

## Aurora protocol emulation mode

Aurora protocol emulation mode is a function designed to maintain compatibility with existing monitoring systems, in case of replacement of PVI or TRIO inverter models with new generation PVS-10... 33-TL inverters according to the table shown below.

PVS Inverter model	Inverter exposed by monitoring system
PVS-10-TL	PVI-10-TL
PVS-12.5-TL	PVI-12.5-TL
PVS-15-TL	PVI-12.5-TL
PVS-20-TL	TRIO-20-TL
PVS-30-TL	TRIO-27.6-TL
PVS-33-TL	TRIO-27.6-TL

Aurora protocol emulation mode shall be used only for **retrofitting purpose** and shall not be used for new installations.

New PV plant with PVS-10...33-TL inverter can be directly connected to internet to fully benefit of the characteristics of the inverter:

- Internal datalogging capability
- Direct internet connection through Ethernet or WiFi
- Aurora Vision cloud solutions
- Remote inverter management
- Export Limitation
- Meter and Environmental monitoring

### List of available commands

The commands available for PVS-10..33-TL inverters are shown in the following table.

Request the state of the system modules (50)
PN Reading (52)
Version reading (58)
Request measurement to the DSP (59)
Serial Number reading (63)
Read Week-Year of production (65)
Time-Date reading (70)
Firmware release reading (72)
Cumulated energy readings (78)
Last four alarms (86)
Read "partner devices" RAM area (116)

Read "update version" (121)
Power set points

Any discrepancy with aurora protocol is highlighted for each request in the next chapter.

### Request the state of the system modules (50)

The MPPT states cannot be directly emulated due to the different number of MPPT between PVS inverters and TRIO/PVI inverters.

To properly reproduce the correct behavior more MPPTs state of PVS inverter are merged into MPPTs of PVI/TRIO inverters with the associations included in the following table

MPPT 1(3) state	MPPT 2(4) state	DC/DC Channel 1(2) State
Fault	Any	Fault condition for MPPT 1(3)
Any no Fault	Fault	Fault condition for MPPT 2(4)
Run	Any no Fault	Run
Off or Input low	Run	Run
Off	Off or Input low	Off
Input low	Off	Off
Input low	Input low	Input Low

Where:

A **faulty state** on a MMPT is one of the following alarm conditions:

- Over\_voltage = 6
- Voltage\_unbalance (Input mode error) = 13
- Under\_voltage = 5
- Other = 12

When the MPPT is in a **fault state** the inverter will be not connected to the grid neither exporting power.

A **run state** is the normal operating condition of the MPPT with the inverter connected to the grid and generating power.

An **off state** is a condition with no voltage on the PV arrays connected to the MPPT, the normal condition during nighttime or when no PV arrays are physically connected to the MPPT.

An **input low** state is the condition when the DC voltage decreases under 70% of the starting voltage and a normal operating condition that arise during sunset or sunrise.

### PN Reading (52) and Version Reading (58)

PVS inverter will reply to any Part Number or Version request with the same encoding of PVI/TRIO inverters and, for back compatibility, will be recognized by monitoring systems operating with Aurora Protocol as follows

PVS Inverter model	Inverter exposed by monitoring system
PVS-10-TL	PVI-10-TL
PVS-12.5-TL	PVI-12.5-TL
PVS-15-TL	PVI-12.5-TL
PVS-20-TL	TRIO-20-TL
PVS-30-TL	TRIO-27.6-TL
PVS-33-TL	TRIO-27.6-TL

Grid standards are applied with the encoding already available on Aurora Protocol, any new grid standard available on PVS-10...33-TL inverters that is not encoded on Aurora Protocol will be exposed with a country code DEBUG FF.

### Request measurement to the DSP (59)

The following measures are available for PVS-10..33-TL inverters

Type	Measurement	Comments
1	Grid Voltage (V)	
2	Grid Current (A)	
3	Grid Power (W)	
4	Frequency (Hz)	
5	Vbulk (V)	
6	Ileak (Dc/Dc)	
7	Ileak (Inverter)	
8	Pin1	Sum of MPPT1 and MPPT2 powers for PVS inverters with 4 MPPTS
9	Pin2	Sum of MPPT3 and MPPT4 powers for PVS inverters with 4 MPPTS
21	Inverter Temperature (°C)	

22	Booster Temperature (°C)	
23	Input 1 Voltage (V)	Max of MPPT1 and MPPT2 voltages for PVS inverters with 4 MPPTS
25	Input 1 Current (A)	Average of MPPT1 and MPPT2 currents for PVS inverters with 4 MPPTS
26	Input 2 Voltage (V)	Max of MPPT3 and MPPT4 voltages for PVS inverters with 4 MPPTS
27	Input 2 Current (A)	Average of MPPT3 and MPPT4 currents for PVS inverters with 4 MPPTS
28	Grid Voltage (Dc/Dc) (V)	
29	Grid Frequency (Dc/Dc) (Hz)	
30	Isolation Resistance (Riso) (M)	
31	Vbulk (Dc/Dc) (V)	
32	Average Grid Voltage (VgridAvg) (V)	
33	VbulkMid (V)	
34	Power Peak (W)	
36	Grid Voltage neutral (V)	
64	Actual applied power limit [W]	
65	Cos-phi setpoint target value for reactive power regulation	
77	Actual power versus nominal power ratio	
78	Nominal power [W]	
80	Fan 3 speed [rpm]	Max speed between all fans
81	R-ISO measured by DC/AC module [MOhm]	
82	R-ISO measured by DC/CC module [MOhm]	
83	Ground voltage [V]	
85	Grid voltage R-S [V]	
86	Grid voltage S-T [V]	
87	Grid voltage T-R [V]	
90	Bulk voltage set-point for DC/AC module	
91	Bulk voltage set-point for DC/DC module	
112	Q-set point applied	

**Serial Number reading (63) and Read Week-Year of production (65)**

No discrepancy with Aurora Protocol

### Time-Date reading (70) and setting (71)

Time and Date will be automatically aligned to the NTP server if the inverter is connected to internet.

### Firmware release reading (72) and Read “update version” (121)

PVS-10...33-TL inverters will always provide the current firmware for both commands

### Cumulated energy readings (78)

Partial energy is not available

### Timers, counters read-reset (80)

Only operation mode 0 and 2 are available.

### Last four alarms (86)

No discrepancy with Aurora Protocol

### Read “partner devices” RAM area (116)

PVS-10...33-TL inverters will emulate the TRIO-20/27.6 partner area to publish the PVS string current and voltage measures and will be linked as follows.

Voltage Measure	Current Measure	PVS-10/12.5/15-TL PVS-20-TL (2MPPT)	PVS-30/33-TL PVS-20-TL (4MPPT)
Voltage 1A (analog)	Current 1A (analog)	Measures for PV String A on MPPT 1	Measures for PV String A on MPPT 1
Voltage 1B (analog)	Current 1B (analog)	Measures for PV String B on MPPT 1	Measures for PV String B on MPPT 1
Voltage 1C (analog)	Current 1C (analog)	Not available	Measures for PV String A on MPPT 2
Voltage 1D (analog)	Current 1D (analog)	Not available	Measures for PV String B on MPPT 2
Voltage 1E (analog)	Current 1E (analog)	Not available	Not available
Voltage 2A (analog)	Current 2A (analog)	Measures for PV String A on MPPT 2	Measures for PV String A on MPPT 3
Voltage 2B (analog)	Current 2B (analog)	Measures for PV String B on MPPT 2	Measures for PV String B on MPPT 3

Voltage 2C (analog)	Current 2C (analog)	Not available	Measures for PV String A on MPPT 4
Voltage 2D (analog)	Current 2D (analog)	Not available	Measures for PV String B on MPPT 4
Voltage 2E (analog)	Current 2E (analog)	Not available	Not available
Voltage channel 1 (analog)		MPPT 1 Voltage	Max of MPPT1 and MPPT2 voltages
Voltage channel 2 (analog)		MPPT 2 Voltage	Max of MPPT3 and MPPT4 voltages

About other measures, info and status:

- Fuse, Communication and Display boards info are not available
- Communication board status will provide only the CCB board presence and the status of inverter SPD DC 1 and SPD AC
- Communication board measures, including PT100/1000 and analog inputs, are not be available
- Fuse board status, including fuses and unbalanced currents alarms, are not available

### Power Setpoints

Only active power, reactive power (mode 3) power factor (mode 4) commands and set points are available and can be used to manage the output power of inverters PVS-10...33-TL.

**No control (mode 0) is available for both active and reactive power control.**