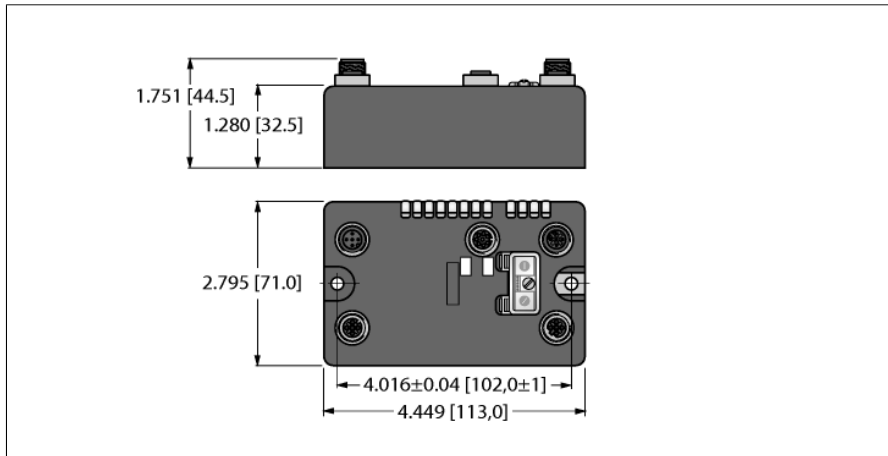


# BL compact™ multiprotocol fieldbus station for Industrial Ethernet

## Digital Counter/Encoder Interface

### BLCEN-1M12MT-1CNT-ENC



- On-machine Compact fieldbus I/O block
- EtherNet/IP™, Modbus® TCP, or PROFINET slave
- Integrated Ethernet Switch
- 10 Mbps / 100 Mbps supported
- Two 4-pole M12, D-coded, connectors for fieldbus connection
- 2 rotary switches for node address
- IP67, IP69K
- M12 I/O connectors
- LEDs indicating status and diagnostics
- Electronics galvanically separated from the field level via optocouplers
- Detection of standard counting signals
- 5 VDC differential
- 5...24 VDC single ended
- 1 digital PNP input, 24 VDC
- 1 digital PNP output, 24 VDC, 0.5A

|                                   |                                                                                                                                                  |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type designation</b>           | BLCEN-1M12MT-1CNT-ENC                                                                                                                            |
| Ident-No.                         | 6811479                                                                                                                                          |
| <b>Nominal system voltage</b>     | 24 VDC                                                                                                                                           |
| System power supply               | Via auxiliary power                                                                                                                              |
| Voltage supply connection         | 2 x M12, 5-pin                                                                                                                                   |
| Admissible range Vi               | 18...30VDC                                                                                                                                       |
| Nominal current Vi                | 225 mA                                                                                                                                           |
| Max. current Vi                   | 1 A                                                                                                                                              |
| Admissible range Vo               | 18...30VDC                                                                                                                                       |
| Max. current Vo                   | 4 A                                                                                                                                              |
| <b>Fieldbus transmission rate</b> | 10/100 Mbps                                                                                                                                      |
| Adjustment transmission rate      | Automatic detection                                                                                                                              |
| Fieldbus address range            | 1...92<br>0 (192.168.1.254)<br>93 (BootP)<br>94 (DHCP)<br>95 (PGM)<br>96 (PGM-DHCP) *Recommended for PROFINET<br>97...98 (manufacturer specific) |
| Fieldbus addressing               | 2 decimally coded rotary switches                                                                                                                |
| Fieldbus connection technology    | 2 x M12<br>4-pole, D-coded                                                                                                                       |
| Protocol detection                | automatic                                                                                                                                        |
| Web server                        | Integrated                                                                                                                                       |
| Service interface                 | Ethernet                                                                                                                                         |
| Vendor ID                         | 48                                                                                                                                               |
| Product type                      | 12                                                                                                                                               |
| Product code                      | 11479                                                                                                                                            |
| <b>Modbus TCP</b>                 |                                                                                                                                                  |
| Addressing                        | Static IP, BOOTP, DHCP                                                                                                                           |
| Supported function codes          | FC1, FC2, FC3, FC4, FC5, FC6, FC15, FC16, FC23                                                                                                   |
| Number of TCP connections         | 6                                                                                                                                                |
| Input Data Size                   | max. 8 register                                                                                                                                  |
| Input register start address      | 0 (0x0000 hex)                                                                                                                                   |
| Output Data Size                  | max. 4 register                                                                                                                                  |
| Output register start address     | 2048 (0x0800 hex)                                                                                                                                |

**BL compact™ multiprotocol fieldbus station for Industrial Ethernet**  
**Digital Counter/Encoder Interface**  
**BLCEN-1M12MT-1CNT-ENC**

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**EtherNet/IP™**

|                                 |                                    |
|---------------------------------|------------------------------------|
| Addressing                      | acc. to EtherNet/IP™ specification |
| Device Level Ring (DLR)         | supported                          |
| Class 1 connections (CIP)       | 6                                  |
| Input Assembly Instance         | 103                                |
| Input Data Size                 | 8 INT                              |
| Output Assembly Instance        | 104                                |
| Output Data Size                | 4 INT                              |
| Configuration Assembly Instance | 106                                |
| Configuration Size              | 0                                  |
| Comm Format                     | Data - INT                         |

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**PROFINET**

|                                 |                                 |
|---------------------------------|---------------------------------|
| Addressing                      | DCP                             |
| Conformance class               | B (RT)                          |
| MinCycleTime                    | 1 ms                            |
| Diagnostics                     | acc. to PROFINET alarm handling |
| Topology detection              | supported                       |
| Automatic addressing            | supported                       |
| Media Redundancy Protocol (MRP) | supported                       |
| Input Data Size                 | max. 12 BYTE                    |
| Output Data Size                | max. 8 BYTE                     |

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**Technology**

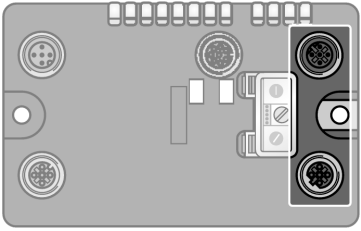
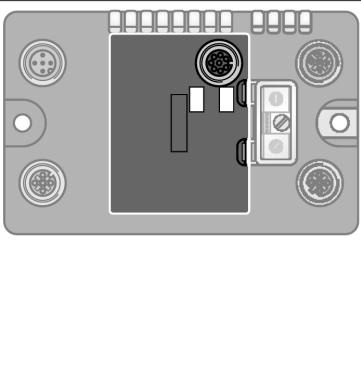
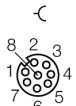
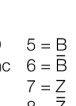
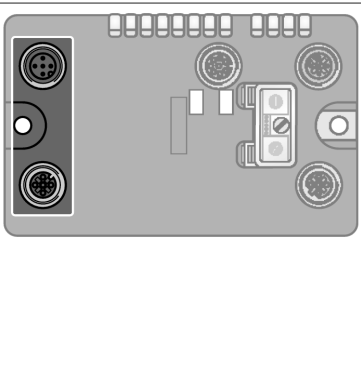
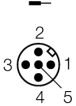
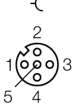
|                             |                                                           |
|-----------------------------|-----------------------------------------------------------|
| Signal type                 | Counter / Encoder                                         |
| Number of channels          | 1                                                         |
| Input type                  | PNP                                                       |
| Output type                 | PNP                                                       |
| Output current per channel  | 0.5 A                                                     |
| Output delay                | 0.2 ms                                                    |
| Load type                   | resistive                                                 |
| Short-circuit protection    | yes                                                       |
| Sensor supply               | 24 VDC                                                    |
| Transmission signals        | A, B, Z                                                   |
| Frequency measurement       | up to 250 kHz                                             |
| Speed measurement           | factor parameterizable                                    |
| Period duration measurement | 400 ns to 858.9 s                                         |
| Upper count limit           | 0xFFFFFFFF                                                |
| Lower count limit           | 0x80000000                                                |
| Cable length                | 30 m                                                      |
| Electrical isolation        | isolation of electronics and field level via optocouplers |

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**Dimensions**

|                                   |                                                    |
|-----------------------------------|----------------------------------------------------|
| Mounting                          | 113 x 71 x 32.5 mm                                 |
| Weight                            | 2 × 5.4 mm diameter holes, 1.7 Nm torque           |
| Housing material                  | 330 ± 20 g                                         |
| Housing color                     | Glass-filled nylon, nickel plated brass connectors |
| Window material                   | Black                                              |
| Material screw                    | Lexan                                              |
| Material label                    | Nickel-plated brass                                |
| Ground label material             | Polyester with polycarbonate overlay               |
| Protection class                  | Nickel plated brass                                |
|                                   | IP67                                               |
|                                   | IP69K                                              |
| Operating temperature             | -40...+70 °C                                       |
| Storage temperature               | -40...+85 °C                                       |
| Relative humidity                 | 15 to 95% (non-condensing)                         |
| Vibration test                    | according to IEC 61131-2                           |
| Extended vibration resistance     |                                                    |
| - up to 20 g (at 10 up to 150 Hz) | For mounting on base plate or machinery            |
| Shock test                        | according to IEC 61131-2                           |
| Electromagnetic compatibility     | according to IEC 61131-2                           |
| MTTF                              | 120 years                                          |
| MTTF note                         | acc. to SN 29500 (Ed. 99) 20 °C                    |
| Approvals and certificates        | CE, cULus                                          |

**Pinning and wiring diagram**

|                                                                                     |                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p><b>Ethernet</b><br/>Fieldbus cable (IP67 example): RSSD RSSD 441-2M ID number U-02482 or RSSD-RSSD-441-2M/S2174 ID number 6914218</p>                      | <p>Pin Assignment (M12, D-code)</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <p>1 = TD +<br/>2 = RD +<br/>3 = TD -<br/>4 = RD -</p>                                                                           |
|   | <p><b>Digital Counter/Encoder Interface</b><br/>Extension cable (example): E-RKC 8T-264-2-RSS 8T/BL/S1500 ident-no. U-89641 or BS8181-0 ident-no. 6901004</p> | <p>Pin Assignment</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <p>1 = Di 3 / GND 5 = B<br/>2 = DO 3 / Venc 6 = <math>\bar{B}</math><br/>3 = A 7 = Z<br/>4 = <math>\bar{A}</math> 8 = <math>\bar{Z}</math></p> |
|  | <p><b>Auxiliary Power</b><br/>Extension cable (example): RKC 4.4T-2-RSC 4.4T ident-no. U5264 or RKC4.4T-2-RSC4.4T/TEL ident-no. 6625208</p>                   | <p>Pin Assignment</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <p>1 = <math>V_i</math><br/>2 = <math>V_o</math><br/>3 = GND<br/>4 = GND<br/>5 = PE</p>                                                    |

**BL compact™ multiprotocol fieldbus station for Industrial Ethernet**  
**Digital Counter/Encoder Interface**  
**BLCEN-1M12MT-1CNT-ENC****Station LED status**

| LED     | Color  | Status          | Description                     |
|---------|--------|-----------------|---------------------------------|
| IOs     |        | OFF             | No power                        |
|         | RED    | ON              | Low power or station error      |
|         | RED    | FLASHING (1 Hz) | I/O module configuration error  |
|         | RED    | FLASHING (4 Hz) | No I/O module bus communication |
|         | GREEN  | ON              | Station ok                      |
|         | GREEN  | FLASHING        | Force mode active               |
| BUS     |        | OFF             | Power Off                       |
|         | GREEN  | ON              | Connected to Master             |
|         | GREEN  | FLASHING        | Ready                           |
|         | RED    | ON              | Error                           |
|         | RED    | FLASHING        | WINK                            |
|         | YELLOW | ON              | DHCP/BOOTP Search               |
| LNK/ACT |        | OFF             | No Link                         |
|         | GREEN  | ON              | Link                            |
|         | GREEN  | FLASHING        | Traffic                         |
|         | YELLOW | ON              | 100 Mbit Linked                 |

**I/O LED status**

| LED  | Color       | Status           | Description                                                 |
|------|-------------|------------------|-------------------------------------------------------------|
| D *  |             | OFF              | No diagnostics active                                       |
|      | RED         | ON               | Station error/ module bus communication failure             |
|      | RED         | FLASHING (0.5Hz) | Diagnostics active                                          |
| A/Z  |             | OFF              | Inputs A and Z inactive                                     |
|      | GREEN       | ON               | Input A active                                              |
|      | RED         | ON               | Input Z active                                              |
|      | RED & GREEN | ON               | Inputs A and Z active                                       |
| B    |             | OFF              | Input B inactive                                            |
|      | GREEN       | ON               | Input B active resp. direction input indicates "count down" |
| DO 3 |             | OFF              | Output status x = 0 (OFF)                                   |
|      | GREEN       | ON               | Output status x = 1 (ON)                                    |
|      | RED         | ON               | Overload at output x                                        |
| DI 3 |             | OFF              | Input status x = 0 (OFF)                                    |
|      | GREEN       | ON               | Input status x = 1 (ON)                                     |

\* D LED also indicates gateway diagnostics

# BL compact™ multiprotocol fieldbus station for Industrial Ethernet

## Digital Counter/Encoder Interface

### BLCEN-1M12MT-1CNT-ENC

#### Process Data Mapping of Each Protocol

#### EtherNet/IP™ I/O & Diagnostics Data Mapping

| INPUT                 | BYTE | Bit 7                                   | Bit 6      | Bit 5              | Bit 4 | Bit 3   | Bit 2   | Bit 1    | Bit 0           |
|-----------------------|------|-----------------------------------------|------------|--------------------|-------|---------|---------|----------|-----------------|
| Status Bytes          | 0    | -                                       | A          | B                  | Z     | DI3     | DI2     | DI1      | DI0             |
|                       | 1    | ERR_PARA                                | SYNC_AKN   | -                  | -     | -       | -       | -        | Count Direction |
|                       | 2    | REG_WR_ACCEPT                           | REG_WR_AKN | -                  | -     | -       | STS_ZC  | STS_OFLW | STS_UFLW        |
| Communication         | 3    | REG_RD_ABORT REG_ACT_RD_ADR             |            |                    |       |         |         |          |                 |
| User Data             | 4    | REG_RD_DATA, Byte 0                     |            |                    |       |         |         |          |                 |
|                       | 5    | REG_RD_DATA, Byte 1                     |            |                    |       |         |         |          |                 |
|                       | 6    | REG_RD_DATA, Byte 2                     |            |                    |       |         |         |          |                 |
|                       | 7    | REG_RD_DATA, Byte 3                     |            |                    |       |         |         |          |                 |
|                       | 8    | AUX_RD_DATA, Byte 0                     |            |                    |       |         |         |          |                 |
|                       | 9    | AUX_RD_DATA, Byte 1                     |            |                    |       |         |         |          |                 |
|                       | 10   | AUX_RD_DATA, Byte 2                     |            |                    |       |         |         |          |                 |
|                       | 11   | AUX_RD_DATA, Byte 3                     |            |                    |       |         |         |          |                 |
| Diagnostics           | 12   | Module number reporting diagnostic data |            |                    |       |         |         |          |                 |
|                       | 13   | Replace Station                         | -          | Diagnostics Active | -     | -       | -       | -        | -               |
| Slot 1 (ref. Byte 12) | 14   | ERR_PARA                                | -          | -                  | -     | -       | -       | STS_OFLW | STS_UFLW        |
|                       | 15   | -                                       | -          | -                  | -     | DIA_DO3 | DIA_DO2 | DIA_DO1  | DIA_DO0         |
|                       | 16   | -                                       | -          | -                  | -     | -       | -       | -        | -               |
|                       | 17   | -                                       | -          | -                  | -     | -       | -       | -        | -               |
|                       | 18   | -                                       | -          | -                  | -     | -       | -       | -        | -               |
|                       | 19   | -                                       | -          | -                  | -     | -       | -       | -        | -               |
|                       | 20   | -                                       | -          | -                  | -     | -       | -       | -        | -               |
|                       | 21   | -                                       | -          | -                  | -     | -       | -       | -        | -               |
| OUTPUT                | BYTE | Bit 7                                   | Bit 6      | Bit 5              | Bit 4 | Bit 3   | Bit 2   | Bit 1    | Bit 0           |
| Control Bytes         | 0    | DO3                                     | DO2        | DO1                | DO0   | -       | -       | -        | GATE            |
|                       | 1    | -                                       | SYNC_REQ   | -                  | -     | -       | -       | -        | RES_STS         |
| Communication         | 2    | REG_WR                                  | REG_WR_ADR |                    |       |         |         |          |                 |
|                       | 3    | REG_RD_ADR                              |            |                    |       |         |         |          |                 |
| User Data             | 4    | REG_WR_DATA, Byte 0                     |            |                    |       |         |         |          |                 |
|                       | 5    | REG_WR_DATA, Byte 1                     |            |                    |       |         |         |          |                 |
|                       | 6    | REG_WR_DATA, Byte 2                     |            |                    |       |         |         |          |                 |
|                       | 7    | REG_WR_DATA, Byte 3                     |            |                    |       |         |         |          |                 |

Count Direction: 0 = Up, 1 = Down

SYNC\_AKN: Encoder not synchronized with zero-position

ERR\_PARA: Faulty/inconsistent parameter data

STS\_UFLW: Counter value below lower limit of counter range

STS\_OFLW: Counter value exceeded upper limit of counter range

STS\_ZC: Counter value crossed zero value

REG\_WR\_AKN: Register contents updated

REG\_WR\_ACCEPT: REG\_WR\_ADR valid

REG\_ACT\_RD\_ADR: Address of actually read input register

REG\_RD\_ABORT: REG\_RD\_ADR error

REG\_RD\_DATA: Content of the register selected by REG\_RD\_ADR, if RD\_ABORT does not equal 1

AUX\_RD\_DATA: Content of the register which has been defined via parameter byte 14

GATE: Counter active, depending on parameter Gate function

RES\_STS: During the change from 0 to 1 the counter status bits (STS\_UFLW and STS\_OFLW) are reset

SYNC\_REQ: Synchronization request

# BL compact™ multiprotocol fieldbus station for Industrial Ethernet

## Digital Counter/Encoder Interface

### BLCEN-1M12MT-1CNT-ENC

REG\_WR\_ADR: Address of the register which has to be written with REG\_WR\_DATA

REG\_WR: Write REG\_WR\_DATA to REG\_WR\_ADR

REG\_RD\_ADR: Address of the register which has to be read

REG\_WR\_DATA: Value which has to be written to the register defined via REG\_WR\_ADR

DIA\_DOx: Diagnostics pending for DOx

NOTE: Digital Inputs and Outputs 0-2 are not accessible via physical connections on BL compact stations.

#### Modbus® TCP Register Mapping

|                | REG                  | Bit 15                | Bit 14         | Bit 13 | Bit 12 | Bit 11     | Bit 10     | Bit 9      | Bit 8                 | Bit 7              | Bit 6            | Bit 5 | Bit 4 | Bit 3 | Bit 2     | Bit 1       | Bit 0       |
|----------------|----------------------|-----------------------|----------------|--------|--------|------------|------------|------------|-----------------------|--------------------|------------------|-------|-------|-------|-----------|-------------|-------------|
| Inputs (RO)    | 0x0000               | ERR<br>PARA           | SYNC<br>AKN    | -      | -      | -          | -          | -          | CNT<br>Direc-<br>tion | -                  | A                | B     | Z     | DI3   | DI2       | DI1         | DI0         |
|                | 0x0001               | REG<br>RD<br>ABORT    | REG_ACT_RD_ADR |        |        |            |            |            |                       | REG<br>WR<br>ACEPT | REG<br>WR<br>AKN | -     | -     | -     | STS<br>ZC | STS<br>OFLW | STS<br>UFLW |
|                | 0x0002 ...<br>0x0003 | REG_RD_DATA (2 Words) |                |        |        |            |            |            |                       |                    |                  |       |       |       |           |             |             |
|                | 0x0004 ...<br>0x0005 | AUX_RD_DATA (2 Words) |                |        |        |            |            |            |                       |                    |                  |       |       |       |           |             |             |
|                |                      |                       |                |        |        |            |            |            |                       |                    |                  |       |       |       |           |             |             |
| Status (RO)    | 0x0006               | -                     | FCE            | -      | -      | CFG        | COM        | VI low     | -                     | VO low             | -                | -     | -     | -     | -         | -           | DIA         |
| Diag. (RO)     | 0x0007               | -                     | -              | -      | -      | -          | -          | -          | -                     | -                  | -                | -     | -     | -     | -         | -           | S1 DIA      |
| Outputs (RW)   | 0x0800               | -                     | SYNC<br>REQ    | -      | -      | -          | -          | -          | RES<br>STS            | DO3                | DO2              | DO1   | DO0   | -     | -         | -           | GATE        |
|                | 0x0801               | REG_RD_ADR            |                |        |        |            |            |            |                       | REG<br>WR          | REG_WR_ADR       |       |       |       |           |             |             |
|                | 0x0802 ...<br>0x0803 | REG_WR_DATA (2 Words) |                |        |        |            |            |            |                       |                    |                  |       |       |       |           |             |             |
|                |                      |                       |                |        |        |            |            |            |                       |                    |                  |       |       |       |           |             |             |
| I/O Diag. (RO) | 0xA000               | -                     | -              | -      | -      | SC-<br>DO3 | SC-<br>DO2 | SC-<br>DO1 | SC-<br>DO0            | PRM                | -                | -     | -     | -     | -         | OF          | UF          |

#### PROFINET® Process Data

|         | BYTE                | Bit 7                       | Bit 6      | Bit 5 | Bit 4 | Bit 3 | Bit 2  | Bit 1    | Bit 0           |
|---------|---------------------|-----------------------------|------------|-------|-------|-------|--------|----------|-----------------|
| Inputs  | 11                  | -                           | A          | B     | Z     | DI3   | DI2    | DI1      | DI0             |
|         | 10                  | ERR_PARA                    | SYNC_AKN   | -     | -     | -     | -      | -        | Count Direction |
|         | 9                   | REG_WR_ACCEPT               | REG_WR_AKN | -     | -     | -     | STS_ZC | STS_OFLW | STS_UFLW        |
|         | 8                   | REG_RD_ABORT REG_ACT_RD_ADR |            |       |       |       |        |          |                 |
|         | 7                   | REG_RD_DATA, Byte 0         |            |       |       |       |        |          |                 |
|         | 6                   | REG_RD_DATA, Byte 1         |            |       |       |       |        |          |                 |
|         | 5                   | REG_RD_DATA, Byte 2         |            |       |       |       |        |          |                 |
|         | 4                   | REG_RD_DATA, Byte 3         |            |       |       |       |        |          |                 |
|         | 3                   | AUX_RD_DATA, Byte 0         |            |       |       |       |        |          |                 |
|         | 2                   | AUX_RD_DATA, Byte 1         |            |       |       |       |        |          |                 |
|         | 1                   | AUX_RD_DATA, Byte 2         |            |       |       |       |        |          |                 |
| 0       | AUX_RD_DATA, Byte 3 |                             |            |       |       |       |        |          |                 |
| Outputs | 7                   | DO3                         | DO2        | DO1   | DO0   | -     | -      | -        | GATE            |
|         | 6                   | -                           | SYNC_REQ   | -     | -     | -     | -      | -        | RES_STS         |
|         | 5                   | REG_WR                      | REG_WR_ADR |       |       |       |        |          |                 |
|         | 4                   | REG_RD_ADR                  |            |       |       |       |        |          |                 |
|         | 3                   | REG_WR_DATA, Byte 0         |            |       |       |       |        |          |                 |
|         | 2                   | REG_WR_DATA, Byte 1         |            |       |       |       |        |          |                 |
|         | 1                   | REG_WR_DATA, Byte 2         |            |       |       |       |        |          |                 |
|         | 0                   | REG_WR_DATA, Byte 3         |            |       |       |       |        |          |                 |