OMRON

Model

CQM1-PRT21

PROFIBUS-DP SLAVE UNIT

INSTRUCTION SHEET

Thank you for purchasing an OMRON product. Read this instruction sheet thoroughly and familiarise yourself with the functions and characteristics of the product before using it. To ensure safe and correct use of this Unit, also read the Operation Manuals for your CQM1 PLC system.
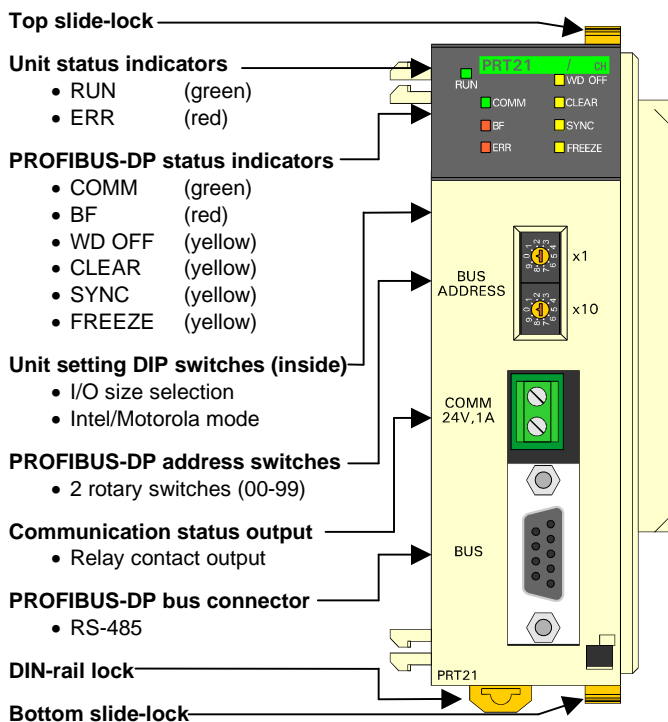
Keep this instruction sheet for future reference.

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⚠ **DANGER** Do not attempt to take the Unit apart. Do not touch any internal parts while the power is being supplied. Doing either of these may result in electrical shock, and serious or fatal injury.

⚠ **Warning** Before touching the Unit, be sure to first touch a grounded metallic object in order to discharge any electrostatic build-up. Not doing so may result in malfunction or damage to the Unit.

■ Nomenclature

Top slide-lock

Unit status indicators
- RUN   (green)
- ERR   (red)

PROFIBUS-DP status indicators
- COMM   (green)
- BF   (red)
- WD OFF   (yellow)
- CLEAR   (yellow)
- SYNC   (yellow)
- FREEZE   (yellow)

Unit setting DIP switches (inside)
- I/O size selection
- Intel/Motorola mode

PROFIBUS-DP address switches
- 2 rotary switches (00-99)

Communication status output
- Relay contact output

PROFIBUS-DP bus connector
- RS-485

DIN-rail lock

Bottom slide-lock

■ Unit setting DIP switches

SW1 – SW 4 can be found on the printed circuit board of the unit.

| Switches			Function
SW1	**SW2**	**I/O words**	SW1 and SW2 select the number of I/O words that the unit will occupy on the CQM1 I/O bus. The PROFIBUS-DP master's configuration data must match this setting to enable data exchange over PROFIBUS-DP.
OFF	OFF	2/2	
ON	OFF	4/4	
OFF	ON	6/6	
ON	ON	8/8	
SW3	**Data format**		SW3 selects Motorola/Intel data format
OFF	Motorola (big-endian)		1st PROFIBUS data byte is mapped to the most significant byte in the first PLC word (default format for word-based data).
ON	Intel (little-endian)		1st PROFIBUS data byte is mapped to the least significant byte in the first PLC word (use for masters with byte-oriented data).
SW4			Reserved. Always set to OFF position.

■ Communication status output

The COMM relay contact output indicates if data exchange with the PROFIBUS-DP master unit is active. This signal can be connected to a PLC input or external signalling device. It is recommended to use this information in the PLC to judge the validity of the received data.

ON state	• I/O data exchange with the PROFIBUS-DP master is active.
OFF state	• PLC Power OFF • Fatal error in PLC CPU or I/O bus. • No I/O data exchange with PROFIBUS-DP master (check LED indication)
Relay type	OMRON G6H-2F, non-replaceable
Maximum load	1 A at 24 V DC
ON/OFF delay	less than 10 ms
Connector	Phoenix MSTBA 2,5/2-G

■ PROFIBUS-DP bus connector

- The 9-pin female sub-D connector conforms to the guidelines defined in the PROFIBUS-DP standard EN 50170 vol. 2.

- At baud rates over 1.5 Mbit/s, always use PROFIBUS-DP plugs with built-in inductors to minimise signal reflections.

- External termination as shown below is required if the Unit is the first or the last station of a bus segment.
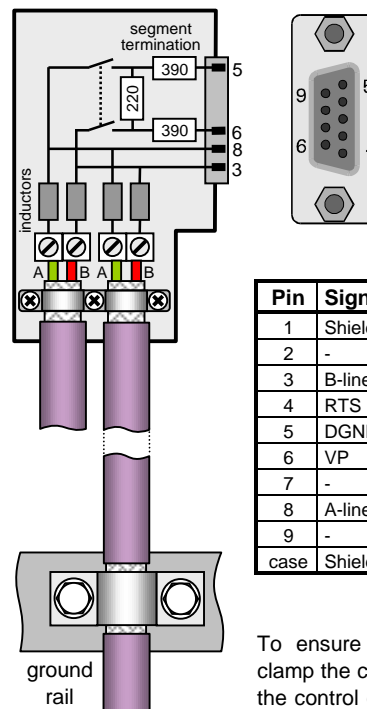
At least the data lines A and B (pins 8 and 3) and the cable shield must be connected at each station.

Recommended colours:
A-line = pin 8 = GREEN
B-line = pin 3 = RED

Pin	Signal	Description
1	Shield	Functional ground
2	-	
3	B-line	Data signal (RS-485)
4	RTS	Repeater control signal (TTL)
5	DGND	Data ground (0V)
6	VP	+5V for bus termination
7	-	
8	A-line	Data signal (RS-485)
9	-	
case	Shield	Functional ground

To ensure electro-magnetic compatibility, clamp the cable shield to a grounding rail in the control cabinet, as close as possible to the cable lead-trough.

■ Unit specifications

Storage temperature	-20 to +75 °C
Ambient temperature	0 to +55 °C
Ambient humidity	10 to 90 % (non-condensing)
EMC compliance	EN 50081-2, EN 61131-2
Current consumption (max)	350 mA at 5V DC (at CQM1 I/O bus)
Weight	170 g
I/O data	Configurable by DIP switches *Note • 2 words in + 2 words out • 4 words in + 4 words out • 6 words in + 6 words out • 8 words in + 8 words out
I/O refresh time (data exchange with CPU)	Max. 0.16 ms

*Note: The CQM1-PRT21 can be mounted to any CQM1- or CQM1H-series CPU. The maximum amount of I/O data that can be exchanged with the CPU depends on the selected CPU type, and on the number and type(s) of any additional I/O unit(s). To operate with the Unit's maximum I/O capacity, a CQM1H-CPU51 or CQM1H-CPU61 is required.

■ Communication specifications

Applicable standard	EN 50170 vol.2 (PROFIBUS-DP)
Station type	Modular PROFIBUS-DP slave One module of 2, 4, 6 or 8 words I/O Word consistency only
Baud rates in kbit/s (auto-detect)	9.6, 19.2, 45.45, 93.75, 187.5, 500, 1500, 3000, 6000, 12000
Minimum slave interval	0.5 ms
PROFIBUS-DP address	00 – 99 set by 2 rotary switches *Note
Supported DP functions	Data_Exchange (including Fail_safe) Set_Prm, Chk_Cfg, Get_Cfg, Slave_Diag, RD_Inp, RD_Outp, Global_Control (SYNC/FREEZE/CLEAR), Watchdog_base 10 ms or 1 ms
GSD file	OC_054D.GSD on 3½" Floppy Disk provided with Unit

*Note: Turn off the PLC's power supply before making changes to the PROFIBUS-DP address switches.

■ Indicators, Troubleshooting

Name	State	Unit status
RUN (Green)	OFF	Fatal error or no power supply. • Check the host PLC's CPU status. • Check the status of other I/O units. • If all other units function normally, replace the CQM1-PRT21
	FLASH	Initialising the Unit. • Check the host PLC's CPU for errors. • Check if an end plate is mounted at the rightmost I/O unit.
	ON	I/O bus communication with the Unit is normal.
ERR (Red)	**OFF**	No fatal errors in the I/O bus communication .
	ON	Fatal error in the I/O bus communication. • Check the CPU unit for errors. • Re-start the PLC system. • If the ERR LED is still lit, replace the unit.

Name	State	PROFIBUS-DP status
COMM (Green)	OFF	No PROFIBUS-DP data communication. • Check the wiring of all PROFIBUS cables and connectors. • Verify that no other station on the network has the same address. • Verify that the master uses the correct GSD file (OC_054D.GSD) • Check the status of the BF LED (see below).
	ON	PROFIBUS-DP I/O data exchange is active. If the I/O data in the master or in the slave PLC is not updated as expected, check the PROFIBUS-DP detailed status LEDs.
BF (Red)	**OFF**	I/O data communication on PROFIBUS-DP.
	FLASH	Slave communicates with a master, but the master's configuration data and/or parameter data are incorrect. • Verify that the configuration data in the master matches the Unit's DIP switch setting (number of I/O words). • Verify the user parameters as defined in the master's configuration; these should be either **0x00 0x00 0x00** or **0x40 0x00 0x00** (Master supports Fail-safe) **0x04 0x00 0x00** (Watchdog base = 1 ms) **0x44 0x00 0x00** (Fail-safe + WD base 1 ms)
	ON	Bus Fail. No PROFIBUS-DP I/O data exchange was established after the (re)start of the Unit, or the communication interval of the master has exceeded the configured watchdog time. See also COMM=OFF above

Name	State	PROFIBUS-DP detailed status
WD OFF (Yellow)	OFF	Normal operation. The master has configured a watchdog control time in the slave. If the master's communication interval exceeds the watchdog control time, the Unit will exit PROFIBUS-DP data exchange mode and clear the outputs to the PLC. The value of the watchdog control time can be found in the master's bus parameters.
	ON	The slave's watchdog control timer is disabled by the master. The slave will stay in data exchange mode regardless of the interval between two master telegrams. The slave will not clear the outputs to the PLC at a communication failure of the master. The last received output data will be held until the master resumes communication.
CLEAR (Yellow)	OFF	Normal I/O data exchange on PROFIBUS-DP.
	ON	The slave has received a global control command CLEAR. All slave outputs to the CQM1 PLC are set to 0. Subsequently, the master may send empty data telegrams, and read the slave's input data, or resume data exchange.
SYNC (Yellow)	OFF	Normal I/O data exchange on PROFIBUS-DP.
	ON	The slave has received a global control command SYNC. The PROFIBUS-DP output data to the CQM1 PLC is not updated until the next SYNC command. When the master sends an UNSYNC command, the LED will go OFF; the data to the PLC will be updated every PROFIBUS cycle.
FREEZE (Yellow)	OFF	Normal I/O data exchange on PROFIBUS-DP.
	ON	The slave has received a global control command FREEZE. The PROFIBUS-DP input data from the CQM1 PLC is not updated until the next FREEZE command. When the master sends an UNFREEZE command, the LED will go OFF; data from the PLC will be updated every PROFIBUS cycle.

Note: The WD OFF, CLEAR, SYNC and FREEZE indications are only valid while the COMM LED is ON.