duct	none outs.	none outs.	exp. room	none room	none duct
Spec. no.												
Control												
Output												
<b>MN 300</b>												
MN 440	•	•	•	•	•	•	•	•	•	•	•	•
MN 500	•	•	•	•	•	•	•	•	•	•	•	•
MN 620	•	•	•	•	•	•	•	•	•	•	•	•
Product Selection - page no.	39	39	4									

MB, MBF Valves with linkage kits

	RM 3601	XRM 3201	ARM 2607	ARX 2203	ARE 2304	ARM 2657	ARX 2253	ARE 2354
Input Control Signal	230V	24V	230V	24V	0...10V adj span 24V	230V	24V	0...10V
Types	std	std	short	std	short	s.fast*	s.fast*	spring return
Force (N)	538	538	311	538	511	700	700	311
Size	Spec. no.	Cv <sub>s</sub>						
1/2"	MB 1402	1.8	•	•	•	•	•	•
3/4"	MB 1452	4	•	•	•	•	•	•
1"	MB 1502	8	•	•	•	•	•	•
1 1/4"	MB 1552	12	•	•	•	•	•	•
1 1/2"	MB 1602	20	•	•	•	•	•	•
2"	MB 1652	32	•	•	•	•	•	•
<b>MBF</b> Flanged, table 6/11, BS 4504, rotary shoe (2...120°C max water)								
65mm	MBF 4732	63	X	X	•	•	X	X
80mm	MBF 4782	80	X	X	•	•	X	X
100mm	MBF 4857	120	X	X	•	•	X	X
<b>MBX</b> Screwed, BSP parallel, female, rotary shoe (2...110°C max water)								
1/2"	MBX 1401	1.8	•	•	•	•	•	•
3/4"	MBX 1451	4	•	•	•	•	•	•
1"	MBX 1501	8	•	•	•	•	•	•
1 1/4"	MBX 1551	12	•	•	•	•	•	•
1 1/2"	MBX 1601	20	•	•	•	•	•	•
2"	MBX 1651	32	•	•	•	•	•	•
Product Selection - page no.	47	47	47	47	47	47	47	47

• Direct coupling X NOT compatible

MZ, MZF Valves

	ALM 1601	ALX 1201	ALX 1251	ALE 1302	ALE 1352	ALI 1576	ALI 1676	ALMS 1601/1651	ALXS 1201/1251	ALES 1302/1352
Input Control Signal	230V	24V	24V	0.10V	0.10V	0.10V	0.10V	230V	24V	0.10V
Types	std	std	short	std	short	s.fast*	s.fast*	spring return	spring return	spring return
Force (N)	538	538	311	538	511	700	700	311	311	311
Size	Spec. no.	Cv <sub>s</sub>								
1/2"	MZ 3402	2.5	•	•	•	•	•	•	•	•
3/4"	MZ 3452	4	•	•	•	•	•	•	•	•
1"	MZ 3501	8	•	•	•	•	•	•	•	•
1 1/4"	MZ 3551	12	•	•	•	•	•	•	•	•
1 1/2"	MZ 3601	20	•	•	•	•	•	•	•	•
2"	MZ 3651	32	•	•	•	•	•	•	•	•
<b>MZF</b> Flanged, table 16/11, BS 4504, cast iron globe construction, linear movement (2...200°C max water)										
65mm	MZF 3729	63	•	X	•	X	•	•	•	•
80mm	MZF 3779	80	•	X	•	X	•	•	•	•
100mm	MZF 3854	125	•	X	•	X	•	•	•	•
125mm	MZF 3904	200	•	X	•	X	X	X	X	X
150mm	MZF 3958	315	•	X	•	X	X	X	X	X
Product Selection - page no.	48	48	48	48	48	48	48	48	48	48

• Direct coupling X NOT compatible \* Self stroking, superfast/low hysteresis

VSF, MJF Valves

	ALM 1601	ALX 1201	ALX 1251	ALE 1302	ALE 1352	ALI 1576	ALI 1676	ALMS 1601/1651	ALXS 1201/1251	ALES 1302/1352
Input Control Signal	230V	24V	24V	0-10V	0-10V	0-10V	0-10V	230V	24V	0-10V
Types	std	std	short	std	short	s.fast*	s.fast*	spring return	spring return	spring return
Force (N)	538	538	311	538	511	700	700	311	311	311
Size	Spec. no.	Cv <sub>s</sub>								
15mm	VSF 2426	0.63	•	•	•	•	•	•	•	•
15mm	VSF 2427	1	•	•	•	•	•	•	•	•
15mm	VSF 2428	1.6	•	•	•	•	•	•	•	•
15mm	VSF 2429	2.5	•	•	•	•	•	•	•	•
15mm	VSF 2430	4	•	•	•	•	•	•	•	•
20mm	VSF 1476	6.3	•	•	•	•	•	•	•	•
25mm	VSF 1526	10	•	•	•	•	•	•	•	•
32mm	VSF 1576	16	•	•	•	•	•	•	•	•
40mm	VSF 1626	25	•	•	•	•	•	•	•	•
50mm	VSF 1676	40	•	•	•	•	•	•	•	•
<b>MJF</b> Flanged, table 16/11, BS 4504, cast iron globe construction, linear movement (2...200°C max water)										
15mm	MJF 3426	2.5	•	•	•	•	•	•	•	•
15mm	MJF 3427	4	•	•	•	•	•	•	•	•
20mm	MJF 3476	6.3	•	•	•	•	•	•	•	•
25mm	MJF 3526	10	•	•	•	•	•	•	•	•
32mm	MJF 3576	16	•	X	•	X	•	•	•	•
40mm	MJF 3626	25	•	X	•	X	•	•	•	•
50mm	MJF 3676	40	•	X	•	X	•	•	•	•
Product Selection - page no.	48	48	48	48	48	48	48	48	48	48

• Direct coupling X NOT compatible \* Self stroking, superfast/low hysteresis

VZ, VZF Valves

	ALM 1601	ALX 1201	ALX 1251	ALE 1302	ALE 1352	ALI 1576	ALI 1676	ALMS 1601/1651	ALXS 1201/1251	ALES 1302/1352
Input Control Signal	230V	24V	24V	0.10V	0.10V	0.10V	0.10V	230V	24V	0.10V
Types	std	std	short	std	short	s.fast*	s.fast*	spring return	spring return	spring return
Force (N)	538	538	311	538	511	700	700	311	311	311
Size	Spec. no.	Cv <sub>s</sub>								
1/2"	VZ 1401	0.2	•	•	•	•	•	•	•	•
1/2"	VZ 1402	0.5	•	•	•	•	•	•	•	•
1/2"	VZ 1403	1	•	•	•	•	•	•	•	•
1/2"	VZ 1404	2	•	•	•	•	•	•	•	•
3/4"	VZ 1451	4	•	•	•	•	•	•	•	•
<b>VZF</b> Screwed, bronze, hot/chilled water, globe construction, linear movement (2...120°C max water)										
65mm	VZF 1727	63	•	•	X	•	X	•	•	•
80mm	VZF 1777	80	•	•	X	•	X	•	•	•
100mm	VZF 1852	125	•	•	X	•	X	•	•	•
125mm	VZF 1902	200	•	•	X	•	X	X	X	X
150mm	VZF 1954	315	•	•	X	•	X	X	X	X
Product Selection - page no.	48	48	48	48	48	48	48	48	48	48

• Direct coupling X NOT compatible \* Self stroking, superfast/low hysteresis

MZX, VZX Valves

	AVUX 4202	AVUM 4601	AVUE 4304	AVUE 4354
Input Control Signal	24V	230V	0...10V DA	0...10V RA
Types	-	-	-	-
Force (N)	220	220	220	220
Size	Spec. no.	Cv <sub>s</sub>		
1/2"	MZX 4402	2.5	•	•
3/4"	MZX 4452	4	•	•
1"	MZX 4501	8	•	•
1 1/4"	MZX 4551	12	•	•
1 1/2"	MZX 4601	20	•	•
2"	MZX 4651	32	•	•
<b>VZX</b> Screwed BSP, bronze globe construction, linear movement (2...120°C max water)				
1/2"	VZX 4404	2	•	•
3/4"	VZX 4451	4	•	•
1"	VZX 4501	8	•	•
1 1/4"	VZX 4551	12	•	•
1 1/2"	VZX 4601	20	•	•
2"	VZX 4651	32	•	•
Product Selection - page no.	46	46	46	46

• Direct coupling X NOT compatible

VEU, MEU, FEU Valves

	AVU 2201	AVUX 3202	AVUM 3601	AVUE 3304	AVUE 3354	AVE 0001	AVE 0002
Input Control Signal	24V	24V	230V	0.10V DA	0.10V RA	0.10V DA	0.10V RA
Types	-	-	-	-	-	-	-
Force (N)	105	220	220	220	220	105	105
Size	Spec. no.	Cv <sub>s</sub>					
<b>VEU</b> 2-port unit valves (2...120°C max water)							
1/2"	VEU 4414	0.63	•	•	•	•	•
1/2"	VEU 4415	1	•	•	•	•	•
1/2"	VEU 4416	1.6	•	•	•	•	•
3/4"	VEU 4626	4	•	•	•	•	•
<b>MEU</b> 3-port unit valves (2...120°C max water)							
1/2"	MEU 4422	0.63	•	•	•	•	•
1/2"	MEU 4423	1	•	•	•	•	•
1/2"	MEU 4425	2	•	•	•	•	•
3/4"	MEU 4426	4	•	•	•	•	•
3/4"	MEU 4427	6	•	•	•	•	•
<b>FEU</b> 4-port unit valves (2...120°C max water)							
1/2"	FEU 6414	0.63	•	•	•	•	•
1/2"	FEU 6415	1	•	•	•	•	•
1/2"	FEU 6416	2	•	•	•	•	•
3/4"	FEU 5626	4	•	•	•	•	•
3/4"	FEU 5627	5.6	•	•	•	•	•
15mm	FEU 6451	0.63	•	•	•	•	•
15mm	FEU 6452	1	•	•	•	•	•
15mm	FEU 6454	2	•	•	•	•	•
Product Selection - page no.	46	46	46	46	46	46	46

• Direct coupling X NOT compatible

Humidity & Temperature Controllers

Item	Spec. no.	Current Equipment	Notes	Remarks
Duotronic EC	EC1-2 to EC26-2	•		No single direct replacement for these controls however a combination of keyboard or climatronic may be suitable.
Duotronic E	576-2-201 to 576-2-458	•		
Duotronic 565				Refer to Satchwell with full specification of obsolete control and temperature range controller or contact your local sales engineer.
SET	565-1-404 to 565-1-455	•		
SEH	565-1-501	•		
SETH	565-1-601 to 565-1-610	•		

Humidity Controllers

Item	Spec. no.	Range	Current Equipment	Notes	Remarks
Monotronic ZH	574-2-701	45...65% rh	•		Detectors/sensors to be changed
Climatronic CZH	562-3-501	30...55% rh	•		
	562-3-502	45...70% rh	•		
Keyboard					KZH and KMC terminals are different
KZH 4551	20...80% rh	•			
MMC 2401	20...90% rh	•			
MMC 2402	20...90% rh	•			
MMC 2403	20...90% rh	•			
MMC 2451	20...90% rh	•			
MMC 2452	20...90% rh	•			

Temperature Controllers

Item/Spec. no.	Range	Current Equipment					Notes	Remarks
		CXR 5805	CXT 5605	CZT 5305	KMC 3201	MMC 4701		
<b>Intronic X</b>								
575-1-201	6...40°C	●					Detectors/sensors to be replaced	Actuators must be replaced with a 0...10V type when used with CZT/KMC or multi-stage MMC's.
575-1-202	40...110°C							
<b>Monotronic</b>								
574-2-551	6...40°C		●	●				
574-2-552	20...95°C		●	●				
574-2-553	45...125°C		●	●				
<b>Climatronic CXT</b>								
562-3-601	-5...40°C	●					CXT 5605 can use existing sensors	
562-3-602	20...70°C							
562-3-603	35...120°C							
562-3-604	35...120°C							
562-4-601	0...50°C	●						
562-4-604	30...120°C	●						
<b>Climatronic AXT Controller-motor</b>								
566-1-601	5...40°C	●					Detectors/sensors to be changed if MMC, KMC is being installed	These controls are controller/actuator combined therefore a replacement actuator will be required.
566-1-602	20...65°C							
566-1-603	35...120°C							
566-1-651	5...40°C	●						
<b>Climatronic AZT Controller-motor</b>								
566-1-301	-5...40°C		●	●	●			
566-1-302	-5...40°C		●	●	●			
566-1-303	35...120°C		●	●	●			
566-1-351	-5...40°C		●	●	●			
566-1-352	-5...40°C		●	●	●			
<b>Climatronic CZT</b>								
562-3-301	-5...40°C		●	●	●		CZT 5305 can use existing sensors	
562-3-302	-5...40°C		●	●	●			
562-3-303	35...120°C		●	●	●			
562-4-302	-5...40°C		●	●	●			
562-4-303	30...120°C		●	●	●			
<b>CD</b>								
567-2-401			●				ARE actuator + linkage kit	
<b>Climatronic AZT Controller-motor</b>								
566-3-001	10...35°C		●	●	●		Detectors/sensors to be changed if MMC, KMC is being installed.	Controller/actuator combined therefore actuator to be replaced.
566-3-302	10...35°C		●	●	●			
566-3-304	10...35°C		●	●	●			
566-3-352	10...35°C		●	●	●			
566-3-354	10...35°C		●	●	●			
<b>Controller-actuator AET, AEST</b>								
568-1-201	10...40°C		●	●	●		Detectors/sensors to be changed if adjustable type. Also if MMC, KMC is installed.	Controller/actuator combined therefore actuator to be replaced.
568-1-202	10...40°C		●	●	●			
568-1-301	10...40°C		●	●	●			
568-1-302	10...40°C		●	●	●			
<b>Controller-motor AXR</b>								
566-1-801		●					Detectors/sensors to be changed if MMC being installed.	
<b>Climatronic CXR</b>								
562-1-801		●					CXR 5805 can use existing sensors	
562-2-801		●						
562-3-801		●						
562-4-831	10...40°C	●						
562-4-801	10...40°C	●						
<b>Monotronic Balancing Relay (ZC)</b>								
581-2-201							No equivalent replacement	Change system.
<b>Climatronic AZS Controller-motor</b>								
485-1-201								
<b>Climatronic CZS</b>								
562-3-201								
<b>Keyboard</b>								
CMT 1201	563-1-201		●				MMC 4701 can use existing sensors	Refer to Satchwell or contact your local sales engineer.
FMS 1201	583-1-201		●					
MPD 1801	583-1-801						No equivalent replacements	
COE 1601	583-1-601							
FSS 1001	583-1-001							
FSS 1401	583-1-401							
FSC 1251	583-1-251							
<b>Micro Management</b>								
MMC 2401	-40...140°C		●					
MMC 2402	-40...140°C		●					
MMC 2403	-40...140°C		●					
MMC 2451	-40...150°C		●					
MMC 2452	-40...150°C		●					
MMC 3701	-40...150°C		●					
<b>Keyboard</b>								
KZT 4351	5...50°C		●					
KET 4201	0...10Vdc							
KET 4201	5...50°C		●					
<b>Keyboard</b>								
KET 4201	0...10Vdc							

Product Selection - page no. 35 36 36 36 37

Detectors/sensors

Item/Spec. no.	Range	Stem/pocket	Current Equipment							Notes	Remarks	
			DDH 7XXX 8XXX	DDTH 7XXX 8XXX	DRH 7XXX 8XXX	DRTH 7XXX 8XXX	DDU 1803	DDT 0001	DWT 0001			DWT 0002
<b>Adjustable scale Location</b>												
	none duct											
	none room											
	none room											
<b>Detectors</b>												
<b>Ethors</b>												
331-1-401												
<b>ZHT</b>	331-2-601											
<b>DDH</b>	331-3-702											
331-3-704												
<b>DRH</b>	331-3-601											
331-3-602												
<b>DRH</b>	331-3-401											
<b>DRH</b>	331-4-401											
<b>DRTH</b>	331-7-501											
<b>DRTH</b>	7722											
<b>DRTH</b>	7723											
<b>DDH</b>	331-3-451											
<b>DDH</b>	331-7-451											
<b>DDTH</b>	331-7-551											
<b>DDH</b>	331-3-551											
<b>DO</b>	2202											
<b>DD</b>	1401											
<b>DD</b>	1403											
<b>DD</b>	336-1-204											
<b>DW</b>	1202											
<b>DW</b>	1204											
<b>DWS</b>	339-1-304											
<b>DR</b>	3251											
<b>DR</b>	3252											
<b>DRT</b>	215-1-601											
<b>DDE</b>	331-3-301											
<b>DDTE</b>	1601											
<b>DWTE</b>	1201											
<b>DWTE</b>	1202											
Product Selection - page no. 41 41 40 40												
<b>Adjustable scale Location</b>												
	none duct											
	none imm.											
	none imm.											
	none clamp											
	none outs.											
	none outs.											
<b>Spec. no. Range Stem/pocket</b>												
<b>DDT</b>	1701	-5...+100°C	300mm									
<b>DDU</b>	1801	-5...+40°C	-									
<b>DWT</b>	1701	-10...+120°C	125mm									
<b>DWT</b>	1702	-10...+120°C	200mm									
<b>DWT</b>	1801	-10...+120°C	165mm									
<b>DST</b>	1601	5...120°C	-									
<b>DOT</b>	2301	-40...+40°C	-									
<b>DOT</b>	0001	-40...+55°C	-									
<b>DOS</b>	2501	-	-									
Product Selection - page no. 41 41 42 42 42 43 43												
* note: DWA 0001 is required												
<b>Current Equipment</b>												
<b>Item</b>	<b>Spec. no.</b>	<b>Range</b>										
<b>Regulator Thermostats</b>												
<b>CR</b>												
<b>CRX</b>												
<b>Outside Pilot</b>												
<b>CP</b>												
<b>Detectors</b>												
<b>C7P</b>	326-2-501											
<b>C7W</b>	323-2-501											
<b>CO</b>	327-1-202											
<b>ET</b>	325-1-201											
	325-1-251											
	325-1-301											
<b>ZW</b>	323-2-201											
	323-2-204											
	323-2-207											
<b>ZHO</b>	331-2-701											
<b>EO</b>	326-1-303											
<b>DP</b>	334-1-201											
<b>Limiting Detectors</b>												
<b>LO</b>	137-1-452	5...60°C										
<b>LR</b>	167-1-253	20...90°C										
<b>LZS</b>	315-1-201	10...40°C										

Pressure Sensors

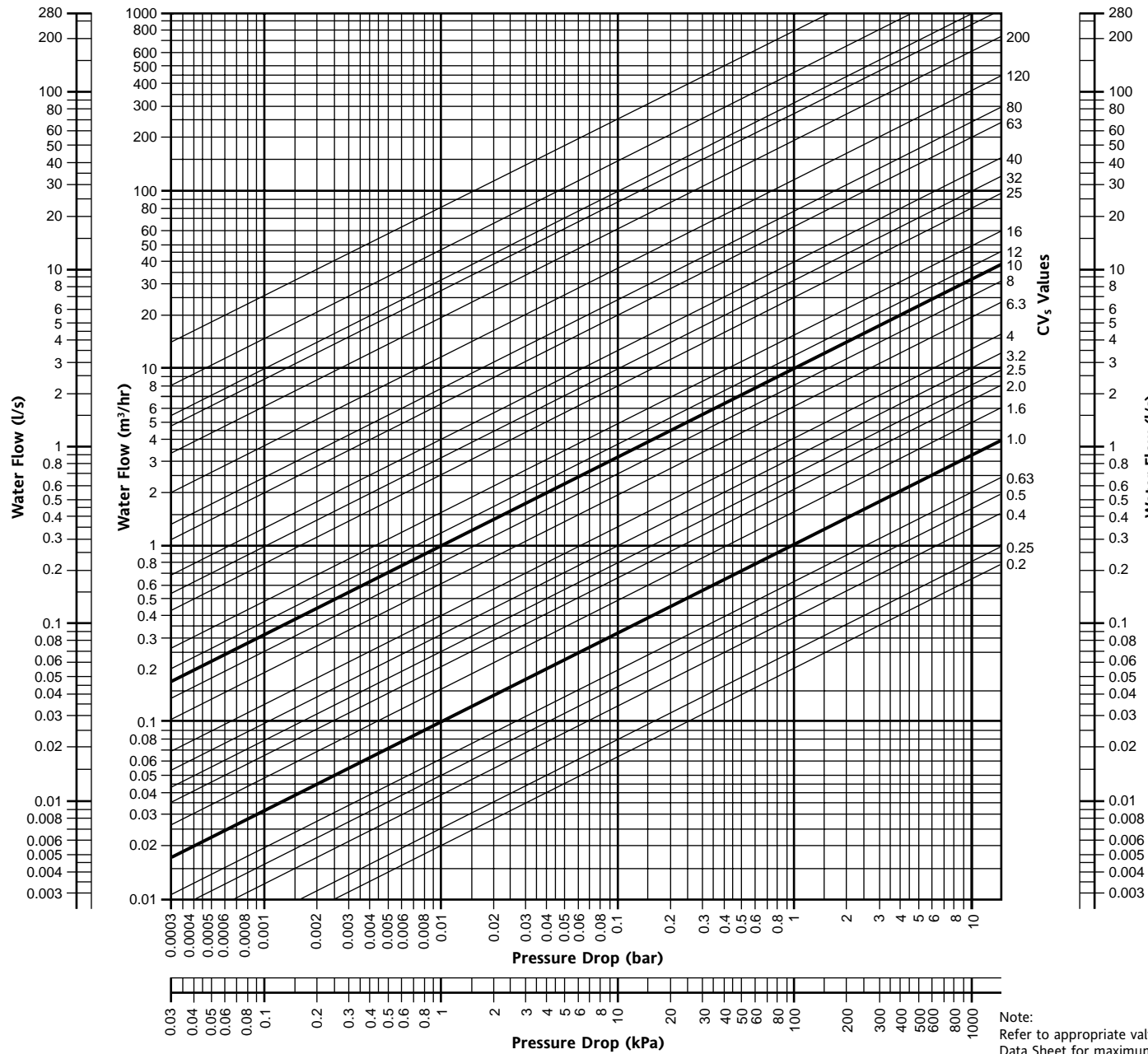
Item/Spec. no.	Range	Current Equipment				Notes	Remarks
		DDP 5601	DDP 5610	DDP 6601	DDP 6610		
<b>LCD display Location</b>							
	no duct						
	no duct						
	yes panel						
	yes panel						



2-Port Valves

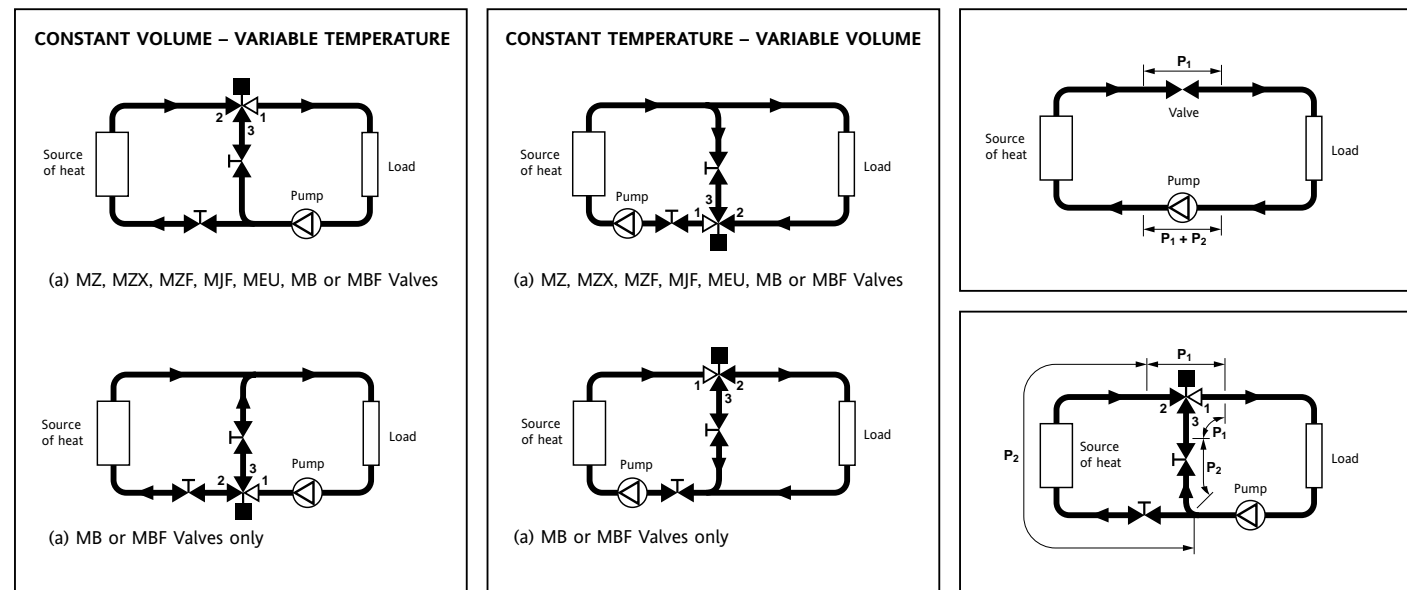
Item	Size	Spec. no.	Cvs	Current Equipment													Notes	Remarks															
				VZ 1401	VZ 1402	VZ 1403	VZ 1404	VZ 1451	VZ 2501	VZ 2551	VZ 2601	VZ 2651	VZF 1727	VZF 1777	VZF 1852	VZF 1902	VZF 1954	VSF 2426	VSF 2427	VSF 2428	VSF 2429	VSF 2430	VSF 1476	VSF 1526	VSF 1576	VSF 1626	VSF 1676						
<b>MA (Steam and high pressure hot water)</b>																																	
	1 1/4"	666-2-577	15																														
	1 1/2"	666-2-627	15																														
	2"	666-2-677	39																														
	2 1/2"	666-2-727	56																														
	3"	666-2-777	100																														
	4"	N/A	150																														
<b>MA (Water)</b>																																	
	1 1/4"	666-2-576	15																														
	1 1/2"	666-2-626	22																														
	2"	666-2-676	39																														
	2 1/2"	666-2-726	56																														
	3"	666-2-776	100																														
	4"	666-2-861	150																														
<b>VM (Steam)</b>																																	
	1/2"	641-1-401	2.7																														
	3/4"	641-1-451	5.6																														
	1"	641-1-501	8.2																														
	1 1/4"	641-1-551	15																														
	1 1/2"	641-1-601	18																														
<b>VM (Water)</b>																																	
	1/2"	641-1-401	2.7																														
	3/4"	641-1-451	5.6																														
	1"	641-1-501	8.2																														
	1 1/4"	641-1-551	15																														
	1 1/2"	641-1-601	18																														
<b>VZ (Screwed, cast iron, globe construction, linear moving spindle. (2 to 130°C max water)</b>																																	
	1"	VZ 2502	8																														
	1 1/4"	VZ 2552	12																														
	1 1/2"	VZ 2602	20																														
	2"	VZ 2652	32																														
<b>VJF (Flanged, cast iron, globe construction, linear moving spindle (steam)</b>																																	
	15mm	644-4-426	0.25																														
	15mm	644-4-427	1																														
	15mm	644-4-428	2.5																														
	15mm	644-4-429	4																														
	20mm	644-4-476	6.3																														
	25mm	644-4-526	10																														
	32mm	644-4-576	16																														
	40mm	644-4-626	25																														
	50mm	644-4-676	40																														
<b>MF (Steam)</b>																																	
	1/8"	633-1-203	0.18																														
	3/16"	633-1-253	0.33																														
	1/4"	633-1-303	0.68																														
	3/8"	633-1-353	1.2																														
	1/2"	633-1-403	2.2																														
	3/4"	633-1-453	5.6																														
	1"	633-1-503	10																														
	1 1/4"	633-1-533	15																														
	1 1/2"	633-1-603	22																														
	2"	633-1-653	39																														
	2 1/2"	633-1-727	56																														
	3"	633-1-777	82																														
<b>MF (Water)</b>																																	
	1/8"	633-1-201	0.18																														
	3/16"	633-1-251	0.33																														
	1/4"	633-1-301	0.68																														
	3/8"	633-1-351	1.2																														
	1/2"	633-1-401	2.2																														
	3/4"	633-1-451	5.6																														
	1"	633-1-501	10																														
	1 1/4"	633-1-551	15																														
	1 1/2"	633-1-601	22																														
	2"	633-1-651	39																														
	2 1/2"	633-1-726	56																														
	3"	633-1-776	82																														
<b>MS (Steam)</b>																																	
	3/4"	631-1-453	12																														
	1"	631-1-503	18																														
	1 1/2"	631-1-603	33																														
	2"	631-1-677	68																														
<b>MS (Water)</b>																																	
	3/4"	631-1-451	12																														
	1"	631-1-501	18																														
	1 1/2"	631-1-601	33																														
	2"	631-1-676	68																														
<b>MH (Steam and high pressure hot water)</b>																																	
	3/8"	656-1-377	1.2																														
	1/2"	656-1-427	2.2																														
	3/4"	656-1-478	5.6				</																										

WATER VALVE SIZING CHART



Note: Refer to appropriate valve Data Sheet for maximum allowable differential pressure.

1 l/s = 3.6m<sup>3</sup>/h  
100 kPa = 1 Bar approximately equal to 1.02 kgf/cm<sup>2</sup> approximately equal to 14.5 lbf/in<sup>2</sup>

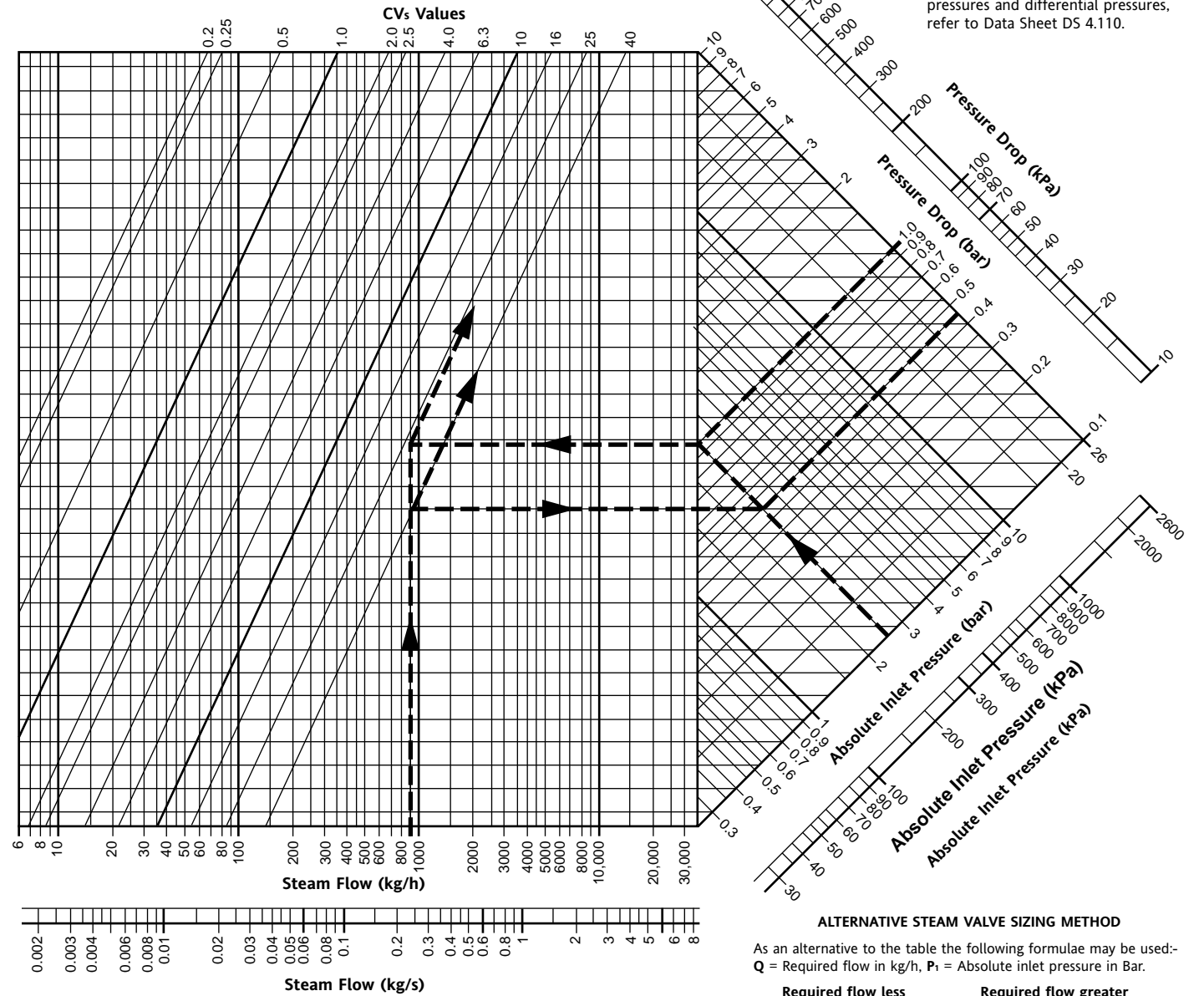


STEAM VALVE SIZING CHART

**Example:** Required flow: 900 kg/h  
Absolute inlet pressure: 2.5 bar  
Optimum pressure drop through valve = 40% of 2.5 = 1.0 bar  
Ideal Cv<sub>s</sub> = 27  
Nearest available valve has Cv<sub>s</sub> 25. This is inadequate because the maximum flow = 800 kg/h  
∴ Use next larger valve which has Cv<sub>s</sub> = 40  
Pressure drop through valve = 0.45 bar\*  
Max flow for same inlet pressure & Cv<sub>s</sub> = 1300 kg/h

\* This is only 18% of absolute inlet pressure and the control quality will not be good until the valve has partially closed. As with all steam valves this compromise is necessary since the next smaller valve would not pass the required flow.

Note: For maximum temperatures, internal pressures and differential pressures, refer to Data Sheet DS 4.110.



ALTERNATIVE STEAM VALVE SIZING METHOD

As an alternative to the table the following formulae may be used:-  
Q = Required flow in kg/h, P<sub>1</sub> = Absolute inlet pressure in Bar.

$$CV_s = \frac{Q}{8 (P_1)^{1.56}} \quad \text{Required flow less than 15 kg/h}$$

$$CV_s = \frac{Q}{13 (P_1)^{0.98}} \quad \text{Required flow greater than 15 kg/h}$$

Note: The formulae take into account the 40% optimum pressure of drop automatically.

FLOW COEFFICIENTS: Cv<sub>s</sub>

Cv<sub>s</sub> = Flow in UK gal/min to produce 1lbf/in<sup>2</sup> pressure drop when the valve is fully open  
Kv<sub>s</sub> = Flow in m<sup>3</sup>/hr to produce 1 bar pressure drop when the valve is fully open.

$$\Delta p \text{ (bar)} = \left[ \frac{\text{flow (m}^3\text{/h)}}{Kv_s} \right]^2$$

Valve Type	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"
	15 mm	15 mm	15 mm	15 mm	15 mm	15 mm	20 mm	20 mm	25 mm	32 mm	40 mm	50 mm	65 mm	80 mm	100 mm	125 mm	150 mm
VEU	DS 4.101	-	-	-	0.63	1.0	1.6	4.0	-	-	-	-	-	-	-	-	-
MEU	DS 4.101	-	-	-	0.63	1.0	2.0	4.0	6.0	-	-	-	-	-	-	-	-
FEU	DS 4.101	-	-	-	0.63	1.0	2.0	4.0	5.6	-	-	-	-	-	-	-	-
BFB	DS 4.103	0.4	0.6	1.0	1.6	2.0	2.5	-	-	-	-	-	-	-	-	-	-
VZ, VZX, VZF	DS 4.110, 4.101	-	-	0.2	0.5	1.0	2.0	4.0	-	8.0	12	20	32	63	80	125	315
VSF	DS 4.110	-	0.63	1.0	1.6	2.5	4.0	6.3	-	10.0	16	25	40	-	-	-	-
MB, MBF	DS 4.501	-	-	-	-	1.8	4.0	-	8.0	12	20	32	63	80	120	-	-
MZ, MZX, MZF	DS 4.610, 4.601	-	-	-	-	2.5	4.0	-	8.0	12	20	32	63	80	125	200	315
MJF	DS 4.610	-	-	-	-	1.0	4.0	6.3	-	10.0	16	25	40	-	-	-	-



SENSOR RESISTANCE CHARTS

°C	Ohms			
	DO 2202	DWS 1202 DW 1305 DW 1204	DR 2253 DW 1202 DD 1401 DD 1403 DD 1304	DWT DDT DDU DRT DST DOT DOS
-40	2317.20		2462.00	9711.43
-39	2304.00		2459.00	9692.31
-38	2290.30		2455.80	9672.02
-37	2276.20		2452.30	9650.72
-36	2261.50		2448.70	9628.11
-35	2246.30		2444.90	9604.43
-34	2230.50		2440.80	9579.30
-33	2214.30		2436.50	9552.97
-32	2197.60		2432.00	9525.17
-31	2180.40		2427.20	9495.97
-30	2162.60		2422.10	9465.53
-29	2144.50		2416.80	9433.11
-28	2125.80		2411.20	9399.40
-27	2106.70		2405.30	9364.27
-26	2087.20		2399.10	9327.05
-25	2067.20		2392.50	9288.26
-24	2046.90		2385.70	9247.56
-23	2026.10		2378.50	9205.09
-22	2005.00		2371.00	9161.07
-21	1983.60		2363.10	9115.04
-20	1961.90		2354.80	9066.90
-19	1939.90		2346.20	9016.81
-18	1917.60		2337.10	8964.70
-17	1895.10		2327.70	8910.56
-16	1872.30		2317.90	8854.26
-15	1849.40		2307.70	8795.91
-14	1826.40		2297.00	8735.46
-13	1803.20		2285.90	8672.68
-12	1780.00		2274.40	8607.82
-11	1756.20		2262.40	8540.79
-10	1733.30		2250.00	8471.65
-9	1709.90		2237.20	8400.00
-8	1686.60		2223.90	8326.36
-7	1663.30		2210.10	8250.52
-6	1640.10		2195.90	8172.52
-5	1617.00		2181.20	8092.69
-4	1594.00		2166.00	8010.35
-3	1571.20		2150.40	7925.74
-2	1548.60		2134.40	7839.71
-1	1526.20		2117.80	7751.29
0	1504.00		2100.90	7660.82
1	1482.00	3033.10	2083.50	7568.68
2	1460.30	3020.60	2065.60	7474.75
3	1438.90	3007.70	2047.30	7378.77
4	1417.80	2994.40	2028.60	7281.87
5	1396.90	2980.50	2009.50	7182.31
6	1376.40	2966.30	1990.00	7082.00
7	1356.30	2951.60	1970.10	6979.77
8	1336.50	2936.40	1949.90	6876.95
9	1317.00	2920.80	1929.30	6772.11
10	1297.90	2904.70	1908.30	6666.67
11	1279.20	2888.20	1887.00	6560.03
12	1260.80	2871.10	1865.50	6452.64
13	1242.80	2853.70	1843.60	6343.69
14	1225.30	2835.80	1821.50	6234.94
15	1208.10	2817.40	1799.10	6125.53
16	1191.20	2798.50	1776.50	6015.94
17	1174.80	2779.30	1753.70	5905.00
18	1158.80	2759.50	1730.70	5794.79
19	1143.10	2739.40	1707.50	5684.07
20	1127.90	2718.80	1684.20	5573.26
21	1113.00	2697.80	1660.80	5462.80
22	1098.50	2676.40	1637.30	5353.16
23	1084.40	2654.60	1613.80	5242.63
24	1070.60	2632.40	1590.20	5133.82
25	1057.20	2609.80	1566.60	5024.89
26	1044.20	2586.80	1542.90	4916.89
27	1031.60	2563.50	1519.30	4809.78
28	1019.20	2539.90	1495.80	4702.55
29	1007.30	2515.90	1472.30	4596.64
30	995.70	2491.70	1448.90	4492.48
31	984.40	2467.10	1425.60	4389.27
32	973.40	2442.30	1402.50	4286.69
33	962.80	2417.20	1379.40	4185.03
34	952.50	2391.90	1356.60	4085.29

°C	Ohms			
	DO 2202	DWS 1202 DW 1305 DW 1204	DR 2253 DW 1202 DD 1401 DD 1403 DD 1304	DWT DDT DDU DRT DST DOT DOS
35	942.40	2366.30	1333.90	3986.77
36	932.70	2340.60	1311.50	3890.15
37	923.30	2314.60	1289.30	3795.37
38	914.10	2288.50	1267.20	3701.58
39	905.30	2262.30	1245.50	3609.00
40	896.70	2235.90	1224.00	3517.86
41		2209.50	1202.70	3428.40
42		2182.90	1181.80	3340.89
43		2156.30	1161.10	3255.55
44		2129.70	1140.80	3170.80
45		2103.00	1120.70	3089.15
46		2076.30	1101.00	3006.99
47		2049.70	1081.60	2927.86
48		2023.10	1062.50	2852.04
49		1996.50	1043.80	2776.13
50		1970.00	1025.40	2702.33
51		1943.60	1007.30	2629.17
52		1917.40	989.60	2559.52
53		1891.20	972.20	2490.80
54		1865.20	955.20	2423.67
55		1839.40	938.50	2358.25
56		1813.70	922.20	2294.65
57		1788.20	906.20	2232.41
58		1762.90	890.60	2172.21
59		1737.80	875.30	2112.94
60		1713.00	860.40	2055.93
61		1688.40	845.80	2000.00
62		1664.10	831.60	1945.83
63		1640.00	817.60	1892.99
64		1616.20	804.00	1841.40
65		1592.70	790.80	1791.84
66		1569.50	777.80	1743.04
67		1546.50	765.20	1695.73
68		1523.90	752.90	1649.97
69		1501.60	740.90	1605.81
70		1479.60	729.20	1562.61
71		1458.00	717.80	1520.39
72		1436.90	706.70	1479.21
73		1415.60	695.90	1439.82
74		1394.90	685.30	1401.55
75		1374.60	675.10	1363.68
76		1354.60	665.10	1327.73
77		1334.90	655.40	1292.23
78		1315.60	645.90	1258.74
79		1296.70	636.70	1225.76
80		1278.00	627.70	1193.31
81		1259.70	619.00	1162.17
82		1241.80	610.50	1132.39
83		1224.20	602.30	1103.20
84		1206.90	594.30	1074.62
85		1190.00	586.50	1047.45
86		1173.40	578.90	1020.11
87		1157.10	571.50	994.24
88		1141.20	564.30	969.60
89		1125.60	557.30	945.31
90		1110.30	550.60	921.47
91		1095.40	544.00	899.16
92		1080.70	537.50	876.75
93		1066.40	531.30	855.05
94		1052.40	525.20	834.10
95		1038.60	519.40	814.73
96		1025.20	513.60	794.44
97		1012.10	508.10	775.76
98		999.30	502.70	757.00
99		986.70	497.40	739.88
100		974.40	492.30	721.84
101		962.50	487.30	705.46
102		950.70	482.50	689.01
103		939.30	477.80	673.38
104		928.10	473.20	657.70
105		917.20	468.80	642.84
106		906.50	464.40	628.81
107		896.10	460.20	614.74
108		885.90	456.20	601.50
109		875.90	452.20	588.24

°C	Ohms			
	DO 2202	DWS 1202 DW 1305 DW 1204	DR 2253 DW 1202 DD 1401 DD 1403 DD 1304	DWT DDT DDU DRT DST DOT DOS
110		866.20	448.30	574.93
111		856.70	444.60	563.37
112		847.50	440.90	550.88
113		838.40	437.40	539.26
114		829.60	433.90	527.61
115		821.00	430.60	516.83
116		812.60	427.30	506.03
117		804.40	424.20	496.10
118		796.40	421.10	486.16
119		788.50	418.10	476.19
120		780.90	415.10	466.20
121		773.40	412.30	457.11
122		766.20	409.50	448.90
123		759.10	406.80	439.77
124		752.10	404.20	431.54
125		745.40	401.70	423.29
126		738.80	399.20	415.03
127		732.30	396.80	407.67
128		726.00	394.40	400.31
129		719.90	392.10	392.93
130		713.90	389.90	385.54
131		708.10	387.80	379.07
132		702.40	385.60	371.65
133		696.80	383.60	365.16
134		691.40	381.60	358.65
135		686.00	379.60	353.08
136		680.90	377.70	346.56
137		675.80	375.90	340.96
138		670.90	374.10	335.36
139		666.10	372.30	329.76
140		661.40	370.60	324.14
141		656.80	369.00	319.46
142		652.30	367.40	313.83
143		647.90	365.80	309.14
144		643.70	364.20	304.44
145		639.50	362.70	299.74
146		635.40	361.30	295.03
147		631.40	359.80	290.32
148		627.60	358.50	286.55
149		623.80	357.10	281.83
150		620.10	355.80	278.05

DC Range Sensor Resistance Chart

A701, A702, A703, A704, A705					
°C	Ohms	°C	Ohms	°C	Ohms
-20	331,020	28	26,107	76	3,743
-18	293,370	30	23,827	78	3,487
-16	260,370	32	21,768	80	3,251
-14	231,410	34	19,907	82	3,033
-12	205,960	36	18,223	84	2,831
-10	183,560	38	16,697	86	2,644
-8	163,820	40	15,314	88	2,472
-6	146,400	42	14,059	90	2,312
-4	131,000	44	12,919	92	2,164
-2	117,380	46	11,882	94	2,026
0	105,310	48	10,937	96	1,899
2	94,596	50	10,077	98	1,780
4	85,080	52	9,292	100	1,670
6	76,614	54	8,577	102	1,568
8	69,078	56	7,922	104	1,473
10	62,355	58	7,324	106	1,384
12	56,352	60	6,777	108	1,301
14	50,985	62	6,275	110	1,224
16	46,185	64	5,815	112	1,153
18	41,883	66	5,394	114	1,085
20	38,022	68	5,006	116	1,023
22	34,557	70	4,650	118	964
24	31,440	72	4,323	120	909
26	28,634	74	4,021		

Valves



VST, VMT, VTT  
Fan-coil Unit and Zone Valves (2, 3 & 4-port)

These valves are used for hot and/or chilled water control fan-coil units, induction units, solar energy on plants, small reheaters and dehumidifiers (in electric/electronic temperature control systems).

INSTALLATION DETAILS

Stroke - 5.5mm  
Pipe connections - male thread  
Characteristic - equal percentage A-AB port (VMT and VTT - B-AB linear)  
Rangeability - ≥ 50  
Max fluid speed - 3m/sec  
International pressure rating - PN 16

Order code**	Size	Flow rate Kvs*, m³/h	Max pressure rating (kPa)	Limits
<b>Two-port</b>				
VST09	15mm	0.25	350	Water - 95°C max, 2°C min
VST10	15mm	0.4	350	
VST11	15mm	0.6	350	Glycol added 50% max
VST12	15mm	1	350	
VST13	15mm	1.6	350	
VST1	15mm	2.5	350	
VST21	20mm	2.5	250	
VST2	20mm	4	250	
<b>Three-port</b>				
VMT09	15mm	0.25 (0.25)	350	
VMT10	15mm	0.4 (0.25)	350	
VMT11	15mm	0.6 (0.4)	350	
VMT12	15mm	1 (0.6)	350	
VMT13	15mm	1.6 (1)	350	
VMT1	15mm	2.5 (1.6)	350	
VMT2	20mm	4 (2.5)	250	
<b>Three-port with built-in by-pass (4-port)</b>				
VTT09	15mm	0.25 (0.25)	350	
VTT10	15mm	0.4 (0.25)	350	
VTT11	15mm	0.6 (0.4)	350	
VTT12	15mm	1 (0.6)	350	
VTT13	15mm	1.6 (1)	350	
VTT1	15mm	2.5 (1.6)	350	
VTT21	20mm	2.5 (1.6)	250	
VTT2	20mm	4 (2.5)	250	

Data Sheet - VST-VMT-VTT



VSZ, VMZ, VTZ  
Fan-coil Unit and Zone Valves (2, 3 & 4-port)

This range of valves are used to control hot and cool water in zone systems, two/four-pipes terminal units and solar plants.

INSTALLATION DETAILS

Stroke - 3.5mm  
Pipe connections - male thread  
Characteristic - linear  
Max fluid speed - 3m/sec  
International pressure rating - PN 16

Order code**	Size	Flow rate Kvs*, m³/h	Max pressure rating (kPa)	Limits
<b>Two-port</b>				
VSZ09B	15mm	0.25	150	Water - 95°C max, 5°C min
VSZ10B	15mm	0.4	150	
VSZ11B	15mm	0.6	150	Glycol added 50% max
VSZ12B	15mm	1	150	
VSZ13B	15mm	1.6	150	
VSZ1B	15mm	2.5	150	
VSZ21B	20mm	2.5	150	
VSZ2B	20mm	4	150	
<b>Three-port</b>				
VMZ09B	15mm	0.25 (0.25)	150	
VMZ10B	15mm	0.4 (0.25)	150	
VMZ11B	15mm	0.6 (0.4)	150	
VMZ12B	15mm	1 (0.6)	150	
VMZ13B	15mm	1.6 (1)	150	
VMZ1B	15mm	2.5 (1.6)	150	
VMZ2B	20mm	4 (2.5)	150	
<b>Three-port (4-port)</b>				
VTZ09B	15mm	0.25 (0.25)	150	
VTZ10B	15mm	0.4 (0.25)	150	
VTZ11B	15mm	0.6 (0.4)	150	
VTZ12B	15mm	1 (0.6)	150	
VTZ13B	15mm	1.6 (1)	150	
VTZ1B	15mm	2.5 (1.6)	150	
VTZ21B	20mm	2.5 (1.6)	150	
VTZ2B	20mm	4 (2.5)	150	

Data Sheet - VSZ-VMZ-VTZ



VSB, VMB  
PN16 Valves (2 & 3-port)

Both 2-port VSB and 3-port VMB valve bodies can be used to control flow in air-conditioning, thermo-ventilation and heating systems, in environmental and industrial plants for machines employed for thermic treatment of products. 3-port valves must be used as mixing valves only; the angle port should never be used for control purposes. Valve stem down: straight-port open.

INSTALLATION DETAILS

Stroke - 16.5mm (max 18.5mm)  
Pipe connections - female thread  
Characteristic - VSB - equal percentage, VMB - straight port - equal percentage, angle port - linear  
Rangeability - ≥ 50  
International pressure rating - PN 16

ACCESSORIES

AG21 - linkage kit for SH actuators  
AG31 - linkage kit for MVL-MVLA/C actuators

Order codes		Size	Flow rate Kvs, m³/h	Max pressure rating (kPa)	Limits
2-port	3-port				
VSB11	VMB11	15mm	1	1600	Water - 120°C max
VSB1	VMB1	15mm	1.6	(16 bar)	-10°C min
VSB15	VMB15	15mm	2.5		
VSB2	VMB2	15mm	4		Glycol added 50% max
VSB3	VMB3	20mm	6.3		
VSB4	VMB4	25mm	8		
VSB5	VMB5	32mm	16		Saturated steam
VSB6	VMB6	40mm	22		120°C max
VSB8	VMB8	50mm	30		1.5 bar absolute
VSB8A	VMB8A	50mm	40		max pressure

Data Sheet - VSB-VMB

MAX DIFFERENTIAL PRESSURE (bar)

Order codes		Actuators - max ΔP (bar)				Notes:
2-port	3-port	MVB	MVLA/C +AG31	MVL +AG31	SH +AG21	
VSB1	VMB1	2 (10)	2 (10)	2 (10)	2 (10)	100 KPa = 1 bar ΔPmax = max differential pressure value ensured by the actuator for operation control. Values in brackets are the maximum differential pressure values when valve is fully closed.
VSB11	VMB11	2 (10)	2 (10)	2 (10)	2 (10)	
VSB15	VMB15	2 (10)	2 (10)	2 (10)	2 (10)	
VSB2	VMB2	2 (10)	2 (10)	2 (10)	2 (10)	
VSB3	VMB3	2 (10)	2 (10)	2 (10)	2 (10)	
VSB4	VMB4	2 (6.5)	2 (10)	2 (10)	2 (10)	
VSB5	VMB5	2 (4)	2 (6)	2 (10)	2 (10)	
VSB6	VMB6	2 (2.5)	2 (4)	2 (8)	2 (8)	
VSB8A	VMB8A	2 (2)	2 (3)	2 (6)	2 (6)	

Valves (cont)



VSBT, VMBT  
PN16 Valves (2 & 3-port)

VSBT (2-port) and VMBT (3-port) valves can be used for fluid control in heating and air conditioning plants for both residential and industrial use, as well as with machines for thermic treatment. 3-port valves will only be used for mixing. Angle port (B-AB) is never to be used for control.

INSTALLATION DETAILS

Stroke - 5.5mm  
Pipe connections - female thread  
Characteristic - linear  
Rangeability - ≥ 50

Order codes		Size	Flow rate Kvs, m³/h	Max pressure rating (kPa)	Limits
2-port	3-port				
VSBT3	VMBT3	20mm	6.3	1600	Water - 95°C max, 5°C min
VSBT4	VMBT4	25mm	10	(16 bar)	
VSBT5	VMBT5	32mm	13		
VSBT6	VMBT6	40mm	16		Glycol added 50% max

Data Sheet - VSBT-VMBT

MAX DIFFERENTIAL PRESSURE (bar)

Order codes	Actuators - max ΔP (bar)	Notes:
	MVL	
VSBT3	170	100 KPa = 1 bar ΔPmax = max differential pressure value ensured by actuator for regular working conditions.
VSBT4	100	
VSBT5	70	
VSBT6	50	
VMBT3	170	
VMBT4	100	
VMBT5	70	
VMBT6	50	



SS, VS  
Single Seat Globe valves (2-port)

These 2-port single seat valves are used to control fluids in air-conditioning, thermo-ventilation, heating plants and industrial processes.

INSTALLATION DETAILS

Stroke - see data sheet  
Characteristic - equal percentage

ACCESSORY

245 - stem heater (24V) motorised with MVL actuator

Construction	VSG	SS-GA	VSS	SS-AA	SS-AACP
	25...150mm	15...100mm	25...65mm	15...100mm	15...100mm
Body rating (bar)	16	16	25	40	40
Body	Cast iron	Cast iron	Cast iron	Cast steel	Cast steel
Plug	Brass	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Max. fluid temp.	150°C	200°C	230°C	230°C	350°C**
Min. fluid temp.*	-10°C	-10°C	-10°C	-10°C	-30°C***
Flanged	NP16	NP16	NP25	NP40	NP40

Data Sheet - SS-VS

Notes: \* For applications free from icing on stem and packing, see accessory option 245.  
\*\* With finned bonnet, high temp and forced lubrication. Low temp Teflon packing.  
\*\*\* For fluid temperature from -10 to -30°C add 'B' to the order code.

MAX DIFFERENTIAL PRESSURE (bar)

Size mm	Kvs			VSG			SS-GA			VSS			SS-AA / SS-AACP	
	VSG	VSS	SS	SH	MVL	MVLA/C	SH	MVL	MVLA/C	SH	MVL	MVLA/C	MVL	MVLA/C
15R	-	-	1.6	-	-	-	6 (16)	6 (16)	6 (16)	-	-	-	10 (30)	10 (30)
15	-	-	4	-	-	-	6 (16)	6 (16)	6 (16)	-	-	-	10 (30)	10 (30)
25R	4	4	-	2 (10)	2 (10)	2 (10)	-	-	-	8 (20)	8 (20)	7 (10)	-	-
20	-	-	6.3	-	-	-	6 (16)	6 (16)	6 (14)	-	-	-	10 (30)	10 (12)
25I	6.3	6.3	-	2 (10)	2 (10)	2 (10)	-	-	-	8 (18)	8 (20)	7 (10)	-	-
25	10	10	10	2 (10)	2 (10)	2 (10)	6 (16)	6 (16)	6 (9)	8 (16)	8 (20)	7 (10)	10 (20)	7.5
32	-	16	16	-	-	-	6 (16)	6 (16)	6 (9)	7.5 (12)	8 (14)	6	10 (20)	7.5
40	25	25	22	2 (7.5)	2 (9.5)	2 (3.5)	6 (10)	6 (13.5)	5.5	6.5 (8)	8 (10)	4.5	10 (13)	4.5
50	32	40	32	2 (4.7)	2 (6)	2 (2.4)	6 (7)	6 (9)	3.5	5.2	6.5	2.7	8	3
65	63	63	63	2 (2.8)	2 (3.6)	1.4	2.5	3.5	1.4	2.7	3.7	1.4	3.5	1
80	100	-	110	1.7	2 (2.3)	0.8	1.5	2.3	0.9	-	-	-	2.4	0.8
100	130	-	140	0.8	1.4	0.4	1	1.4	0.5	-	-	-	1.4	0.4
125	200	-	-	0.5	0.8	-	-	-	-	-	-	-	-	-
150	300	-	-	0.3	0.4	-	-	-	-	-	-	-	-	-

Notes: (100 KPa = 1 bar)  
ΔPmax = max differential pressure value ensured by the actuator for operation control.  
Values in brackets are the maximum differential pressure values when valve is fully closed.



DS  
Double Seat Globe Valves (2-port)

2-port double seat valves are used to control fluids in air-conditioning, thermoventilation, heating plants and industrial processes.

INSTALLATION DETAILS

Stroke - see data sheet  
Characteristic - equal percentage

ACCESSORY

245 - stem heater (24V) motorised with MVL and SH actuators

Construction	DS-AA	DS-AACP
	32...150mm	25...150mm
Body rating (bar)	40	40
Body	Cast steel	Cast steel
Plug	Stainless steel	Stainless steel
Max. fluid temp.	230°C	350°C**
Min. fluid temp.*	-10°C	-30°C***
Flanged	NP40	NP40

Data Sheet - DS






Notes: \* For applications free from icing on stem and packing, see accessory 245.  
\*\* With finned bonnet, high temp and forced lubrication.  
Low temp Teflon packing.  
\*\*\* For fluid temperature from -10 to -30°C add 'B' to the order code.

MAX DIFFERENTIAL PRESSURE (bar)



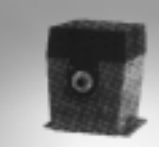
Size mm	Kvs	Actuators - max ΔP (bar)		Notes:
		MVL	MVLA/C	
32R (rid.)	10	12 (30)	12 (30)	100 KPa = 1 bar ΔPmax = max differential pressure value ensured by the actuator for operation control. Values in brackets are the maximum differential pressure values when valve is fully closed.
32	16	12 (30)	12 (30)	
40	22	12 (30)	12 (30)	
50	32	12 (30)	12 (30)	
65	63	12 (30)	12 (14)	
80	85	12 (30)	11	
100	160	12 (20)	8.5	
125	200	12 (20)	8	
150	300	12 (14)	7	
200	500	-	-	



Actuators

 <p><b>MVA</b> Electro-thermal Terminal Unit and Zone Valve Actuators</p>	<p>MVA actuators are used in V-ZB globe valve coupling for cool/warm water control in two and four pipe terminal units and zone systems.</p>	<table border="1"> <thead> <tr> <th>Model</th> <th>Control</th> <th>Control signal (power supply)</th> </tr> </thead> <tbody> <tr> <td>MVA21</td> <td>On/off (with cable)</td> <td>110...230Vac</td> </tr> <tr> <td>MVA23</td> <td>On/off</td> <td>"</td> </tr> <tr> <td>MVA41</td> <td>On/off PWM (with cable)</td> <td>24Vac</td> </tr> <tr> <td>MVA43</td> <td>On/off PWM</td> <td>"</td> </tr> </tbody> </table> <p>Data Sheet - MVA2/4</p> <p><b>INSTALLATION DETAILS</b>  <b>Action</b> - direct  <b>Stroke</b> - 3.5mm (max)  <b>Stroke time</b> - 3 min (opening), 8 min (closing)  <b>Thrust</b> - 100 N (min)  <b>Protection class</b> - IP 31</p>	Model	Control	Control signal (power supply)	MVA21	On/off (with cable)	110...230Vac	MVA23	On/off	"	MVA41	On/off PWM (with cable)	24Vac	MVA43	On/off PWM	"														
Model	Control	Control signal (power supply)																													
MVA21	On/off (with cable)	110...230Vac																													
MVA23	On/off	"																													
MVA41	On/off PWM (with cable)	24Vac																													
MVA43	On/off PWM	"																													
 <p><b>MVT44</b> Fan-coil Pulsed Valve Actuator</p>	<p>MVT4 actuator is designed to provide, with VST and VSBT valve bodies, floating control of hot/cool water in two/four-pipe fan-coil units, zone and solar plants, reheat coils and dehumidification batteries.</p>	<table border="1"> <thead> <tr> <th>Model</th> <th>Control</th> <th>Control signal</th> </tr> </thead> <tbody> <tr> <td>MVT44</td> <td>3 position</td> <td>24Vac</td> </tr> </tbody> </table> <p>Data Sheet - MVT</p> <p><b>INSTALLATION DETAILS</b>  <b>Action</b> - direct/reversing  <b>Stroke</b> - 6.5mm  <b>Running speed</b> - 30 s/mm at 50 Hz, 25 s/mm at 60 Hz  <b>Thrust</b> - 200 N  <b>Protection class</b> - IP 40</p>	Model	Control	Control signal	MVT44	3 position	24Vac																							
Model	Control	Control signal																													
MVT44	3 position	24Vac																													
 <p><b>MVT56</b> Fan-coil Proportional Valve Actuator</p>	<p>The MVT5 actuator is designed to provide proportional control of both VST and VSBT valve bodies in fan-coil units, solar plants, reheaters and coolers using hot and/or cold water.</p>	<table border="1"> <thead> <tr> <th>Model</th> <th>Supply</th> <th>Control signal</th> </tr> </thead> <tbody> <tr> <td>MVT56</td> <td>24Vac</td> <td>Proportional - ranges 0...10, 6...10, 0...4, 2...10, 4...7, 6...9, 8...11Vac</td> </tr> </tbody> </table> <p>Data Sheet - MVT5</p> <p><b>INSTALLATION DETAILS</b>  <b>Action</b> - direct/reversing  <b>Stroke</b> - 6.5mm  <b>Running speed</b> - 30 s/mm at 50 Hz, 25 s/mm at 60 Hz  <b>Thrust</b> - 200 N  <b>Protection class</b> - IP 40</p>	Model	Supply	Control signal	MVT56	24Vac	Proportional - ranges 0...10, 6...10, 0...4, 2...10, 4...7, 6...9, 8...11Vac																							
Model	Supply	Control signal																													
MVT56	24Vac	Proportional - ranges 0...10, 6...10, 0...4, 2...10, 4...7, 6...9, 8...11Vac																													
 <p><b>MVB</b> Pulsed and Proportional Linear Valve Actuators (450N)</p>	<p>These actuators are equipped with a reversing synchronous motor and an electronic board available in three different models respectively for:                      - floating control                      - proportional control (d.c. voltage or current)</p> <p>Due to their versatility these actuators can be mounted both on new 'Controlli' globe valves up to DN 2" as well as on different manufacturers valves, with stroke from 10.8 to 20mm.</p> <table border="1"> <thead> <tr> <th>Body valve</th> <th>Nominal diameter</th> <th>Model</th> </tr> </thead> <tbody> <tr> <td>PN16</td> <td>DN 1/2"...2"</td> <td>VSB (2-port)</td> </tr> <tr> <td>PN16</td> <td>DN 1/2"...2"</td> <td>VMB (3-port)</td> </tr> </tbody> </table>	Body valve	Nominal diameter	Model	PN16	DN 1/2"...2"	VSB (2-port)	PN16	DN 1/2"...2"	VMB (3-port)	<table border="1"> <thead> <tr> <th>Model</th> <th>Timing (secs)</th> <th>Supply</th> <th>Control signal</th> </tr> </thead> <tbody> <tr> <td>MVB26</td> <td>65</td> <td>230Vac</td> <td>Floating</td> </tr> <tr> <td>MVB46</td> <td>65</td> <td>24Vac</td> <td>"</td> </tr> <tr> <td>MVB56</td> <td>65</td> <td>24Vac</td> <td>Proportional (V- or mA)</td> </tr> <tr> <td>MVB52</td> <td>30</td> <td>24Vac</td> <td>"</td> </tr> </tbody> </table> <p>Data Sheet - MVB</p> <p>Note: Timings refer to 16.5mm standard stroke. For different strokes see data sheet.</p> <p><b>INSTALLATION DETAILS</b>  <b>Action</b> - direct/reversing  <b>Stroke</b> - 21mm max (mechanical end stroke)  <b>Thrust</b> - 450 N  <b>Protection class</b> - IP 50  <b>Output signal</b> - for remote position indication 0...10V, 10...0V</p> <p><b>ACCESSORIES</b>  <b>D36</b> - two auxiliary microswitches (SPDT) adjustable, rated 230V  <b>MVBPA2</b> - potentiometer for MVB46 (pcb with 1KΩ auxiliary pot.)  <b>244</b> - stem heater 24V (for valve applications with fluids below -10°C)</p>	Model	Timing (secs)	Supply	Control signal	MVB26	65	230Vac	Floating	MVB46	65	24Vac	"	MVB56	65	24Vac	Proportional (V- or mA)	MVB52	30	24Vac	"
Body valve	Nominal diameter	Model																													
PN16	DN 1/2"...2"	VSB (2-port)																													
PN16	DN 1/2"...2"	VMB (3-port)																													
Model	Timing (secs)	Supply	Control signal																												
MVB26	65	230Vac	Floating																												
MVB46	65	24Vac	"																												
MVB56	65	24Vac	Proportional (V- or mA)																												
MVB52	30	24Vac	"																												
 <p><b>SH</b> Pulsed and Proportional Linear Valve Actuators (1200N)</p>	<p>Series SH actuators are used in air conditioning, thermoventilation, heating systems and in industrial processes to drive dampers.</p> <p><b>INSTALLATION DETAILS</b>  <b>Angular travel</b> - 160°  <b>Timing</b> - 80 secs  <b>Torque</b> - 12 Nm  <b>Radial force</b> - 1200 N (max)  <b>Protection class</b> - IP 40  <b>Shaft</b> - Ø 16mm with pin hole Ø 4mm  <b>Manual override</b></p>	<table border="1"> <thead> <tr> <th>Model</th> <th>Supply</th> <th>Control signal</th> </tr> </thead> <tbody> <tr> <td>SH222</td> <td>24Vac</td> <td>2 positions, 3 points from controller</td> </tr> <tr> <td>SH242</td> <td>230Vac</td> <td>"</td> </tr> <tr> <td>SH522</td> <td>24Vac</td> <td>voltage or current variation from controller</td> </tr> </tbody> </table> <p>Data Sheet - SH--2</p> <p><b>ACCESSORIES</b>  <b>AG21</b> - linkage kit for fitting actuator to VMB and VSB valves  <b>D5</b> - one auxiliary microswitch (SPST) at end of stroke, rated 230V  <b>P-140-1</b> - auxiliary potentiometer 140Ω  <b>P-1000-1</b> - auxiliary potentiometer 1000Ω  <b>245</b> - stem heater 24V (for valve applications with fluids below -10°C)</p>	Model	Supply	Control signal	SH222	24Vac	2 positions, 3 points from controller	SH242	230Vac	"	SH522	24Vac	voltage or current variation from controller																	
Model	Supply	Control signal																													
SH222	24Vac	2 positions, 3 points from controller																													
SH242	230Vac	"																													
SH522	24Vac	voltage or current variation from controller																													

Actuators (cont)

 <p><b>MVL</b> Pulsed and Proportional Linear Valve Actuators (700N &amp; 1500N)</p>	<p>MVL actuators have linear characteristic (linear ratio between input signal and valve coupling joint movement). They are used for fluid control in air-conditioning-heating systems and in industrial processes.</p> <p>Two different control types are available:                      - floating (3-point)                      - proportional (dc voltage or current)</p> <p>They are designed for direct coupling on all Controlli globe valves (add AG31 linkage for V.B valves) and they may also be used easily on valves of other manufacturers with 0...45 mm stroke for floating action models or 10...45 mm stroke for proportional action models.</p> <p><b>INSTALLATION DETAILS</b>  <b>Stroke</b> - MVL2/4 0...45 mm, MVL5 10...45 mm  <b>Running speed</b> - 1.33 s/mm  <b>Thrust</b> - MVL 1500 N, MVL.A/C 700 N  <b>Protection class</b> - IP 55</p>	<table border="1"> <thead> <tr> <th rowspan="2">Mod.</th> <th colspan="3">Input Stroke/Time(s)</th> <th rowspan="2">Supply</th> <th rowspan="2">Input Control Signal</th> </tr> <tr> <th>16.5</th> <th>25</th> <th>45</th> </tr> </thead> <tbody> <tr> <td colspan="6"><b>Raise Lower Actuators</b></td> </tr> <tr> <td>MVL26</td> <td>22</td> <td>33</td> <td>60</td> <td>230 V</td> <td>floating</td> </tr> <tr> <td>MVL46</td> <td>22</td> <td>33</td> <td>60</td> <td>24 V</td> <td>floating</td> </tr> <tr> <td>MVL46A</td> <td>22 (16)</td> <td>33 (25)</td> <td>60 (45)</td> <td>24 V</td> <td>floating</td> </tr> <tr> <td>MVL46C</td> <td>22 (16)</td> <td>33 (25)</td> <td>60 (45)</td> <td>24 V</td> <td>floating</td> </tr> <tr> <td colspan="6"><b>Proportional Actuators</b></td> </tr> <tr> <td>MVL56</td> <td>22</td> <td>33</td> <td>60</td> <td>24 V</td> <td>prop. (V or mA)</td> </tr> <tr> <td>MVL56A</td> <td>22 (16)</td> <td>33 (25)</td> <td>60 (45)</td> <td>24 V</td> <td>prop. (V or mA)</td> </tr> <tr> <td>MVL56C</td> <td>22 (16)</td> <td>33 (25)</td> <td>60 (45)</td> <td>24 V</td> <td>prop. (V or mA)</td> </tr> </tbody> </table> <p>Data Sheet - MVL</p> <p>Remark: MVL A/C models are fitted with spring return device. Values in brackets indicate the spring return time.                      A - spring return retracts (valve stem up)                      C - spring return extends (valve stem down)</p> <p><b>ACCESSORIES</b>  <b>DMVL</b> - two auxiliary microswitches (SPDT) adjustable, rated 230V, 10 (3) amp.  <b>MVLP2</b> - potentiometer for MVL2 (pcb with 1KΩ auxiliary pot.)  <b>MVLP4</b> - potentiometer for MVL4  <b>MVLP4M</b> - potentiometer for MVL46A and MVL46C  <b>245</b> - stem heater 24V (for valve applications with fluids below -10°C)  <b>AG31</b> - linkage kit for fitting actuator to VMB and VSG valves</p>	Mod.	Input Stroke/Time(s)			Supply	Input Control Signal	16.5	25	45	<b>Raise Lower Actuators</b>						MVL26	22	33	60	230 V	floating	MVL46	22	33	60	24 V	floating	MVL46A	22 (16)	33 (25)	60 (45)	24 V	floating	MVL46C	22 (16)	33 (25)	60 (45)	24 V	floating	<b>Proportional Actuators</b>						MVL56	22	33	60	24 V	prop. (V or mA)	MVL56A	22 (16)	33 (25)	60 (45)	24 V	prop. (V or mA)	MVL56C	22 (16)	33 (25)	60 (45)	24 V	prop. (V or mA)
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 <p><b>ST</b> Rotary Valve Actuators (100N)</p>	<p>ST actuators are used to control VFG butterfly valves in heating, refrigeration and hydraulic plants.</p> <p><b>INSTALLATION DETAILS</b>  <b>Angular travel</b> - 90°  <b>Timing</b> - 360 secs  <b>Torque</b> - 10 Nm  <b>Radial force</b> - 100 N (max)  <b>Protection class</b> - IP 20  <b>Shaft</b> - Ø 20mm with 18x6 key</p>	<table border="1"> <thead> <tr> <th>Model</th> <th>Supply</th> <th>Control signal</th> </tr> </thead> <tbody> <tr> <td>ST404</td> <td>24Vac</td> <td>2 positions, 3 points from controller</td> </tr> <tr> <td>ST405</td> <td>230Vac</td> <td>"</td> </tr> </tbody> </table> <p>Data Sheet - VF-ST400</p>	Model	Supply	Control signal	ST404	24Vac	2 positions, 3 points from controller	ST405	230Vac	"																																																						
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ST404	24Vac	2 positions, 3 points from controller																																																															
ST405	230Vac	"																																																															
 <p><b>MDL</b> Damper Actuators</p>	<p>The MDL actuators are used in civil and industrial systems for driving dampers and other devices that require the control of an angular position within a maximum angle of 160° (e.g. for adjusting the flame n liquid or gas burners).</p>	<table border="1"> <thead> <tr> <th rowspan="2">Model</th> <th colspan="2">Stroke time (s)</th> <th rowspan="2">Torque (Nm)</th> <th rowspan="2">Power supply</th> <th rowspan="2">Control signal</th> </tr> <tr> <th>90°C</th> <th>160°C</th> </tr> </thead> <tbody> <tr> <td>MDL22</td> <td>15</td> <td>27</td> <td>6 (8)</td> <td>230Vac</td> <td>3-point</td> </tr> <tr> <td>MDL24</td> <td>45</td> <td>80</td> <td>20 (27)</td> <td>"</td> <td>"</td> </tr> <tr> <td>MDL26</td> <td>60</td> <td>107</td> <td>30 (40)</td> <td>"</td> <td>"</td> </tr> <tr> <td>MDL42</td> <td>15</td> <td>27</td> <td>6 (8)</td> <td>24Vac</td> <td>3-point</td> </tr> <tr> <td>MDL44</td> <td>45</td> <td>80</td> <td>20 (27)</td> <td>"</td> <td>"</td> </tr> <tr> <td>MDL46</td> <td>60</td> <td>107</td> <td>30 (40)</td> <td>"</td> <td>"</td> </tr> <tr> <td>MDL52</td> <td>15</td> <td>27</td> <td>6 (8)</td> <td>24Vac</td> <td>proportional</td> </tr> <tr> <td>MDL54</td> <td>45</td> <td>80</td> <td>20 (27)</td> <td>"</td> <td>"</td> </tr> <tr> <td>MDL56</td> <td>60</td> <td>107</td> <td>30 (40)</td> <td>"</td> <td>"</td> </tr> </tbody> </table> <p>Data Sheet - MDL</p> <p><b>INSTALLATION DETAILS</b>  <b>Action</b> - direct/reversing  <b>Angular travel</b> - 90° preset, 0...160° adjustable (55...160° adjustable - MDL5-)  <b>Thrust</b> - 500 N max  <b>Protection class</b> - IP 55</p> <p><b>ACCESSORY</b>  <b>AF22</b> - coupling for VFG butterfly valves.</p>	Model	Stroke time (s)		Torque (Nm)	Power supply	Control signal	90°C	160°C	MDL22	15	27	6 (8)	230Vac	3-point	MDL24	45	80	20 (27)	"	"	MDL26	60	107	30 (40)	"	"	MDL42	15	27	6 (8)	24Vac	3-point	MDL44	45	80	20 (27)	"	"	MDL46	60	107	30 (40)	"	"	MDL52	15	27	6 (8)	24Vac	proportional	MDL54	45	80	20 (27)	"	"	MDL56	60	107	30 (40)	"	"	
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Compatibility and Selection Chart

Controlli valves and actuators range

Actuator model		On / Off		On / Off with spring return		Floating		Floating with spring return		Proportional V d.c.		Proportional V d.c. with spring return		Proport. with 300 Ohm balance potentiometer		Proport. with 300 Ohm balance potentiometer with spring return		Supply voltage [V a.c.]		Stem force [Newton]	
Model	Connection	PH	Size	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke
Model	Connection	PH	Size	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke	Stroke
VST	2 way	Threaded male	16 1/2" 3/4"	5.5	0.25	4	2" 50"	3.5	2.5	-	-	-	-	-	-	-	-	-	-	-	-
VMT	3 way	Threaded male	16 1/2" 3/4"	5.5	0.25	4	2" 50"	3.5	2.5	-	-	-	-	-	-	-	-	-	-	-	-
VTT	2 way-4p	Threaded male	16 1/2" 3/4"	5.5	0.25	4	2" 50"	3.5	2.5	-	-	-	-	-	-	-	-	-	-	-	-
VZL	2 way	Threaded male	16 1/2" 3/4"	3.5	0.25	4	1" 40"	1.5	1.0	-	-	-	-	-	-	-	-	-	-	-	-
VNZ	3 way	Threaded male	16 1/2" 3/4"	3.5	0.25	4	1" 40"	1.5	1.5	-	-	-	-	-	-	-	-	-	-	-	-
VTZ	3 way-4p	Threaded male	16 1/2" 3/4"	3.5	0.25	4	1" 40"	1.5	1.5	-	-	-	-	-	-	-	-	-	-	-	-
VSBT	2 way	Screwed female	16 3/4" 1 1/2"	5.5	0.3	16	1" 40"	1.7	0.5	-	-	-	-	-	-	-	-	-	-	-	-
VMBT	3 way	Screwed female	16 3/4" 1 1/2"	5.5	0.3	16	1" 40"	1.7	0.5	-	-	-	-	-	-	-	-	-	-	-	-
VSB	2 way	Screwed female	16 1/2" 2"	16.5	1.0	40	-10" 200"	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VMB	3 way	Screwed female	16 1/2" 2"	16.5	1.0	40	-10" 200"	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VSBF	2 way	Flanged	16 15 50	16.5	1.0	40	-10" 200"	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VMBF	3 way	Flanged	16 15 50	16.5	1.0	40	-10" 200"	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VSBPF	2 way	Flanged	16 65	20	63	-10" 200"	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
VMBPF	3 way	Flanged	16 65	20	63	-10" 200"	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
VSG	2 way	Flanged	16 25 150	16.5-25-45	4	300	10" 150"	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4
SSGA	2 way	Flanged	16 16 100	16.5-25-45	1.6	140	-10" 200"	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
VSS	2 way	Flanged	25 25 65	16.5-25-45	4	83	-10" 200"	0.2	2.7	0.2	2.7	0.2	2.7	0.2	2.7	0.2	2.7	0.2	2.7	0.2	2.7
SSAA	2 way	Flanged	40 16 100	16.5-25-45	1.6	140	-10" 200"	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
SSAACF	2 way	Flanged	40 16 100	16.5-25-45	1.6	140	-20" 300"	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
VMB16	3 way	Flanged	16 25 150	16.5-25-45	4	300	10" 150"	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4
VNCA	3 way	Flanged	16 100 125	45	160	250	-10" 200"	1.3	0.5	0.5	0.2	1.3	0.5	0.5	0.2	1.3	0.5	0.5	0.2	1.3	0.5
VMS	3 way	Flanged	25 25 65	16.5-25	4	83	-10" 200"	0.6	2.7	0.6	2.7	0.6	2.7	0.6	2.7	0.6	2.7	0.6	2.7	0.6	2.7
VMSA	3 way	Flanged	25 25 65	16.5-25	4	83	-10" 200"	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5
VMS16	3 way	Flanged	25 25 65	16.5-25	4	83	-10" 200"	0.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0
VNSATS	3 way	Flanged	25 25 65	45	4	83	-10" 200"	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VNSA	3 way	Flanged	40 25 125	16.5-25-45	4	250	-10" 200"	0.8	7.50	0.8	7.50	0.8	7.50	0.8	7.50	0.8	7.50	0.8	7.50	0.8	7.50
VNSACP	3 way	Flanged	40 25 125	16.5-25-45	4	250	-20" 300"	0.8	7.50	0.8	7.50	0.8	7.50	0.8	7.50	0.8	7.50	0.8	7.50	0.8	7.50
VNS	2 way	Flanged	16 80 150	45	160	300	-10" 150"	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VNSA	2 way	Flanged	16 100 125	45	160	200	-10" 200"	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
VNSA	2 way	Flanged	25 25R 80	16.5-25-45	4	100	-10" 200"	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
VNSA	2 way	Flanged	40 25 125	16.5-25-45	10	200	-20" 300"	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
DSGA (*)	2 way	Flanged	16 200	45	500	-10" 200"	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
DSAA	2 way	Flanged	40 150	45	300	-10" 200"	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
VFG16	2 way	Flanged	16 40 200	85	250	max 120°C	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4	2.0	0.4	2.0

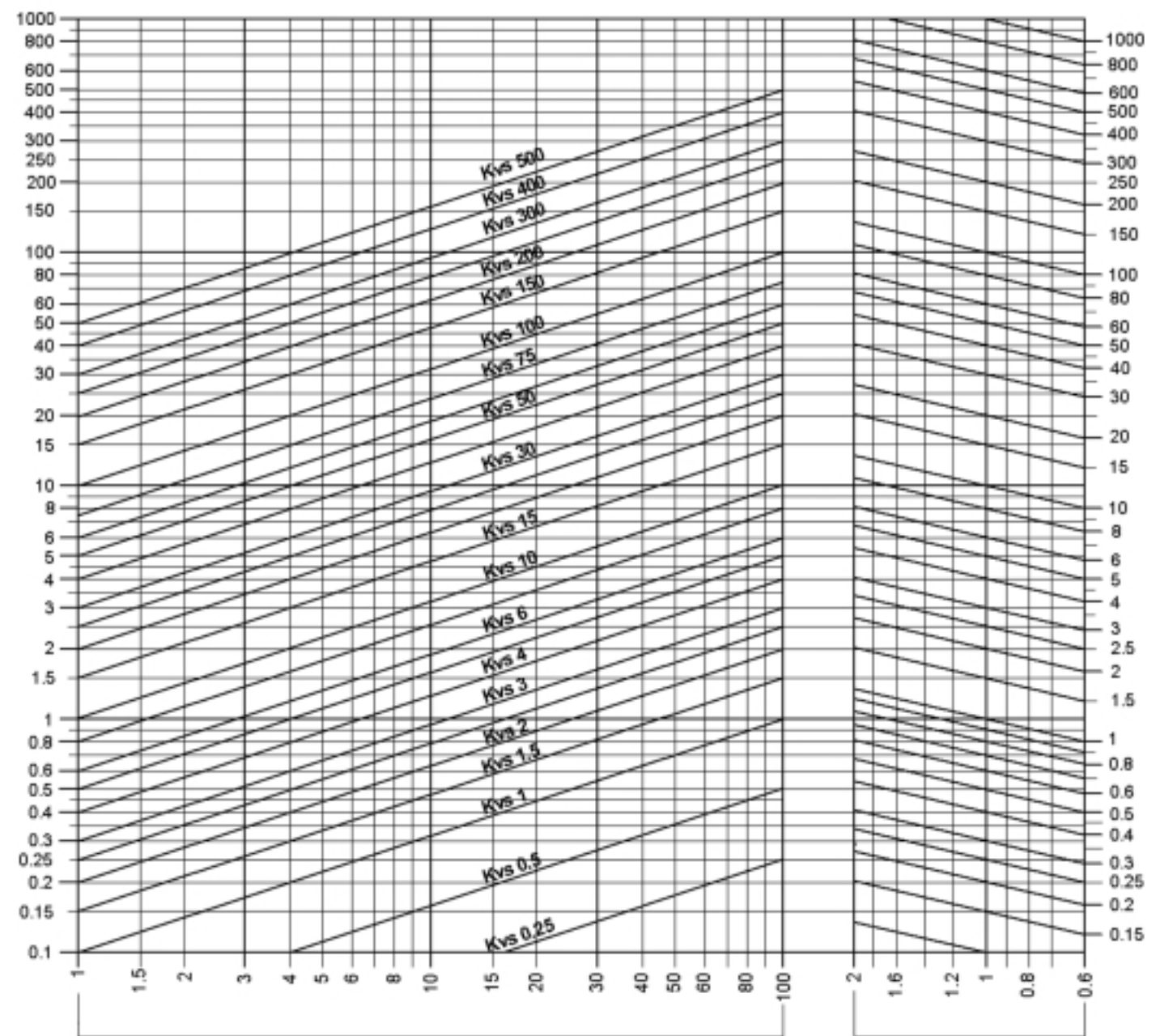
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FLUID VALVE SIZING CHART

Flow liquid with specific gravity 1 kg/dm<sup>3</sup> m<sup>3</sup>/h

$$Kvs = \frac{Q - 10}{\sqrt{\Delta p v}} \quad Q = \text{flow m}^3/\text{h} \quad \Delta p v = \text{pressure drop (kPa)}$$

Flow liquid with specific gravity different than 1 kg/dm<sup>3</sup> m<sup>3</sup>/h



Flow pressure drop kPa  
(100 kPa = 1 bar = -10m H<sub>2</sub>O)

Specific gravity

Example for fluids with specific gravity 1 kg/dm<sup>3</sup> (water)

**Flow** : 7.5 m<sup>3</sup>/h water

**Pressure Drop** : 55 kPa

- Locate the crossing point between the line with starting point at flow value 7.5 m<sup>3</sup>/h and the line at pressure drop value 55 kPa.

This point corresponds to flow coefficient Kvs 10, therefore control valve must have Kvs = 10.

Example for fluids with specific gravity different than 1 kg/dm<sup>3</sup>

**Flow** : 30 m<sup>3</sup>/h fluid with specific gravity 0.9 kg/dm<sup>3</sup>

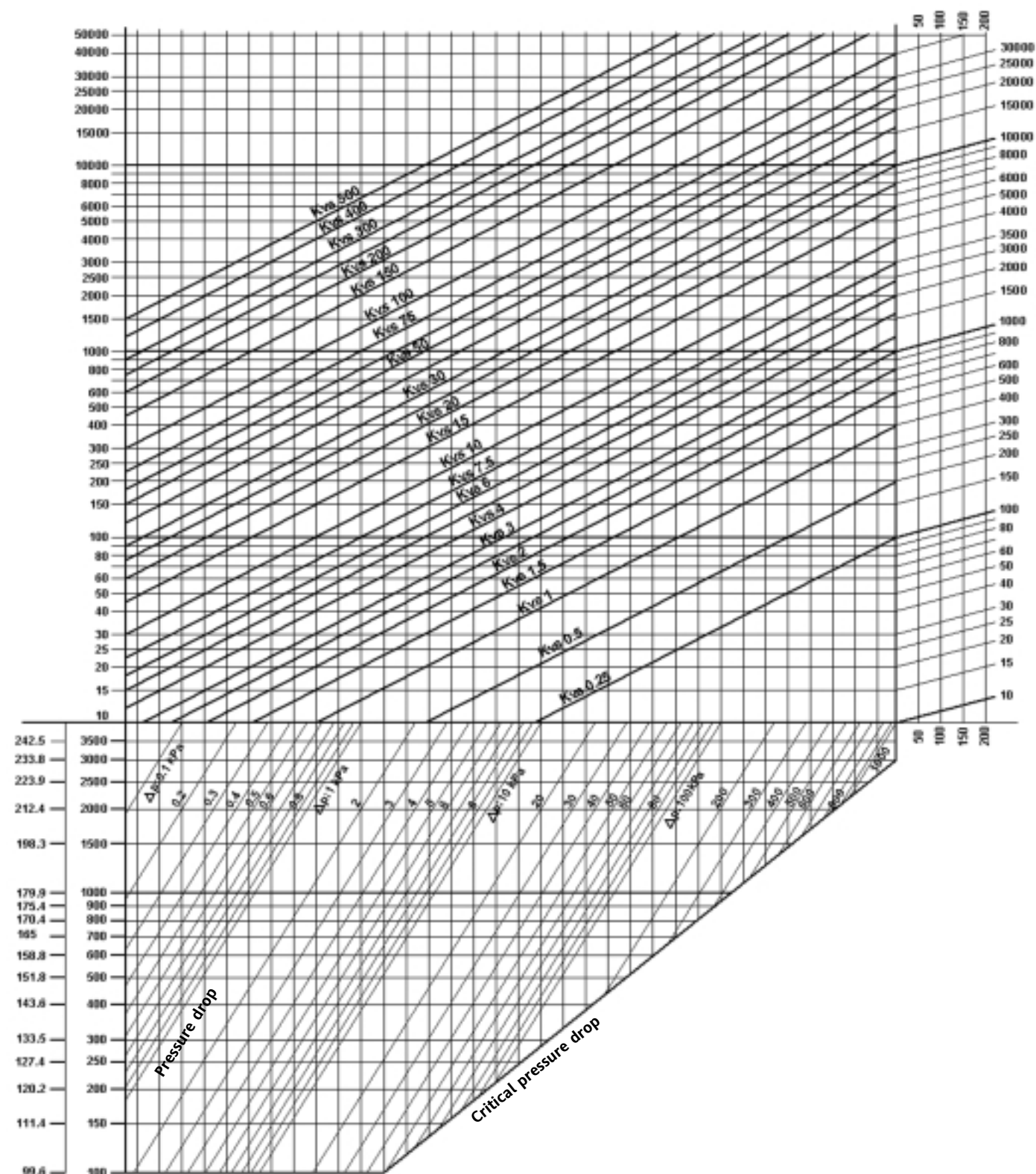
**Pressure Drop** : 20 kPa

- Locate the crossing point (right side of diagram) between the line with starting point at specific gravity value 0.9 kg/dm<sup>3</sup> and the sloping line at flow value 30 m<sup>3</sup>/h.

- Locate the crossing point between the line with starting point at above crossing point and the line at pressure drop value 20 kPa.

This point corresponds to flow coefficient Kvs 63, therefore control valve must have size Kvs = 63 (DN65).

**STEAM VALVE SIZING CHART**



Example for saturated steam:

- Flow** : 4700 kg/h saturated steam
- Absolute Inlet Pressure** : 850 kPa
- Pressure Drop** : 160 kPa

- Locate the crossing point between the line with starting point at absolute inlet pressure 850 kPa and the sloping line of 160 kPa pressure drop.
- Locate the crossing point between the line with starting point at above crossing point and the line of 4700 kg/h flow.

This point corresponds to flow coefficient Kv<sub>5</sub> 63, DN 65, therefore control valve must have size 65mm.

Example for superheated steam:

- Flow** : 140 kg/h superheated steam
- Absolute Inlet Pressure** : 350 kPa
- Temperature** : 209°C
- Pressure Drop** : 100 kPa

Calculate the superheating degree as follows:

- Read the temperature value corresponding to 350 kPa (139°C) Superheating degree – 209 – 139 = 70°C
- Locate the crossing point (right side of diagram) between the line with starting point at superheating 70°C and the sloping line of 140 kg/h flow.
- Locate the crossing point between the line with starting point at 350 kPa inlet pressure and the sloping line at 100 kPa pressure drop.
- Locate the crossing point between lines with starting points.

This point corresponds to flow coefficient Kv<sub>5</sub> 4.

**CONDITIONS OF SALE**

- 1. Definitions**  
"Seller" means Satchwell Control Systems Limited. "Purchaser" means any party to whom Goods and/or Software are supplied by the Seller. "Goods" means the products which are the subject of sale between the Purchaser and the Seller. "Software" means the software or programs included in the Goods or ordered for use with the Goods. "Order" means any contract for the sale of Goods and/or Software by the Seller to the Purchaser.
- 2. General**
  - a) Orders are accepted by the Seller subject to these terms and conditions and any special conditions, which together form the entire understanding between the parties, take precedence over any terms in the Purchaser's Order and supersede any previous agreements statements or representations for which the Seller can accept no liability, save in the case of fraudulent misrepresentation.
  - b) Unless otherwise stated quotations lapse 30 (thirty) days from the date they were made.
  - c) The Purchaser acknowledges that the Purchaser is not purchasing as a consumer.
- 3. Price**
  - a) Unless otherwise specified, the price and relevant discount (if any) for the Goods and/or Software shall be that ruling at date of despatch.
  - b) All prices are strictly net and are exclusive of VAT and of all non-UK taxes, duties and levies.
  - c) The Seller reserves the right to review all prices quoted for the Goods and/or Software in the event of devaluation of the pound sterling or fluctuation in rates of foreign exchange or the Euro.
- 4. Packing**  
Where special packing is ordered by the Purchaser, or is deemed necessary by the Seller, then the Seller will charge the Purchaser with the full cost of such special packing. Otherwise packing in accordance with the Seller's standard procedure is included in the product prices charged.
- 5. Limits of Contract**  
The Seller's acceptance of the Purchaser's Order includes only such Goods and/or Software as are specified in such acceptance.
- 6. Specifications**
  - a) The descriptions and illustrations contained in the Seller's catalogues, brochures, price lists and other advertising media are intended merely to present a general idea of the Goods and/or Software described therein and do not form part of any contract for sale of the Goods and/or Software and no responsibility is accepted by the Seller for any errors or omissions therein or for any loss and/or damage resulting from the Purchaser's reliance on such descriptions and illustrations.
  - b) Any performance figures given by the Seller are based upon the Seller's experience and are such as the Seller would expect to obtain on test in the Seller's works. The Seller shall be under no liability for damages for failure to attain such figures unless the Seller has guaranteed such performance figures in writing for the specific installation.
  - c) If the Goods and/or Software performance criteria obtained on any test is outside the guaranteed performance figures referred to in 6.b) above, then the Seller will be given reasonable time and opportunity to rectify the said performance requirements. Should the Seller fail to rectify the said performance requirements, then the Purchaser will be entitled to reject the Goods and/or Software within twelve months of the date of delivery unless agreed otherwise in writing by the Seller.
  - d) The Purchaser assumes responsibility that the Goods and/or Software stipulated by the Purchaser are sufficient and suitable for the Purchaser's intended purpose.
  - e) Unless expressly stated otherwise by the Seller, no responsibility is accepted by the Seller for any errors, omissions or other defects in any drawings, designs or specifications not prepared by the Seller. The Purchaser will indemnify the Seller against any and all liabilities and/or expenses so incurred by the Seller as a consequence of any such error, omission or other defect.
  - f) The Purchaser shall not copy, without the prior written consent of the Seller, any documentation supplied by the Seller.
  - g) All documentation supplied by the Seller shall remain at all times the property of the Seller.
- 7. Inspection and Tests**  
The Seller's products are carefully inspected and submitted to the Seller's standard tests at the Seller's works before despatch. If tests in the presence of the Purchaser or the Purchaser's representative are required, these will be charged for. In the event of any delay on the Purchaser's part in attending such tests or in carrying out any inspection required by the Purchaser after seven days notice that the Seller is ready, the tests will proceed in the Purchaser's absence and shall be deemed to have been made in the Purchaser's presence.
- 8. Despatch and Delivery**
  - a) Any times quoted for despatch will date from the Seller's acceptance of the Purchaser's written Order and where necessary the opening of an Irrevocable Letter of Credit.
  - b) Any dates given for despatch by the Seller are estimates only and will not involve the Seller in any liability for failure to despatch on any particular date or dates. In the event that the Seller shall fail to despatch the Goods and/or Software within 30 days of the estimated date, then the Purchaser shall be entitled to serve notice upon the Seller requiring the Seller to effect despatch within 30 days of receipt of such notice, failing which, the Purchaser may terminate the Order without further charge on either side.
  - c) If no delivery date is stated by the Purchaser then the Seller will deliver the Goods and/or Software within such reasonable period as the Seller shall determine.
  - d) The Purchaser's Order may be dispatched in instalments provided always that any such despatch will be deemed to be a separate contract governed by these Conditions of Sale.
  - e) Unless expressly stated otherwise by the Seller, the Seller's price includes the cost of delivery of the Goods and/or Software to an address or a carrier within the UK. The Purchaser shall state the point of delivery on the Order.
  - f) The Seller retains the right to select the method of carriage. Where the Purchaser orders any special carriage requirements, or these are deemed necessary by the Seller, then the Seller will charge the Purchaser for the full cost of such special carriage requirements.
  - g) Off-loading at the point of delivery shall in all circumstances be at the Purchaser's cost and risk unless otherwise agreed in writing by the Seller.
  - h) Any dimensions, weight or quantities of packing stated by the Seller are estimates only.
  - i) In the event that the Purchaser or carrier fails to accept delivery of the Goods and/or Software, the Purchaser shall on demand pay the Seller for and/or indemnify the Seller against any liabilities for all services provided or used by the Seller in consequence, including, but not limited to, insurance, storage or handling and the Seller shall have a lien over any such Goods and/or Software.
  - j) If the quantity of Goods and/or Software received by the Purchaser does not equate to the quantity of Goods and/or Software ordered, (or in the case of part-shipments the quantities advised by the Seller) then the Purchaser is required to notify the Seller in writing of the discrepancy within 7 calendar days of receipt of the Goods and/or Software. The Purchaser will not be entitled to reject any Goods and/or Software by reason of short delivery.
  - k) Should the Purchaser return Goods and/or Software which the Seller has dispatched in accordance with the terms and conditions of the Order without reason, then the Purchaser will pay a re-stocking charge to a maximum of 25% of the price of the Goods and/or Software so returned.
  - l) Time for delivery shall not be of the essence.
- 9. Loss or Damage in Transit**
  - a) The Seller will repair, or at the Seller's option replace, free of charge, Goods and/or Software lost or damaged up to the point of delivery provided that the Seller and the carriers receive written notification of such damage within three days of delivery, or if lost, within ten days from the date the Seller has acknowledged the Goods and/or Software will be dispatched. The Seller's obligations hereunder are in lieu of all other liabilities that might otherwise arise in respect of such loss or damage and its consequences.
  - b) The Purchaser will afford the Seller reasonable opportunity to inspect the Goods and/or Software alleged to be damaged, as and where delivered, should the Seller wish to do so.
- 10. Storage**  
If the Seller does not receive forwarding instructions sufficient to enable the Seller to despatch the Goods and/or Software within 14 days of the acknowledged despatch date, the Seller shall be entitled to arrange alternative storage facilities or re-allocate the Goods and/or Software at the Seller's sole discretion and any costs incurred by the Seller for storage, insurance or demurrage shall be charged to the Purchaser.
- 11. Risk**
  - a) Risk in the Goods and/or Software will pass to the Purchaser at the point of delivery.
  - b) It is a condition of the Order that both the Purchaser and the Seller shall individually effect and maintain adequate insurance cover in respect of the risks each party has accepted under these Conditions of Sale.
- 12. Title**
  - a) Title in the Goods (excluding Software) will not pass to the Purchaser until payment in full for the Goods has been received by the Seller. Until such time, the Purchaser's possession of the Goods shall be as bailee for the Seller and the Purchaser will store the Goods in a manner which enables the Goods to be clearly identified as the property of the Seller.
  - b) Notwithstanding 12(a) above: (i) If the Goods and/or Software are purchased for re-sale by the Purchaser in the normal course of the Purchaser's business, then the Purchaser may as agent for the Seller sell and deliver the Goods and/or Software to the third party strictly on condition that all proceeds of such sales shall be held in trust and in a separate account for the Seller until the time that full payment to the Seller has been effected. Until such time, the Seller reserves the option, on written notice to the Purchaser, to have assigned to the Seller, all rights and claims which the Purchaser may have against third parties arising from such sales. (ii) Should the Goods and/or Software be incorporated or combined with other items of equipment or materials by the Purchaser or others acting on his behalf, then the Seller shall retain the legal and beneficial title to the Goods and/or Software and the Purchaser agrees to store the Goods and/or Software so incorporated or combined in accordance with the provisions of 12(a) above or the Purchaser may re-sell such Goods and/or Software to a third party subject to the terms of 12(b)(i) above.
  - c) Should payment to the Seller for any Goods and/or Software become overdue, then the Seller reserves the right to repossess any such Goods and/or Software and to re-sell the same. For this purpose the Seller will grant the Seller's representative vehicular access, during normal business hours, to all or any of the premises used by the Purchaser for storing the Goods and/or Software.
  - d) Title in the Software will remain at all times vested in the Seller.
- 13. Terms of Payment**
  - a) Unless otherwise agreed in writing by the Seller payment in full for Goods and/or Software shall be received by the Seller at Farnham Road, Slough, Berkshire SL1 4UH, England prior to date of despatch. Payment will be made in pounds sterling unless

- agreed otherwise by the Seller and if made by cheque or other negotiable instrument, will not be effective until it is honoured and the Seller's bank account is credited with the amount due.
- b) Payment by the due date is the essence of every Order. Failure by the Purchaser to ensure payment is received by the Seller on or before the due date shall entitle the Seller without prejudice to any other rights or remedies which the Seller may possess: (i) to withhold further despatches under this and any other contract existing between the Seller and the Purchaser for the purchase of Goods and/or Software. (ii) to offset overdue monies against any sums which may be owed by the Seller to the Purchaser under any other contract. (iii) to charge interest at 8 percent above the Bank of England's base rate in accordance with The Late Payment of Commercial Debts (interest) Act 1998.
- c) Any payment made by the Purchaser to the Seller which has not been apportioned by the Purchaser to specific debts will be apportioned as the Seller believes to be correct.
- d) Credit facilities extended by the Seller to the Purchaser are at the sole discretion of the Seller and may be revised or withdrawn at any time without prior notification being provided to the Purchaser.
- 14. Defects after Delivery**
  - a) Unless expressly stated otherwise by the Seller, the Seller will make good, by repair or at the Seller's option by the supply of a replacement, defects which, under proper storage and use, appear in the Goods and/or Software within a period of twelve calendar months after the Goods and/or Software have been dispatched and which arise solely from faulty design (other than a design made, furnished or specified by the Purchaser for which the Seller has disclaimed responsibility in writing), materials or workmanship: provided always that defective parts have been returned to the Seller if the Seller shall have so required. The repaired or new parts will be delivered by the Seller free of charge as provided in condition 8 above.
  - b) In the case of Goods and/or Software not of the Seller's manufacture the Purchaser is entitled only to such benefits as the Seller may receive under guarantees given to the Seller in respect thereof, but not so as to impose on the Seller in respect of such parts or components a liability greater than that imposed upon the Seller by the preceding paragraph of this condition.
  - c) The Seller's liability under this condition 14, shall be in lieu of any warranty or condition implied by law as to the quality or fitness for any particular purpose of the Goods and/or Software, and save as provided in this condition 14, the Seller shall not be under any liability, whether in contract, tort or otherwise, in respect of defects in Goods and/or Software delivered or for any injury (other than personal injury caused by the Seller's negligence as defined in Section 1 of the Unfair Contract Terms Act, 1977), damage or loss resulting from such defects or from any work done in connection therewith.
- 15. Patents**  
The Seller will indemnify the Purchaser against any claim for infringement of Letters Patent, Registered Design, Trade Mark or Copyright (published at the date of the Order) by the use or sale of any article or material supplied by the Seller to the Purchaser and against all costs and damages which the Purchaser may incur in any action for such infringement or for which the Purchaser may become liable in any such action. Provided always that this indemnity shall not apply to any infringement which is due to the Seller having followed a design or instruction furnished or given by the Purchaser or to the use of such article or material in a manner or for a purpose or in a country not specified by or disclosed to the Seller, or to any infringement which is due to the use of such article or material in association or combination with any other article or material not supplied by the Seller. Provided also that this indemnity is conditional on the Purchaser giving to the Seller the earliest possible notice in writing of any claim being made or action threatened or brought against the Purchaser, the Purchaser not making any admission of liability and on the Purchaser permitting the Seller at the Seller's own expense to conduct any litigation that may ensue and all negotiations for a settlement of the claim. The Purchaser on his part warrants that any design or instruction furnished or given by the Purchaser shall not be such as will cause the Seller to infringe any Letters Patent, Registered Design, Trade Mark or Copyright in the execution of the Seller's order.
- 16. Liability**
  - a) Notwithstanding the provisions of condition 14, above, the Seller will not, in any circumstances, be liable to the Purchaser or a third party for any loss of use, loss of production, loss of reputation, loss of goodwill, loss of profit, loss of business, loss of contracts, loss of revenues, loss of anticipated savings, increase in operating costs, financial or economic loss, indirect loss, consequential loss or any other damage suffered.
  - b) Subject to condition 16 (c) below, the exclusions and limitations of liability set out in condition 16 (a) above will apply to all claims of any kind whether as a result of breach of contract, statutory duty or warranty, negligence or otherwise on the part of the Seller, its employees, agents, subcontractors or suppliers who will have no greater liability in relation to these Conditions of Sale than the Seller.
  - c) The Seller will compensate the Purchaser for any legal liability for personal injury to or death of any person or damage to any property to the extent that such personal injury or death or damage is caused by the negligence of the Seller or its employees or agents.
  - d) In the case of damage to property other than the Goods and/or Software supplied under these Conditions of Sale, such compensation will unless otherwise specified in these Conditions of Sale be limited to the value of Goods and/or Software ordered in respect of any one occurrence or series of occurrences originating from one incident.
  - e) The total aggregate liability of the Seller for all other claims of any kind for any loss or damage resulting from its performances or lack of performance under these Conditions of Sale in any twelve calendar month period will not in any event exceed an amount equal to the value of Orders accepted by the Seller from the Purchaser in that twelve calendar month period.
  - f) The Purchaser will indemnify the Seller against any and all claims in respect of or consequent to pollution or to the release of substances capable of causing harm to living organisms or interference with ecological systems arising from the Goods and/or Software except in respect of personal injury or death, whether or not resulting from the negligence of any person.
  - g) If the Purchaser is not the sole end user and ultimate owner of the Goods and/or Software, then the Purchaser will ensure by its contract with the end user or ultimate owner or its buyer that the Seller is given the benefit of the exclusions and limitations of liability set out in these Conditions of Sale by all such users, owners and buyers and will indemnify the Seller against claims of any kind by them to the extent that the Seller would not be liable to the Purchaser under these Conditions of Sale if the claim had been made by the Purchaser.
- 17. Force Majeure**  
Should the Seller be delayed, hindered or otherwise prevented from complying with the terms of the Order by reason of events or circumstances beyond the reasonable control of the Seller including but not limited to Acts of God, wars, riots, strikes, lockouts, trade disputes, fuel shortages or labour disturbances, breakdown of plant or machinery, accident, storm, fire, flood, difficulties in obtaining materials, transport or labour or any other circumstances affecting the supply of the Goods and/or Software, then the Seller shall not be liable to the Purchaser for any loss or damage which may be suffered by the Purchaser whether as a direct or indirect result of any such occurrences.
- 18. Software**  
All rights in the Software will remain at all times vested in the Seller. The Seller shall licence the Purchaser to use any Software that is specified in an Order on the terms set out in the Seller's applicable Software/Computer Program Licence Agreement provided with the Software. In the event that the Seller shall not have received payment in full for the Goods and/or Software to which the licence relates within 30 days of the due payment date then the Purchaser's right to use the Software pursuant to such Software/Computer Program Licence Agreement shall cease without further notice.
- 19. Cancellation**  
Should the Order be cancelled in whole or in part by the Purchaser prior to despatch of the Goods and/or Software then the Purchaser agrees to reimburse the Seller for all costs arising from design, manufacture, packing and storage of the Goods and/or Software and in addition shall pay compensation at a level of 20% of the Order value in respect of loss of profit, restocking and administrative charges. The rights of the Purchaser to cancel the Order under this condition are without prejudice to the rights of the Seller if such cancellation is executed vexatiously or otherwise amounts to a wrongful repudiation of the Order.
- 20. Licences**  
Should any licence or consent of any government or other authority be required for procurement, carriage or use of the Goods and/or Software by the Purchaser, then the Purchaser shall acquire the appropriate licence or consent at the Purchaser's own expense and if requested by the Seller, shall produce evidence of the same on demand. The failure of the Purchaser to obtain any necessary licence or consent will not entitle the Purchaser to withhold or delay payment of the purchase price beyond the due date. Should the Seller incur any additional direct or indirect expenses or charges resulting from the Purchaser's failure to obtain any necessary licence or consent, then these will be for the Purchaser's account.
- 21. Statutory and Other Regulations**  
If the cost to the Seller of performing the Seller's obligations under the Order shall be increased by reasons of the making or amendment of any law or of any other regulation or by-law having the force of law that shall affect the performance of the Seller's obligation under the Order, the amount of such increase shall be added to the Order price.
- 22. Insolvency**  
The Seller shall, without prejudice to any of its other rights, be entitled at any time to stop any Goods and/or Software in transit and/or suspend further deliveries or services and/or by notice in writing to the Purchaser determine the Order should the Purchaser become bankrupt, make a composition or arrangement with its creditors, have a winding up order made or (except for the purposes of amalgamation or reconstruction) a resolution for voluntary winding up passed or have a provisional liquidator, receiver or manager of his business or undertaking duly appointed or having possession taken, by or on behalf of the holders of any debentures secured by a floating charge.
- 23. Waiver**  
The failure by the Seller to exercise or enforce any rights under these Conditions of Sale shall not be deemed to be a waiver of any such rights, neither will it operate so as to prevent the exercise or enforcement of the Seller's right at any time or times thereafter.
- 24. Notices**  
Any notices given hereunder by the Seller or the Purchaser shall be deemed to have been duly given if sent to the last known address of either party, by first class post three days after despatch or, on the date of despatch if given by telefax, telex, telegraph or other electronic system of communication.
- 25. Contracts (Rights of Third Parties) Act 1999**  
The parties agree that no term or condition of these Conditions of Sale will be enforceable by virtue of the Contracts (Rights of Third Parties) Act 1999 by any third party.
- 26. Legal Construction**  
Unless otherwise agreed in writing the Order shall in all respects be construed and operate as an English contract and in conformity with English Law and is subject to the exclusive jurisdiction of the English Courts.