domat
control system

RPQC Active and reactive power controller

Summary

The P and Q controller interface receives signals from a power distribution system and converts them to bus signals for solar inverter control. The basic configuration provides 16 digital inputs for 4 P-stages, and 5 stages for Q-control. The complete I/O configuration depends on the signals provided by the distributor, and on the signal demanded by the inverter(s).

Applications

- **Solar photovoltaic systems – control of active and reactive power generated by the inverters**

Function

The binary and / or analogue signals are acquired by an I/O module and brought to the controller. In the controller, the signals may be processed as necessary, and then they are sent over a bus or contacts to the inverter(s). At the same time, the controller provides binary signals to the distributor's system that the command has been accepted by the solar plant. It is also possible to acquire some additional signals such as contactor states or temperatures, which are communicated to the distributor's system.

The firmware is adapted to a particular distributor's demands and fit to the communication protocol of the inverters. The function depends on the target country and distributor regulations and is configured prior to shipping.
Some parameters may be changed over configuration program or HMI (optional LCD display and keys on the front panel of the controller).

Installation

The controller may be installed in the inverter cabinet on a DIN rail or in a separate box, depending on location of the distributor's interface and inverters and availability of free space in the existing control cabinets. Check the EMC environment parameters of the location.

Technical data

Power supply	14...24 V AC, 12...35 V DC or 230 V AC if installed in a cabinet
Consumption	max. 15 VA
Protection degree	IP20

Cabinet

Cabinet dimensions	500 (w) x 600 (h) x 240 (d) mm
Cabinet protection degree	IP43
Ambient temperature	-20...50°C
Interfaces	RS485 (inverters) Ethernet (inverters, configuration) Binary and analogue I/Os (distributor / inverters) – I/O modules – see below
I/O parameters	BI: 24 V AC, 4 mA, optically insulated up to 3500V BO: 24...230 V AC, optically insulated up to 1500 V AI: 0..10 V or 4..20 mA, or resistive (20...1600 Ohm) AO: 4..20 mA
Inputs	The basic configuration (ordered as **RPQC**) contains the main unit and one M420 input module with 16 binary inputs, and output modules M210 and M200 with 12 binary outputs total. The I/O mix can be extended by add-on I/O modules as necessary, see table below.
Ethernet terminals	RJ45, Ethernet 10/100
RS485 terminals	Screw terminals, cables up to 2.5 mm^2, optically insulated
Power supply terminals	Screw terminals, cables up to 2.5 mm^2
I/O terminals	Screw terminals, cables up to 2.5 mm^2

Supported inverters

- Xantrex (over RS485)
- Advanced Energy (over Ethernet)
- SMA (over Power Reducer Box contacts)
- Power One – Aurora (over contacts and current loop)

In preparation:

- Oelmaier
- Sinvert
- LTi

Other types are available on request.

I/O module table

The I/O modules are selected so as to fit the necessary amount of inputs and outputs, both for the distributor and for the inverter. The assignment of the terminals is specific to the firmware application.

Module type	**Analog inputs** (0..10 V, 4..20 mA)	**Analog inputs** (temperature)	**Digital inputs** (24 V AC)	**Analog outputs** (4..20 mA)	**Digital outputs** (230 V, 5A relay)
M420	-	-	16	-	-
M210	-	-	-	-	8
M200	-	-	-	-	4
M620	-	-	-	4	-
M550	-	8	-	-	-
M500	8	-	-	-	-

Each hardware configuration is loaded with a specific software version which performs the requested functionality.

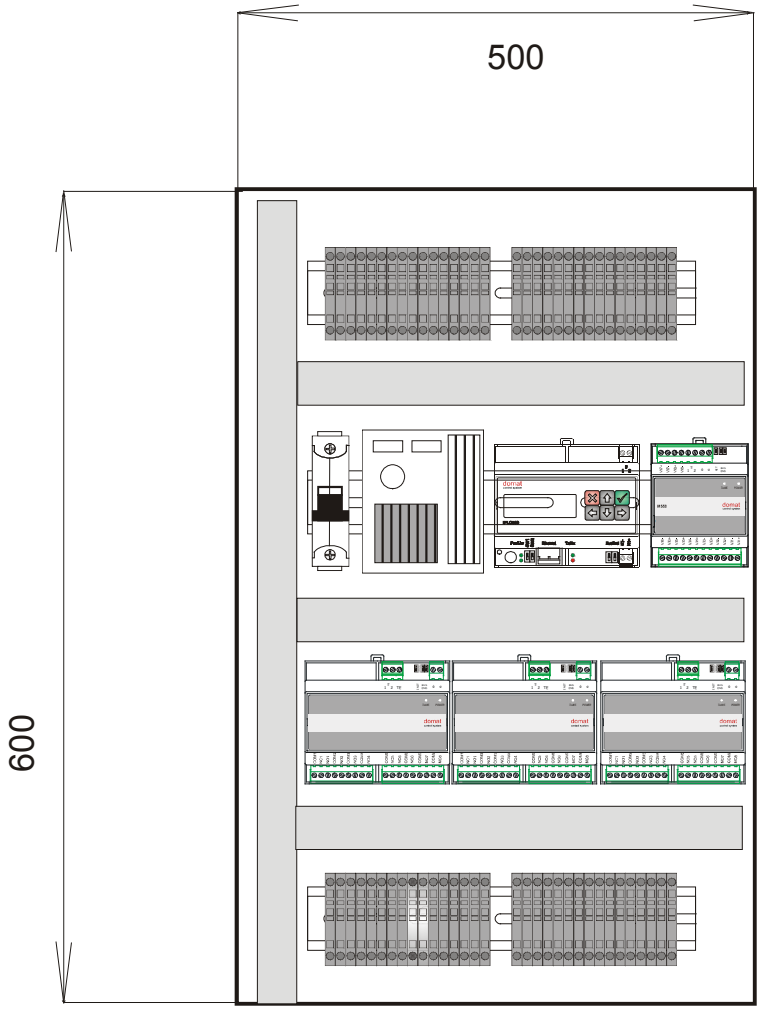
Variants

The panel with the controller are supplied in two basic versions:

- **RPQC** master, inclusive I/Os for communication with the distributor

- **RPQC-SLAVE** no distributor I/Os, to control remote inverters. The control signals are communicated over the Ethernet from the master controller. A master can control up to 20 slave controllers.

Dimensions



The number and type of I/O modules depends on the configuration ordered.

Terminals

RPQC

Block	Terminal	Function
X	L	Power 230 V, 50 Hz live
	N	Neutral
	PE	Protective earth
XK	K+	RS485 to inverters, positive
	K-	RS485 to inverters, negative
XPI	C	Common (24 V AC) to the distributor cabinet
	1	P limitation to 0 %
	2	P limitation to 30 %
	3	P limitation to 60 %
	4	P limitation to 100 %
XEI	C	Common (24 V AC)
	1	Input 1 - Reserved
	2	Input 2 - Reserved
	3	Input 3 - Reserved
	4	Input 4 - Reserved
XQI	C	Common (24 V AC) to the distributor cabinet
	1	Q control to 0.95 capacitive
	2	Q control to 0.97 capacitive

	3	Q control to 1
	4	Q control to 0.97 inductive
	5	Q control to 0.95 inductive
XQO	C	Common – potential free to the distributor cabinet
	1	Q control to 0.95 capacitive – command accepted
	2	Q control to 0.97 capacitive – command accepted
	3	Q control to 1 – command accepted
	4	Q control to 0.97 inductive – command accepted
	5	Q control to 0.95 inductive – command accepted
XRO	C	Common terminal for outputs 1 - 3
	1	Output 1 (relay) – Alarm to the distributor
	2	Output 2 (relay) - Reserved
	3	Output 3 (relay) - Reserved
XPO	C	Common – potential free to the distributor cabinet
	1	P limitation to 0 % – command accepted
	2	P limitation to 30 % – command accepted
	3	P limitation to 60 % – command accepted
	4	P limitation to 100 % – command accepted

RPQC-SLAVE

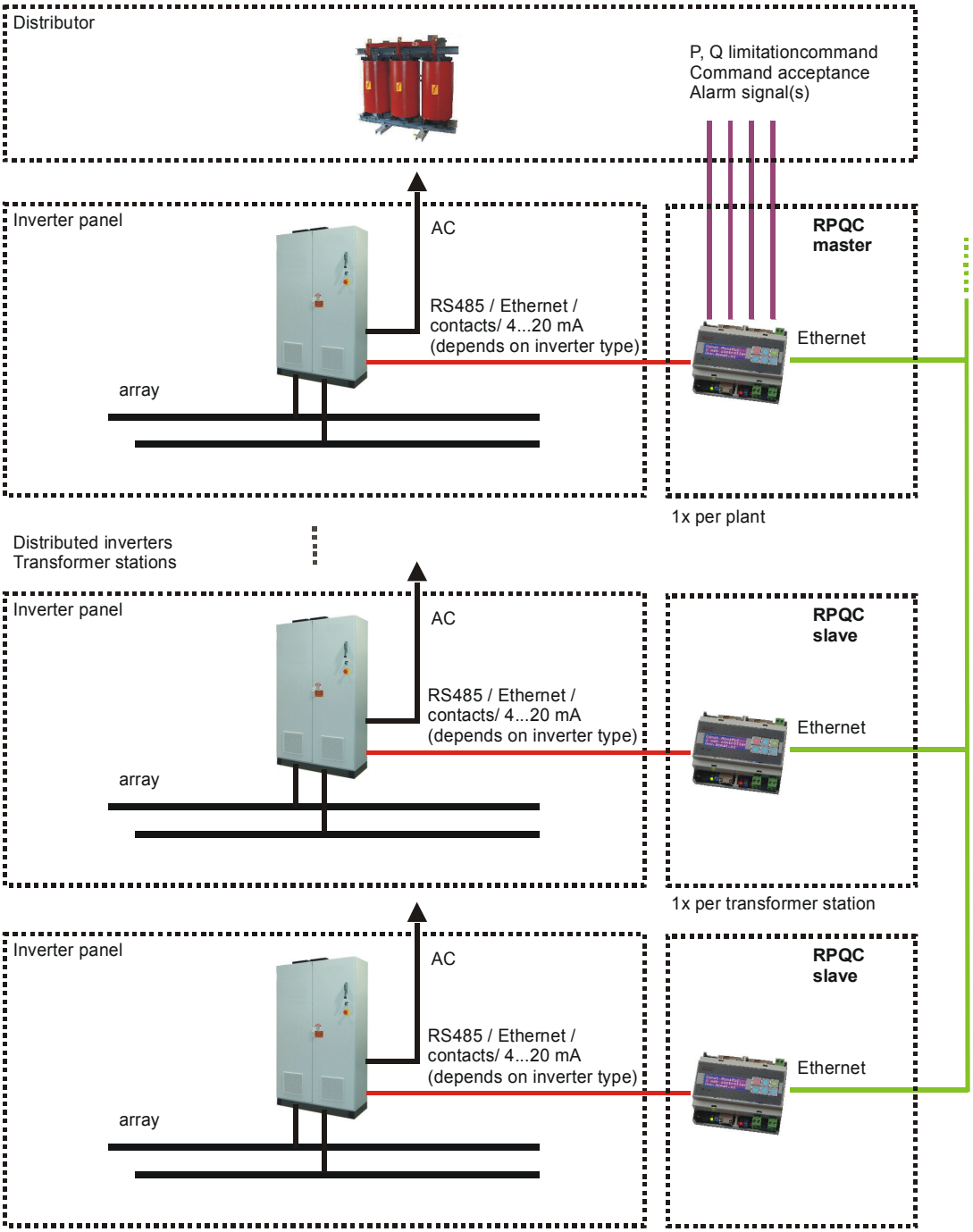
Block	**Terminal**	**Function**
X	L	Power 230 V, 50 Hz live
	N	Neutral
	PE	Protective earth
XK	K+	RS485 to inverters, positive
	K-	RS485 to inverters, negative

All terminals are screw terminals, cables up to 2.5 mm^2

The Ethernet socket is available directly on the controller and is not brought to the common terminal rail.

Other terminals depend on I/O module selection. See the terminal connection in a separate document (wiring schematics).

Topology



Optional accessories

M420	input module, 16 binary inputs
M200	output module, 4 binary outputs
M210	output module, 8 binary outputs
M500	8 analogue inputs module 0...10 V
M550	input module, 8 passive analogue inputs 0...1600 Ohm
M620	input module, 4 analogue outputs 4...20 mA

Related products

COM.INTERFACE	communication interface for PV monitoring
DATALOGGER	data acquisition interface for PV monitoring
Domat EMS	graphical supervisory system for energy controls
RFVE	string monitoring box

Version 2: SMA inverters

RPQC-SMA

For communication with the distributor and a bus of SMA inverters. Installation of a Power Reducer Box (PRB, supplied by SMA) required. The PRB controls active power and power factor by 4 contacts. The PRB must be configured by a SMA engineer. The PRB evaluates 16 states based on combination of 4 contacts.

Block	Terminal	Function
X	L	Power 230 V, 50 Hz live
	N	Neutral
	PE	Protective earth
XPI	C	Common (24 V AC) to the distributor cabinet
	1	P limitation to 0 %
	2	P limitation to 30 %
	3	P limitation to 60 %
	4	P limitation to 100 %
XEI	C	Common (24 V AC)
	1	Input 1 - Reserved
	2	Input 2 - Reserved
	3	Input 3 - Reserved
	4	Input 4 - Reserved
XQI	C	Common (24 V AC) to the distributor cabinet
	1	Q control to 0.95 capacitive
	2	Q control to 0.97 capacitive
	3	Q control to 1
	4	Q control to 0.97 inductive
	5	Q control to 0.95 inductive
XQO	C	Common – potential free to the distributor cabinet
	1	Q control to 0.95 capacitive – command accepted
	2	Q control to 0.97 capacitive – command accepted
	3	Q control to 1 – command accepted
	4	Q control to 0.97 inductive – command accepted
	5	Q control to 0.95 inductive – command accepted
XRO	C	Common terminal for outputs 1 - 3
	1	Output 1 (relay) – Alarm to the distributor
	2	Output 2 (relay) - Reserved
	3	Output 3 (relay) - Reserved
XPO	C	Common – potential free to the distributor cabinet
	1	P limitation to 0 % – command accepted
	2	P limitation to 30 % – command accepted
	3	P limitation to 60 % – command accepted
	4	P limitation to 100 % – command accepted
XCHO	C1	Binary output (relay) DO1
	1	Binary output (relay) DO1 – PRB, K1
	C2	Binary output (relay) DO2
	2	Binary output (relay) DO2 – PRB, K2
	C3	Binary output (relay) DO3
	3	Binary output (relay) DO3 – PRB, K3
	C4	Binary output (relay) DO4
	4	Binary output (relay) DO4 – PRB, K4

RPQC-SLAVE-SMA

For communication with a bus of SMA inverters. Control signals are distributed over the Ethernet from a master controller **RPQC-SMA** or **RPQC**. Installation of a Power Reducer Box (PRB, supplied by SMA) required. The PRB controls active power and power factor by 4 contacts. The PRB must be configured by a SMA engineer. The PRB evaluates 16 states based on combination of 4 contacts

Block	Terminal	Function
X	L	Power 230 V, 50 Hz live
	N	Neutral
	PE	Protective earth
XCHO	C1	Binary output (relay) DO1
	1	Binary output (relay) DO1 – PRB, K1
	C2	Binary output (relay) DO2
	2	Binary output (relay) DO2 – PRB, K2
	C3	Binary output (relay) DO3
	3	Binary output (relay) DO3 – PRB, K3
	C4	Binary output (relay) DO4
	4	Binary output (relay) DO4 – PRB, K4