

Data sheet SM 031 (031-1CD40)

## Technical data

| Type   | Order no.   | 031-1CD40 |
|--|---|-----------|
| Module ID  | Туре  | SM 031    |
| Note   |   | 0412 1544 |
| Note   |   |           |
| Features   | General information                                     |           |
| Current consumption/power loss  Current consumption from backplane bus 60 mA  Power loss 0.8 W  Technical data analog inputs  Number of inputs 4  Cable length, shielded 200 m  Rated load voltage DC 24 V  Current consumption from load voltage L+ (without load) 20 mA  Voltage inputs -  Min. input resistance (voltage range) - Input voltage ranges - Operational limit of voltage ranges with SFU - Destruction limit current ranges with SFU - Current inputs -  Max. input resistance (current range) 60 Ohm Input current ranges +/-0.2% Operational limit of voltage ranges +/-0.2% Operational limit current ranges +/-0.4% Radical error limit current ranges with SFU - Destruction limit current ranges +/-0.4% Radical error limit current ranges +/-0.4% Radical error limit current ranges with SFU - Destruction limit current ranges +/-0.4% Radical error limit current ranges with SFU - Destruction limit current ranges with SFU - Destruction limit current ranges -  Operational limit of current ranges with SFU - Destruction limit current ranges with SFU - Destruction limit current inputs (electrical current) - Resistance ranges - Operational limit of resistor ranges with SFU - Destruction limit current inputs (electrical current) - Resistance ranges - Operational limit of resistor ranges with SFU - Destruction limit current inputs (electrical current) - Resistance ranges - Operational limit of resistor ranges with SFU - Basic error limit with SFU -  | Note  | -         |
| Current consumption from backplane bus 60 mA Power loss 0.8 W  Technical data analog inputs  Number of inputs 4 Cable length, shielded 200 m Rated load voltage DC 24 V  Current consumption from load voltage L+ (without load) 20 mA  Voltage inputs - Min. input resistance (voltage range) - Input voltage ranges - Operational limit of voltage ranges with SFU - Basic error limit voltage ranges with SFU - Destruction limit current - Current inputs  Max. input resistance (current range) 60 Ohm Input current ranges - Operational limit of current ranges +/-0.2% Operational limit of current ranges with SFU - Destruction limit current - Current inputs  Max. input resistance (current ranges with SFU - Destruction limit of current ranges +/-0.2% Operational limit of current ranges +/-0.1% Radical error limit current ranges with SFU - Destruction limit current ranges with SFU - Destruction limit current ranges with SFU - Operational limit of current ranges with SFU - Destruction limit current inputs (voltage) - Destruction limit current inputs (voltage) - Destruction limit or resistor ranges - Operational limit of resistor ranges with SFU - Destruction limit or resistor ranges with SFU - Destruction limit with SFU - Destruction limit with SFU - Destruction limit or resistor ranges wi | Features  |           |
| Power loss  Technical data analog inputs  Number of inputs  4  Cable length, shielded  200 m  Rated load voltage  DC 24 V  Current consumption from load voltage L+ (without load)  Voltage inputs   | Current consumption/power loss                          |           |
| Number of inputs 4 Cable length, shielded 200 m Rated load voltage DC 24 V Current consumption from load voltage L+ (without load) 20 mA Voltage inputs - Min. input resistance (voltage range) - Input voltage ranges - Operational limit of voltage ranges with SFU - Basic error limit voltage ranges with SFU - Destruction limit current Current inputs -  Max. input resistance (current range) 60 Ohrm Input current ranges 0 mA +20 mA +4 mA +20 mA +4 mA +20 mA +4 mA +20 mA +4 mB +20 mA +4 mB +20 mB +10.1% Radical error limit current ranges with SFU - Destruction limit current ranges with SFU - Basic error limit current ranges with SFU - Operational limit of current ranges with SFU - Basic error limit current ranges with SFU - Basic error limit current ranges with SFU - Basic error limit current ranges with SFU - Operational limit of current ranges with SFU - Destruction limit current ranges with SFU - Destruction limit current ranges with SFU - Destruction limit current inputs (voltage) - Destruction limit current inputs (voltage) - Destruction limit or resistor ranges - Operational limit of resistor ranges with SFU - Basic error limit torrent inputs (voltage) - Operational limit of resistor ranges with SFU - Basic error limit with SFU - Basic error limit with SFU - Basic error limit with SFU -  | Current consumption from backplane bus                  | 60 mA     |
| Number of inputs 4 Cable length, shielded 200 m Rated load voltage DC 24 V Current consumption from load voltage L+ (without load) 20 mA Voltage inputs - Min. input resistance (voltage range) - Input voltage ranges - Operational limit of voltage ranges - Operational limit of voltage ranges with SFU - Basic error limit voltage ranges with SFU - Destruction limit current - Current inputs - Max. input resistance (current range) 60 Ohm Input current ranges - Operational limit of current ranges +4-0.2% Operational limit of current ranges with SFU - Destruction limit current - Current inputs - Max. input resistance (current range) 60 Ohm Rate input current ranges - Operational limit of current ranges +4-0.2% Operational limit of current ranges with SFU - Basic error limit current ranges with SFU - Basic error limit current inputs (voltage) - Destruction limit current inputs (voltage) - Destruction limit current inputs (electrical current) - Resistance inputs - Resistance ranges - Operational limit of resistor ranges with SFU - Basic error limit current inputs (selectrical current) - Resistance inputs - Resistance ranges - Operational limit of resistor ranges with SFU - Basic error limit current inputs (selectrical current) - Resistance inputs - Resistance ranges - Operational limit of resistor ranges with SFU - Basic error limit turrent inputs (selectrical current) - Basic error limit turrent inputs (selectrical current) - Basic error limit turrent inputs (selectrical current) - Basic error limit with SFU - Basic error limit with SFU -  | Power loss  | 0.8 W     |
| Cable length, shielded 200 m  Rated load voltage DC 24 V  Current consumption from load voltage L+ (without load) 20 mA  Voltage inputs -  Min. input resistance (voltage range) - Input voltage ranges - Operational limit of voltage ranges with SFU - Basic error limit voltage ranges with SFU - Destruction limit current ranges with SFU - Current inputs -  Max. input resistance (current range) 60 Ohm Input current ranges - Operational limit of voltage ranges with SFU - Destruction limit current ranges -  Max. input resistance (current range) 60 Ohm Operational limit of current ranges ++/-0.2% Operational limit of current ranges +/-0.2% Operational limit of current ranges with SFU - Basic error limit current ranges +/-0.1% Radical error limit current inputs (voltage) - Destruction limit current inputs (electrical current) - Resistance inputs Resistance inputs Resistance ranges - Operational limit of resistor ranges with SFU -  Destruction limit or resistor ranges - Operational limit of resistor ranges with SFU -  Basic error limit surrent inputs (selectrical current) - Resistance ranges - Operational limit of resistor ranges with SFU -  Basic error limit turrent ranges with SFU -  Basic error limit turrent ranges with SFU -  Basic error limit with SFU -  Destruction limit resistance inputs -   | Technical data analog inputs                            |           |
| Rated load voltage DC 24 V  Current consumption from load voltage L+ (without load) 20 mA  Voltage inputs -  Min. input resistance (voltage range) - Input voltage ranges - Operational limit of voltage ranges with SFU - Basic error limit voltage ranges with SFU - Destruction limit current ranges with SFU - Current inputs -  Max. input resistance (current range) 60 Ohm Input current ranges - Operational limit of voltage ranges with SFU - Destruction limit current ranges -  Max. input resistance (current range) 60 Ohm Operational limit of current ranges ++/-0.2% Operational limit of current ranges +/-0.2% Operational limit of current ranges with SFU - Basic error limit current ranges with SFU - Destruction limit current ranges with SFU - Basic error limit current ranges with SFU - Destruction limit current inputs (voltage) - Destruction limit current inputs (voltage) - Destruction limit current inputs (electrical current) - Resistance ranges - Operational limit of resistor ranges with SFU - Basic error limit surrent inputs (selectrical current) - Resistance ranges - Operational limit of resistor ranges with SFU - Basic error limit surrent inputs (selectrical current) - Resistance ranges - Operational limit of resistor ranges with SFU - Basic error limit with SFU - Basic error limit with SFU -   | Number of inputs  | 4         |
| Current consumption from load voltage L+ (without load)  Voltage inputs  - Min. input resistance (voltage range) - Input voltage ranges - Operational limit of voltage ranges - Operational limit of voltage ranges - Basic error limit voltage ranges with SFU - Basic error limit voltage ranges with SFU - Current inputs - Current inputs - Max. input resistance (current range) - Input current ranges - Operational limit of current ranges - Operational limit of current ranges - Operational limit of current ranges - Applicational limit of current ranges with SFU - Basic error limit current ranges with SFU - Basic error limit current ranges with SFU - Destruction limit current ranges with SFU - Current imputs - Coperational limit of current ranges with SFU - Coperational limit current ranges - Coperational limit current ranges with SFU - Coperational limit current inputs (voltage) - Coperational limit current inputs (voltage) - Coperational limit of resistor ranges - Coperational limit of resistor ranges - Coperational limit of resistor ranges with SFU - Basic error limit - Basic error limit - Basic error limit with SFU - Coperational limit of resistor ranges with SFU - Coperational Resistor | Cable length, shielded                                  | 200 m     |
| Voltage inputs - Min. input resistance (voltage range) - Input voltage ranges - Operational limit of voltage ranges - Operational limit of voltage ranges - Operational limit of voltage ranges with SFU - Basic error limit voltage ranges with SFU - Operational limit current - Operational limit current - Operational limit current - Operational limit of voltage ranges with SFU - Operational limit of current ranges - Operational limit current ranges - Operational limit current ranges with SFU - Operational limit current ranges with SFU - Operational limit current inputs (voltage) - Operational limit of resistor ranges - Operational limit of resistor ranges - Operational limit of resistor ranges with SFU - Operational limit of resistor ranges with SFU - Operational limit of resistor ranges with SFU - Operational limit of resistor ranges - Operational limit of resistor ranges with SFU - Operational limit of resistor ranges operational limit of resistor ranges with SFU - Operational limit of resistor ranges operational limit o | Rated load voltage                                      | DC 24 V   |
| Min. input resistance (voltage ranges Input voltage ranges - Operational limit of voltage ranges - Operational limit of voltage ranges - Operational limit of voltage ranges with SFU - Basic error limit voltage ranges with SFU - Destruction limit current - Current inputs - Max. input resistance (current range) 60 Ohm Input current ranges 0 mA +20 mA +4 mA +20 mA -44 mA +20 mA -44 mA +20 mA  Operational limit of current ranges with SFU - Basic error limit current ranges +/-0.2% Operational limit of current ranges with SFU - Destruction limit current ranges with SFU - Destruction limit current inputs (voltage) - Destruction limit current inputs (electrical current) - Resistance ranges - Operational limit of resistor ranges with SFU - Basic error limit - Basic error limit - Basic error limit tresistance inputs - Current ranges with SFU - Basic error limit - Basic error limit with SFU - Destruction limit resistance inputs - Current ranges with SFU - Current ranges - C             | Current consumption from load voltage L+ (without load) | 20 mA     |
| Input voltage ranges Operational limit of voltage ranges Operational limit of voltage ranges Operational limit of voltage ranges with SFU  | Voltage inputs  | -         |
| Operational limit of voltage ranges - Operational limit of voltage ranges with SFU - Basic error limit voltage ranges with SFU - Basic error limit voltage ranges with SFU - Destruction limit current - Current inputs  | Min. input resistance (voltage range)                   | -         |
| Operational limit of voltage ranges with SFU  Basic error limit voltage ranges  Basic error limit voltage ranges with SFU  -  Destruction limit current  -  Current inputs  Max. input resistance (current range)  Input current ranges  O mA +20 mA +4 mA +20 mA  4 + mA +20 mA  Operational limit of current ranges with SFU  Basic error limit current ranges with SFU  Destruction limit current inputs (voltage)  Destruction limit current inputs (electrical current)  Resistance ranges  Operational limit of resistor ranges  Operational limit of resistor ranges with SFU  -  Basic error limit current inputs (Poltage)  -  Operational limit of resistor ranges  -  Operational limit of resistor ranges  -  Operational limit of resistor ranges with SFU  -  Basic error limit  -  Basic error limit with SFU  -  Destruction limit resistance inputs  -  Basic error limit with SFU  -  Destruction limit resistance inputs  -  Basic error limit with SFU  -  Destruction limit resistance inputs  -  Basic error limit with SFU  -  Destruction limit resistance inputs  -  Destruction limit resistance inputs  | Input voltage ranges                                    | -         |
| Basic error limit voltage ranges -  Basic error limit voltage ranges with SFU -  Destruction limit current -  Current inputs -  Max. input resistance (current range) 60 Ohm  Input current ranges 0 mA +20 mA +4 mA +20 mA  Operational limit of current ranges +/-0.2%  Operational limit of current ranges with SFU -  Basic error limit current ranges with SFU -  Destruction limit current inputs (voltage) -  Destruction limit current inputs (electrical current) -  Resistance inputs -  Resistance ranges -  Operational limit of resistor ranges with SFU -  Basic error limit surrent inputs (electrical current) -  Resistance inputs -  Resistance ranges -  Operational limit of resistor ranges with SFU -  Basic error limit urit of resistor ranges with SFU -  Basic error limit -  Basic error limit with SFU -  Destruction limit resistance inputs -  Coperational limit of resistor ranges with SFU -  Basic error limit with SFU -  Destruction limit resistance inputs -  | Operational limit of voltage ranges                     | -         |
| Basic error limit voltage ranges with SFU  Destruction limit current  Current inputs  Max. input resistance (current range)  Input current ranges  Om A +20 mA +4 mA +20 mA  +4 mA +20 mA  Operational limit of current ranges with SFU  Basic error limit current ranges  +/-0.2%  Destruction limit current ranges with SFU  Destruction limit current inputs (voltage)  Destruction limit current inputs (electrical current)  Resistance inputs  Resistance ranges  Operational limit of resistor ranges with SFU  -  Basic error limit ourrent inputs (electrical current)  -  Resistance ranges  Operational limit of resistor ranges with SFU  -  Basic error limit  -  Basic error limit  -  Basic error limit with SFU  -  Destruction limit resistance inputs  -   | Operational limit of voltage ranges with SFU            | -         |
| Destruction limit current  Current inputs  Max. input resistance (current range)  Input current ranges  O mA +20 mA +4 mA +20 mA  +4 mA +20 mA  Operational limit of current ranges  Operational limit of current ranges with SFU  Basic error limit current ranges with SFU  Destruction limit current inputs (voltage)  Destruction limit current inputs (electrical current)  Resistance inputs  Resistance ranges  Operational limit of resistor ranges with SFU  -  Basic error limit ourrent inputs (electrical current)  -  Resistance ranges  Operational limit of resistor ranges with SFU  Basic error limit  -  Basic error limit  -  Basic error limit with SFU  -  Destruction limit resistance inputs  | Basic error limit voltage ranges                        | -         |
| Current inputs  Max. input resistance (current range)  Input current ranges  O mA +20 mA +4 mA +20 mA  Hy-0.2%  Operational limit of current ranges  Hy-0.2%  Operational limit of current ranges with SFU  Basic error limit current ranges with SFU  Destruction limit current inputs (voltage)  Destruction limit current inputs (electrical current)  Resistance inputs  Resistance ranges  Operational limit of resistor ranges with SFU  Basic error limit current inputs (alectrical current)  Current inputs  -  Resistance ranges  Operational limit of resistor ranges with SFU  Basic error limit  -  Basic error limit with SFU  -  Destruction limit resistance inputs  -  -  -  -  -  -  -  -  -  -  -  -  -   | Basic error limit voltage ranges with SFU               | -         |
| Max. input resistance (current range)  Input current ranges  0 mA +20 mA +4 mA +20 mA  +4 mA +20 mA  Operational limit of current ranges  +/-0.2%  Operational limit of current ranges with SFU  Basic error limit current ranges with SFU  -  Destruction limit current inputs (voltage)  Destruction limit current inputs (electrical current)  Resistance inputs  Resistance ranges  Operational limit of resistor ranges with SFU  Basic error limit current inputs (electrical current)  -  Resistance ranges  -  Operational limit of resistor ranges with SFU  Basic error limit  -  Basic error limit with SFU  -  Destruction limit resistance inputs  -  -  -  -  -  -  -  -  -  -  -  -  -  | Destruction limit current                               | -         |
| Input current ranges  O mA +20 mA  +4 mA +20 mA  Operational limit of current ranges  +/-0.2%  Operational limit of current ranges with SFU  Basic error limit current ranges  +/-0.1%  Radical error limit current ranges with SFU  Destruction limit current inputs (voltage)  -  Destruction limit current inputs (electrical current)  Resistance inputs  -  Resistance ranges  Operational limit of resistor ranges with SFU  Basic error limit  -  Basic error limit  -  Basic error limit  -  Basic error limit of resistance inputs  -  Destruction limit resistance with SFU  -  Basic error limit  -  Basic error limit with SFU  -  Destruction limit resistance inputs   | Current inputs  | ✓         |
| +4 mA +20 mA  Operational limit of current ranges +/-0.2%  Operational limit of current ranges with SFU -  Basic error limit current ranges +/-0.1%  Radical error limit current ranges with SFU -  Destruction limit current inputs (voltage) -  Destruction limit current inputs (electrical current) -  Resistance inputs -  Resistance ranges -  Operational limit of resistor ranges with SFU -  Basic error limit -  Basic error limit -  Basic error limit with SFU -  Destruction limit resistance inputs -  | Max. input resistance (current range)                   | 60 Ohm    |
| Operational limit of current ranges with SFU - Basic error limit current ranges +/-0.1%  Radical error limit current ranges with SFU - Destruction limit current inputs (voltage) - Destruction limit current inputs (electrical current) - Resistance inputs - Resistance ranges - Operational limit of resistor ranges with SFU - Basic error limit - Basic error limit with SFU - Destruction limit resistance inputs -   | Input current ranges                                    |           |
| Basic error limit current ranges +/-0.1%  Radical error limit current ranges with SFU -  Destruction limit current inputs (voltage) -  Destruction limit current inputs (electrical current) -  Resistance inputs -  Resistance ranges -  Operational limit of resistor ranges with SFU -  Basic error limit -  Basic error limit with SFU -  Destruction limit resistance inputs -  | Operational limit of current ranges                     | +/-0.2%   |
| Radical error limit current ranges with SFU -  Destruction limit current inputs (voltage) -  Destruction limit current inputs (electrical current) -  Resistance inputs -  Resistance ranges -  Operational limit of resistor ranges with SFU -  Basic error limit -  Basic error limit with SFU -  Destruction limit resistance inputs -  | Operational limit of current ranges with SFU            | -         |
| Destruction limit current inputs (voltage)  Destruction limit current inputs (electrical current)  Resistance inputs  Resistance ranges  Operational limit of resistor ranges  Operational limit of resistor ranges with SFU  Basic error limit  Destruction limit resistance inputs  -  Destruction limit resistance inputs  -  Destruction limit resistance inputs   | Basic error limit current ranges                        | +/-0.1%   |
| Destruction limit current inputs (electrical current)  Resistance inputs  - Resistance ranges  - Operational limit of resistor ranges  Operational limit of resistor ranges with SFU  Basic error limit  - Basic error limit with SFU  Destruction limit resistance inputs  -  | Radical error limit current ranges with SFU             | -         |
| Resistance inputs - Resistance ranges - Operational limit of resistor ranges - Operational limit of resistor ranges with SFU - Basic error limit - Basic error limit with SFU - Destruction limit resistance inputs -  | Destruction limit current inputs (voltage)              | -         |
| Resistance ranges  Operational limit of resistor ranges  Operational limit of resistor ranges with SFU  Basic error limit  Basic error limit with SFU  Destruction limit resistance inputs  -  | Destruction limit current inputs (electrical current)   | -         |
| Operational limit of resistor ranges - Operational limit of resistor ranges with SFU - Basic error limit - Basic error limit with SFU - Destruction limit resistance inputs -  | Resistance inputs                                       | -         |
| Operational limit of resistor ranges with SFU -  Basic error limit -  Basic error limit with SFU -  Destruction limit resistance inputs -  | Resistance ranges                                       | -         |
| Basic error limit - Basic error limit with SFU - Destruction limit resistance inputs -   | Operational limit of resistor ranges                    | -         |
| Basic error limit with SFU -  Destruction limit resistance inputs -  | Operational limit of resistor ranges with SFU           | -         |
| Destruction limit resistance inputs -  | Basic error limit                                       | -         |
|  | Basic error limit with SFU                              | -         |
| Resistance thermometer inputs -  | Destruction limit resistance inputs                     |           |
|  | Resistance thermometer inputs                           | -         |



| Resistance thermometer ranges                               | A YASKAWA COMPANY        |  |
|---|--------------------------|--|
| Operational limit of resistance thermometer ranges          | -                        |  |
| Operational limit of resistance thermometer ranges with SFU | -                        |  |
| Basic error limit thermoresistor ranges                     | -                        |  |
| Operational limit of resistance thermometer ranges with SFU | -                        |  |
| Destruction limit resistance thermometer inputs             | -                        |  |
| Thermocouple inputs   | -                        |  |
| Thermocouple ranges   | -                        |  |
| Operational limit of thermocouple ranges                    | -                        |  |
| Operational limit of thermocouple ranges with SFU           | -                        |  |
| Basic error limit thermoelement ranges                      | -                        |  |
| Basic error limit thermoelement ranges with SFU             | -                        |  |
| Destruction limit thermocouple inputs                       | -                        |  |
| Programmable temperature compensation                       | -                        |  |
| External temperature compensation                           | -                        |  |
| Internal temperature compensation                           | -                        |  |
| Internal temperature compensation                           | -                        |  |
| Technical unit of temperature measurement                   | -                        |  |
| Resolution in bit   | 16                       |  |
| Measurement principle                                       | successive approximation |  |
| Basic conversion time                                       | 240 µs all channels      |  |
| Noise suppression for frequency                             | >80dB (UCM<4V)           |  |
| Status information planns discussed                         |                          |  |
| Status information, alarms, diagnostics                     |                          |  |
| Status display  | yes                      |  |
| Interrupts  | yes, parameterizable     |  |
| Process alarm   | yes, parameterizable     |  |
| Diagnostic interrupt  | yes, parameterizable     |  |
| Diagnostic functions  | yes                      |  |
| Diagnostics information read-out                            | possible                 |  |
| Module state  | green LED                |  |
| Module error display  | red LED                  |  |
| Channel error display                                       | red LED per channel      |  |
| Isolation   |                          |  |
| Between channels  | •                        |  |
| Between channels of groups to                               | -                        |  |
| Between channels and backplane bus                          | <b>₹</b>                 |  |
| Between channels and power supply                           | ⋖                        |  |
| Max. potential difference between circuits                  | -                        |  |
| Max. potential difference between inputs (Ucm)              | DC 4 V                   |  |
| Max. potential difference between Mana and Mintern (Uiso)   | -                        |  |
| Max. potential difference between inputs and Mana (Ucm)     | -                        |  |
| Max. potential difference between inputs and Mintern (Uiso) | DC 75 V/ AC 60 V         |  |
| Max. potential difference between Mintern and outputs       | -                        |  |
| Insulation tested with                                      | DC 500 V                 |  |
| Datasizes   |                          |  |
| Input bytes   | 8                        |  |



| Output bytes             | 0                          | A YASKAWA COMPANY |
|--------------------------|----------------------------|-------------------|
| Parameter bytes          | 32                         |                   |
| Diagnostic bytes         | 20                         |                   |
| Housing                  |                            |                   |
| Material                 | PPE / PPE GF10             |                   |
| Mounting                 | Profile rail 35 mm         |                   |
| Mechanical data          |                            |                   |
| Dimensions (WxHxD)       | 12.9 mm x 109 mm x 76.5 mm |                   |
| Weight                   | 60 g                       |                   |
| Environmental conditions |                            |                   |
| Operating temperature    | 0 °C to 60 °C              |                   |
| Storage temperature      | -25 °C to 70 °C            |                   |
| Certifications           |                            |                   |
| UL508 certification      | yes                        |                   |