IQ-MP Gateway

Version 4.009

28. apr. 2011

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Description

The IQ-MP Gateway is a communications module, which interfaces Belimo MP Bus Actuators and Trend BMS controllers.

The IQ-MP Gateway is compatible with all types of MP actuator, including VAV controllers, which provide additional information and controllability to that of the basic valve & damper actuators.

The range of compatible actuators includes:

- MP/MFT(2) Damper Actuators
- MP/MFT(2) Valve Actuators
- MP-VAV Controllers
- Window Ventilation Actuators (FLS)
- BF(G) Top-Line Fire Damper Actuators

All MP actuators have the facility to connect an analogue sensor or digital input onto the MP Bus. In addition to the information fed back from the actuator itself, the IQ-MP Gateway allows all connected sensor values to be written into the Trend outstation, effectively giving up to 8 additional inputs to the system without increasing the controller size.

The IQ-MP Gateway is suitable for use with both IQ2 and IQ3 series controllers.

Up to 4 IQ-MP Gateway can be connected together. Each IQ-MP Gateway's MP Bus can have 8 actuators and 8 sensors connected. All in all you can connect up to 32 actuators and 32 sensors to one Trend Controller.

Features

- Effectively increases point count on any outstation
- Greatly reduces field wiring – one MP Bus of 3 cores serves up to 8 actuators and 8 sensors.
- Provides enhanced functionality from actuators.
- Provides genuine positional feedback.
- Greatly reduces requirement for terminal connections within an MCC – 3 terminals are required for up to 8 actuators and 8 sensors, normally at least 48 connections.
- Simplifies field wiring reducing likelihood of errors.
- Provides error code status for all connected devices.
- Din rail mounting.
- Up to 4 IQ-MP Gateway can be connected to one Trend Controller.

MP Bus

The Belimo MP Bus is a proprietary network that can be used to connect up to 8 devices ; MP/MFT(2) damper & valve actuators and Belimo MP VAV controllers.

The same three core cable can be used for power and communications.

The speed of the MP Bus depends on the number of connected devices, but a complete cycle of all parameters for all devices is approximately 8 seconds.

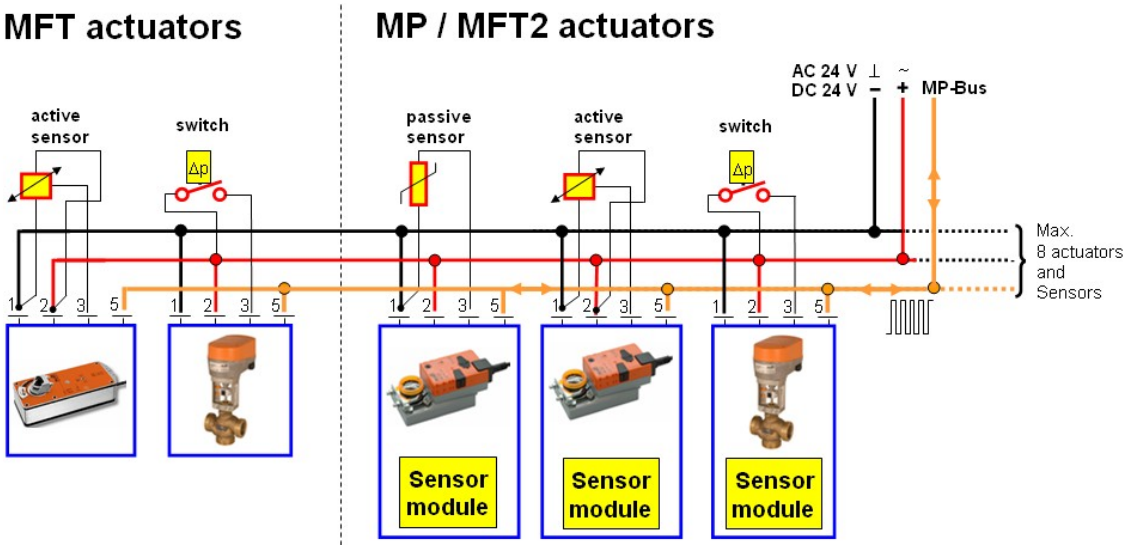
In using the IQ/MP Gateway from reading a sensor, allowing time for the controller to process the information then final movement of the actuator takes approximately 12 seconds.

Actuators

The Belimo MP/MFT(2) range of actuators provide enhanced functionality over conventional actuators, together with a far greater feedback of information that may be used by the control system to provide status and alarm information.

MFT Actuators can accommodate switch inputs or active sensors which have 24v power supply and 0-10v signal output. The actuators can accommodate a signal voltage input up to 32vdc

Additionally the MFT(2) range can also accommodate passive sensors, such as standard the Trend 10K NTC Thermistor range.
See the Belimo documentation for the complete compatibility guide.



Wiring

The diagram above shows the connections for each actuator on the MP network. The 24v supply (ac or dc) and the MP Bus connection are the same for any type of actuator, but different types of sensors or switches require different terminal connections as indicated.

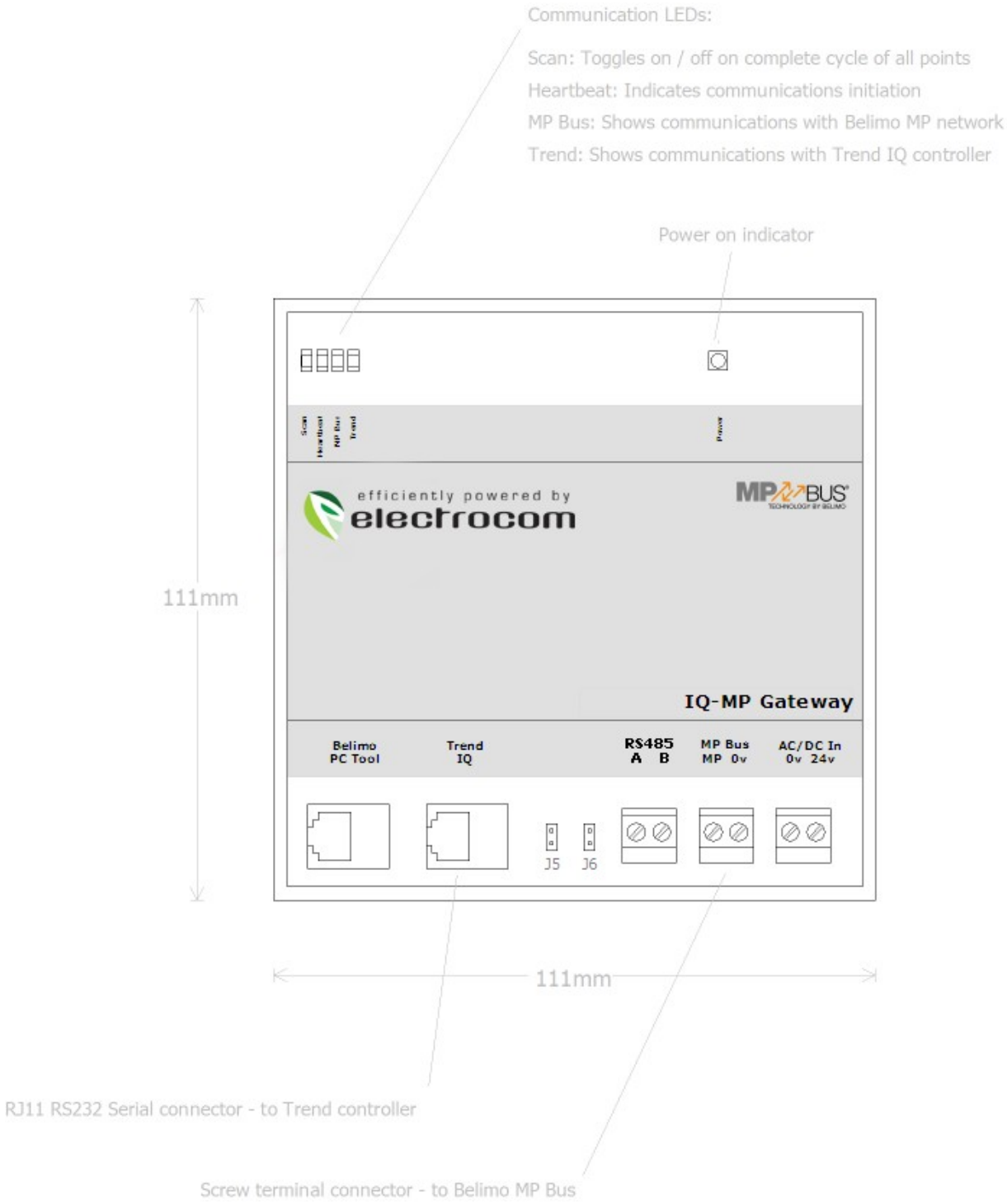
Note: It is not relevant which sensor is connected to which actuator. All control strategy is configured within the host IQ controller as per a conventional installation.

For convenience the nearest sensor may be connected to the nearest actuator.

Hardware

The IQ-MP Gateway is a DIN rail mountable module.
Connection to Trend IQ controllers is via a standard RJ11 communications cable (1m supplied).

A second RJ11 connector allows connection of a laptop computer running Belimo PC Tool software. This software may be used for configuration, addressing and fault diagnosis of the MP network.
LEDs are provided to show power and communications to each of the connected networks.



Data Transfer

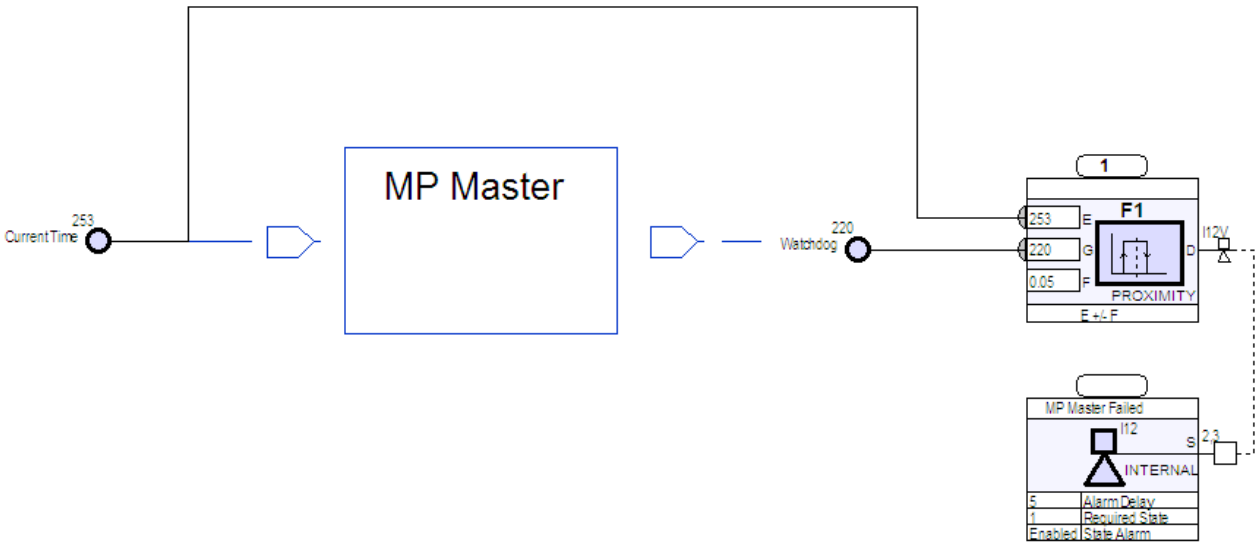
The Belimo MP Bus is capable of supporting 8 downstream devices.
These devices can be a mixture of Belimo MP/MFT(2) actuators and/or MP-VAV controllers.

The IQ-MP Gateway reads from and writes to analogue nodes within the connected IQ controller.
The number of data points transferred for each device depends on the nature of the connected devices, but nodes within the connected Trend IQ controller are reserved for the maximum possible number of transferred data points. A table of reserved nodes is shown later in this document.

It should be noted that when using the IQ3 range of controllers it is necessary to create these analogue nodes within the SET strategy. **It is necessary to create all the relevant nodes within the IQ3 strategy whether they are used or not.**

With IQ2 controllers, some of the nodes used are conventionally outputs from function modules. This does not apply in the case of IQ21x series controllers, which only accommodate 40 function modules. The IQ22x series controllers accommodate up to 90 function modules, and so the IQ-MP Gateway uses some nodes from the higher modules' destinations. Controllers above this size will have function modules that could write to all the reserved nodes.

If actuators corresponding to these nodes are installed then great care should be taken when writing the software strategy not to use these nodes other than for intentional actuator commands.



Communications Watchdog

In order to ensure that the IQ-MP Gateway is functioning at all times a 'watchdog' facility is provided.
The IQ-MP Gateway reads the current time (analogue node 253) from the host IQ and writes it back to analogue node 220. By adding the above strategy an alarm can be provided to show failure of the IQ-MP Gateway.

With IQ3 controllers it is necessary to write the 'current time' node to analogue node 253 within the IQ strategy.

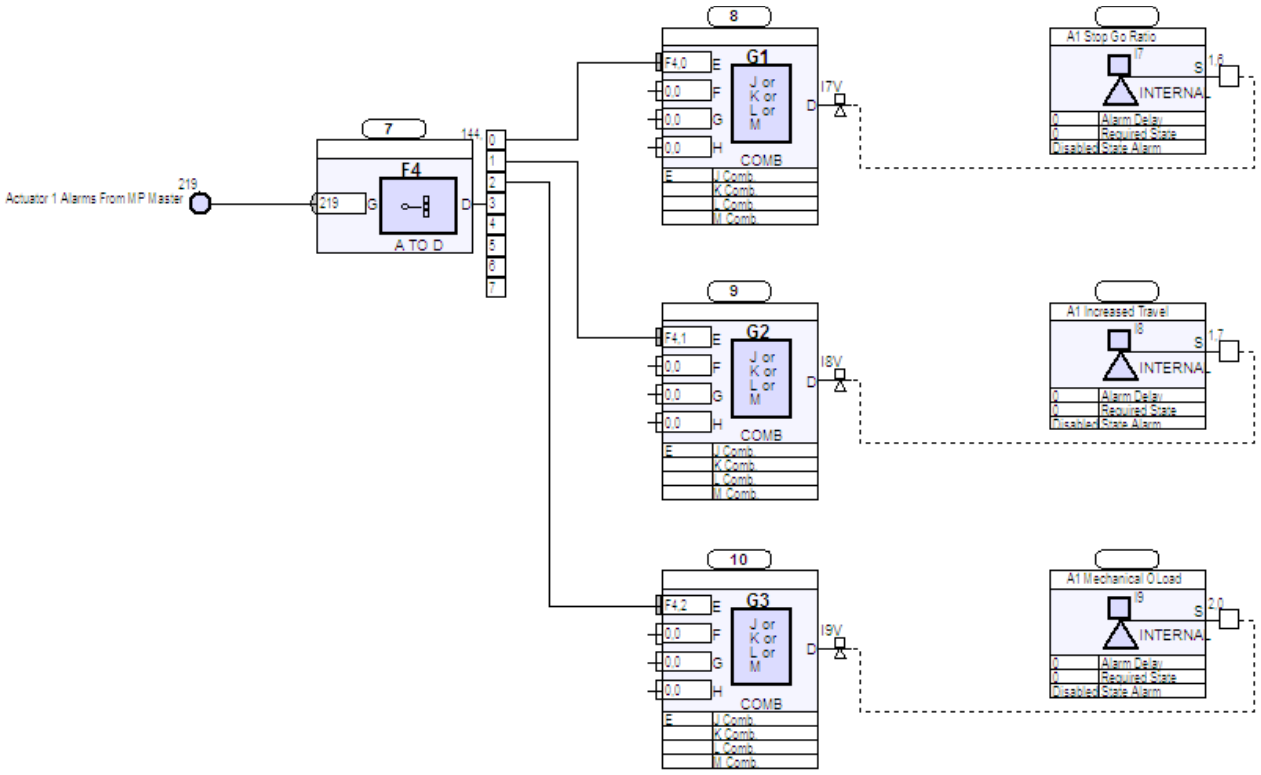
The example shown will instigate an alarm should the outstation time and the IQ-MP Gateway time differ by 5 minutes. In order to prevent the alarm from being transmitted spuriously at midnight a delay of 5 minutes has been added to the internal alarm point.

This strategy proves the operation of the IQ-MP Gateway itself. To prove that the MP bus is actually functioning the IQ-MP Gateway writes values of –99 to any nodes that correspond to actuators that are not responding to communications requests.

Actuator Alarms

As all transferred values are via analogue nodes, analogue to digital converters should be employed within the IQ strategy to convert the three digital alarms – stop/go ratio, increased travel and mechanical overload – from an analogue value to three internal digital inputs.

These can then be used to generate alarms. If internal digital inputs are scarce, then alternatively a common fault could be provided.



Stop Go Ratio is an internal alarm from the actuator. This is the ratio of time that the actuator has been travelling over the time that it has been powered up. This alarm indicates that the actuator has been 'hunting' or that the control strategy may need tuning.

Increased Travel is an alarm that is generated if the actuator, having gone through the self stroking – or adaption – process is subsequently seen to travel past the stops determined during the stroking procedure. This alarm usually meand that the actuator has been removed from the valve body or damper assembly.

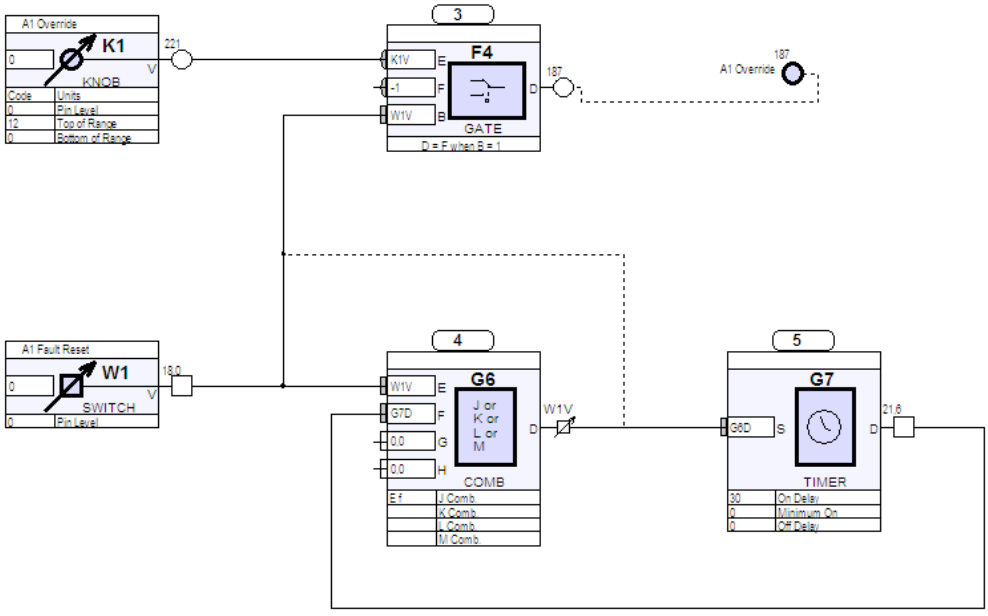
The Mechanical Overload alarm occurs when the actuator requires more torque than anticipated to move the connected mechanical device – i.e. valve or damper. This alarm provides a very effective early warning of mechanical seizure.

Any alarm that should occur will require resetting by means of the Actuator Override node. Following resolution of the problem that caused the alarm setting the override node to –1 will reset the alarm. Note that the override node must subsequently be reset back to its previous state for automatic control to resume.

Actuator Override

The actuator override node may be set within the Trend outstation control strategy to carry out the following functions:

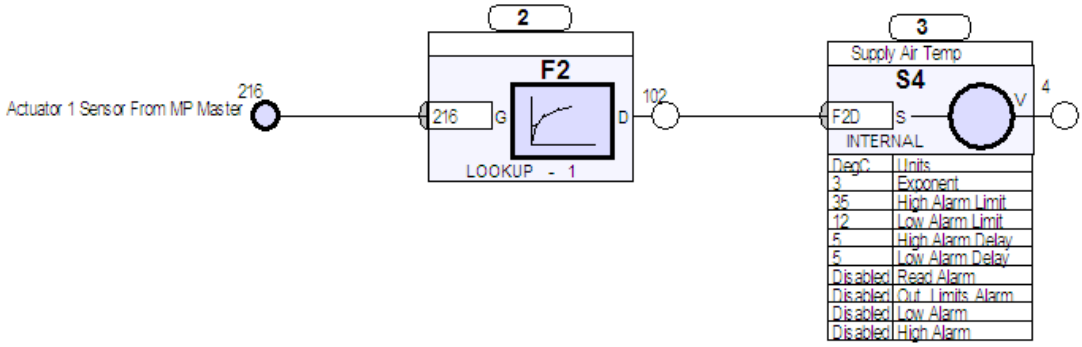
0 Automatic operation (as dictated by the corresponding setpoint node)
1 Open
2 Close
3 Max Position:
   a. On standard actuators a maximum position may be configured using the Belimo PC Tool MFT-P.
   b. On MP-VAV Controllers this will send the VAV box to its V max setting.
4 Min Position – As for 3
5 Mid Position – As for 3
6 Not Used
7 100% of adapted control range or nominal volumetric flow.
8 Fast Close
9 Fast Open
10 Stop
-1 Fault Reset (Not for Fire Dampeners)

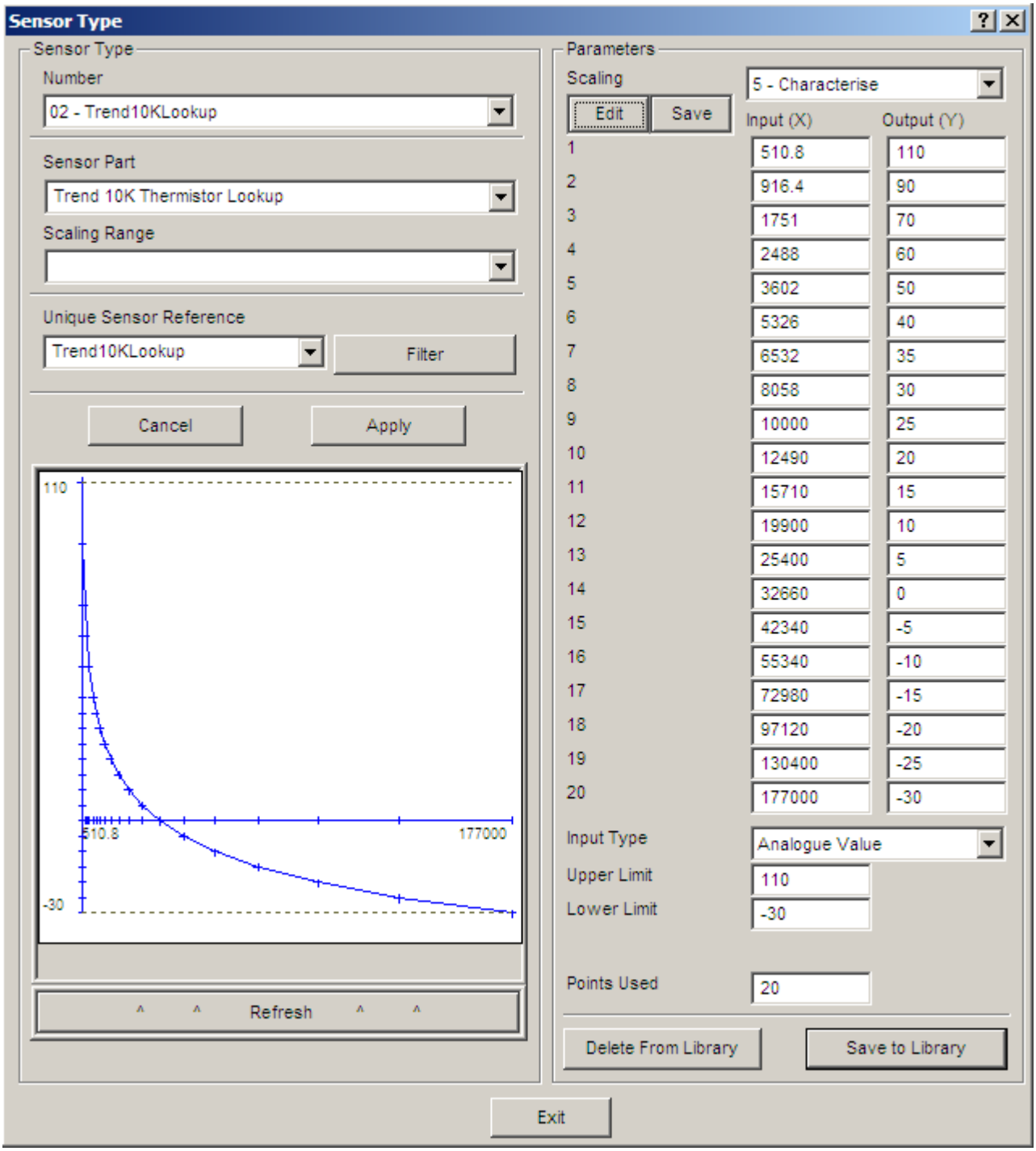


Sensor Values

Many types of sensor may be connected to the MP/MFT(2) Type actuators. In addition to switches and 0-10v sensors the MFT(2) range will accommodate NTC Thermistor sensors in the range 1k – 20k and PT or NI 1000 passive sensors. The IQ-MP Gateway must be configured to recognise the nature of the sensor connected to the auxiliary input. This is carried out by use of two analogue nodes within the host IQ controller. For details please see the commissioning section of this document.

The IQ-MP Gateway – after configuration – will return a value from each actuator's connected sensor. If configured as a 0-10v input then the value sent to the appropriate analogue node will be in the order of 0-10. Similarly if the connected sensor is an NTC thermistor then the value returned will be in the order of 0 – 60,000 ( ). In each case the returned value will usually require conversion into a meaningful sensor value by passing it through a lookup module within the Trend strategy.





Example sensor scaling: Trend 10k NTC Thermistor range.

Note that the input type is an analogue value, as the scaling is used in a function lookup table, not as an actual sensor type.
The input value, received from the IQ-MP Gateway is an ohmic value.

Installation

The IQ-MP Gateway is Din rail mountable. It is usually mounted within an MCC or BMS control panel, adjacent to the IQ controller.

The IQ-MP Gateway communicates with the IQ controller via an RJ11 cable (supplied) connected to the IQ supervisor port. The RJ11 connection is the standard cable used by Trend for connecting RDs and SDUs to the IQ controller.

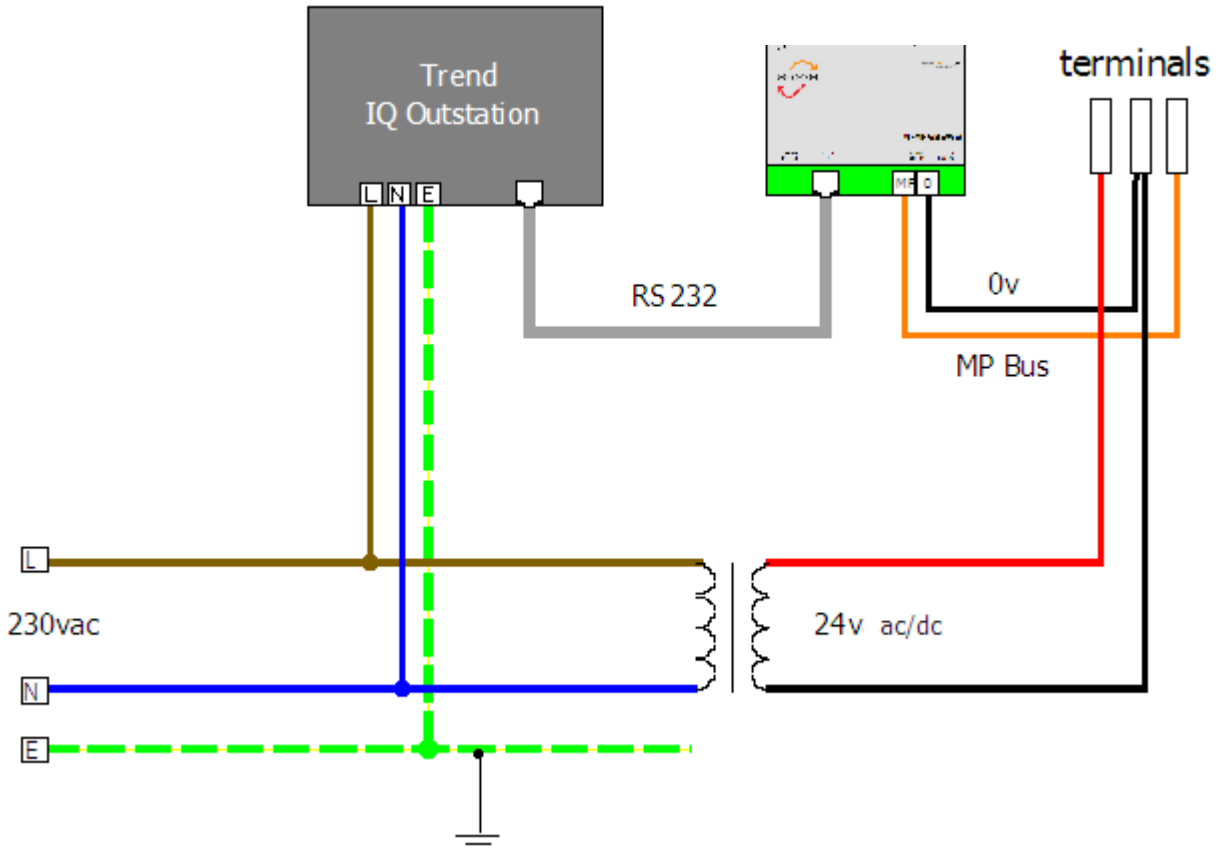
The MP bus power is 24v ac or dc. The 0v or negative terminal of the power supply must be linked to the 0v or Gnd connection of the IQ-MP Gateway.

Addressing

All devices on the MP Bus require a network address in the order 1 - 8. Actuators provided by Xecom can be ordered pre-addressed and can simply be connected to the MP bus network. The device address is indicated on a label on each MP actuator.

Basic addressing can be carried put directly from the IQ-MP Gateway. By placing a jumper on J6 the Gateway enters auto-addressing mode. LED B will then flash for a few seconds whilst the Gateway scans the network. LED D will then flash a number of times representing the next available address number. The appropriate actuator ID Button should then be operated (either override pushbutton or L/R selector - See Belimo documentation). Remove J6 following addressing.

Alternatively MP actuators may be addressed by using the IQ-MP Gateway in conjunction with the Belimo PC-Tool MFT-P. The PC-Tool MFT-P and a Tool Cable are both available from ElectroCom.
To use the Gateway in PC-Tool mode apply a jumper on J5. This must be removed before normal control is resumed.



Typical Wiring Within an MCC or Control Panel

Connecting 4 IQ-MP Gateways

Up to 4 IQ-MP Gateways can be connected to one host IQ controller. This makes it possible to connect 4 individual MP Bus to one host IQ controller which gives a total of 32 actuators and 32 sensors.

The IQ-MP Gateways are connected together in a Master/Slave system. The IQ-MP Gateway Master is connected to the host IQ controller and the IQ-MP Gateway Slaves are connected to the Master.

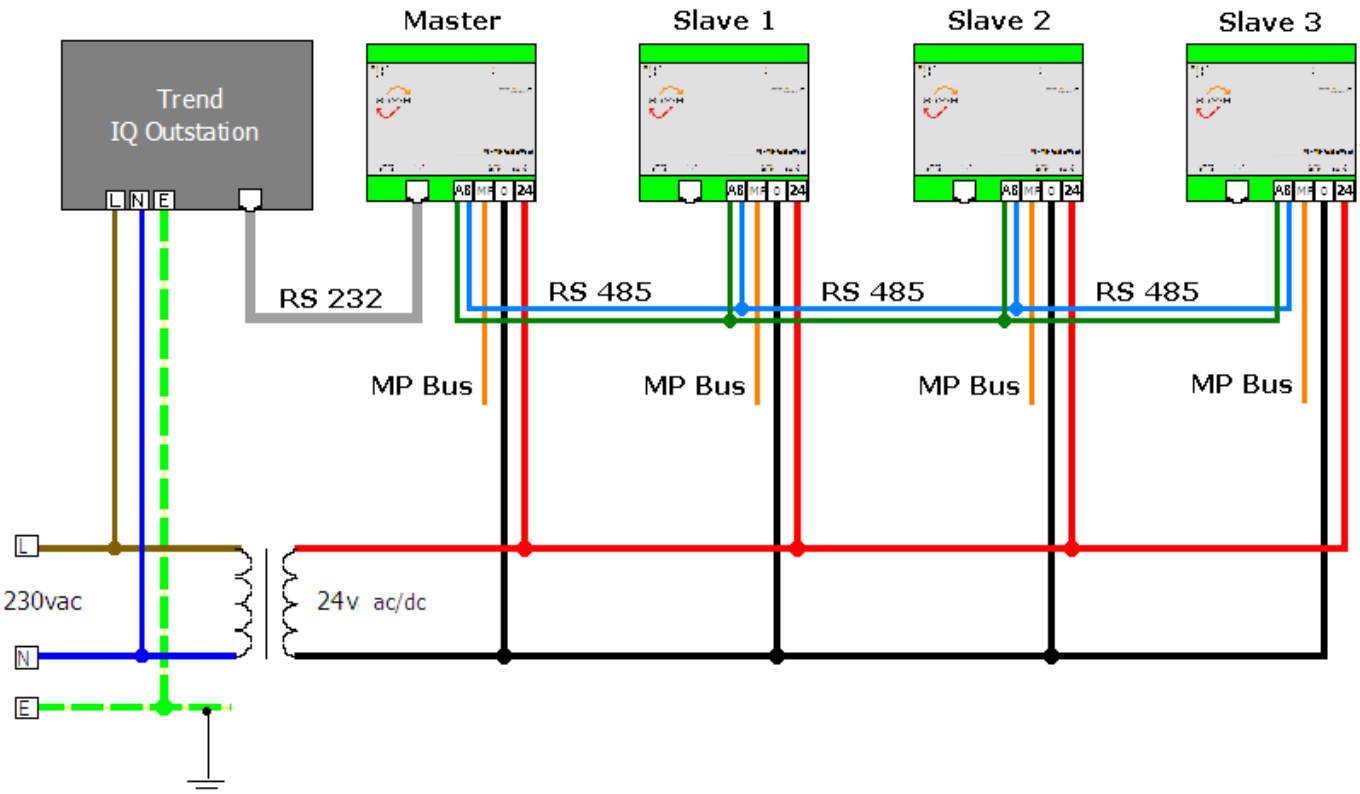
The IQ-MP Gateways are connected together with a RS485 connection. RS485 consist of an A line and a B line. All the A lines for the Master and Slaves are wired together in a parallel connection. The same is done for line B.

In the figure below it is shown how to connect the Master and Slaves via the RS485 communication.

The IQ-MP Gateway Master can be connected to host IQ controller alone without any IQ-MP Gateway Slaves. The IQ-MP Gateway Slaves do not work without the Master.

Which IQ-MP Gateway units are needed for a project depends on how many Belimo MP Bus Actuators will be connected to a host IQ controller.

Actuators	**IQ-MP Gateways**
1 to 8	Master
9 to 16	Master + Slave1
17 to 24	Master + Slave1 + Slave2
25 to 32	Master + Slave1 + Slave2 + Slave3



Setup Slave Number

It is possible to manually setup the Slave number for a IQ-MP Gateway – Slave.
The Slave number can be 1, 2 or 3.
The slave number is setup in this order of instructions:

1. Turn OFF the IQ-MP Gateway – Slave.

2. Place jumpers on Jumper 5 and Jumper 6 pins.

3. Turn ON the IQ-MP Gateway – Slave.

4. The LEDs will turn ON / OFF showing either 1, 2 or 3 LEDs turned ON.
    - Changing every 7th second.

5. Remove the jumpers from Jumper 5 and 6 pins.
    - The slave number will be equal to the amount of LEDs turned ON.

6. The LEDs will turn OFF for 1 second and then show the new Slave number with the LEDs.

Master - IQ Node Reference Table

Actuator	IQ Analogue Node	Point Description	Direction		Range	Notes
			From	To		
No.1 - No.4	170	Configuration Node - Sensor Selection A1 - A4	Trend	MP Bus	50000-55555	
No.5 - No.8	171	Configuration Node - Sensor Selection A5 - A8	Trend	MP Bus	50000-55555	
No.8	172	Command	Trend	MP Bus	0-100%	
	173	Override	Trend	MP Bus	0-10	
No.7	174	Command	Trend	MP Bus	0-100%	
	175	Override	Trend	MP Bus	0-10	
No.6	176	Command	Trend	MP Bus	0-100%	
	177	Override	Trend	MP Bus	0-10	
No.5	178	Command	Trend	MP Bus	0-100%	
	179	Override	Trend	MP Bus	0-10	
No.4	180	Command	Trend	MP Bus	0-100%	
	181	Override	Trend	MP Bus	0-10	
No.3	182	Command	Trend	MP Bus	0-100%	
	183	Override	Trend	MP Bus	0-10	
No.2	184	Command	Trend	MP Bus	0-100%	
	185	Override	Trend	MP Bus	0-10	
No.1	186	Command	Trend	MP Bus	0-100%	
	187	Override	Trend	MP Bus	0-10	
No.8	188	Sensor	MP Bus	Trend	0-65000	
	189	Volume	MP Bus	Trend	0-100%	VAV Only
	190	Angle	MP Bus	Trend	0-100%	
	191	Error Code	MP Bus	Trend	0-11000	
No.7	192	Sensor	MP Bus	Trend	0-65000	
	193	Volume	MP Bus	Trend	0-100%	VAV Only
	194	Angle	MP Bus	Trend	0-100%	
	195	Error Code	MP Bus	Trend	0-11000	
No.6	196	Sensor	MP Bus	Trend	0-65000	
	197	Volume	MP Bus	Trend	0-100%	VAV Only
	198	Angle	MP Bus	Trend	0-100%	
	199	Error Code	MP Bus	Trend	0-11000	
No.5	200	Sensor	MP Bus	Trend	0-65000	
	201	Volume	MP Bus	Trend	0-100%	VAV Only
	202	Angle	MP Bus	Trend	0-100%	
	203	Error Code	MP Bus	Trend	0-11000	
No.4	204	Sensor	MP Bus	Trend	0-65000	
	205	Volume	MP Bus	Trend	0-100%	VAV Only
	206	Angle	MP Bus	Trend	0-100%	
	207	Error Code	MP Bus	Trend	0-11000	
No.3	208	Sensor	MP Bus	Trend	0-65000	
	209	Volume	MP Bus	Trend	0-100%	VAV Only
	210	Angle	MP Bus	Trend	0-100%	
	211	Error Code	MP Bus	Trend	0-11000	
No.2	212	Sensor	MP Bus	Trend	0-65000	
	213	Volume	MP Bus	Trend	0-100%	VAV Only
	214	Angle	MP Bus	Trend	0-100%	
	215	Error Code	MP Bus	Trend	0-11000	
No.1	216	Sensor	MP Bus	Trend	0-65000	
	217	Volume	MP Bus	Trend	0-100%	VAV Only
	218	Angle	MP Bus	Trend	0-100%	
	219	Error Code	MP Bus	Trend	0-11000	
Common	220	Watchdog - Time Node 253	Trend	Trend	0-23.59	Comms Watchdog

Slave 1 - IQ Node Reference Table

Actuator	IQ Analogue Node	Point Description	Direction		Range	Notes
			From	To		
No.1 - No.4	119	Configuration Node - Sensor Selection A1 - A4	Trend	MP Bus	50000-55555	
No.5 - No.8	120	Configuration Node - Sensor Selection A5 - A8	Trend	MP Bus	50000-55555	
No.8	121	Command	Trend	MP Bus	0-100%	
	122	Override	Trend	MP Bus	0-10	
No.7	123	Command	Trend	MP Bus	0-100%	
	124	Override	Trend	MP Bus	0-10	
No.6	125	Command	Trend	MP Bus	0-100%	
	126	Override	Trend	MP Bus	0-10	
No.5	127	Command	Trend	MP Bus	0-100%	
	128	Override	Trend	MP Bus	0-10	
No.4	129	Command	Trend	MP Bus	0-100%	
	130	Override	Trend	MP Bus	0-10	
No.3	131	Command	Trend	MP Bus	0-100%	
	132	Override	Trend	MP Bus	0-10	
No.2	133	Command	Trend	MP Bus	0-100%	
	134	Override	Trend	MP Bus	0-10	
No.1	135	Command	Trend	MP Bus	0-100%	
	136	Override	Trend	MP Bus	0-10	
No.8	137	Sensor	MP Bus	Trend	0-65000	
	138	Volume	MP Bus	Trend	0-100%	VAV Only
	139	Angle	MP Bus	Trend	0-100%	
	140	Error Code	MP Bus	Trend	0-11000	
No.7	141	Sensor	MP Bus	Trend	0-65000	
	142	Volume	MP Bus	Trend	0-100%	VAV Only
	143	Angle	MP Bus	Trend	0-100%	
	144	Error Code	MP Bus	Trend	0-11000	
No.6	145	Sensor	MP Bus	Trend	0-65000	
	146	Volume	MP Bus	Trend	0-100%	VAV Only
	147	Angle	MP Bus	Trend	0-100%	
	148	Error Code	MP Bus	Trend	0-11000	
No.5	149	Sensor	MP Bus	Trend	0-65000	
	150	Volume	MP Bus	Trend	0-100%	VAV Only
	151	Angle	MP Bus	Trend	0-100%	
	152	Error Code	MP Bus	Trend	0-11000	
No.4	153	Sensor	MP Bus	Trend	0-65000	
	154	Volume	MP Bus	Trend	0-100%	VAV Only
	155	Angle	MP Bus	Trend	0-100%	
	156	Error Code	MP Bus	Trend	0-11000	
No.3	157	Sensor	MP Bus	Trend	0-65000	
	158	Volume	MP Bus	Trend	0-100%	VAV Only
	159	Angle	MP Bus	Trend	0-100%	
	160	Error Code	MP Bus	Trend	0-11000	
No.2	161	Sensor	MP Bus	Trend	0-65000	
	162	Volume	MP Bus	Trend	0-100%	VAV Only
	163	Angle	MP Bus	Trend	0-100%	
	164	Error Code	MP Bus	Trend	0-11000	
No.1	165	Sensor	MP Bus	Trend	0-65000	
	166	Volume	MP Bus	Trend	0-100%	VAV Only
	167	Angle	MP Bus	Trend	0-100%	
	168	Error Code	MP Bus	Trend	0-11000	
Common	169	Watchdog - Time Node 253	Trend	Trend	0-23.59	Comms Watchdog

Slave 2 - IQ Node Reference Table

Actuator	IQ Analogue Node	Point Description	Direction		Range	Notes
			From	To		
No.1 - No.4	68	Configuration Node - Sensor Selection A1 - A4	Trend	MP Bus	50000-55555	
No.5 - No.8	69	Configuration Node - Sensor Selection A5 - A8	Trend	MP Bus	50000-55555	
No.8	70	Command	Trend	MP Bus	0-100%	
	71	Override	Trend	MP Bus	0-10	
No.7	72	Command	Trend	MP Bus	0-100%	
	73	Override	Trend	MP Bus	0-10	
No.6	74	Command	Trend	MP Bus	0-100%	
	75	Override	Trend	MP Bus	0-10	
No.5	76	Command	Trend	MP Bus	0-100%	
	77	Override	Trend	MP Bus	0-10	
No.4	78	Command	Trend	MP Bus	0-100%	
	79	Override	Trend	MP Bus	0-10	
No.3	80	Command	Trend	MP Bus	0-100%	
	81	Override	Trend	MP Bus	0-10	
No.2	82	Command	Trend	MP Bus	0-100%	
	83	Override	Trend	MP Bus	0-10	
No.1	84	Command	Trend	MP Bus	0-100%	
	85	Override	Trend	MP Bus	0-10	
No.8	86	Sensor	MP Bus	Trend	0-65000	
	87	Volume	MP Bus	Trend	0-100%	VAV Only
	88	Angle	MP Bus	Trend	0-100%	
	89	Error Code	MP Bus	Trend	0-11000	
No.7	90	Sensor	MP Bus	Trend	0-65000	
	91	Volume	MP Bus	Trend	0-100%	VAV Only
	92	Angle	MP Bus	Trend	0-100%	
	93	Error Code	MP Bus	Trend	0-11000	
No.6	94	Sensor	MP Bus	Trend	0-65000	
	95	Volume	MP Bus	Trend	0-100%	VAV Only
	96	Angle	MP Bus	Trend	0-100%	
	97	Error Code	MP Bus	Trend	0-11000	
No.5	98	Sensor	MP Bus	Trend	0-65000	
	99	Volume	MP Bus	Trend	0-100%	VAV Only
	100	Angle	MP Bus	Trend	0-100%	
	101	Error Code	MP Bus	Trend	0-11000	
No.4	102	Sensor	MP Bus	Trend	0-65000	
	103	Volume	MP Bus	Trend	0-100%	VAV Only
	104	Angle	MP Bus	Trend	0-100%	
	105	Error Code	MP Bus	Trend	0-11000	
No.3	106	Sensor	MP Bus	Trend	0-65000	
	107	Volume	MP Bus	Trend	0-100%	VAV Only
	108	Angle	MP Bus	Trend	0-100%	
	109	Error Code	MP Bus	Trend	0-11000	
No.2	110	Sensor	MP Bus	Trend	0-65000	
	111	Volume	MP Bus	Trend	0-100%	VAV Only
	112	Angle	MP Bus	Trend	0-100%	
	113	Error Code	MP Bus	Trend	0-11000	
No.1	114	Sensor	MP Bus	Trend	0-65000	
	115	Volume	MP Bus	Trend	0-100%	VAV Only
	116	Angle	MP Bus	Trend	0-100%	
	117	Error Code	MP Bus	Trend	0-11000	
Common	118	Watchdog - Time Node 253	Trend	Trend	0-23.59	Comms Watchdog

Slave 3 - IQ Node Reference Table

Actuator	IQ Analogue Node	Point Description	Direction		Range	Notes
			From	To		
No.1 - No.4	17	Configuration Node - Sensor Selection A1 - A4	Trend	MP Bus	50000-55555	
No.5 - No.8	18	Configuration Node - Sensor Selection A5 - A8	Trend	MP Bus	50000-55555	
No.8	19	Command	Trend	MP Bus	0-100%	
	20	Override	Trend	MP Bus	0-10	
No.7	21	Command	Trend	MP Bus	0-100%	
	22	Override	Trend	MP Bus	0-10	
No.6	23	Command	Trend	MP Bus	0-100%	
	24	Override	Trend	MP Bus	0-10	
No.5	25	Command	Trend	MP Bus	0-100%	
	26	Override	Trend	MP Bus	0-10	
No.4	27	Command	Trend	MP Bus	0-100%	
	28	Override	Trend	MP Bus	0-10	
No.3	29	Command	Trend	MP Bus	0-100%	
	30	Override	Trend	MP Bus	0-10	
No.2	31	Command	Trend	MP Bus	0-100%	
	32	Override	Trend	MP Bus	0-10	
No.1	33	Command	Trend	MP Bus	0-100%	
	34	Override	Trend	MP Bus	0-10	
No.8	35	Sensor	MP Bus	Trend	0-65000	
	36	Volume	MP Bus	Trend	0-100%	VAV Only
	37	Angle	MP Bus	Trend	0-100%	
	38	Error Code	MP Bus	Trend	0-11000	
No.7	39	Sensor	MP Bus	Trend	0-65000	
	40	Volume	MP Bus	Trend	0-100%	VAV Only
	41	Angle	MP Bus	Trend	0-100%	
	42	Error Code	MP Bus	Trend	0-11000	
No.6	43	Sensor	MP Bus	Trend	0-65000	
	44	Volume	MP Bus	Trend	0-100%	VAV Only
	45	Angle	MP Bus	Trend	0-100%	
	46	Error Code	MP Bus	Trend	0-11000	
No.5	47	Sensor	MP Bus	Trend	0-65000	
	48	Volume	MP Bus	Trend	0-100%	VAV Only
	49	Angle	MP Bus	Trend	0-100%	
	50	Error Code	MP Bus	Trend	0-11000	
No.4	51	Sensor	MP Bus	Trend	0-65000	
	52	Volume	MP Bus	Trend	0-100%	VAV Only
	53	Angle	MP Bus	Trend	0-100%	
	54	Error Code	MP Bus	Trend	0-11000	
No.3	55	Sensor	MP Bus	Trend	0-65000	
	56	Volume	MP Bus	Trend	0-100%	VAV Only
	57	Angle	MP Bus	Trend	0-100%	
	58	Error Code	MP Bus	Trend	0-11000	
No.2	59	Sensor	MP Bus	Trend	0-65000	
	60	Volume	MP Bus	Trend	0-100%	VAV Only
	61	Angle	MP Bus	Trend	0-100%	
	62	Error Code	MP Bus	Trend	0-11000	
No.1	63	Sensor	MP Bus	Trend	0-65000	
	64	Volume	MP Bus	Trend	0-100%	VAV Only
	65	Angle	MP Bus	Trend	0-100%	
	66	Error Code	MP Bus	Trend	0-11000	
Common	67	Watchdog - Time Node 253	Trend	Trend	0-23.59	Comms Watchdog

Commissioning

Before initial power-up all devices should be checked for correct terminations. It should be noted that different types of sensor or switch should be connected as shown earlier in this document.

On power up the IQ-MP Gateway waits for approximately 10 seconds before attempting to establish communications with either the MP network or the host IQ controller. This is in order to allow the systems time to initialise. The gateway then polls the IQ controller for information as to the nature of the sensors connected to each actuator on the network and sends this information to each relevant actuator. This is described in more detail in the configuration section of this document.

Following power up of the system the IQ-MP Gateway reads the time of day node (253) from the host IQ controller and writes it back into analogue node 220 for the IQ-MP Gateway Master. After initial connection analogue node 220 should be checked to see if it represents the time of day. This will confirm that the IQ-MP Gateway Master is functioning.

Note: values will not be transferred whilst the Trend outstation is in configuration mode. It is recommended that commissioning is carried out using live SET.

Note: It is not relevant which sensor is connected to which actuator. All control functions are carried out within the host IQ controller as with a conventional installation.
Sensors may be wired to the most convenient actuator and then used within the IQ control strategy.

Configuration

The IQ-MP Gateway requires very little configuration. The configuration is carried out within the host IQ controller by altering values of free analogue nodes. For each IQ-MP Gateway there are two analogue nodes which are reserved within the host Trend controller strategy to in order to configure IQ-MP Gateway. On initialisation of the Gateway these nodes are read from the Host IQ controller and used to configure the following:

IQ MP Gateway Master is used for this illustration.

Node 170 Actuators 1 – 4 sensor type selection *
Node 171 Actuators 5 – 8 sensor type selection

- Analogue nodes 170 and 171 should be configured as a 5 digit number. The first digit must be a 5, and then the subsequent 4 digits represent the sensor type for four actuators.

The value for each digit should be set up as follows:

0 - Raw Voltage at Y input
1 - Pt1000 at Sensor 1
2 - NTC Thermistor at Sensor 1
3 - Pt1000 at Sensor 2 (Future)
4 - NTC at Sensor 2 (Future)
5 - Digital Input (Switch)

Example:

Actuators 1 and 2 have NTC thermistor temperature sensors connected, and actuators 3 and 4 have digital inputs connected to their sensor connections.

Analogue node 170 should be set to 52255.

Note: If any of the configuration nodes are altered from a switch to another input type following initial power-up of the IQ-MP Gateway, then the actuator must be powered off and back on for the relevant internal hardware reconfiguration to take place.

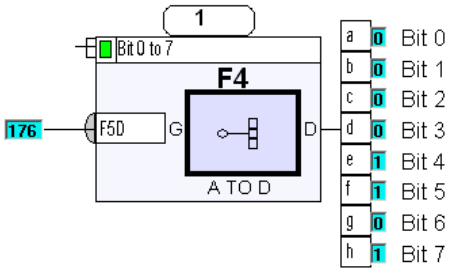
Error Code

The Belimo Actuators on the MP Bus returns an error code. The error code is a value that consist of 8 bits. One bit is used to indicate an error.

Here is a list of different bits in the Error Code.

- Bit 0: Excessive utilisation
- Bit 1: Actuating range increased
- Bit 2: Overload - set position not reached
- Bit 3: Actual torque > load limit
- Bit 4: Safety-relevant fault
- Bit 5: Damper free-running fault
- Bit 6: Duct temperature too high
- Bit 7: Smoke detector alarm

In the Trend strategy use a "A TO D" component to split the Error Code into bits.



Fire Dampener

The Belimo BF/BFG Top-Line Fire Dampener Actuators are supported by a special version of the IQ-MP Gateway. This version of the IQ-MP Gateway does not support the IQ MP Gateway's Master and Slave functionality. One Trend Controller can control up to 8 Fire Dampener Actuators.

It is possible to mix Fire Dampener Actuators with other Belimo Actuators on the MP Bus. Belimo warns against doing this and says only have Fire Dampener Actuators on the MP Bus.

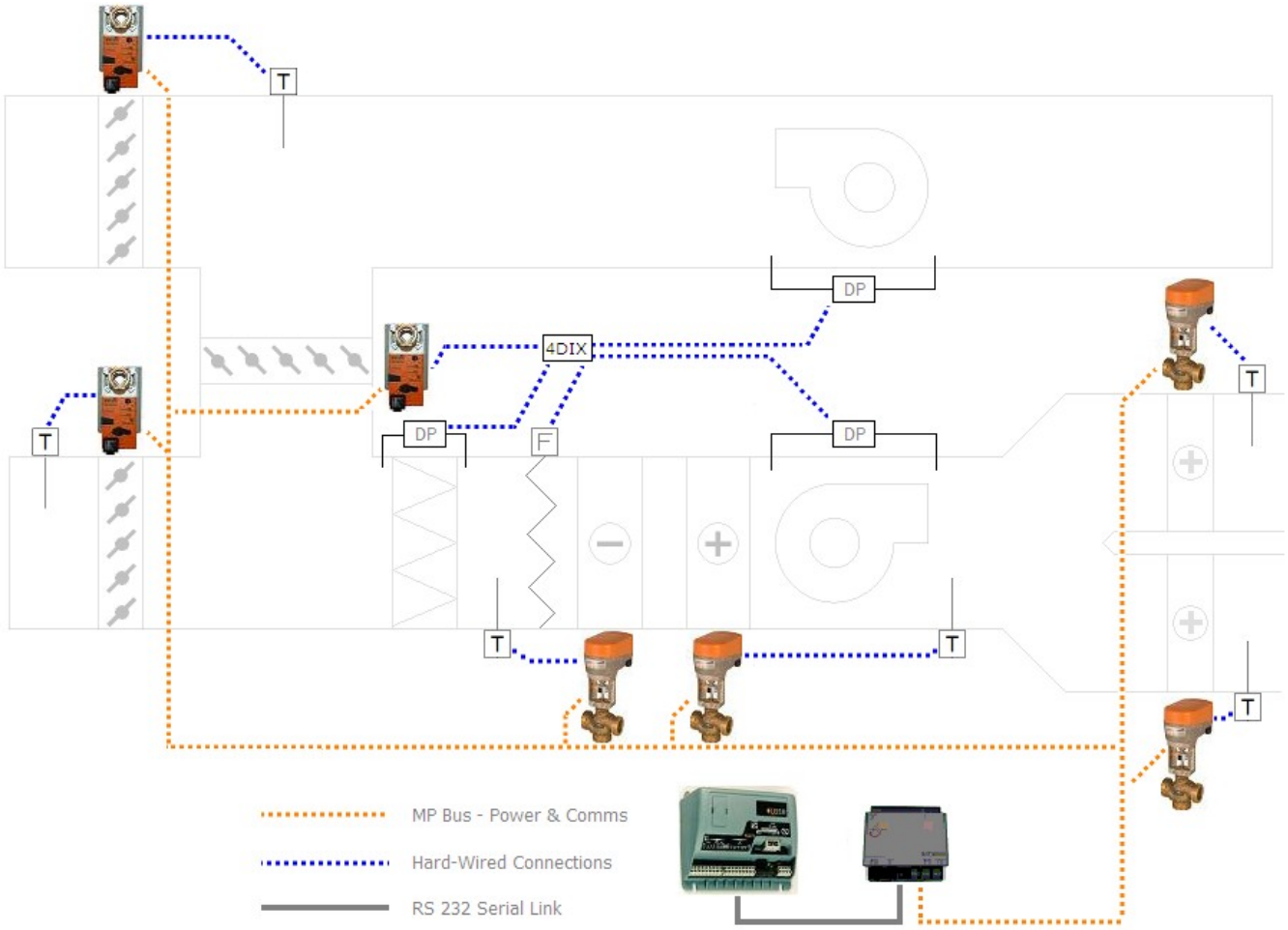
Here is an overview of the Trend Analogue Nodes used by the Fire Dampener Actuator.

Command:
- 1 – Clear Error Code
- 97 – Start Fire Testrun

Override:
- 1 – Open Actuator
- 7 – Open Actuator (alternative)
- 8 – Fast Close Actuator

Angle:
- 0 – Actuator closed
- 50 – Actuator moving to open/close position
- 100 – Actuator open

Error Code:
- Check error code section



Application Example 1 – Recirculating Air Handling Unit

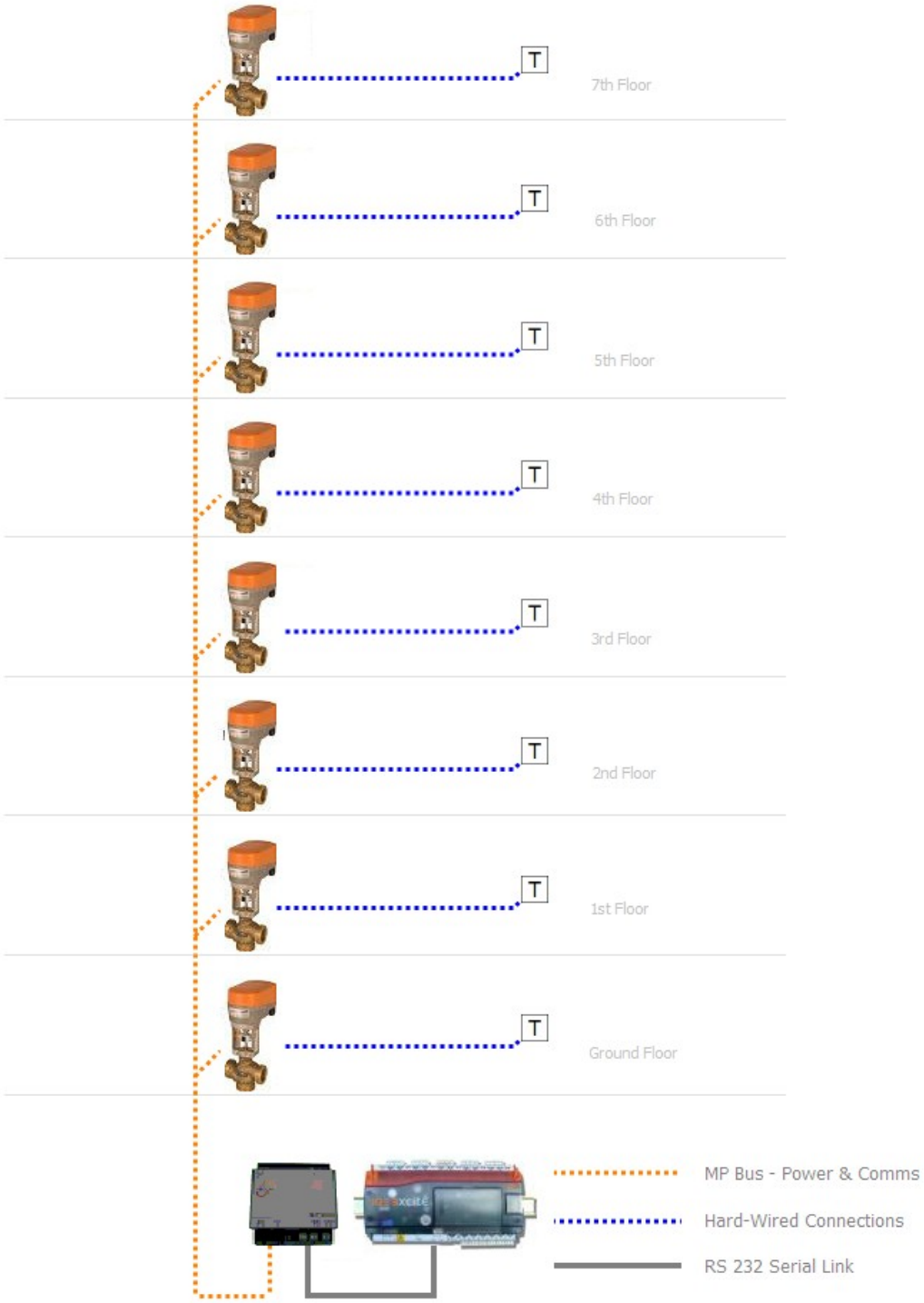
In the example shown an Air Handling Unit is fitted with Supply, Exhaust and Recirculation dampers, together with cooling and heater batteries, and two zone re-heat batteries.

MP/MFT(2) type actuators are used throughout.
Only one cable is required from the MCC to all the MP actuators and sensors.

The MP/MFT(2) actuators directly accommodate all the sensors shown, and therefore all are written into the IQ212 controller as internal sensors. The differential pressure switches are wired back to a digital input multiplexer and then connected to a further MP/MFT(2) actuator.

This leaves two of the on-board outputs to operate the digital outputs required for the supply and extract fans.

The remainder of the I/O capacity of the controller is available for other purposes.



Application Example 2 – Floor Heating Zone Valves

In this example a building has seven floors each with a heating control zone valve and temperature sensor.
MP/MFT(2) type actuators are used throughout.
Only one cable is required from the MCC to all the actuators and sensors.

The MP/MFT(2) actuators directly accommodate all the sensors shown, and are written into the IQ3 Exact controller as internal sensors.
The IQ3 is able to provide separate Optimum Start/Stop routines for each floor to maximise energy efficiency and allow different occupancy profiles on each floor.

The physical I/O capacity of the controller may be used to control the boilers and pumps associated with the heating system.

Specifications

Electrical

Supply Voltage 24 Vdc or 24 Vac
Power sourced from external power supply.

Supply Current max 50 mA

Mechanical

General DIN rail mounting

Dimensions 111mm x 111mm x 40mm

Connections
MP Bus 2-part connector with 2 screw terminals for 0.5 to 2.5mm2 cross sectional area.

Trend IQ RJ11 connects host IQ controller to IQ-MP Gateway Master. Use RJ11 to RJ11 cable (supplied)

Environmental

Temperature Limits

Storage	0ºC to 45ºC
Operating	5ºC to 45ºC

Humidity Limits

Storage	10%RH to 90%RH
Operating	10%RH to 90%RH