

3.	PRODUCTS	
3.1	Balancing and control valve with energy measuring capabilities	
	a)	Functional
	(1)	The control valves shall be capable of continuously measuring hydronic data (Flow, media's supply temperature, media's return temperature, power) via ultrasonic flow measurement technology.
	(2)	The control valves shall have different control modes, to choose between position control, flow control, power control.
	(3)	The valve and actuator shall be configurable via mobile application.
	(4)	The devices' control characteristic shall be adjustable from quick opening to equal percentage modified (EQM) characteristics electronically via a mobile application.
	(5)	Unless specified otherwise, the control valve shall be integrated with balancing valve function described below for a more compact installation.
	(6)	The valve shall be pressure independent (electronically) i.e variations of the available differential pressure will not affect the controlled flow/power.
	(7)	The valve shall have a pressure balanced cone to provide low force actuating.
	(8)	The valve shall have a minimum rangeability of 125 for all dimensions.
	(9)	The valve shall have a maximum leakage rate of 0.02% from at maximum differential pressure across the valve.
	(10)	The valve shall have a maximum differential pressure acceptable across the valve of 400kPa without noise issues. The close-off differential pressure shall not exceed 600kPa.
	(10)	The valve should have manual override modes, electrical override through an external device (for all dimensions) and mechanical override (for DN65-125).
	(11)	The detailed Full Hydronic Calculation which includes the calculation of available differential pressure for all the circuits / branches, minimum circuit pressure drops, location of the index circuit, pump head requirement and DPS location with setting, shall be provided by the valve manufacturer based on equipment selections with actual flow rates and pressure drops of heat exchangers and terminal coils, control valves, pipe lengths and sizes.
	b)	Installation and mounting
	(1)	The installation of the valve should be composed of maximum two components to reduce energy consumption, the balancing & control valve and an additional temperature sensor housing for minimizing installation costs and required space.

		(2)	The flow measuring and the balancing and control section should be contained in a unified casted body to reduce the total body length.
		(3)	The valves in sizes from 20mm to 50mm shall be mounted directly (0D) after inlet disturbances (pipe elbows, pipe restrictions, T-connections) and shall not require distances before next hydronic item in the circuit.
		(4)	The valves in sizes from 65mm to 125mm shall be mounted directly (5D) after inlet disturbances (pipe elbows, pipe restrictions, T-connections) and shall not require distances before next hydronic item in the circuit.
		(5)	The valves in sizes from 65mm to 125mm shall fit in F1 length (EN558).
		(6)	The control valve shall be supplied suitable matched and fully assembled by the control valve manufacturer, including a mounted actuator, two temperature sensors, a temperature sensor housing and a pre mounted control interface .
		(7)	Control valves shall be installed in accordance with the manufacturer's recommendations to ensure proper control.
		(8)	The control valve shall be capable of communicating installation error alerts (for instance wrong direction of flow) via BUS, Cloud system and mobile application.
		(9)	Enclosure protection class: Minimum IP 54.
	c)		Measuring accuracy
		(1)	<p>The valves shall be designed to monitor flow within flow accuracy requirements in all type of fluids at temperature from -10 to +110°C:</p> <ul style="list-style-type: none"> - ±5% accuracy in a range of 5% to 3% of valve maximum flow - ±3% accuracy in a range of 100% to 5% of valve maximum flow <p>External test reports should be provided to prove performances as measured on representative samples.</p>
		(2)	<p>The valves shall be designed to monitor flow within flow accuracy requirements in water at temperatures from -10 to +110°C:</p> <ul style="list-style-type: none"> - ±2% accuracy in a range of 100% to 5% of valve maximum flow <p>External test reports should be provided to prove performances as measured on representative samples.</p>
		(2)	The valves shall be capable of measuring flow up to minimum 150% of maximum set-able flow.
		(3)	The valves shall be capable of measuring the temperature according to SS/EN 60751 class AA.
		(4)	<p>The valve shall ensure a temperature difference accuracy:</p> <ul style="list-style-type: none"> - ±0.1 K @ $\Delta T = 6$ K (for cooling) - ±0.15 K @ $\Delta T = 10$ K (for heating) - ±0.2K @ $\Delta T = 20$ K (for heating)

		(5)	Immersion wells and necessary fittings for installation shall be provided.
	d)	Connectivity	
		(1)	The valve shall incorporate high level interface functionality with BAS via RS 485 Modbus/RTU, BACnet MS/TP or Ethernet Modbus/TCP and BACnet IP.
		(2)	The valve shall be capable of interacting wirelessly through BLE. The valve shall interface with a mobile application and be configurable through this device. The valve shall also be configurable via a web app through the local area network.
		(3)	The valve shall offer the possibility to connect to the manufacturer's cloud service.
		(4)	The valve shall provide the possibility to be controlled with 0(2)-10VDC or 0(4)-20mA.
		(5)	The valve should provide feedback through 0(2)-10VDC signal.
		(6)	The valve shall provide the ability to interact through a Micro-USB interface.
		(7)	The valve shall be capable of indicating mode, status, position, end position through LED signals.
		(8)	Actuator shall be able to trend and store data up to 32 days for samples at 1-2 min interval and 13 months for samples at maximum 2 hours interval. A super-fast logging should be provided on demand for 2-3 hours at every 10 seconds maximum
	e)	Material and Pressure Ratings:	
		(1)	Valves with thread connections in sizes from 20mm to 50mm shall be made in a dezincification resistant copper alloy with Brinell hardness of at least 130 and a body pressure rating of at least 25 bars at 150°C.
		(2)	Balancing valves with flange connections from 65mm to 125mm shall be made in ductile iron complying to EN 1563 for a body pressure rating of 16 bar and 25 bars.
		(3)	The valve shall be able to work in a temperature range of minus 10°C to 110°C.