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ABB Procontic CS 31

Intelligent decentralized automation system

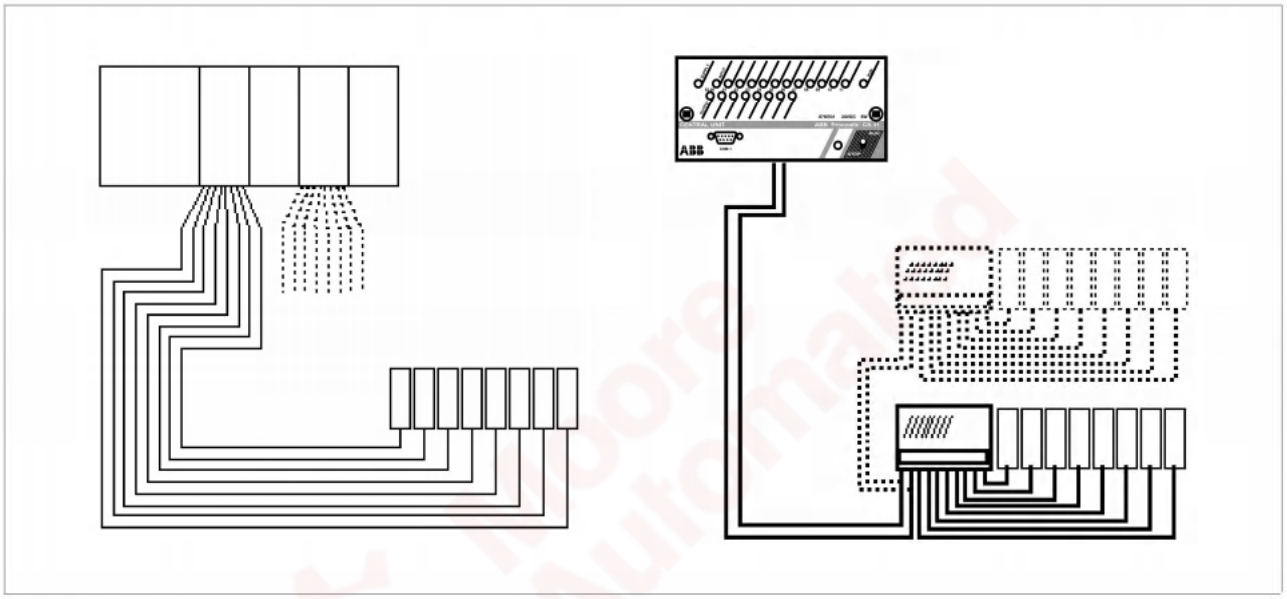
System description

The decentralized architecture of the ABB Procontic CS 31 system offers a superior solution to control system requirements:

- The central unit can be mounted within the control panel.
- The input/output units can be mounted local to the sensors and actuators.

As an example the central unit may be connected to remote units distributed along a process line.

A cost reduction in wiring is possible upto 80% with the implementation of the CS 31 system.



Conventional wiring

Simplified wiring with
the ABB Procontic CS 31 system

2.1 CS 31 benefits

– decentralized architecture as opposed to centralized system,

– reduction of wiring costs (design, materials and commissioning time),

– configurable input/output units,

– extensive diagnosis functions,

– freely expandable network. Additional units can be connected whilst the installation is operational,

– simple transparent programming. All remote I/O channels are handled as though they were centralized,

– remote I/O facility is integral feature and not an additional unit,

– programmable serial communications (RS 232) connection to modem, printer, operator display etc...

2.2 Modular system

The comprehensive range of units enhances the modularity of the system.

For example :

The low profile 16 channel user configurable input/output unit can be mounted on the control panel door, with inputs and outputs connected to pushbuttons and pilot lamps.

2.3 Versatile range

The CS 31 is based upon two types of central units, 07 KR 91, 07 KT 92/07 KT 93 and 07 KR 31/07 KT 31.

The system can be configured to comply with most control system requirements (See previous configuration examples).

- 07 KR 91, 07 KT 92/07 KT 93 is designed for complex applications with an higher level of functionality (Data manipulation, PID regulation, etc...).

- 07 KR 31/07 KT 31 incorporates all of the functions required for smaller decentralized applications, thus providing an excellent Price/Performance ratio.

2.4 Diagnosis

The CS 31 system incorporates extensive diagnosis functions.

All of the remote units contain a microprocessor which is dedicated to the management of inputs/outputs and diagnosis facilities.

The diagnosis are accessed using the "test" button on the front of each remote unit, the results are displayed on the I/O status led's.

The diagnosis results can be incorporated with the user program thus enabling effective fault management.

2.5 Use of the CS 31 system

All of the remote units are easily interchangeable, even with the process in operation, as they are plug-in base mounted.

The screw terminals of the plug-in bases are used for connection to the process inputs and outputs.

Bases are screw or DIN rail mounted.

The DIL switches on the bases are used for coding the address of units.
Any additional connected units are automatically recognized by the central unit.

NOTE : The system may comprise of remote units of varying supply and input voltages.

2.6 Emergency operation

A system may comprise of many central units, however one single master and the remainders slaves.

If the bus communication is interrupted or the master unit fails the individual slave units continue with their own operation.

2.7 ABB Procontic CS 31 equipment

Central processing units - CPU

Type	Description	Order code
07 KR 31	CPU - 2 K word user memory (EEPROM), twelve 24 VDC inputs Eight 2A relay outputs Programmable RS 232 port RS 485 system bus real time clock high speed counter 10 kHz high order functions PI data handling, etc... Master/Slave MODBUS built-in	
	24 VDC power supply	**FPR 360 0227 R1202**
	120 VAC power supply	**FPR 360 0227 R0204**
	230 VAC power supply	**FPR 360 0227 R0206**
07 KT 31	CPU - 2 K word user program (EEPROM), twelve 24 VDC inputs Eight 24 VDC/0.5A transistor outputs Programmable RS 232 port RS 485 system bus real time clock high speed counter 10 kHz high order functions PI data handling, etc... Master/Slave MODBUS built-in	
	24 VDC power supply	**FPR 360 0228 R1202**
	120 VAC power supply	**FPR 360 0228 R0204**
	230 VAC power supply	**FPR 360 0228 R0206**
07 KR 91	CPU - 7 K FLASH EPROM, twenty 24 VDC inputs Twelve 2A relay outputs Programmable RS 232 port RS 485 system bus real time clock high speed counter 10 kHz high order functions PID data handling, etc...	
	24 VDC power supply	**GJR 525 0000 R0252**
	120 or 230 VAC power supply	**GJR 525 0000 R0202**
07 KT 92	CPU - 14 K FLASH EPROM, twelve 24 VDC inputs Eight 24 VDC/ 0.5A transistor outputs 4 analogue inputs 12 bits resolution 2 analogue output 12 bits resolution 2 programmable RS 232 port RS 485 system bus real time clock high speed counter 50 kHz high order functions PID data handling, etc...	
	24 VDC power supply	**GJR 525 0500 R0202**
07 KT 92	CPU - 14 K FLASH EPROM, twelve 24 VDC inputs Eight 24 VDC/ 0.5A transistor outputs 4 analogue inputs 12 bits resolution 2 analogue output 12 bits resolution 2 programmable RS 232 port RS 485 system bus real time clock high speed counter 50 kHz high order functions PID data handling, etc... ARCNET built-in	
	24 VDC power supply	**GJR 525 0500 R0262**

High speed counter unit

Type	Description	Order code
ICSF 08 D1	encoder unit or 3 independant up/counter 2 threshold detections counter preset Max. frequency 50kHz 7 transistor outputs 24 V d.c. 300mA 4 binary inputs 24 V d.c. Integral 5V, 15V, 24V power supply for encoder	
	24 VDC power supply	**FPR 332 3101 R1012**
	120 VAC power supply	**FPR 332 3101 R0014**
	230 VAC power supply	**FPR 332 3101 R0016**

Remote display unit

TCAD	Display unit 2 lines, 32 characters 127 messages programmable + 1 backgroung message buzzer (programmable) key function embedded variables 24 VDC power supply	**FPR 320 3526 R1002**

CS31 Bus units

NCB	CS31 bus amplifier up to 2km 24 VDC power supply	**FPR 347 1200 R0006**
NCBR	CS31 bus amplifier with redondancy amplification up to 2km 24 VDC power supply	**FPR 347 1300 R0006**

Robot coupler unit

ICBG 32 L7	Robot coupler connect ABB S3 robot to CS 31 bus 16 inputs, 16 outputs for communication supply from robot rack	**FPR 333 0705 R0321**
ICBG 64 L7	Robot coupler connect ABB S3 robot to CS 31 bus 32 inputs, 32 outputs for communication supply from robot rack	**FPR 333 0705 R0641**

2.8 General characteristics

The CS 31 system is developped according to the international standard IEC 1131-2.

• Operating conditions

– Temperature :
  • operation 0 °C ... + 55 °C 32 ... 131 °F
  • storage - 40 °C ... + 75 °C - 40 ... 167 °F
  • transport - 25 °C ... + 75 °C - 13 ... 167 °F

– Humidity acc. to DIN 40040 class F without condensation :
  • average over the year 75 %
  • up to 30 days of a year 95 %
  • on the other days withregard to the average of the year, occasionnally 85 %

– Air pressure :
  • operation 800 hPA (2000 m)
  • storage 660 hPA (3500 m)

• Mechanical data

– degree of protection	IP 20
– housing	UL94 V0 UL94 V1 for central units serie 90, coupler 07KPxx and units ICDxx
– vibration	each of three mutually perpendicular axes 10 Hz ...57 Hz continuous : 0.0375 mm amplitude occasional : 0.075 mm amplitude 57 Hz ... 150 Hz continuous : 0.5 g acceleration occasional : 1.0 g acceleration
– shocks	occasional excursion to 15 g, 11 ms, halfsine in each of three mutually perpendicular axes
– impact withstand test	for units with a power supply > 30 VAC. According to IEC 950 : a steel sphere with a mass of 500 g is to fall freely from a height of 1300 mm

• Mounting

– DIN rail	35 mm
– Screw mounting	screws Ø 4 mm (M4)

• Serial interfaces

– for connection of the central unit to the remote units	RS485, using screw terminals
– for programming and setting parameter	RS232-C 9 pole D connector (female)

• Termination

– on the plug-in base ECZ use 60 °C copper conductor only

Cross section :

– bus wiring terminal : twisted pair
  AWG 24 (0.22 mm²) to AWG 18 (0.8 mm²)
– earth terminal : rigid or stranded connector
  AWG 10 (5.2 mm²)
– Others terminals :
  • inputs : stranded connector
    AWG 18 (0.8 mm²) to AWG 14 (2.1 mm²)
  • outputs : stranded connector
    AWG 14 (2.1 mm²)
  • power supply
    AWG 14 (2.1 mm²)

– on removable terminal block (small section)	2.5 mm² (copper N° AWG14)
– on removable terminal block (small section)	1.5 mm² (copper N° AWG16)
– screws tightening torque (for guidance only)	7 ibs. inch (0.8 Nm)

• Supply connections

– 24 VDC (process and power supply	24 VDC (-20 %, +25 %, i.e. 19.2 ... 30V) incl. ripple
ripple factor	< 5 %
– 120 VAC power supply	120 VAC (-15%, +10%, i.e. 102 ... 132V) 50 Hz or 60 Hz (± 5 %)
– 230 VAC power supply	230 VAC (-15%, +10%, i.e. 195.5 ... 253V) 50 Hz or 60 Hz (± 5 %)

• Voltage drops and interruptions

– DC power supply	interruption time 10 ms time interval between two drops 1s
– AC power supply	interruption time 0.5 period time interval between two drops 1s

• Creepage distances and clearances

according to EN 61131-2 / IEC1131-2

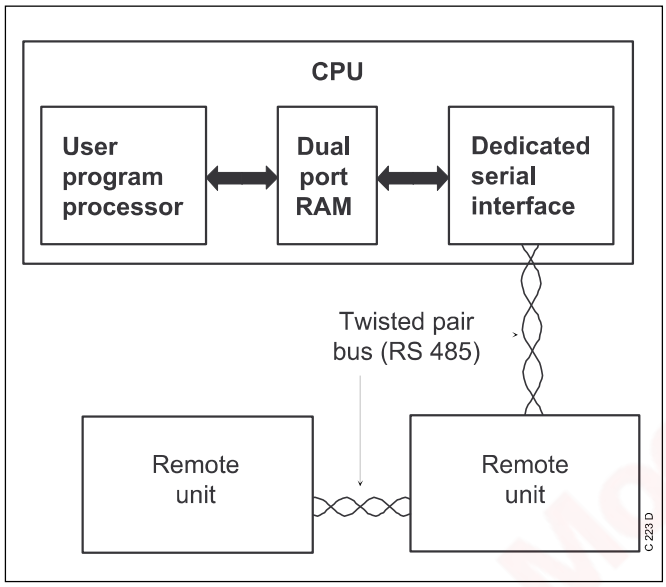
• Insulation test voltages

the insulation test voltages are according to IEC 1131-2

3.1 CPU communication with remote units

Communication between the central units and the remote units requires no user intervention as it is carried out by a dedicated serial interface.

The dual port RAM of the central unit enables data transfer between the user program processor and the dedicated serial interface.



In the read cycle, data is taken from the remote unit and stored within the dual port RAM via the bus and dedicated serial interface, the user program processor then reads the data from the dual port RAM.

Similarly, data is transfered from the dual port RAM to the remote units via the dedicated serial interface and bus for the write cycle.

3.2 Addressing of the remote units

All system bus request telegrams have an address. The remote unit which has the same address as the telegram receives and responds to the data.

The address of the remote unit is set using the DIL switches of the plug-in base.

The inputs and outputs have the following address structure: yy, xx

yy represents the remote unit number,
xx represents the channel number.

Example

Address setting of DIL-switches : 03
Number of channels on remote unit : 08

The I/O channels are simply addressed from 03, 00 to 03, 07 within the user program of the central unit, as though they were centralized.

3.3 System bus

This is a simple 2-wire serial connection (RS 485).

Connection type	Serial RS 485
Mode	Half-Duplex
Baud rate	187.5 k bauds
Maximum length	500 metres
Isolation	opto-couplers
Material	twisted pair

NOTE : For the wiring precautions and characteristics see the "hardware" chapter.

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