





# ASHIDA Feeder Remote Terminal Unit (APCG – 42)

#### Introduction

The APCG-42 with its compact size is specially designed for Ring Main Unit Automation, which commonly known as APCG-42 or AFRTU2. APCG-42 is a customized implementation of various ASHIDA SCADA components & modules. Support for I/Os using modular cards.

The APCG-42 is available in two models depending on the number of input/output requirements.

- Side Modular
- Front Modular

## **Features**

- 32 bit Processor
- Communication Protocols:
- > IEC 60870-5-101

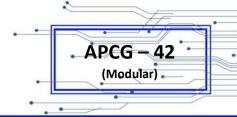
- > IEC 60870-5-104
- > IEC 60870-5-103
- ➢ MODBUS RTU or TCP
- > DNP3 (Optional)
- > IEC 61850 (Optional)
- Interface with numerical Relays/ Multifunction Meters.
- 3 Serial Ports.
- 2 Ethernet Ports
- Wired/Wireless connectivity to master system.
- GSM/GPRS connectivity support for wireless.
- Ease of configuration using OP+ configuration tool.
- Optional HMI
- LED Indications for status indications of CB / isolators, monitoring the ports & health of APCG-42.

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APCG42/PC/01





- 8 Front push buttons for CB/Isolator control (Available in Small Cabinet)
- Temperature monitoring and alarm available (Optional).
- Time sync using user SNTP.
- Power Rating: 24V-48V DC.



APCG-42 – Side Modular (Small Cabinet)



APCG-42 – Side Modular (Big Cabinet)



APCG-42 – Front Modular







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#### Description

APCG-42 modular RTU (AFRTU2) consists all the necessary monitoring and communication function required for controlling remote feeders. It consists of mainly two variants, side Modular (Big) & Modular having 6 (DI/DO/AI) cards while side Modular (small) version having provision of 2 cards.

The APCG-42 is designed using modular construction. It consists of following main components.

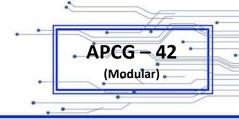
- 1. OpenPro+
- 2. I/O Cards consisting of
- Digital Input Card
- Digital Output Card
- Analogue Card
- CT & PT Card

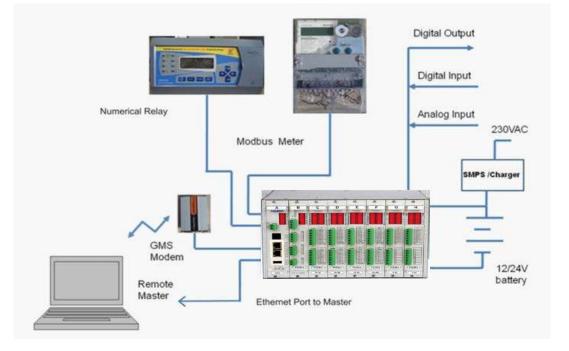
The heart of the system is a data concentrator or communication gateway internally OpenPro+ known as Controller. The OpenPro+ controller mainly consists of high speed controller, various communication ports and storage memory. It has two port for master connections and three slave ports. The master ports are Ethernet interface capable of communicating of IEC 60870-5-104 protocol; OpenPro+ also has three high speed RS slave communication ports.

The 1<sup>st</sup> Port is capable of communication of IEC 60870-5-103 protocol with

internal I/O cards, external Protection even external relay or expansion (FCCM3/5) unit. The 2<sup>nd</sup> slave port with RS485 physical interface is capable on communicating on MODBUS & DNP3 protocol. This port can be used to interface Energy meter or similar device having MODBUS protocol. All these ports independent and can are be independently programmed on different speeds and settings.







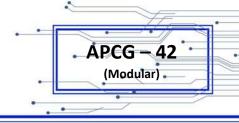
The APCG-42 unit has 6 slots for Big Cabinet & Modular version and 2 for Small cabinet APCG-42 on which various cards can be connected such as Digital Input (DI) card, Digital Output (DO) card or Analog Input (AI) card. These 6 internal I/O Cards are used to monitor various events, CB status, Isolators, Status, Etc. The various events are by DI card and event monitored generated in APCG-42 are controlled by OpenPro+ controller along with various parameter such energy, voltage, current, power from Energy Meters. These are used to report to the various masters such as local HMI or Remote Load Dispatch centre (LD) or any master system along with time stamp. The RTC (Real Time Clock) of the APCG-42 can be time-synchronised from remote master

or a GPS time server using IEC60870-5-101/104 protocol of through SNPT server.

Three (3) Different types of I/O cards are available for acquiring status of associated switchgear, issuing control outputs or acquiring analog inputs.

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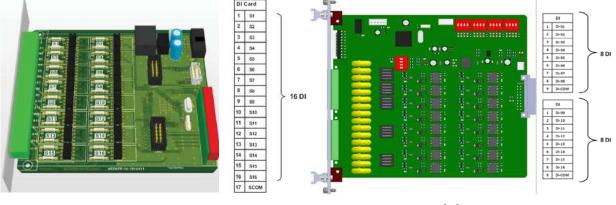




# **Digital Input Card:**

The digital input card has 16 status inputs. On change of any status, an event is generated; each input is optically isolated and has input range of 24V DC.

The Terminal definition of Digital Input (DI) card is shown in figure.



Side Modular APCG-42

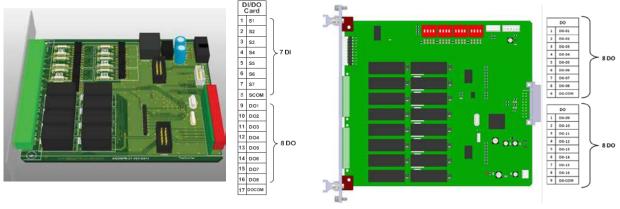
**Front Modular APCG-42** 

# **Digital Output Card:**

The Typical APCG-42 has 7 digital inputs and 8 Control outputs.

The Modular version has 16 Control outputs. All outputs are potential free contacts.

The Terminal definition of Digital Output (DO) card is shown in figure.



## Side Modular APCG-42

**Front Modular APCG-42** 

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## **Analogue Card:**

The digital output or input card can be replaced with analog card as per requirement. The Typical APCG-42 has 4 analogue inputs and Modular version has 8 analogue inputs which can be used as 0 to +10V or 4 to 20mA input to various interface various transducers. The Terminal Definition is as shown in figure.

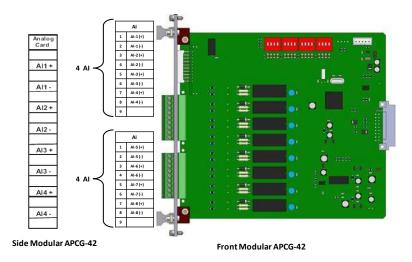




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Depending on the actual requirement any combination of cards can be formed.

For example

Modular version consist of Maximum

6 x 16 = 96 Digital Inputs, OR

6 x 16 = 96 Digital Outputs, OR

6 x 8 = 48 Analogue Inputs

Big Cabinet can have :

6 x 16 = 96 Digital Inputs OR

6 x 8 = 48 Digital Outputs & 6 x 7 42 Digital Inputs OR

6 x 4 = 24 Analogue Inputs

A typical APCG-42 (Small Cabinet) can have

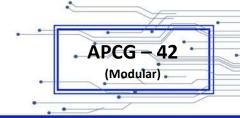
 $1 \times 6 + 1 \times (7+8) = 23$  Digital Inputs (DI) and 8 Digital Outputs (DO)

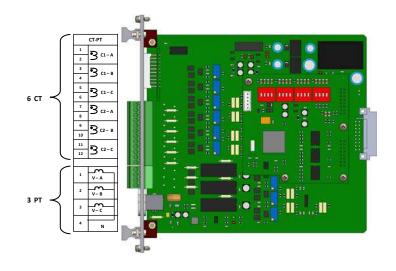
For more DI/DO requirement an expansion unit can be connected to RS485 slave ports on IEC 60870-5-103 protocol.

## CT & PT Card (Optional):

The Front access FRTU2 is provided with CT & PT card (Optional). The digital output or input card can be replaced with CT & PT card as per requirement. The Typical APCG-42 has 6 CT & 3 PT inputs which can be used for current & voltage input. The Terminal Definition is as shown in figure.







#### Temperature Sensor (Optional):

The Front access FRTU2 is having provision for temperature sensor. The temperature sensor with 1 meter cable will be provided with FRTU2 as an additional accessory. The sensor will detect the change in temperature of CB / Isolator and generates alarm. The sensor can be programmed by using software tool (RTV2).

## **Application**

#### **Ring Main Unit Automation:**

The APCG-42 due to its compact size finds its main application for RMU Automation. The data from remote Ring Main Units is sent to central system for further analysis.







**APCG - 42** (Modular) -

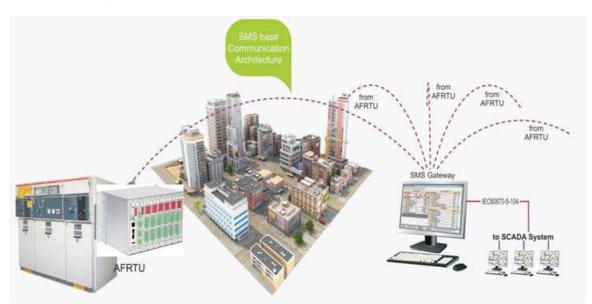
#### **Substation Automation**

The APCG-42 can also be used for substation Automation where less number of I/Os are required. The data can be integrated with any SCADA system for user ease.



#### **SAIDI – SAIFI** Calculation

Major concern in the power distribution sector today is poor power distribution reliability. APCG-42's can form an integral part of the System for improving SAIDI & SAIFI for any distribution utility.









#### Relay Talk – V2 (RTV2) Software:

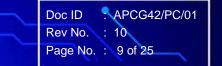
The general communication software is provided to communicate with APCG-42, known as RT. By using this software, the user can set CT and PT ratio, Angle calibration, Power measurement.

| RT HMI  | C:\Usors\saurabh\Docum             | ents\ASHIDA\Relay Talk\RTSystem\SCADA\AFRTU2\FCCM 08 | VI.01\SETTINGS\000.set |
|---|------------------------------------|--|------------------------|
| RTSystem 000 set(Offer  | w0                                 |  |                        |
|   | 0                                  |  |                        |
| CO GLOBA  |                                    | Value  | Remark/Range           |
| Gar Gar   | eral Settings<br>RT F              |  | 1 100 5                |
| 2 3/25/V  |                                    | 15   | 1 + 100 %              |
| Distance SYSTE  |                                    | 35   | 1+100 %                |
| Differendial Keley_VS.D4b   | Clarker Content<br>Clarker Clarker | 15   | 1 + 100 %              |
| Semps     Fig 00 Am     F |                                    |  |                        |
| oported Falme   |                                    |  |                        |
| Address of Factor Control Support False<br>doorted False<br>RCSM 00V1.01 III<br>attrives Supported False<br>accorded Taue   |                                    |  |                        |
| Device.   |                                    |  |                        |
| NOR.  |                                    |  |                        |

In the RTV2 user can arrange setting in different files and maintain as per feeder or bay level. The setting file can be done offline

The User can view the online measurement of APCG-42.

| RT HMI  |           |         |       | RTSystem\Sub | station 5\AL | DR2458_M0_08 | 032017\ADR245BI | 40_011 | /1.00\Measu | rements |        |       |    |
|---|-----------|---------|-------|--------------|--------------|--------------|-----------------|--------|-------------|---------|--------|-------|----|
| ADR2458_M0_17022017                               | Measurer  | nents   |       |              |              |              |                 |        |             |         |        |       |    |
| ADR2458_M0_20022017                               | 142 +     |         |       |              |              |              |                 |        |             |         |        |       |    |
| ADR2458_M0_21022017                               |           |         |       |              | 11           |              |                 |        | 120         |         |        |       |    |
| ADR2458_M0_22022017                               | No.       | Name    | Value | Unit         | No.          | Name         | Value           | Une    | No.         | Nome    | Value  | Unt   |    |
| sp. 108 ADR2458_M0_28022017                       | 1         | LA MAG  | 2     | A            | 79           | PA           | 63 364          | w      | 2 101       | Za MAG  | 63.411 | Ohms  |    |
| ADR245B_M0_02032017                               | [₩] 2     | IB MAG  | 2     | A            | IV 80        | PB           | 63.454          | W      | 102         | Zh ANG  | -0.066 | Deg   |    |
| ADR2458_M0_04022017                               | 23        | IC MAG  | 2     | A            | 12 21        | PC.          | 63.56           | w      | UI 103      | Ra MAG  | 63.411 | Ohma  |    |
| 0 KADR2458_M0_07032017                            | SV 4      | IN MAG  | 2     | A            | 2 82         | 3P           | 190.379         | W      | 2 104       | Xe MAG  | 0.073  | Ohma  |    |
| ADR2458_M0_08032017                               | 12 5      | LAB MAG | 2     | A            | 2 83         | QA           | -0.035          | Var    | 105         | Zb MAG  | 63.359 | Ohms  |    |
| ADR2458M0_011V1.00                                | 2 6       | IBC MAG | 4     | A            | 2 84         | QB           | 0.436           | Var    | 2 106       | Zb ANG  | -0.425 | Deg   |    |
| E Device Details                                  | 7         | ICA MAG | 3     | A            | 2 85         | QC.          | -0.104          | Vor    | 2 107       | Fb MAG  | 63.357 | Ohma  |    |
|   | 12 8      | Is MAG  | 1     | A            | 1V1 86       | 30           | -0.575          | Var    | 12 108      | X0 MAG  | -0.47  | Otwis |    |
| Connection  | 17 9      | la ANG  | 0     | Deg          | 1 87         | SA           | 53.459          | VA     | 109         | Ze MAG  | 63.453 | Ohms  |    |
| _ 💭 Settings                                      | IV 10     | Ib MAG  | 1.001 | A            | EV 88        | SB           | 63.457          | VA     | 2 110       | Zc ANG  | -0.029 | Deg   |    |
| AProLogic   | 12 11     | IL ANG  | -60   | Deg          | 171 89       | SC           | 64.477          | VA     | 10/1 111    | Ro MAG  | 63.453 | Ohms  |    |
| _ m 000.apl                                       | 12 12     | le MAG  | 1.001 | A            | IV 90        | 35           | 191.393         | VA     | 112         | Xe MAG  | 0.032  | Ohms  |    |
| _ 😴 001 apl                                       | 13        | Ic ANG  | 120   | Deg          | 12 91        | Frequency    | 50.004          | Hz     | 12 113      | Zab MAG | \$3.73 | Ohma  |    |
| <b>P</b> 31 002.apl                               | 2 14      | In MAG  | 1.001 | A            | V 92         | di/dt        | 0               | Hz/s   | 2 114       | Zab ANG | -0.285 | Deg   |    |
| Everts  | 11 15     | In ANG  | 0     | Deg          | V 93         | PEA          | 0.999           | pu     | 115         | Rab MAG | 63.729 | Ohms  |    |
| 🛞 🧓 History Faults                                | 16        | lab MAG | 1     | A            | IV 94        | PFB          | 1               | pu     | 1116        | Xab MAG | -0.319 | Ohms  |    |
| Disturbance Record                                | 2 17      | Jab ANG | 60    | Deg          | V 95         | PEC          | 0.986           | pu     | 12 117      | Zbc MAG | 63.405 | Ohms  |    |
| Measurements                                      | 18        | be MAG  | 2     | A            | V 95         | 3PF          | 0.995           | DU.    | 118         | Zbc ANG | -0.227 | Deg   |    |
| The Status  | 12 19     | be ANG  | -60   | Deg          | IV 97        | kwb+         | 0               | kwh    | 119         | Rbo MAG | 63.406 | Ohms  |    |
| Control   | 12 20     | Ica MAG | 1.73  | A            | 88 1         | kwh-         | 0               | kwh    | 120         | Xbe MAG | 0.251  | Ohma  |    |
| Ales  | 21        | Ica ANG | 150   | Deg          | V 99         | kwft+        | 0               | kwh    | VI 121      | Zoa MAG | 63.444 | Ohms  |    |
| a   | 22        | IT MAG  | 0.881 | A            | 100          | kath         | 0               | kwh    | 122         | Zea ANG | 0.058  | Deg   |    |
| 1 🖾   | 12 23     | II ANG  | 19    | Deg          |              |              |                 |        | 123         | Rca MAG | 63.444 | Ohms  |    |
|   | 24        | 12 MAG  | 0.335 | A            |              |              |                 |        | 121 124     | Xca MAG | -0.065 | Otims |    |
| 091850 Supported False *                          | 25        | 12 ANG  | -120  | Deg          |              |              |                 |        |             | Z1 MAG  | 63 515 | Ohms  |    |
| intenance Record Suc False<br>dous Supported True | (2) 26    | I0 MAG  | 0.335 | A            |              |              |                 |        | 126         | Z1 ANG  | -0.172 | Deg   |    |
| dbus Supported True ADR2458M0 011 V1 +            | inter and | ID ANG  | 0     | Deg          |              |              |                 |        | 12 127      | R1 MAG  | 63.514 | Ohms  |    |
| ue  | 1 28      | 310 MAG | 1.005 | A            |              |              |                 |        |             | X1 MAG  | 0.19   | Ohma  |    |
| o   | 12 29     | 10/11   | 0.38  | 00           |              |              |                 |        | 121         | Z2 MAG  | 63.085 | Ohme  |    |
| of the Device                                     | 17 30     | 12/11   | 0.38  | pu           |              |              |                 |        |             | 22 ANG  | 0.168  | Deg   |    |
|   |           |         |       | 2            |              |              | 10              |        |             |         |        |       | ę, |





To view events data, double click on Event file. Event list with time, date and parameters will display on screen. Following window will appear on screen.

**APCG - 42** 

(Modular) -

| *1 2 0 0 % % % % % 9 画 &<br>RT HMI      |                                  | uments\ASHIDA\Relay Talk\RTSystem\Substation 5\ADI | 82458_M0_08032017\ADR2458M0_011V1.00\EventHistory\Thursday 9 Ma | arch 2017      |
|---|----------------------------------|--|---|----------------|
| ADR2458_M0_17022017                     | Thursday 9 March 2017 12 28 30 1 |  | an and a start of the   |                |
| ADR2458_M0_20022617                     |                                  |  | Page No. :- 1 /1 Refresh cc                                     |                |
| a Ka ADR2456_M0_22022017                | Time                             | Event  | Value   | (Second Second |
| 4 KADR2458_M0_28022017                  | 09-03-2017 12-44-55 437          | C8 Open Sup  | ON INC.   |                |
| ADR2458_M0_02032017                     | 09.03.2017 12.44.55.242          | OUT 1  | OFF   |                |
| ADR245B_M0_04022017                     | 09-03-2017 12:44:55 242          | LIR  | OFF   |                |
| ADR2458_M0_07032017                     | 09-03-2017 12:44:55:241          | 126  | OFF   |                |
| ADR2458M0_011V1 00                      | 09-03-2017 12-44-55 237          | (FAN=1: RET=0) (P>1 T                              | OFF   |                |
| Device Details                          | 09-03-2017 12:44:55:236          | (FAN+1 RET+0) L1 T                                 | OFF   |                |
| Connection                              | 09032017 12 44 55 236            | (FAN+1: RET+0) IP>1 P                              | OFF   |                |
| Settings                                | 09-03-2017 12-44 55 236          | (FAN=1: RET=0) L1 P                                | OFF   |                |
| - 57 000.apl                            | 09-03-2017 12:44:55 236          | (FAN=1: RET=0) General T                           | OFF   |                |
|   | 09-03-2017 12 44:55 236          | (FAN=1, RET=0) General P                           | OFF   |                |
| _ 10 002 apl                            | 09032017 12 44 00 133            | Fault Vn MAG= 0.000 V                              | UN  |                |
| @ 📰 <mark>Statt</mark>                  | 09-03-2017 12:44:00 133          | Fault Von MAG= 0.000 V                             |   |                |
| History Faults                          | 09-03-2017 12:44:00:133          | Fault Von MAG = 0.000 V                            |   |                |
|   | 09-03-2017 12:44:00 133          | Fault Van MAG= 0.006 V                             |   |                |
| Ratus                                   | 09-03-2017 12:44:00:133          | Fault in MAGe 0.000 A                              |   |                |
| 15 Control                              | 09-03-2017 12:44:00 133          | Fault In MAG= 0 000 A                              |   |                |
| Ge I Alass                              | 09.03-2017 12:44:00.133          | Fault Ib MAG= 0.001 A                              |   |                |
| m21 m                                   | 09-03-2017 12:44:00:133          | Fault is MAG= 7.490 A                              |   |                |
| IECE1950 Supported False                | 09-03-2017 12:44:00:133          | Fault Cearance time= 0.011 Sec                     |   |                |
| Maintenance Record Sup False            | 09-03-2017 12-44-55 168          | OUT 1  | PN .  |                |
| Modbus Supported True ADR245BM0_011_V1+ | 09-03-2017 12:44:55.167          | LIR  | ON  |                |
| hame                                    | 09-03-2017 12:44:55:160          | 126  | ON  |                |
| Name<br>Name of the Device.             | 09-03-2017 12:44:55.160          | (FAN-2: RET-0) IP>1 T                              | ON  |                |
|   | 09-03-2017 12 44 55 159          | (FAN+2 RET+0)L1T                                   | ON  |                |

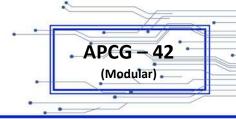
#### **OpenPro+ Configurator:**

For OpenPro+ to act like protocol gateway it has to be configured for protocol master and slave. This can be done with the help of OpenPro+ Configurator tool. By using OpenPro+ Configurator user can generate XML file, export/import IED templates, export INI file, do master/slave mapping, etc.

| > Ashida OpenPro + Configurator |  |              | 20X |
|---------------------------------|--|--------------|-----|
| Elle Rem Rep                    |  |              |     |
| 3 ≥ 8 0 = 8 4 ¥                 |  |              |     |
|                                 | Device Details:  |              |     |
| Details                         | and the second s |              |     |
| - B Network Configuration       | Name   | Value        |     |
| Secial Configuration            | XMLVersion   | 4<br>APCG-42 |     |
| B - 🙀 System Configuration      | DeviceType<br>HwVersion  | 1.0          |     |
| System Conlig                   | Sw/er  | 10           |     |
| B Slave Configuration           | DeviceDescription  | OpenPro+     |     |
| LEC104 Group                    |  |              |     |
| B- Master Configuration         |  |              |     |
| S -245 IEC103 Group             | 35   |              |     |
|                                 |  |              |     |
| EC103 IEC103_1                  | -  |              |     |
| B IED                           |  |              |     |
| N O                             | Edit   |              |     |
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OpenPro+ can be configured any protocol as Master/Slave. User can add multiple masters/slaves and configure its parameters. To make Master/Slave online mark it as "Run".

| enProPlus Configuration  | Mast       | er Configuration: |       |  |
|--|------------|-------------------|-------|--|
| Detaits  | PED-000105 | Description       | Total |  |
| Network Configuration  | PE0.       |                   | 10131 |  |
| Senal Configuration  | 3          | ADR               | 0     |  |
| System Configuration   | 2.7        | IEC101<br>IEC103  |       |  |
| 101 System Config  | 4          | MODBUS            | 6     |  |
| Firewall Configuration   | 2          | IEC61850          | à.    |  |
| Slave Configuration  | 6          | JEC104            | 0     |  |
| A IEC104 Group   | 21         | SPORT             | 0     |  |
| MODEUS Group   |            | Vetual            | 1     |  |
|  | 9          | LoadProfile       | 0     |  |
| T. IEC101 Group  | 10         | PLU               | 0     |  |
| EC61850 Server Group   |            |                   |       |  |
| SPORT Group  |            |                   |       |  |
| The MOTT Group   |            |                   |       |  |
| SMS Group  |            |                   |       |  |
| 📇 GraphicalDisplay Group   |            |                   |       |  |
| T. DNP3 Greup  |            |                   |       |  |
| Haster Configuration   |            |                   |       |  |
| ADR Group  |            |                   |       |  |
| T. IEC101 Group  |            |                   |       |  |
| T. IEC103 Group  |            |                   |       |  |
| MODBUS Group   |            |                   |       |  |
| IEC61050 Group   |            |                   |       |  |
| RC104 Group  |            |                   |       |  |
|  |            |                   |       |  |
| SPORT Group  |            |                   |       |  |
| The Virtual Group  |            |                   |       |  |
| Ta Load Profile Group  |            |                   |       |  |
| T PLU Group  |            |                   |       |  |
| Parameter Load Configuration   |            |                   |       |  |
| d Closed Loop Action   |            |                   |       |  |
| Profile Record   |            |                   |       |  |
| MD Calculation   |            |                   |       |  |
| Derived Parameter  |            |                   |       |  |
| Denied Dr  |            |                   |       |  |
| Contraction of the second seco |            |                   |       |  |
|  |            |                   |       |  |

By using OpenPro+ Configurator, user can add multiple Master/Slave & set their parameters like Analogue Input, Digital Input, Digital Output etc.

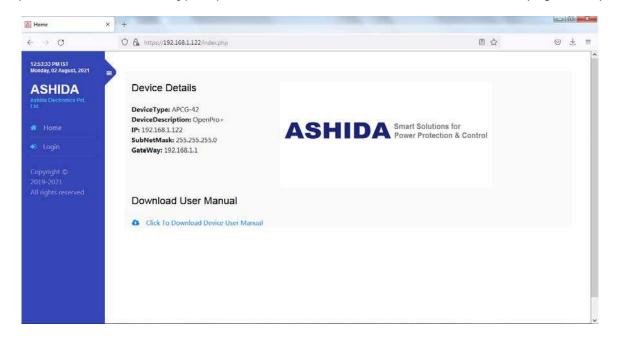
|  | CT 13                 |  | 0  |   |  |   |  |
|--|-----------------------|--|--|---|--|---|--|
| The MODBUS Group   | 1 DI List             | 1 Total Records : 16   | Add Delete   |   |  |   |  |
| LEC101 Group   | Delete                | All Records  | inter   triniter   |   |  |   |  |
| 🕵 (EC61850 Server Group  | DENo.                 | Response Type  | 19292011   | Sub index   | Description  |   |  |
| SPORT Group  |                       |  | Index  | -Shp Huger  |  |   |  |
| KNOFT Group  |                       | TimeTaggedhiessage   | 32579  | 1   | MC61   |   |  |
| Stats Group  |                       | TimeToppedMessage  | 52540  | 1   | MCB1<br>MCB1   |   |  |
| GraphicalDisplay Group   | 104                   | TimeTaggedMessage<br>TimeTaggedMessage   | 32542  | 1   | MCB1   |   |  |
| DNPS Group   | 12                    | TimeTappedMessage  | 32543  | -   | MCBI   | 1   |  |
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| iEC103 Group   | 1 11                  | TimeTappedMessage  | 32549  | 1   | MC81   |   |  |
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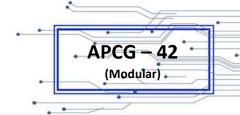


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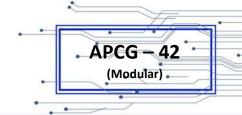
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The Disturbance records can be extracted from IED's on IEC-103 & IEC 61850 protocol.

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| ASHIDA                                       | Download DR Records                                   |                          |                              |
| <ul> <li>Home</li> <li>Admin</li> </ul>      | Download Profile Records                              |                          |                              |
| <ul> <li>Dashboard</li> <li>Users</li> </ul> | Download PR. Download PR 20                           |                          |                              |
| Password     Roles     Database              | Download SOE logs Utilog                              |                          |                              |
| Diagnostic                                   | Download App logs Download Log                        |                          |                              |
| Application                                  |   |                          |                              |
| - Teg Vew                                    |   |                          |                              |
| a fator                                      |   |                          |                              |
| https://192.168.1.122/admin                  |   |                          | ~                            |
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# **Technical Specifications:**

| General | Specification                |  |
|---------|------------------------------|--|
| Sr. No. | Specification                | Particulars  |
| 1.      | Auxiliary Supply             | : 24 to 48V DC   |
| 2.      | VA Burden on Auxiliary       | : Less than 6 Watts (unloaded) for Side<br>Modular                                       |
|         |                              | : Less than 10 Watts for Front Modular   |
| 3.      | Operating Temperature Range  | : -10 deg. to +65 deg  |
| 4.      | Each Digital Input Card      | : 16 with 2kV Isolation  |
| 5.      | Each Digital Output Card     | : 8 Potential Free contacts + 7 DI with 2kV<br>Isolation<br>: 16 Potential Free contacts |
| 6.      | Contact Rating               | : Continuous 5A at 230V AC   |
| 7.      | Each Analogue Input Card     | : 4 AI<br>: 8 AI   |
| 8.      | Each CT & PT Card            | : 6 CT & 3 PT  |
| 9.      | Impedence for CT & PT sensor | : For CT >20k $\Omega$<br>For PT >100k $\Omega$  |
| 10.     | Temperature Sensor Type      | : Analogue Temperature Sensor  |
|         | Measurement Accuracy         | : ± 2°C  |
|         | Setting Range                | : -50°C to 150°C   |

# **Typical Tests Information:**

The APCG-42 confirms to following Standard

| Sr. No.   | Test                                       | Standard                         |
|-----------|--|----------------------------------|
| Electrom  | nagnetic Compatibility Type Test:          |                                  |
| 1.        | Electrostatic Discharge Direct Application | IEC 60870-2-1 Level 3            |
| 2.        | Damp Oscillatory Wave Test                 | IEC 60870-2-1 Level 3            |
| 3.        | Fast Transient Disturbance Test            | IEC 60870-2-1 Level              |
| 4.        | Surge Immunity Test                        | IEC 60870-2-1 Level 3            |
| 5.        | Power Frequency Magnetic Field Test        | IEC 60870-2-1 Level 3            |
| 6.        | Damped Oscillatory Magnetic Field Test     | IEC 60870-2-1 Level 3            |
| 7.        | Related Electromagnetic Field Disturbance  | IEC 60870-2-1 Level -3           |
| Insulatio | on Tests:                                  |                                  |
| 8.        | Power Frequency Voltage Test               | IEC 60870-2-1                    |
| 9.        | Insulation Test                            | Insulation ar resistance 500V DC |
| 10.       | Impulse Voltge Test                        | IEC 60870-2-1                    |
| Environr  | nental tests:                              |                                  |
| 11.       | Dry heat test                              | IEC 60068-2-2                    |
| 12.       | Damp heat test, steady state               | IEC 60068-2-3                    |

\*NOTE: Detailed type test reports are available on request.



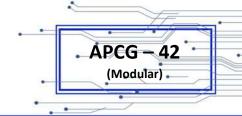


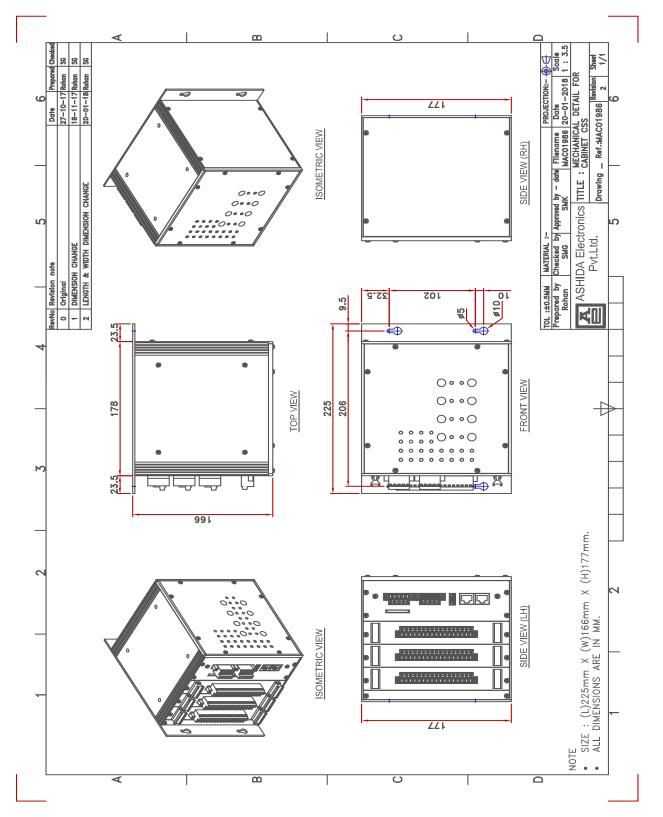
# **Drawings Information:**

| Ι. | Drawing    | : For Cabinet Type CSS – Side Modular (Small) | - MAC01986   |
|----|------------|---|--------------|
|    | References | : For Cabinet Type CSS – Side Modular (Big)   | - MAC01985   |
|    |            | : For Cabinet Type CSS – Front Modular        | - AEM1933003 |
|    |            | : For Back Terminal Details                   | - FRTU00701  |
|    |            | : For Back Terminal Details With CT & PT Card | - FRTU00801  |





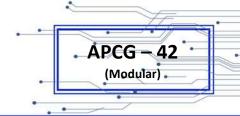


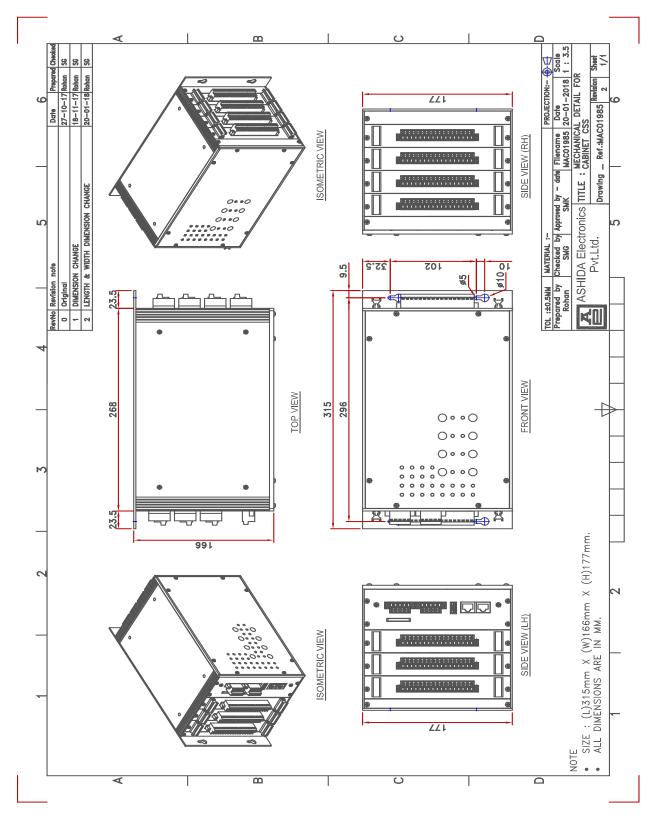


# Mechanical Details for CSS – Side Modular (Small Cabinet):

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# Mechanical Details for CSS – Side Modular (Big Cabinet):

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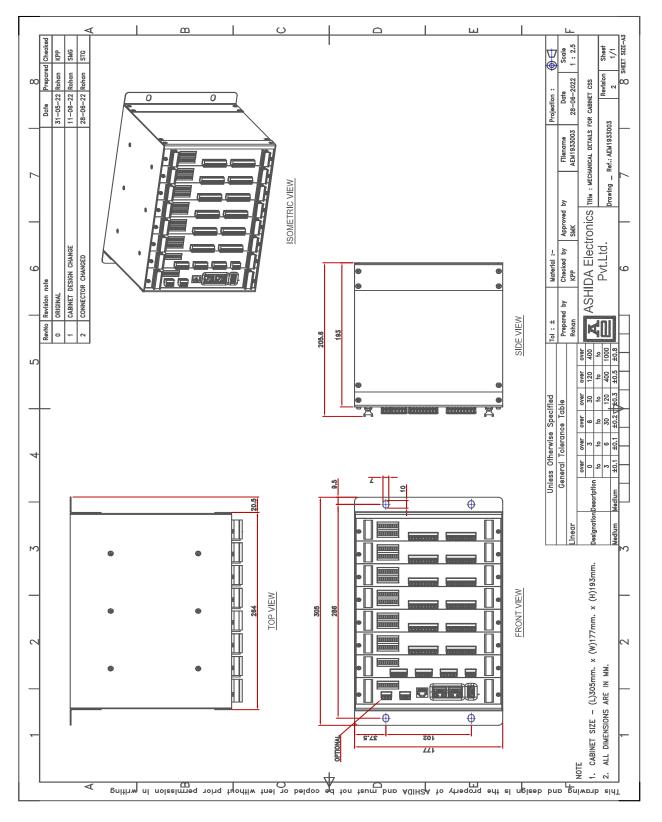
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# Mechanical Details for Front Modular:

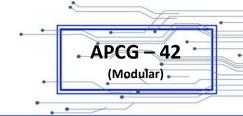


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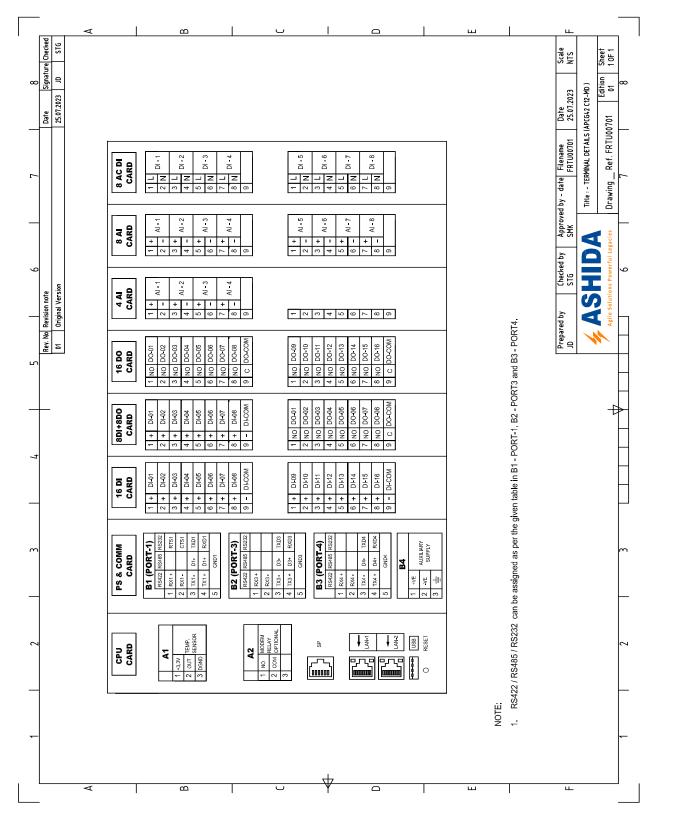
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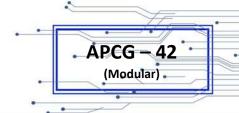


# Back Terminal Details (Front Modular)

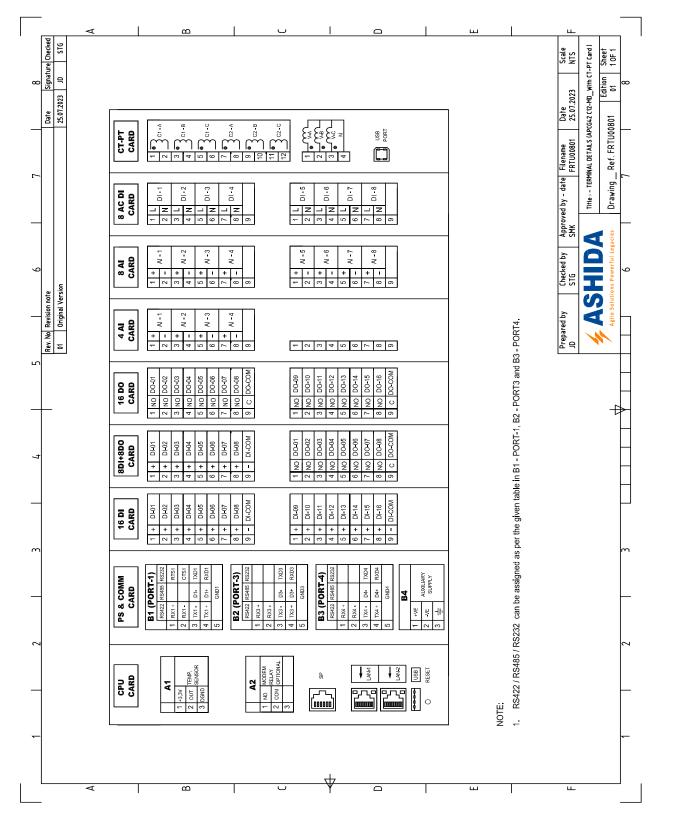


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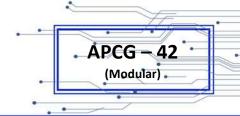


# Back Terminal Details (Front Modular) – With CT-PT Card



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# **Ordering Information**

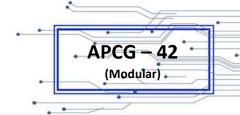
# Ordering Information of Side Modular

|              |             |            | Orde     | ring Inf | ormatio | n – Side | e Modula | r  |    |    |    |    |
|--------------|-------------|------------|----------|----------|---------|----------|----------|----|----|----|----|----|
|              |             | 5          | 6        | 7        | 8       | 9        | 10       | 11 | 12 | 13 | 14 | 15 |
| Model        | FRTU        | Х          | Х        | Х        | Х       | Х        | Х        | Х  | Х  | Х  | Х  | Х  |
| Example      | FRTU        | В          | 0        | Х        | Х       | В        | Х        | Х  | Х  | 1  | 4  | Α  |
| AFRTU        |             |            |          |          |         |          |          |    |    |    |    |    |
| Sub Type     |             |            |          |          |         |          |          |    |    |    |    |    |
| Basic Versi  | on          | В          |          |          |         |          |          |    |    |    |    |    |
| Variant      |             |            |          |          |         |          |          |    |    |    |    |    |
| Without Le   | eds and Key | /S         | 0        |          |         |          |          |    |    |    |    |    |
| With Leds a  | and Keys    |            | 1        |          |         |          |          |    |    |    |    |    |
| MODEM ve     | ersion (Int | ternal)    |          |          |         |          |          |    |    |    |    |    |
| Not Applica  | able        |            |          | Х        |         |          |          |    |    |    |    |    |
| With GPRS    | MODEM       |            |          | 0        |         |          |          |    |    |    |    |    |
| Analog In    | put         |            |          |          |         |          |          |    |    |    |    |    |
| Not Applica  | able        |            |          |          | Х       |          |          |    |    |    |    |    |
| 4AI for Cur  | rent input  |            |          |          | 0       |          |          |    |    |    |    |    |
| 4AI for Vol  | tage input  |            |          |          | 1       |          |          |    |    |    |    |    |
| Communio     | cation Por  | t - Ethern | et       |          |         |          |          |    |    |    |    |    |
| DUAL 10/1    | 00 Base-T I | Ethernet R | J45 Port |          |         | В        |          |    |    |    |    |    |
| Digital I/   | 0           |            |          |          |         |          |          |    |    |    |    |    |
| Not Applica  | able        |            |          |          |         |          | Х        |    |    |    |    |    |
| Default : 7  | DI - 8 DO   |            |          |          |         |          | 0        |    |    |    |    |    |
| Default :14  | DI - 16 DO  | 2          |          |          |         |          | 1        |    |    |    |    |    |
| Digital In   | put         |            |          |          |         |          |          |    |    |    |    |    |
| Not Applica  | able        |            |          |          |         |          |          | Х  |    |    |    |    |
| Default :16  | DI          |            |          |          |         |          |          | 0  |    |    |    |    |
| Default : 32 | 2 DI        |            |          |          |         |          |          | 1  |    |    |    |    |
| DI Setting   | g Threshol  | d          |          |          |         |          |          |    | r  |    |    |    |
| Not Applica  | able        |            |          |          |         |          |          |    | Х  |    |    |    |
| 18VDC        |             |            |          |          |         |          |          |    | 0  |    |    |    |
| 35VDC        |             |            |          |          |         |          |          |    | 1  |    |    |    |
| 77VDC        |             |            |          |          |         |          |          |    | 2  |    |    |    |
| 9VDC         |             |            |          |          |         |          |          |    | 4  |    |    |    |
| Auxiliary    | Supply      |            |          |          |         |          |          |    |    |    |    |    |
| 24VDC - 4    | 18VDC       |            |          |          |         |          |          |    |    | 1  |    |    |

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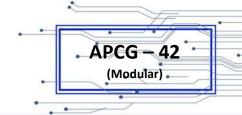
| Cabinet Details                             |   |   |  |  |  |
|---|---|---|--|--|--|
| Modular Version W-09                        | 4 |   |  |  |  |
| Modular Version W-12                        | 5 |   |  |  |  |
| Modular Version W-09 (new dimention)        | 6 |   |  |  |  |
| Modular Version W-12 (new dimention) 7      |   |   |  |  |  |
| Communication Port - Serial                 |   |   |  |  |  |
| Not Applicable                              |   | Х |  |  |  |
| 1xRS-232 Port, 2xRS-485 Port                |   | А |  |  |  |
| 1xRS-232 Port, 1xRS-485 Port, 1xRS-422 Port |   | В |  |  |  |

# Ordering Information Front Modular

-

|                |             |         | Order     | ing Inf | ormatio | on for A | PCG 42 | Rack |    |    |    |    |
|----------------|-------------|---------|-----------|---------|---------|----------|--------|------|----|----|----|----|
|                | 1 – 4       | 5       | 6         | 7       | 8       | 9        | 10     | 11   | 12 | 13 | 14 | 15 |
| Model          | APCG42      | Х       | Х         | Х       | Х       | Х        | Х      | Х    | Х  | Х  | Х  | Х  |
| Example        | APCG42      | С       | 3         | 3       | 3       | В        | Х      | Х    | Х  | 5  | 5  | В  |
| APCG-42        |             |         |           |         |         |          |        |      |    |    |    |    |
| Sub Type       |             |         |           |         |         |          |        |      |    |    |    |    |
| Compact        | Version     | С       |           |         |         |          |        |      |    |    |    |    |
| Variant        |             |         |           |         |         |          |        |      |    |    |    |    |
| Front Acce     | ess         |         | 3         |         |         |          |        |      |    |    |    |    |
| CPU Memory     |             |         |           |         |         |          |        |      |    |    |    |    |
| With EMM       | C, 512 RAM  |         |           | 3       |         |          |        |      |    |    |    |    |
| СРИ Туре       | 9           |         |           |         |         |          |        |      |    |    |    |    |
| Standard       |             |         |           | 3       |         |          |        |      |    |    |    |    |
| Commun         | ication Por | t - Eth | ernet     |         |         |          |        |      |    |    |    |    |
| DUAL 10/       | 100 Base-T  | Etherne | et RJ45 I | Port    |         | В        |        |      |    |    |    |    |
| Digital O      | utputs      |         |           |         |         |          |        |      |    |    |    |    |
| Not Applic     | able        |         |           |         |         |          | Х      |      |    |    |    |    |
| Digital Ir     | nput        |         |           |         |         |          |        |      |    |    |    |    |
| Not Applic     | able        |         |           |         |         |          |        | Х    |    |    |    |    |
| DI Settin      | g Thresho   | ld      |           |         |         |          |        |      |    |    |    |    |
| Not Applicable |             |         |           |         |         |          |        |      | Х  |    |    |    |
| Auxiliary      | Supply      |         |           |         |         |          |        |      |    |    |    |    |
| 24VDC – 48VDC  |             |         |           |         |         |          |        | 5    |    |    |    |    |
| Cabinet I      | Details     |         |           |         |         |          |        |      |    |    |    |    |
| With 6 I/C     | ) slots     |         |           |         |         |          |        |      |    |    | 5  |    |





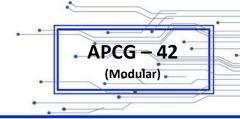
| Communication Port - Serial   |   |  |  |  |  |  |
|-------------------------------|---|--|--|--|--|--|
| NA                            | Х |  |  |  |  |  |
| Three RS-485 Port             |   |  |  |  |  |  |
| Two RS-485 Port + RS-232 Port | F |  |  |  |  |  |
| Two RS-485 Port + RS-422 Port | G |  |  |  |  |  |

# Ordering Information for FCCM Cards of front access modular

|                 | C           | Orderin | g Infor | mation | for AP | CG 42 [ | FCCM | Cards] |    |    |    |    |
|-----------------|-------------|---------|---------|--------|--------|---------|------|--------|----|----|----|----|
|                 | 1 – 4       | 5       | 6       | 7      | 8      | 9       | 10   | 11     | 12 | 13 | 14 | 15 |
| Model           | APCG42      | Х       | Х       | Х      | Х      | Х       | Х    | Х      | Х  | Х  | Х  | Х  |
| DI Card         | FCCM/3      | С       | 3       | Х      | Х      | Х       | Х    | 1      | Х  | Х  | Х  | Х  |
| AI Card         | FCCM/4      | С       | 3       | 0      | Х      | Х       | Х    | Х      | Х  | Х  | Х  | Х  |
| DI & DO Card    | FCCM/5      | С       | 3       | Х      | Х      | 0       | Х    | Х      | Х  | Х  | Х  | Х  |
| DO Card         | FCCM/6      | С       | 3       | Х      | Х      | Х       | 1    | Х      | Х  | Х  | Х  | Х  |
| CT-PT AI Card   | FCCM/8      | С       | 3       | 2      | Х      | Х       | Х    | Х      | Х  | Х  | Х  | Х  |
| FCCM Cards      |             |         |         |        |        |         |      |        |    |    |    |    |
| Sub Type        |             |         |         |        |        |         |      |        |    |    |    |    |
| Compact Versio  | n           | С       |         |        |        |         |      |        |    |    |    |    |
| Variant         |             |         |         |        |        |         |      |        |    |    |    |    |
| Front Access    |             |         | 3       |        |        |         |      |        |    |    |    |    |
| Analogue Inpu   | ut [AI Card | ]       |         |        |        |         |      |        |    |    |    |    |
| Not Applicable  |             |         |         | Х      |        |         |      |        |    |    |    |    |
| 4AI for Current | input       |         |         | 0      |        |         |      |        |    |    |    |    |
| Protocol        |             |         |         |        |        |         |      |        |    |    |    |    |
| Not Applicable  |             |         |         |        | Х      |         |      |        |    |    |    |    |
| Digital I/O     |             |         |         |        |        |         |      |        |    |    |    |    |
| Not Applicable  |             |         |         |        |        | Х       |      |        |    |    |    |    |
| Digital Output  | S           |         |         |        |        |         | •    |        |    |    |    |    |
| Not Applicable  |             |         |         |        |        |         | Х    |        |    |    |    |    |
| 16 DO           |             |         |         |        |        |         | 1    |        |    |    |    |    |
| Digital Input   |             |         |         |        |        |         | •    | •      |    |    |    |    |
| Not Applicable  |             |         |         |        |        |         |      | Х      |    |    |    |    |
| 16 DI           |             |         |         |        |        |         |      | 1      | 1  |    |    |    |
| DI Setting Thr  | eshold      |         |         |        |        |         |      |        |    |    |    |    |
| Not Applicable  |             |         |         |        |        |         |      |        | Х  | 1  |    |    |
| 9 V             |             |         |         |        |        |         |      |        | 0  | 1  |    |    |
| 18 V            |             |         |         |        |        |         |      | 1      | ]  |    |    |    |
| 35 V            |             |         |         |        |        |         |      |        | 2  |    |    |    |

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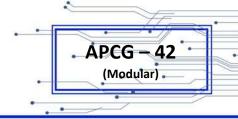




| Auxiliary Supply   |  |   |   |  |  |  |
|--------------------|--|---|---|--|--|--|
| Not Applicable X   |  |   |   |  |  |  |
| Cabinet Details    |  |   |   |  |  |  |
| Not Applicable     |  | Х |   |  |  |  |
| Communication Port |  |   |   |  |  |  |
| Not Applicable     |  |   | Х |  |  |  |







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#### **ASHIDA Electronics Pvt. Ltd.**

ASHIDA House, Plot No. A-308, Road No. 21, Wagle Industrial Estate, Thane - 400604, INDIA Tel :+91 - 21 - 2582 7524 / 6129 9100 Fax :+91 - 21 - 2580 4262 Email : sales@ashidaelectronics.com Web : www.ashidaelectronics

