



## ProCon HT Combustion Commissioning Data.

To ensure that the ProCon HT Cascade Manager operates satisfactorily the following sensors or substitute resistors must installed.

A QAD/Z 36 Flow Sensor (Located on the system side of the low loss header. Remote sensor (QAD 21) required on cascade manger.)

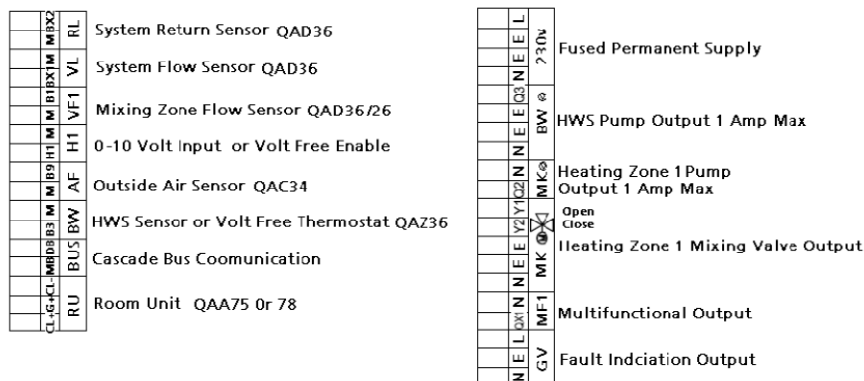
A QAD/Z 36 Return Sensor (Located on the boiler side of the low loss header.)

A QAC34 Outside air sensor or Substitute Resistor simulating -1°C (3000.Ohms) (Part #RES3000)

### LPB Wiring Configuration and Type

The interconnecting cascade wiring from the ProCon HT Cascade Master to the ProCon HT Cascade Slaves must be connected as follows:

In a parallel configuration using screened cable. (The screening must be earthed)



### LPB Connections.

MB

DB

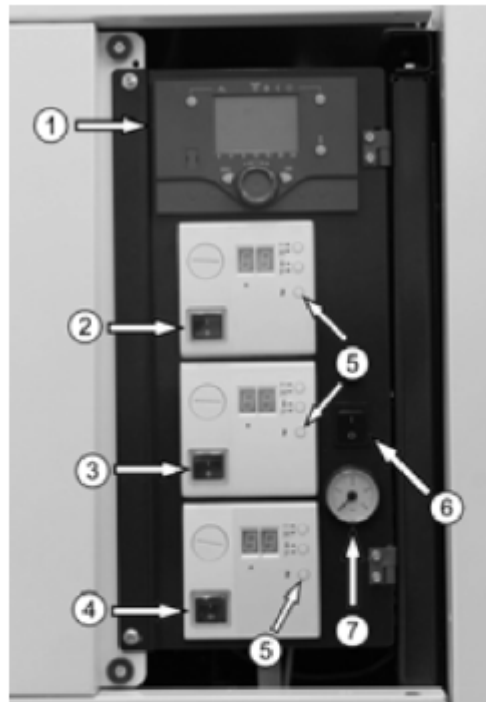
### Communication Operation Indications

The RED LED on the OCI420 communication clip mounted on the front of each LMU64 module controller flashes to indicate the detected operational status of the module dictated by the LPB communication from the ProCon HT Masters RVS43 Cascade Manager.

LED FLASH STATUS	INTERPRETATION OPTIONS
LED ON Constantly	OCI420 not configured to operate with LMU64
LED OFF Constantly	OCI420 Configured. LPB Short Circuit / No Power.
LED ON 93% OFF 7%	OCI420 and LUM64 Not Compatible / LPB Address inadmissible.
LED ON 5% OFF 95%	Boiler being controlled via LPB and required to be not operating.
LED ON 5% OFF 20% ON 5% OFF70%	Boiler being controlled via LPB and required to be operating.

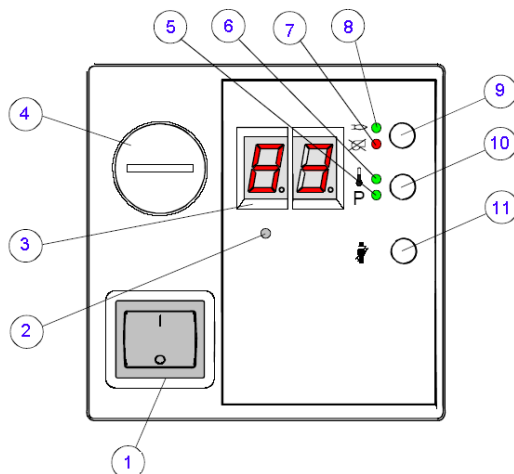
**Appliance Controls**

**Control Panel**



1. RVS43 143 Controller Display
2. Upper Module Power Isolator
3. Middle Module Power Isolator
4. Lower Module Power Isolator
5. Module Commissioning Button
6. Appliance Power Isolator
7. System Manometer

**Module Controller**



**Legend**

- 1. Module Power Isolator
- 2. Infrared Output to Flue Gas Analyzer Optional Extra.
- 3. Module Numerical Indicator
- 4. Temporary Connection Port For QAA73 for LMU 64 Configuration.
- 5. Indication of System Pressure **P** (Not Used)
- 6. Indication of Module Over Temperature
- 7. Indication of Module Lockout
- 8. Indication of Module Burner Activation
- 9. Module Lockout Reset Button (To be pressed for at least 3 Seconds)
- 10. Display Alteration Button
- 11. Commissioning Mode Activation Button

**Module Controller End User Settings.**

The Module Controller provides access to the End User adjustable parameters P parameters along with other operational information only settings A, B, C & D parameters.

End User Adjustable Parameters. (Default = Recommended Settings)

Parameter	Function	Range	Default
P0			
P1	Required Module Flow Temperature / Room Temperature. (Outside air sensor attachment dependant. Without = Flow Temperature)	20-90°C / 10-30°C	85 / 20°C
P2	Required HWS Set Point. <small>(Only Used if the Module is Directly Controlling HWS Generation)</small>	10-80°C	60°C
P3	Not used in This Configuration	NA	NA
P4	Not used in This Configuration	NA	NA
P5	Weather Compensation Curve Heating Circuit 1	-- / 40	32
P6	Weather Compensation Curve Parallel Displacement	-31 / +31	0

### Accessing Module Parameters

1. Press the display mode button (10) to choose display level «P» (keep button depressed).
2. Press the display mode button (10) to choose the required parameter (press button briefly).
3. Adjust the value:

Changing parameters: (only P0...P6)

Only parameters P0...P6 can be changed.

To do this, wait until the value of the parameter flashes on the display (3).

Proceed as follows:



**P** ○ (+) or (Enter) Increase value (+): Press display mode button (10) briefly several times (< 1 second)



○ (-) Decrease value (-): Press chimney sweep button (11) briefly several times (< 3 seconds)



**P** ○ (+) or (Enter) Save value (Enter): Press display mode button (10) for **at least 3** seconds

If the displayed value does not require amending or the altered setting is not required do not press any buttons on the controller for a period greater than 12 seconds.

As a confirmation, the display (3) shows P0...P6 in consecutive order and the newly adjusted value.

The new value will only be adopted **after storage**.

### **Reviewing the Parameter Values**

To query the different parameter values, proceed as follows:

Choosing the display mode

Choose the display mode by pressing button (10) for **more than 3 seconds** (display (3): A...). **Keep button (10) depressed** to reach the different display levels b, C, d, P and back to A.

Release the button when the required display level is reached (A, b, C, d, P).

Choosing and displaying individual values or parameters

To change between the different values or parameters (0... max. 7) of the different display levels (A, b, C, d, P), **press button (10) briefly**.

The current value appears about 2 seconds after choosing the relevant parameter.

**Module Operating Codes**

			LED <sup>1)</sup>	
Display level	Name of LMU... variable	Description	 6	 P 5
<b>General information (enduser level) <sup>2)</sup></b>				
A 0	Meldecode	Diagnostic code (system)	*	* <sup>3)</sup>
A 1	Tk1st	Boiler temperature (flow)	●	○
A 2	Tbw1st1	D.h.w. temperature sensor 1	*	○
A 3	Druck	Water or air pressure	○	●
A 4	Betr.Phase	Operating phase of burner control	○	○
A5	TiAussen	Outside temperature (only AGU2.310...)	○	○
<b>Temperatures (service level)</b>				
b 0	DiagnoseCode	LMU...-internal software diagnostic code	*	* <sup>3)</sup>
b 1	TkRuec	Boiler return temperature	●	●
b 2	Tbw1st2	D.h.w. temperature sensor 2	●	●
b 3	Tabgas	Flue gas temperature	●	●
b 4	TiAussen	Outside temperature	●	●
b 5	TaGem	Composite outside temperature	●	●
b 6	TaGed	Attenuated outside temperature	●	●
b 7	Tvlst	Flow temperature AGU2.500...	●	●
<b>Process values (service level)</b>				
C 1	IonStrom	Ionization current	●	●
C 2	Geb1_Drehz	Fan speed	●	●
C 3	Geb1_PWM_AusAkt	Current fan control (PWM)	●	●
C 4	RelModLevel	Relative output	●	●
C 5	Pumpe_PWM	Pump setpoint (PWM)	●	●
C 6	ek0	Control differential	●	●
<b>Setpoints (service level)</b>				
d 1	Tsoll	Setpoint of 2-position or modulating controller (PID)	●	●
d 2	TkSoll	Current boiler temperature setpoint	●	●
d 3	TsRaum	Room temperature setpoint	●	●
d 4	TbwSoll	D.h.w. temperature setpoint	●	●
d 5	PhzMax	Maximum degree of modulation in heating mode	●	●
d 6	NhzMax	Maximum speed at maximum output in heating mode	●	●
<b>Parameters (service level) (Prog Mode) (setting only with special functions or 4) – not with AGU2.310...</b>				
P 0	PhzRelMmi	Start output controller stop (only in operating mode <b>without</b> the appropriate setpoint potentiometer, otherwise locked)	●	*
P 1	Tr/TvSollMmi	Room / flow temperature setpoint (only in operating mode <b>without</b> the appropriate setpoint potentiometer, otherwise locked)	●	*
P 2	TbwSollMmi	D.h.w. setpoint (only in operating mode <b>without</b> the appropriate setpoint potentiometer, otherwise locked)	●	*
P 3	reserviert	Reserved	●	*
P 4	NqmodMin	Minimum pump speed	●	*
P 5	Sth1	Slope HC1	●	*
P 6	DTR1	Parallel displacement HC1	●	*

1)	LED: * = flashing, ● = lit, ○ = dark
2)	The parameters of group «A» can also be selected by briefly pressing the button for the display mode
3)	Indication flashes alternately
4)	Setting the heating curve when using the heating circuit module AGU...

**Note:** After about 8 minutes, the display will automatically change to the boiler temperature «A1»

**Appliance Error Codes**

If a fault is encountered within the appliance or Cascade LPB network, a fault code will be generated and displayed by the failing module and all LPB networked RVS43 Cascade Managers.

If a fault is encountered by a module the respective code will be displayed along with a flashing LED. Three digit codes will be displayed in two consecutive sections. I.e. 1-53 = 153.

If a fault is encountered by a RVS43 Cascade Manager or communicated to a RVS43 Cascade Manager via the LPB network BELL will be generated on the display.

Press the INFO button to display the fault code.

In either case the fault code should be noted for future reference.

If the fault is related to a specific module the unit can be rest by pressing the Lockout Reset Button (9) for at least 3 seconds.

If the fault is related to a RVS47 Cascade Manager or the LPB communication network the fault code will clear automatically following the rectification of the fault.

This is also applicable following the rectification of any module fault. This can take up to 10 minutes.

<b>Fault Code</b>	<b>Description</b>
E-0	No Error Detected
E-10	Outside Air Sensor Fault / Not Detected
E-20	Flow Water Sensor Fault / Not Detected
E-26	System Flow Sensor Faulty / Not Detected
E-28	Flue Gas Sensor Fault / Not Detected
E-40	Return Water Sensor Fault / Not Detected
E-46	System Return Water Sensor Fault / Not Detected
E-50	HWS Sensor Short Circuit 1
E-52	HWS Sensor Short Circuit 2 (Not Used)
E-58	HWS Volt Free Switch Fault / Not Detected
E-60	Faulty Room Sensor
E-61	Faulty Room Sensor
E-62	Incorrect Room Unit Connected
E-77	Air Pressure Sensor Not Detected (Not Used)
E-78	Water Pressure Sensor Defective (Not Used)
E-81	LPB Short Circuit (Boiler Cascade Wiring)
E-82	LPB Address Conflict (Boiler Cascade Settings)
E-86	Short Circuit on PPS Connection (Not Used in ProCon Configuration)
E-91	EEPROM
E-92	Hardware Malfunction
E-100	Conflict Between Time of Day Master Control (Boiler / QAA70 / RVA47)
E-105	Module Requires Annual Service (QAA73 Room Unit Required to Rest Timer)
E-110	Module Water Temperature Overheat
E-111	Module Temperature Too High (Auto Resetting)
E-113	Flue Gas Temperature overheat (Not Used)
E-117	High System Water Pressure Sensor (Not Used)
E-118	Low System Water Pressure Sensor (Not Used)
E-119	System Water Pressure Switch Activated (Below 0.8 bar)
E-124	Module Temperature Too High (Auto Resetting)
E-128	Flame Extinguished During Operation (LMU Version D)
E-129	Air Supply Error. Fan speed incorrect during operation. (LMU Version D)
E-130	Flue Temperature Too High (Auto Resetting)

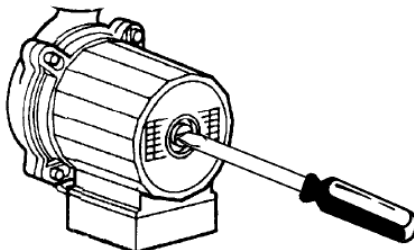
E-131	Fault With Burner
E-132	External Safety Interlock Activated (Open Circuit)
E-133	No Flame Detected After Final Ignition Attempt
E-134	Flame Extinguished During Operation LMU Version C)
E-135	Air Supply Error. Fan speed incorrect during operation. (LMU Version C)
E-140	LPB Segment / Address Not Recognized (Boiler Cascade Settings)
E-142	LPB Missing Partner (Boiler Cascade Settings)
E-145	Wrong Device Connected to PPS Circuit (Not Used in ProCon Configuration)
E-146	Unrecognized Plant Configuration
E-147	Burner Modules Not Connected (PPS Circuit Not Used in ProCon Configuration )
E-148	LPB Interface Not Configured (Boiler Cascade Settings)
E-150	General Boiler Fault
E-151	Module LMU64 Controller Malfunction
E-152	Module LMU64 Controller Parameter Programming Error
E-153	The RESET button has been pressed when no fault is present. Press RESET again.
E-154	Module Operating Outside of Predefined Parameters. (System Hydraulic Error.)
E-160	Fan Not Reaching Set Point
E-161	Module Combustion Fan Speed Too High
E-162	Air Pressure Switch Fault (Not Used)
E-164	Flow Switch / Pressure Switch Open (Not Used)
E-166	Air Pressure Switch Fault (Not Used)
E-180	Module Operating in Chimney Mode 100% Output
E-181	Module Operating in Commissioning Mode
E-183	Module Controller / QAA73 Room Unit in Parameter Setting Mode

## Commissioning The Appliance


### Pre-Commissioning Checks

Prior to undertaking the commissioning of the unit please ensure that the system water has been cleansed and treated with a suitable inhibitor as detailed in Filling the system and system water quality.

Prior to applying power to the individual modules their dedicated circulation pumps should be bled and checked to ensure free rotation of the armature.




### Combustion System Commissioning.


The commissioning function enables the boiler to be started up in heating mode by pressing the  Chimney Sweep Button (11) on the module controller.

There are two levels of operation accessed via the  Chimney Sweep Button (11)


#### **Operation at Maximum Output With No Adjustment.**


Pressing the  Chimney Sweep Button (11) for more than 3 seconds but less than 6 seconds places the respective module in High Fire mode.



To indicate that the module is operating under the control of the Chimney Sweep Button the display (3) will indicate SF and the red Lockout LED (7) will flash with a single pulse.



This mode is maintained until the limit thermostat temperature is reached or the  Chimney Sweep Button is pressed from more than 1 second.


#### **Operation at Maximum or Minimum Output For Flue Gas Analysis and Gas Valve Adjustment**

Pressing the  Chimney Sweep Button (11) for more than 6 seconds. places the respective module in High Fire mode.

To indicate that the module is operating under the control of the  Chimney Sweep Button the display (3) will indicate 100 for High Fire and 0 for Low Fire and the red Lockout LED (7) will flash with a double pulse.

To alternate the module between High Fire and Low Fire the  Chimney Sweep and  P Buttons must be pressed for less than 1 second.

 P Button	High Fire	 Button	Low Fire
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This mode is maintained until the limit thermostat temperature is reached or the  Chimney Sweep Button is pressed from more than 1 second.

Whilst the module is operating under the control of the Chimney Sweep Button (with adjustment) the gas valve can be adjusted to give correct flue gas analysis readings.



Each module is equipped with a modulating gas valve.

The modulating gas valve must be set at High Fire and Low Fire to ensure correct operation throughout its modulating range.

It is advisable to check the combustion figures on High and Low Fire prior to carrying out any adjustments.

Adjusting the High Fire has a marked effect on the Low Fire figures. Where as adjusting the Low Fire has little effect on the High Fire figures.

The High fire adjustment is carried out via the 2.5mm Allen Key socket D

The High Fire adjustment is a Gate type restrictor.

Therefore turning the screw clockwise will close the gate and thus restrict the quantity of gas passing through to the burner.

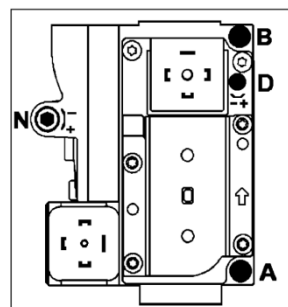
The Low fire adjustment is carried out via the 2.5mm Allen Key socket N

The Low Fire adjustment is a diaphragm governor.

Therefore turning the screw clockwise will increase the pressure on the diaphragm and thus increase the quantity of gas passing through to the burner.

**Legend**

- A. Valve Inlet Gas Pressure Test Point
- B. Valve Outlet Gas Pressure Test Point
- D. High Fire Adjuster (Gate Type)
- N. Low Fire Adjuster (Governor Type)



Each module must be analysed and adjusted separately.

This is undertaken by inserting the analysers probe in to the silicone sampling tube secured to the top of each module and sealed with a black plug. If fluctuating figures are obtained the flue gas analyzer probe should be inserted into the respective modules flue spigot following the temporary removal of the silicone tube.

(Taking care not to dislodge the grommet.)

Each module must be set to the following combustion figures.

Gas Type	Injector Size	High Fire	Low Fire
Natural Gas (G20)	15mm	8.5% CO <sub>2</sub>	9.0% CO <sub>2</sub>
LPG (G31)	10mm	11.0% CO <sub>2</sub>	11.0% CO <sub>2</sub>